Assessment of multi-stakeholders' collaborative efforts during and after oil pipelines disaster in Nigeria.

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"Assessment of multi-stakeholders collaborative efforts during and after oil pipelines disaster in Nigeria"

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DEDICATION

I dedicate this thesis to God Almighty and to my immediate family.

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In conclusion, the completion of this PhD thesis would not have been possible without the support and contributions of the individuals mentioned above. While any omissions are unintentional, please accept my sincere gratitude for being part of this significant milestone in my academic journey.

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ABSTRACT

Nigeria has experienced significant losses in terms of economy, ecology, and human lives due to pipeline disasters. These incidents can have devastating consequences for the environment, individuals, and communities. Previous research has emphasized the importance of collaboration among stakeholders in addressing these issues. The purpose of this study is to assess the level of pipeline disaster awareness among stakeholders, identify the causes of oil pipeline disasters, and evaluate the human and ecological impacts of such incidents. Additionally, the study aims to identify the relevant stakeholders in disaster management and examine the current level of multi-stakeholders' collaboration. Furthermore, it seeks to examine the roles of stakeholders in preventing and managing oil pipeline disasters and design a framework for their management and mitigation in Nigeria. The study also aims to explore the benefits of stakeholders' collaboration through the framework as a disaster management technique, as well as the potential challenges associated with collaboration. To achieve these aims, the study utilizes questionnaires, semi-structured interviews and focus groups. The findings reveal a lack of active collaborative measures in terms of interoperability among stakeholders in Nigeria, with only limited interaction observed. Existing collaborations are deemed insufficient. Therefore, multi-stakeholder collaboration becomes imperative when individual agencies like NNPC or oil companies cannot adequately address recurring threats such as oil pipeline disasters. Thus, agencies such as National Emergency Management Agency (NEMA), NOSDRA, FMHDSD, Fire Service, Oil Companies, Health and Security agencies, the Media, Academia, and the Community must seek to promote cooperation in order to achieve successful implementation of oil pipeline disaster policy. To address these issues efficiently and effectively, the study develops a framework for stakeholders' collaboration in the management and mitigation of oil pipeline disasters in Nigeria. This framework is based on logical reasoning and incorporates interviews with key stakeholders and industry experts. To ensure unbiased opinions, questionnaires and document analysis of secondary data are also conducted. The developed framework outlines the roles of relevant stakeholders in mitigating oil pipeline disasters before, during, and after their occurrence. Key areas of focus in the wake of an oil pipeline disaster include human rehabilitation, environmental restoration, and the prevention of further disasters. The framework captures the relevant stakeholders and their roles in disaster mitigation and management. Improved information and intelligence sharing, better decision-making, more significant coordinated and timely intervention, and enhanced response are some benefits resulting from stakeholders working together. On the other hand, conflicts in shared responsibilities, a lack of resources, lax enforcement of environmental laws and guidelines, and ineffective communication systems are all obstacles that can hinder collaboration. However, if these difficulties are appropriately addressed, the intended outcomes of the collaboration framework will be carried out promptly and efficiently.

Among other recommendations put forward, legislation relevant to the nation's multi-agency response to oil disasters should be strictly implemented and enforced by the relevant agencies. This should be done to ensure everyone is held accountable for their actions.

Keywords: Stakeholders, Collaboration, Collaboration Framework, Disaster Management, Pipeline Disasters, Disaster Mitigation.

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LIST OF ABBREVIATIONS

AOSTI	African Observatory in Science Technology and Innovation
ATM	Automatic Teller Machine
BVN	Bank Verification Number
CBOs	Community-Based Organizations
CCTA	Commission for Technical Cooperation in Africa South of the Sahara
COVID	Corona Virus Disease
CSA	Scientific Council for Africa South of the Sahara
CSO	Civil Society Organizations
Das	Departments and Authorities
DRU	Disaster Response Units
EGASPIN	Environmental Guidelines and Standards for the Petroleum Industries in Nigeria
EWS	Early Warning SYSTEMS
FEMA	Federal Emergency Management Agency
FEPA	Federal Environmental Protection Agency
FMHDSD	Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development
IAD	Institutional Analysis and Development
ICCES	Inter-Agency Consultative Committee on Election Security
ICT	Information and Communication Technology
INEC	Independent National Electoral Commission
JTF	Joint Task Force
JV	Joint Venture
LCB	Lake Chad Basin
LCBC	Lake Chad Basin Commission
LEMA	Local government Emergency Management Agency
MNJTF	Multi-National Joint Task Force
MoU	Memorandum of Understanding
NACGOND	National Coalition on Gas Flaring and Oil Spills in the Niger Delta
NAPTIP	National Agency for the Prohibition of Traffic in Persons
NCSB	Nigeria Customs Service Board
NDES	Niger Delta Environmental Survey
NDMF	National Disaster Management Framework
NEMA	National Emergency Management Agency
NEPA	National Environmental Policy Act
NGO	Non-Governmental Organization

NIA	National Intelligence Agency
NIBSS	Nigeria Inter-Bank Settlement System
NITDA	National Information Technology Development Agency
NNPC	Nigeria National Petroleum Corporation
NOGIC	Nigerian Oil and Gas Industry Content Development
NOPR	Nigeria Oil Producing Region
NOSCP	National Oil Spill Contingency Plan
NOSDRA	National Oil Spill Detection and Response Agency
NSCDC	National Security and Civil Defence Corps
NYSC	National Youth Service Corps
OPRC	Oil Pollution Preparedness Response and Cooperation
SEMA	State Emergency Management Agency
SPDC	Shell Petroleum Development Company
SSS	State Security Service
STISA	Science, Technology, and Innovation Strategy for Africa
UN	United Nations
UNDP	United Nations Development Program
UNISDR	United Nations International Strategy for Disaster Reduction Framework

LIST OF PUBLICATIONS

1. Johnson, F. I. and Leon, M. (2020). Identifying the Immediate and Remote Causes of Pipeline Disasters in Nigeria. *Global Journal of Science Frontier Research H: Environment & Earth Science*, 20(3): 1-14.

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5. Sowole, O. S., Ibrahim, A. A., Sangare, S., Ibrahim, I. O. and Johnson, F. I. (2020). Understanding the Early Evolution of COVID-19 Disease Spread using Mathematical Model and Machine Learning Approaches. *Global Journal of Science Frontier Research F: Mathematics & Decision Science*, 20(5): 19-36.

<div align="center">**CHAPTER ONE**</div>

<div align="center">**INTRODUCTION TO THE RESEARCH**</div>

1.0 Introduction

A general overview and the context for this research study are provided in this chapter. The chapter originates with a background to the concept of disasters, oil pipeline disasters management, a statement of the problem and the need for this research study, which focuses on oil pipeline and pipeline disasters. The notion of disaster and disaster management and the collaboration of stakeholders in managing and reducing oil pipeline disasters are then examined. Finally, the purpose and objectives of the research, as well as research questions, implications and contributions, research methodology, and eventually, the thesis format, are presented.

1.1 Background

Natural and man-made disasters pose a threat to Nigeria, as they do to the rest of the world. These disasters can strike abruptly or build up over time, but in any case, they cause irreparable harm to people, their communities, and the natural world. Desertification, dam failure, flood-related diseases, coastal erosion, building collapse, oil spills, maritime accidents or mishaps, bomb blasts, inter-communal conflict, fire, aircraft crashes, boat disasters, and so on are just some of the numerous forms of catastrophic events that can happen. Planning for, securing against, responding to, and recovering from disasters caused by nature or human intervention are all central to disaster management. It helps to arrange and incorporate the essential activities to accomplish this goal. Coordinating all activities necessary to build, keep up, and further develop the capacity for disaster preparedness, relief, response, and recovery is what disaster management means (Ibitoye, 2012). Haddow and Bullock define disaster management as a prepared strategy to protect essential facilities if a disaster occurs. This definition is based on the description that was given before (Haddow & Bullock, 2003). According to Johnson, disaster management is a strategy, practice, or policy implemented before, during, or after a catastrophic event (Johnson, 2004).

The Nigerian Petroleum Development Company reports that in 2018, Nigeria produced 2.5 million barrels of oil daily, making it the largest oil producer in Africa and the sixth largest in the world (OPEC,

2012). Nigeria's oil reserves are valued at between \$16 and 22 billion dollars (2.5×10^9 and 3.5×10^9 cubic meters) by the US Energy Information Administration (EIA) (US EIA, 2019). Thus, Nigeria is commonly regarded as the wealthiest nation in Africa and ranks tenth on the list of countries with the most extensive petroleum resources. In 2001, Nigeria could produce about 2,200,000 barrels (350,000 m^3) of crude oil daily (Iwueke, et al., 2019). However, large amounts of oil production and potential in Nigeria have led to oil vandalism, militancy, unintentional spills related to oil transportation, and ecological deterioration (Okoli & Orinya, 2013). In these circumstances, the likelihood of a major disaster is significantly increased if appropriate actions to mitigate the dangers associated with the oil crisis are not taken. Moreover, these inactions may give rise to considerable problems, particularly among the communities responsible for oil production.

Armed attacks and regional pressure increased in resource regions as the value of petroleum resources as a significant source of economic advantages became more widely recognised (Onuoha, 2009; Omeje, 2005). According to Collins and Jürgen (2012), the region of Nigeria known as the Niger Delta or South-South region is where oil-related issues are most prominent. This region is also where most of the country's principal reserves are located.

The Nigerian Petroleum Pipeline network is a system of lines designed to carry items containing petroleum across large distances (see Figure 1.1). A network of pipelines in Nigeria connects these lines. These line frameworks convey mixed or single-type liquids from one country region to the next. Today, the pipeline network in Nigeria extends across the entirety of the country. They transport crude oil and its by-products from the oilfields to the terminals, where they are either exported or utilised as raw materials by refineries to make refined goods. After they arrive at the terminals, they are either exported or utilised.
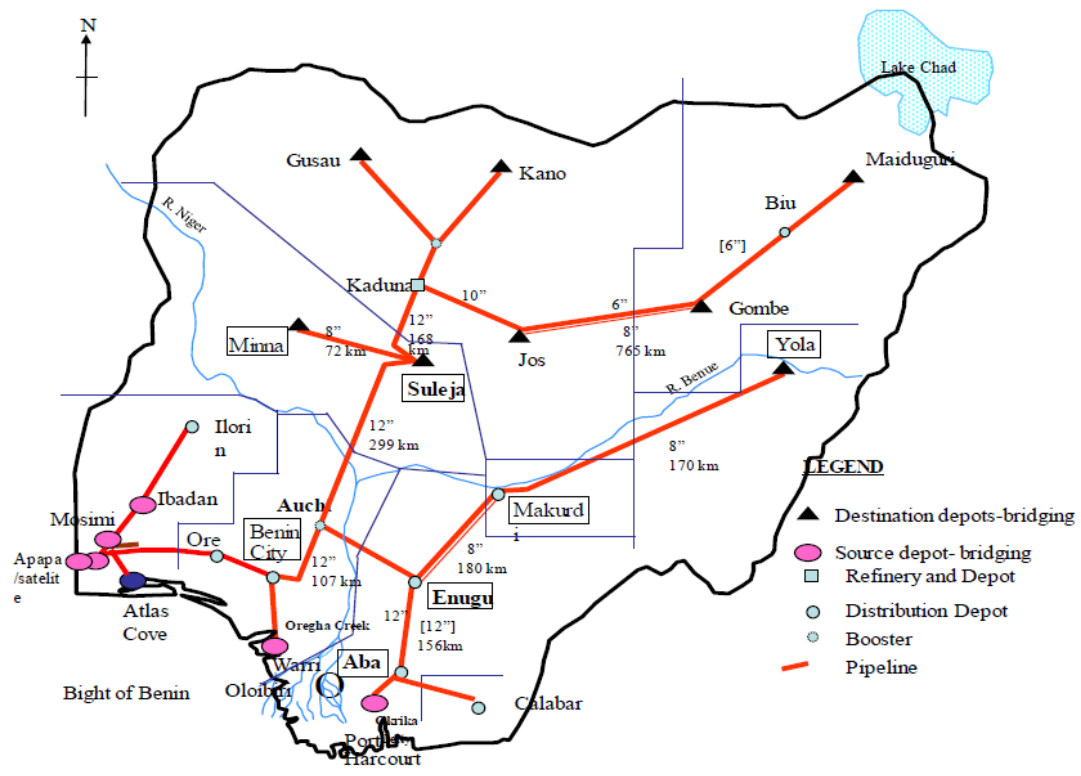
Figure 1.1 The Network of Pipelines in Nigeria

Source: Nigerian National Petroleum Corporation

Previous research has covered much ground regarding management practices, but the stakeholders' role that stands out as being the most helpful in preventing oil pipeline explosions (Saeed & Narimah, 2019). *"Any individual or persons whose decision can influence the achievement of a defined goal"* is what is meant by the term *"stakeholder"* (Freeman, 1984). Stakeholders include the government, the legislature, and any parastatals. The disaster caused by oil pipelines might be managed and its effects mitigated with the help of great synergy among the many stakeholders (Moe, et al., 2007; Mojtahedi & Oo, 2014). This kind of cooperation between multiple parties is referred to as multi-stakeholder collaboration.

In light of this notion, this study aims to investigate how the coordination and cooperation of many stakeholders influence the management of oil pipeline disasters in Nigeria and the efforts made to reduce their impact.

1.2   Aim and Objectives

This research examines the role of stakeholders' collaboration in mitigating human and environmental losses during oil pipeline disasters in Nigeria. This aim shall be pursued through the following objectives:

i.   To examine the level of pipeline disaster awareness among stakeholders.

ii.   To identify the causes of oil pipeline disasters and assess the human and ecological impacts of such occurrences.

iii.   To identify relevant stakeholders in disaster management and examine the current multi-stakeholder collaboration level.

iv.   To examine the roles of stakeholders in preventing and managing oil pipeline disasters.

v.   To design a framework for the management and mitigation of oil pipeline disasters in Nigeria.

vi.   To identify the benefits of stakeholders' collaboration via the framework as a disaster management technique and the possible collaboration challenges.

1.3   Research Questions

This study intends to answer the following questions:

1.   What is the current awareness level of pipeline disasters amongst different stakeholders?

2.   What are the causes of pipeline disasters in Nigeria and what are the human and ecological impacts?

3.   Who are the relevant stakeholders in pipeline disaster mitigation and management?

4.   Are there collaborations between stakeholders on risk mitigation of pipeline disasters in Nigeria?

5.   How should the collaboration of stakeholders be modelled to ensure effective management of oil pipeline disasters?

6.   What are the benefits of stakeholders' collaboration and the possible challenges?

1.4   Statement of the Problem

Nigeria is one of the most prominent oil producers in the world, yet, several pipeline accidents have plagued the country, and there seems to be no way out of this predicament. The prevalence of terrible pipeline accidents in Nigeria has captured the attention of media outlets and governments worldwide (Okoli & Orinya, 2013). Some of the negative repercussions that have captured the attention of the international community include the constant loss of human and animal life, contamination of water, air, and soil; the elimination of ecosystem components (both flora and wildlife); the damage of property and infrastructure; and the loss of crude oil and refined products. Due to the significant attention attracted by this topic, a case study was deemed obligatory.

Multi Stakeholders collaboration becomes imperative when a single agency such as the NNPC or the Oil Companies alone cannot adequately address a recurring menace such as oil pipeline disasters. Thus, agencies such as National Emergency Management Agency (NEMA), NOSDRA, FMHDSD, Fire Service, Oil Companies, Health and Security agencies, the Media, Academia, and the Community must seek to promote cooperation in order to achieve successful implementation of oil pipeline disaster policy.

Research has indicated the significance that individual stakeholders have in disaster management. On the other hand, the collaborative effort on pipeline disaster management has not been subjected to a thorough evaluation. Scholars in planning (Godschalk, 2003) and emergency management (Britton, 2002) have recognised the benefits of collaboration for the long-term prevention of natural disasters. Pearce claimed that multi-stakeholder emergency management and planning must be incorporated to achieve long-term success in mitigating the effects of disasters (Pearce, 2003).

As a result, it has been determined that the coordinated efforts of actual stakeholders are insufficient. Consequently, the most effective disaster management strategies and policies have not been adequately implemented in the region of Nigeria that produces oil.

1.5   Research Implications and Contributions

The results of this research have consequences for the implementation of policy, practice, and baseline studies. This is especially true in light of the pipeline disaster challenges that Nigeria is currently facing,

particularly in the oil-producing regions. Stakeholders have aided the handling of the oil disaster in various ways at some point or another. On the other hand, these stakeholders have never indeed collaborated as a group toward a shared objective. This research has demonstrated that pipeline disasters can be reduced in severity to a significant degree if the various stakeholders work together with the same objectives in mind. This study aims to evaluate the efficacy of a collaborative approach to disaster management among the various stakeholders involved in reducing the number of pipeline accidents in Nigeria.

1.6   Structure of the Thesis

The current chapter summarises the research background and presents the aim, objectives, and research questions. The statement of the problem, research implications and contributions are presented in this chapter.

Chapter 2 explores the Nigeria oil and gas industry. The Niger Delta region, problems and prospects, as well as oil pipeline disasters, causes and effects, are detailed in this chapter. The chapter further explores the concept of disaster, common disasters in Nigeria and the management of disasters in Nigeria.

Chapter 3 examines the *theoretical background* for the study. It considers literature within the context of stakeholders. The chapter begins with a background to the concept of stakeholders, reviewing the different definitions of stakeholders obtained from the literature. The chapter also explores the existing literature on collaboration and stakeholders' collaboration. The concept of collaboration, the benefits of collaboration, and previous considerations of collaboration and collaboration as a disaster mitigation technique were presented after that.

Chapter 4 discusses the research methodologies employed for this study. It begins with an explanation of the study's underlying philosophical perspective. The data-gathering technique, relevant ethical considerations, and an explanation of the data analysis methodologies are then provided.

Chapter 5 details the development of the conceptual framework. Elements of collaboration, requirements for collaboration, identification of stakeholders for collaboration and role of different stakeholders are explained in this chapter.

The results of the questionnaire and semi-structured interview are presented in Chapters 6 and 7. These chapters discuss the various conclusions from the data analysis, and a stakeholder collaboration framework for managing and mitigating pipeline disasters is developed.

This research study's conclusion and recommendations are presented in Chapter 8.

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CHAPTER TWO

NIGERIA AND PIPELINE DISASTERS

</div>

2.0 Introduction

This chapter discusses in detail, the Nigeria oil and gas industry, the Nigeria oil producing regions (NOPR) and pipeline disasters in Nigeria. It gives a comprehensive background to the problem at hand. The chapter commences with Nigeria and he Niger Delta area or region. Thereafter, the outline of the Nigerian pipeline structure was presented. The impacts of the oil and gas industry was discussed afterwhich, concept of disasters ad pipeline disasters in Nigeria were discussed. The menace of pipeline vandalism was explained and the effects of oil pipeline disasters in terms of human and environmental losses were also presented in details. The chapter concludes with the aftermath effect of pipeline disasters to the environment which was explained using the UNEP report of Ogoniland. This report was selected because it is one of the most difficult on-the-ground evaluations that UNEP has ever conducted. It offers the best available understanding of what has happened to the environment of Ogoniland and the accompanying consequences for the populations harmed due to oil industry operations and disasters that have taken place over several years.

2.1 Nigeria and the Niger Delta area

Nigeria is located in West Africa at 10°N and 08°E, and its total land area is 910,768 km^2; its total water area is 13,000 km^2 (Onuoha, 2007). Niger Republic bounds to the north, Benin Republic to the west, Cameroon and Chad to the east, and the Atlantic Ocean to the south form borders (Shittu, 2014). Since gaining independence from the United Kingdom in October 1960, Nigeria has seen a profound economic, political, and social transformation. Nowadays, 36 states and Abuja's Federal Capital Territory make up Nigeria. These nations are organised into six (6) distinct geographic regions. There are six distinct regions: the Northwest, the Central North, the East, the South, and the West (Figure 2.1).
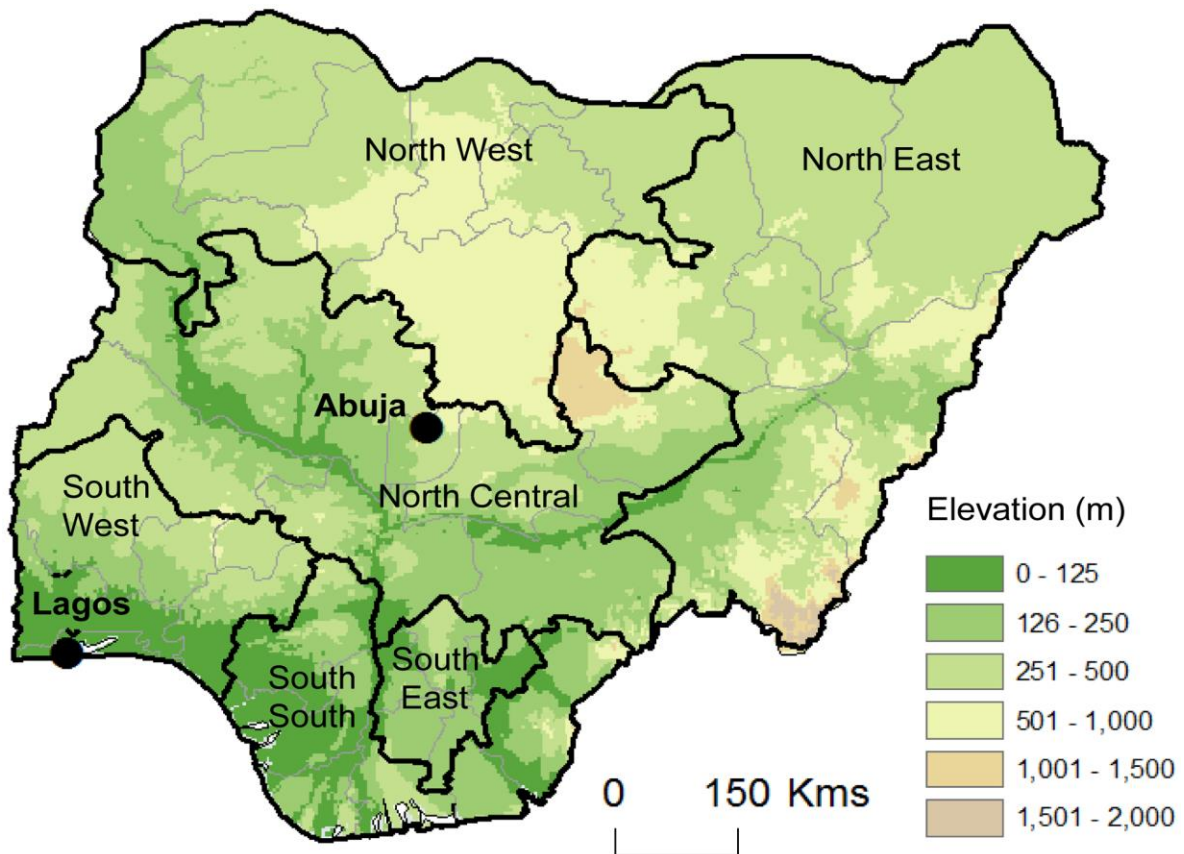
Figure 2.1 Map of Nigeria showing the geopolitical zones

Source: Okorie *et al.* (2013)

All South-South states, one South-West State and two South-Eastern states make up the Niger Delta, sometimes known as the oil-producing states of Nigeria (Hooper, et al., 2002; Imoobe & Iroro, 2009). It spans across Cross River, Akwa Ibom, Abia, Imo, Rivers, Bayelsa, Delta, Edo, and Ondo, taking up an average of 70,000 km^2 of wetland. It is one of the ten most extensive and deltaic biological systems on the earth (Hooper, et al., 2002; Phil-Eze & Okoro, 2009). Due to the existence of more than 40 different ethnic clusters that communicate in more than 250 languages, the Niger Delta region is renowned for its rich ethnic and traditional heritage. These clusters incorporate Binis, Bekwarras, Efiks, Anang, Ibibios, Anangs, Yorubas, Ibeno and Oron (NDDC, 2006). The manner of dressing, marriage freedoms, and customary and social celebrations reflect the traditions of the individuals in this region. Conventional commercial engagements of people in this region might be sorted into;

    i.   land-based, including hunting, cultivating, gathering and handling natural palm products, and

   ii.   water-based, including fishing and buying and selling aquatic animals.

The Niger Delta is home to various ecosystems, including mangrove swamp forests, lowland rain forests, derived savanna, and freshwater marsh (Anejionu, et al., 2015). Non-riverine areas are also a part of the lowland rainforest and the savannah-like northeastern Niger Delta. In addition, 17,000 square kilometres of the Niger Delta is home to a freshwater marsh habitat (NDDC, 2006). Unfortunately, oil spills have badly contaminated the area, wiping out the biodiversity that has made it home to numerous endangered and threatened species (Kadafa, 2012). The mangrove forest covers an enormous area, about 40 km^2 but is much smaller near the estuaries (Zabbey, et al., 2017). The fauna and vegetation on its floor include crustaceans like crabs and shrimp (Balogun, 2010). Unfortunately, oil spills threaten this biodiversity (Anejionu, et al., 2015; Balogun, 2010).

2.1.1 The Niger Delta Oil Producing Region of Nigeria

The Niger Delta region is the largest wetland in Africa and the world (Eweje, 2006). It has a land area of 112,111 km^2 and is located in Nigeria's southern coastline region (NDDC, 2004). The Niger Delta has06 oil fields, 355 of which are on land, while the remaining 251 are on the sea (NNPC, 2016). A 35 million-person population is projected for the area, with 75% typically residing in creeks and villages (NDDC, 2006). The affluence of the population does not accurately represent the fundamental importance of the Niger Delta region to the Nigerian economy; there is clear evidence of deprivation in the region. Since the 1960s, the district has generated more than $600 billion in oil revenue, according to (Wurthmann, 2006). However, despite this, the area is plagued by *"managerial disregard, disintegrating social foundation and administrations, high unemployment, social hardship, miserable neediness, rottenness and filthiness, and endemic clash"* (UNDP, 2006). Additionally, this has degenerated into ongoing conflicts and barbarism between the societies in the Niger Delta region and the oil-producing companies operating there (Oyefusi, 2013)

Idemudia speculated that the Niger Delta region's underdevelopment contributed to the surge in confrontations and violence (Idemudia, 2010). Because of so many factors, oil-producing companies are now forced to deal with problems in the neighbourhood. According to Eweje, the region's strain on oil-producing companies is caused by the Nigerian government's failure to fulfil its responsibilities for

the region's growth, which is why it is essential to consider the region's current difficult situation (Eweje, 2006). Maintaining a stable society is crucial to any nation's economic progress (Olson, 2008).

Asuni stated that it is difficult to quantify the financial impact of the ongoing violence, confrontations, and steady rise in oil bunkering and theft that the Nigerian oil and gas industry is currently experiencing (Asuni, 2009). This might be attributed to inadequate or poor information that is available for evaluation. Asuni defined oil bunkering as the illegal demonstration of stealing crude oil (Asuni, 2009), while Oriola said that oil bunkering is the hacking or infringement of pipelines owned by oil-producing firms to take crude oil (Oriola, 2016). The Niger Delta Region's disputes over oil have taken a worrying turn. The incidence of violent clashes between oil-producing organisations and their host populations was "alarming" between 2000 and 2005, according to Idemudia and Ite (Idemudia & Ite, 2006).

It has since become an emergency for the Nigerian government (Oshwofasa & Anuta, 2012). It is important to note that the actions and operations of the oil-producing companies have an equal impact on many categories of communities, such as the impacted community, transit community, and terminal community area. Nevertheless, the host community experiences the most severe and significant repercussions due to the local oil-producing companies' implementation of onshore operations and responsibilities.

Pipeline accidents can occur anywhere there is a pipeline channel, but they frequently occur in areas where oil is produced in Nigeria. The Niger Delta area is home to many oil-related operations, including exploration, in Nigeria (see the map in figure 2.2). There are around 800 oil-producing towns in this land-covered region. As a result, most pipeline vandalism, oil spills, and petroleum-related calamities occur in this area (ERACJP, 2015). The area has over 900 oil wells, 100 flow stations, and 100 gas plants. With around 45,000 km of oil and gas flow lines, there is a vast network of approximately 1,500 km of trunk lines. In this community, oil pollution is a serious issue that has resulted in an average of 221 oil spills per year (Osuji, 2001). In addition, reports show that about 17.2 billion cubic meters of natural gas flares yearly, resulting from the exploration of unrefined oil in the Niger Delta region (GGFR, 2003). These disasters affect both flora and fauna of the region.
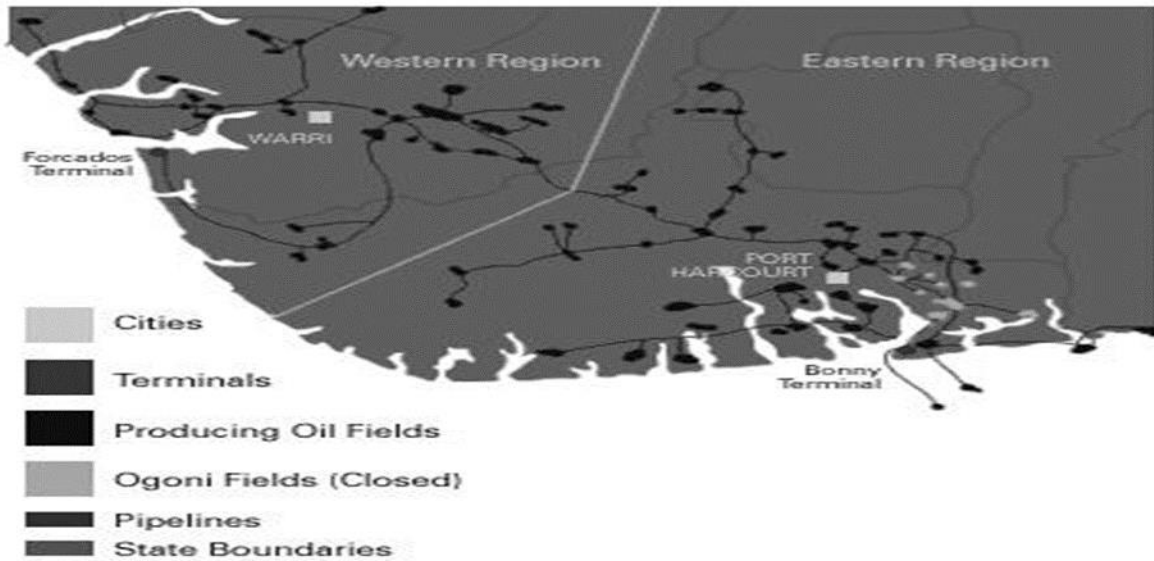
Figure 2.2 Map of Niger Delta outlining the distribution of oil fields in Nigeria
Source: Collins *et al*., 2012

2.2   The Oil and Gas Industry

Off the shore of Summerfield in Santa Barba, California, crude oil drilling started in 1896 and moved into shallower seas. Midway through the 1960s, practical knowledge and technical know-how were created to support the duties of offshore basins like Cabinda and Gipssland, which had minimal onshore production (Nehring, 1985).

In order to meet human needs, this industry is involved in extracting and transporting refined petroleum products. In addition, for home and industrial usage, processed petroleum products like gas and petroleum are needed in some industries, including energy, agriculture, medicine, and research. Therefore, the upstream, midstream, and downstream sectors are the three main divisions of the industry (Figure 2.3).
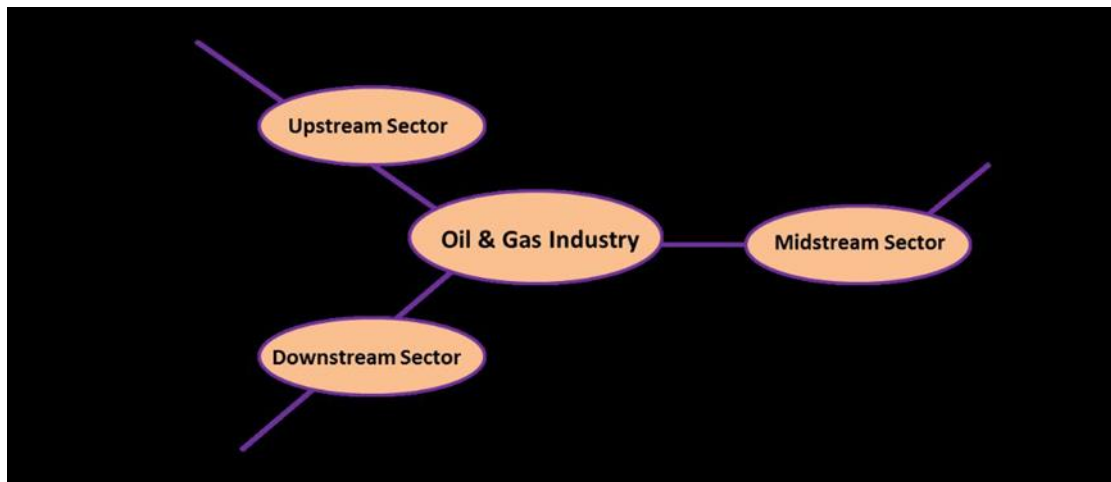
Figure 2.3 Sectors of the Oil and Gas Industry

The mandate of the upstream sector is to search for possible grounds with submerged crude oil and natural gas fields, explore oil fields and ultimately perform drilling operations on these fields to bring crude oil or natural gas to the exterior (Coalbed, 2012). The upstream sector of the petroleum industry handles the transactional aspect of the industry, such as acquisition and divestiture deals. The midstream sector manages the transportation of crude or refined petroleum products, which is done through pipelines, trucks, rail or tankers. These products are being taken to refineries where the downstream processes occur. The midstream sector also stores these products for wholesale marketing (Ite *et al*., 2013). The downstream sector controls the refining and further processing of crude. In addition, they handle selling processed petroleum products such as gasoline, diesel oil, petrol, jet fuel, lubricants, heating oil, asphalt, waxes and several other petrochemicals (John *et al*., 2011). It is, therefore, evident that transportation is relevant at every stage in the oil and gas industry. As a result, transportation processes also contribute to the increased pipeline disasters and shortage in oil and gas reserves in countries that produce oil.

2.2.1 Outline of the Nigerian Oil and Gas Industry

Since the Shell Company discovered crude oil in Nigeria in 1956, the country's oil and gas industry has been a driving force in the country's economy (Ereibi, 2011). In any case, up until the middle of the 1990s, the region was dominated by multinational corporations, but starting about that time, Nigerian companies began to make inroads into the market. Local participation was encouraged through the

implementation of the Nigerian Content Directives, which were issued approximately ten years earlier by the Nigerian National Petroleum Corporation (NNPC), and ultimately through the proclamation of the Nigerian Oil and Gas Industry Content Development (NOGIC) Act (The Act), which was passed in the year 2010. (Nwokeji, 2007). The Act promotes the usage of Nigerian organisations and assets in granting oil licenses, agreements, and other responsibilities related to the oil industry. Upstream, downstream, and the services sector comprise the vast majority of the industry's organisation, and each subsector is further subdivided into subsectors. The activities in the midstream often fall under the purview of the downstream section. In any event, a distinction between the two markets is being developed. Handling, stockpiling, promoting, and transporting unrefined petroleum, gas, gas-to-liquids, and liquefied gas are all examples of activities that fall under the "midstream activities."

KPMG published a report in 2014 detailing the most important regulatory authorities in Nigeria's oil and gas sector. These included the Ministry of Petroleum Resources, the Nigerian National Petroleum Corporation (NNPC), the Department of Petroleum Resources (DPR), the Nigerian Investment Promotion Commission (NIPC), NIMASA (Nigeria's Maritime Administration and Safety Agency), NCSB (Nigeria's Customs Service Board), and the Nigerian National Petroleum Authority (NPA).

2.2.2   The structure of Nigeria's oil pipeline system

The discovery in 1956 in Oloibiri of amounts of crude oil suitable for commercial extraction marked a turning point in Nigeria's petroleum industry. Since then, the Nigerian economy has been almost entirely reliant on the profits gained from oil exportation. In order to expedite the transport of crude petroleum products originating from the oil-rich Niger Delta, a network of oil pipeline links has been established to connect a few states that are located close to one another. This network was inspired to be created by several different states (Onuoha, 2007). The combined length of all of Nigeria's pipelines is 501 kilometres. Multi-product pipelines stretch for 4315 kilometres, and crude oil pipelines stretch for 666 kilometres. These pipes run the country's length, establishing a vital pillar of the nation's infrastructure that links some locations throughout the United States. For example, locating jellies in Atlas Cove, Calabar, Okirika, and Warri is possible.

Moreover, there are 22 storage depots for petroleum, four refineries in Port-Harcourt (I and II), Kaduna, and Warri, and offshore terminals in Bonny and Escravos. This network of oil pipelines travels a total of 719 kilometres in order to transport crude petroleum to refineries located in Port-Harcourt (both I and II), Warri, and Kaduna. In addition, using multi-product pipelines, refined goods are moved from oil refineries and import receiving jetties to oil stockpile depots in various parts of the country. In Table 2.1, you can see how the oil product distribution system and pipeline infrastructure operate together.

Table 2.1. Nigerian pipeline grid and distribution network

S/N	System	Network
1.	System 2A	Warri – Benin – Ore – Mosimi
2.	System 2AX	Auchi – Benin
3.	System 2B	(a) Atlas Cove – Mosimi – Ibadan – Ilorin
		(b) Mosimi – Satelite (Ejigbo in Lagos)
		(c) Mosimi – Ikeja
4.	System 2C	Escravos – Warri – Kaduna (Crude lines)
5.	System 2D	(a) Kaduna – Zaria – Kano – Zaria – Gusau
		(b) Kaduna – Jos – Gombe – Maiduguri
6.	System 2E	PH – Aba – Enugu – Makurdi
7.	System 2EX	PH – Aba – Enugu – Makurdi – Yola
8.	System 2CX	(a) Enugu – Auchi (interconnection)
		(b) Auchi – Suleja – Kaduna
9.	System 2DX	(c) Jos – Gombe

Source (Onuoha, 2007)

2.2.3 The Petroleum Industry Bill 2021

The Petroleum Industry Act was passed to create a consistent legal, legislative, regulatory, and financial framework for Nigeria's petroleum sector and expand towns already home to petroleum-based businesses. The Act consists of 5 Chapters, 319 Sections, and 8 Schedules. These sections and schedules cover a variety of topics, including petroleum fees, rents, and royalties; rights of pre-emption; incorporated joint ventures; domestic base price and pricing framework; pricing formula for gas price for gas-based industries; pricing formula for gas price for gas-based industries; capital allowance, production allowance, and cost price ratio limit; and establishment of the Ministry of Petroleum Incorporated. The Ministry of Petroleum, Inc. was also established simultaneously as a direct consequence of this occurrence. It consists of a financial plan and instructions for administration,

institutions, the expansion of the host community, and other things. Governance and institutions, administration, and the development of the host community are some of the topics that will be covered throughout the discussion.

2.3   The Nigerian Economy and the Impact of Oil and Gas

Since the discovery of commercial quantities of crude oil, the petroleum industry has significantly impacted the Nigerian economy to the point where other industries like manufacturing and agriculture have been abandoned (Akinlo, 2012; Ogen, 2007). There was a dramatic increase from 1969 to 1974 and beyond in the proportion of foreign exchange revenues attributable to the sale of crude oil (from 2.6% to 57.9%). For several decades, Nigeria's exports of crude oil and natural gas have accounted for over 95% of the country's gross domestic product (GDP), 85% of government income, and 95% of the country's foreign exchange earnings (Watts, 2004; Iwayemi & Fowowe, 2011; Frynas, 2000). The environmental degradation, political issues, economic challenges, and social challenges caused by the crude oil and natural gas industry's poor management suggest that the Nigerian economy is entering a time of the "natural resource curse" (Robinson, et al., 2006) or the "crude oil curse" (Ross, 2012). Furthermore, the Nigerian economy is suffering from Dutch disease, which is the collapse of a country's economic sectors like agriculture and manufacturing due to its increased activity in exploiting natural resources like crude oil. It may be argued that when a country aims to raise more money by exploiting its natural resources, one of two things will happen:

    i.   There will be an increase in the value of the local currency, which usually makes exports less competitive.

    ii.   As a result of focusing too much on one industry, progress will be stifled in other areas of the economy.

It is reasonable to imagine that the Dutch disease might quickly spread in Nigeria. This is because the country's economy is overly reliant on the extraction and production of crude oil at the expense of all other industries. Under the following topics, we shall delve deeper into crude oil exploration and production's economic, social, political, environmental, and security effects.

2.3.1 Economic impacts

The Niger Delta and Nigeria's economies have benefited and suffered from oil and gas extraction, production, refining, and export. The country is now a one-industry economy due to the oil and gas industry. As recently as two decades after independence, agricultural exports from Nigeria still accounted for more than 64 per cent of the country's total earnings. However, when oil was first discovered commercially, the Nigerian government shifted its focus away from other industries (Izuchukwu, 2011). To give just one illustration, between 1960 and 2000, exports of agricultural goods fell from almost 64 per cent to 19 per cent of the total. The global energy market's steadiness directly affects Nigeria's economic security (Iwayemi & Fowowe, 2011). This indicates that the Nigerian economy is sensitive to even a modest change in the global energy market price of oil and gas. The IMF has urged the Nigerian government to implement market reforms and public investment in order to diversify the economy away from its reliance on oil (Ehie & Muogboh, 2016; Sola & Joachim, 2016; Adenugba & Dipo, 2013; Ross, 2003). People in the Niger delta were experts in various other industries before oil and gas were discovered there, including commerce, collecting and processing palm fruits, agriculture, fishing, and hunting.

Nevertheless, as oil and gas exploration and production emerged, many residents were forced to abandon their traditional ways of life (UNDP, 2006). For instance, because of the regularity of oil spills in the area, local fishermen are now out of work and struggling to make ends meet for their families. Also, farmers in the area have seen their incomes decline due to the destruction of their land due to oil and gas extraction (Ibeanu, 2000). According to Mmom and Arokoyu (2010), mangrove forests provide "a source of fuel wood, stake pole manufacture, fish traps, boat carving, fishing, platforms and coastal protection" due to the abundance of both terrestrial and aquatic life they support. Hence, a fundamental part of rural life (Omo-Irabor et al., 2011). Before the discovery of crude oil, the mangrove forest was minimally impacted by human activities, according to Bisong (2001). This was due to the era's low population density, subsistence agriculture, and lack of advanced technology. Unfortunately, crude oil exploration and production require advanced equipment, contributing to the devastation of the mangrove forest today (Mmom and Arokoyu, 2010).

2.3.2   Social impacts

As a result of oil and gas development, Nigerians are leaving behind traditional industries like farming and manufacturing in favour of more lucrative white-collar jobs in the oil and gas sector. Also, due to their exposure to oil and gas activities, residents of many communities in the Niger Delta region have lost interest in "traditional" communal social and cultural values (Nwilo and Badejo, 2005). Consequently, there have been more inter- and intra-communal conflicts (Idemudia and Osayande, 2016; Omeje, 2005). A spike in poverty rates in the Nigerian economy may also be traced back to the industry's advent (World Bank, 2010). In the Nigerian oil and gas business, bribery and corruption have become the norm among the major players (Cragg, 2016; Flinn, 2016; Okeke and Aniche, 2013; Al-Kasim et al., 2013). As a result, established institutions in the region are becoming increasingly unstable since monarchs not on board with oil politics risk being deposed (Watts, 2004). The region's high rate of inequality can be primarily attributed to the exploration and production of crude oil (Ross, 2003). However, income inequality among the working population may be to blame. Comparing 1985 and 1992, Canagarajan et al. (1997) found that although the rich saw their standard of living rise, the poor saw theirs fall. As a result of lower per capita spending, Bevan et al. (1999) found that poverty was likely more significant in 1992 than in the 1950s. Elum (2014) further noted that the recurrence of oil leakage in the Niger Delta region had greatly affected the federal government budget to the disadvantage of social welfare. The advent of armed insurgency in the region has had far-reaching social ramifications, according to Dick (2016). This includes damage to infrastructure as well as human lives.

2.3.3   Political impacts

Significant political violence in the Niger Delta region has existed since 1990 (Ross, 2003). In the Niger Delta, ethnic tensions, violence, and corruption have all spiked due to the region's crude oil industry (Idemudia and Ite, 2006). Consequently, communities in the area are now more likely to compete for scarce resources and the spoils of the Nigerian government's largesse. Hence, the government gradually loses its authority as the population's desire for authority grows (Zalik, 2004). As a result, the majority-minority identities of the various populations in the region may be shifting (Idemudia and Ite, 2006). In addition, those in positions of power and strategic importance hoard the profits from crude oil

exploration and production instead of being invested in the region's growth (Obi, 2010). It may be argued that local animosity toward the government has arisen from its failure to bring about the promised development in the area, despite the wealth generated there. According to Watts (2004), the government's reliance on crude oil revenue has led to enacting detrimental laws and decrees for residents. As a result, residents of the Niger Delta region feel ignored due to the government's failure to guarantee and provide for the region's developmental needs adequately. According to Omeje (2005), environmental variables like air pollution and poverty level are indicators that politics is at the heart of the region's violence and conflicts. The "development of militancy in the region" is due to a "lack of political resolve to safeguard the ecosystem from the impacts of oil exploration," according to Dick (2016).

2.3.4 Environmental impacts

The social and economic well-being of the people who live in the Niger Delta is directly tied to the quality of the region's natural resources. Mangrove swamps, coastal islands, rain forests, and freshwater zones are all present in the region, but oil and gas extraction in the previous 50 years has prevented locals from reaping their benefits (Kadafa, 2012; Abam, 2001). Depletion and damage to the local ecology have resulted. Loss of income, crop failure, home devastation, poverty, water contamination, and premature mortality are all consequences of the widespread practice of oil spilling and gas flaring that has been the norm recently (Ukeje, 2001). (Eregha and Irughe, 2009). The "strong feeling in the region that the degree and rate of degradation are pushing the delta towards ecological disaster" was cited as a reason for this dire prognosis (The Development Program, 2006). Damage and degradation caused by oil and gas activities in Ogoniland, where oil and gas were first discovered in Nigeria, have been estimated to require roughly 30 years and over $30 billion to spend on the first five years to repair. This estimate came from the Environmental Program in 2011. According to Elum et al. (2016), people in the Niger Delta have lost their means of subsistence because of the oil industry's impact on the region's ecology. This has led to a decline in fishing and crop production. Research published in 2016 by Nriagu et al. suggests that the negative effects of crude oil extraction on the local ecosystem have had a major influence on the health of the local population. Lack of technical know-how on the part of

oil-producing companies, compromise and corruption among industry regulators, and insufficient punishment for perpetrators by the judicial body are just some of the factors that have impeded compliance with safety and environmental standards in the oil and gas industry (Iheriohanma, 2016; Ite et al., 2016; Odumosu, 2016). Environmental Right Action (ERA) and Stakeholder Democracy Network (SDN) have arisen in response to this precarious scenario to serve as a check and balance between the Nigerian government and oil-producing corporations on economic, social, and environmental issues (Idemudia, 2016).

2.3.5   Security impacts

The Niger Delta conflict "assumed a radical dimension during the 1990s," as stated by experts (Omeje, 2006). As a result, militias have taken to staging regular violent protests to disrupt and destabilise the work of the region's oil-producing corporations (Karl, 1997). According to Ross (2003), militias' insatiable desire for power and resources has fueled the region's perpetual violence and wars. As a result, security threats have emerged in the area (Watts, 2004), which has resulted in a steady increase in kidnappings, assassinations, and property damage at oil production facilities.

2.4   Concept of Disaster and Disaster Management

2.4.1   Disasters in Nigeria

Disasters are multifaceted events with multi-dimensional causes, and thus disaster management requires broad, multi-disciplinary preparation to manage both intricacy and transformation. Significant shifts have happened in how disasters are thought of, resulting from an expanding consciousness of global problems alongside a recognised requirement for resolutions. A disaster depicts a circumstance where unusual or rare dangerous events have grave significance on the communities, causing considerable harm, disturbance and potential causalities and leaving the affected community handicapped or incapable of performing optimally without outside aid (Gavidia, 2000). A disaster is consequently a severe interruption to the continued existence and livelihood organisation of a society ensuing from their exposure to the effect of a scale which overpowers the limit of those affected to survive without assistance (Otero and Marti, 1995).

A disaster is defined by the United Nations International Strategy for Disaster Reduction (UNISDR) as "a substantial disturbance of the functioning of a community or a society involving extensive human, material, or environmental losses and impacts that exceed the ability of the affected community to cope using its resources solely" (UNISDR, 2009).

Nigeria, like the rest of the world, is vulnerable to calamities, both natural and man-made. Some of these disasters have a quick onset, leading to loss of life, property, and environment; others have a more extended period between their onset and their fatal consequences.

Natural and man-made disasters are equally likely to strike in Nigeria. Floods and droughts are just two of Nigeria's many common natural disasters (Oladipo, 1993; Ibem, 2011). More people are displaced by floods than by any other natural disaster in Nigeria, possibly because around 20% of the country's population is at risk of flooding at any given time (Etuonovbe, 2011). Hence, flooding is a constant threat in Nigeria, resulting in loss of life and the relocation of entire villages. In 2010, for instance, flooding killed roughly 1,555 individuals and displaced another 258,000. (Babatunde, 2011). Flooding not only results in human casualties, material destruction, and population relocation (Babatunde, 2011; Etuonovbe, 2011) but can also spread diseases like cholera if people consume contaminated water (Babatunde, 2011). Many rivers run through Nigeria, such as the Niger, Benue, and Ogun; extreme precipitation; river overflows; ocean storms; tidal waves; dam breakdowns and levee collapses; and inadequate or nonexistent drainage systems all contribute to the country's frequent flooding (Etuonovbe, 2011; Ibem 2011). In addition, illegal trash dumps significantly cause floods in regions with functioning drainage systems.

Drought is another common natural hazard in Nigeria. The northern area of Nigeria, specifically the Sudan-Sahel Zone, is prone to drought (Oladipo, 1993). Hence, for instance, a severe drought in northern Nigeria between 1972 and 1973 caused the deaths of nearly 300,000 livestock. Drought in the Sudan-Sahel Zone is caused by the lack of sufficient "rain-bearing monsoon winds from the Atlantic Ocean to penetrate enough into this region" (Oladipo, 1993).

Terrorism, pipeline explosions, transportation disasters (both on the ground and in the air), internal conflicts, and building fires are only some man-made risks specific to Nigeria (Ogundiya & Amzat, 2008; NDMF, 2010; Ibem, 2011). It has been reported that the Nigerian government sponsors acts of

terrorism (Madunagu, 2005, as referenced in Ogundiya and Amzat, 2008). For instance, on October 19, 1986, a letter bomb killed Dele Giwa, the founding Chief Executive and Editor-in-Chief of Newswatch magazine; on October 6, 1995, a nationalist and democrat named Alfred Rewane was killed; on July 7, 1998, Moshood Abiola was allegedly poisoned; and on June 4, 1999, Kudirat Abiola, Moshood Abiola's wife, was also killed (Ogundiya and Amzat, 2008). Boko Haram, an Islamist extremist group whose name means "to outlaw anything Western and Western Education," is responsible for another type of terrorism (Danjibo, 2009). This terrorist organisation seeks to establish an Islamic state to subjugate the West (Danjibo, 2009). USDS-designated terrorist organisation Boko Haram has been responsible for multiple incidents in Nigeria since its formation in 2002 (BBC News 2011). British Broadcasting Corporation (2011) said that a Congressional report in the United States stated, "Boko Haram has quickly evolved and constitutes a rising threat to US interests and the US homeland" (BBC News, 2011). Pipeline explosions can cause widespread destruction in Nigeria. Such incidents resulted from pipeline vandalism, which is defined as "the unlawful or unauthorised destruction or puncturing of oil pipelines to disrupt supply or of siphoning crude oil (or its refined products) in order to appropriate it for personal use or sale on the black market or any other outlet" (Onuoha, 2009). More than 5,000 people have been killed by pipeline explosions since 1998, as reported by Amanze-Nwachukwu in 2007 (Onuoha, 2009) In addition to natural disasters, transportation mishaps on the roads and in the air are common in Nigeria. Sadly, transportation accidents are common in large cities like Lagos. Most Lagos residents name road transportation accidents as the city's most common man-made disaster, according to Ibem's (2011) research on the risks of vulnerability in the Lagos Megacity Region. Since the first aeroplane landed at Ikeja Airport, Lagos, in 1925, there have been several air mishaps in Nigeria (Edeaghe et al., 2006). Nigeria was responsible for 9.3 per cent of all air accidents on the African continent between 1996 and 2005, putting the frequency of air transportation events in Nigeria into perspective (Opara 2007). Opara added that of the 376 people who died in African air accidents in 2005, 225 were from Nigeria. In addition, nearly 300 persons were killed in five plane disasters in Nigeria between October 2005 and November 2006 (Opara 2007).

The Niger Delta region, in particular, is prone to internal conflicts. Hostage-taking, pipeline vandalism, and gun battles between law enforcement and local armed groups are some of the challenges plaguing

the region (Ogundiya and Amzat, 2008). These domestic conflicts stem from the Niger Delta's inhabitants being excluded from decision-making processes (Ogundiya and Amzat, 2008). Almost 80% of Nigeria's oil and gas earnings go to 1% of the population, according to a World Bank report (Onuoha, 2009), putting the extent of marginalisation into context. From what we can gather from the World Bank's statement, the level of exclusion is appalling, to say the least, and may contribute to the armed insurgency against the Federal Government, particularly in the oil-rich Niger Delta region.

Sectarian violence between Muslims and Christians is another source of instability within Nigeria's borders. Almost a thousand people of both religions were killed between 2009 and 2011 due to violence between their respective communities (Walker, 2011). Plateau State has been the epicentre of the conflict, as it sits at a strategic intersection between the Muslim north and Christian south. This cycle of sectarian violence persists partially because those responsible for it are rarely brought to justice when arrested (Walker, 2011).

Even beyond these disasters, Nigerians are more vulnerable to a wide range of new and developing risks due to rising levels of industrial pollution, waste, and extraordinary climatic changes and their harmful repercussions. Many variables contribute to the susceptibility of the Nigerian population to various risks. For example, the poverty rate, population growth and distribution, and cities' state and infrastructure are all crucial factors. In addition, people's awareness, the dynamics of public policy, and the State of the environment all play a role in preventing and managing natural disasters.

Natural occurrences and the built and natural surroundings combine to create a state of vulnerability to risks and disasters (Tierney, et al., 2001). For example, a country is vulnerable to flooding if it is at risk of flooding (for example, due to hydrological processes like higher precipitation) but takes no action to mitigate the risk (such as by constructing drainage systems). Namely, Nigeria is susceptible to fires, floods, transportation and industrial disasters, and political crises (Ibem, 2011). In addition, high population densities in cities (50% of Nigerians live in cities) (Nwaka, 2005), a lack of ability to integrate risk reduction measures into national development plans and programs (Abang, 2005), and widespread poverty all contribute to Nigeria's susceptibility to these and other hazards and the impacts of disasters (NDMF, 2010). Also, in major centres like Lagos, land is at a premium, leading to the excessive development of potentially harmful squatter zones (NDMF, 2010; Ibem, 2011). Also, Nigeria

is susceptible to dangers because of its low level of disaster education (NDMF, 2010; Ibem, 2011). Lastly, analysts have pointed to poverty and marginalisation as the primary drivers of domestic terrorism, particularly the kind of terrorism seen in the Niger Delta region (Ogundiya & Amzat, 2008) and pipeline vandalism (Onuoha, 2009).

2.4.2 Disaster Management Cycle

There is not a single definition of disaster management that can universally be agreed upon by all parties. Many scholars and institutions have given it different definitions, each reflecting their ideologies and the scope of their expertise. According to the Federal Emergency Management Agency (FEMA), the definition of disaster management is "the administrative function responsible for providing the framework within which communities decrease exposure to hazard and react to disasters" (NEMA Handbook, 2010). According to the traditional definition provided by the United Nations Development Program (UNDP), disaster management is "the body of policy and administrative decisions and operational activities that apply to the various stages of a disaster at all levels" (UNDP, 1992). These many stages are illustrated in Figure 2.4.
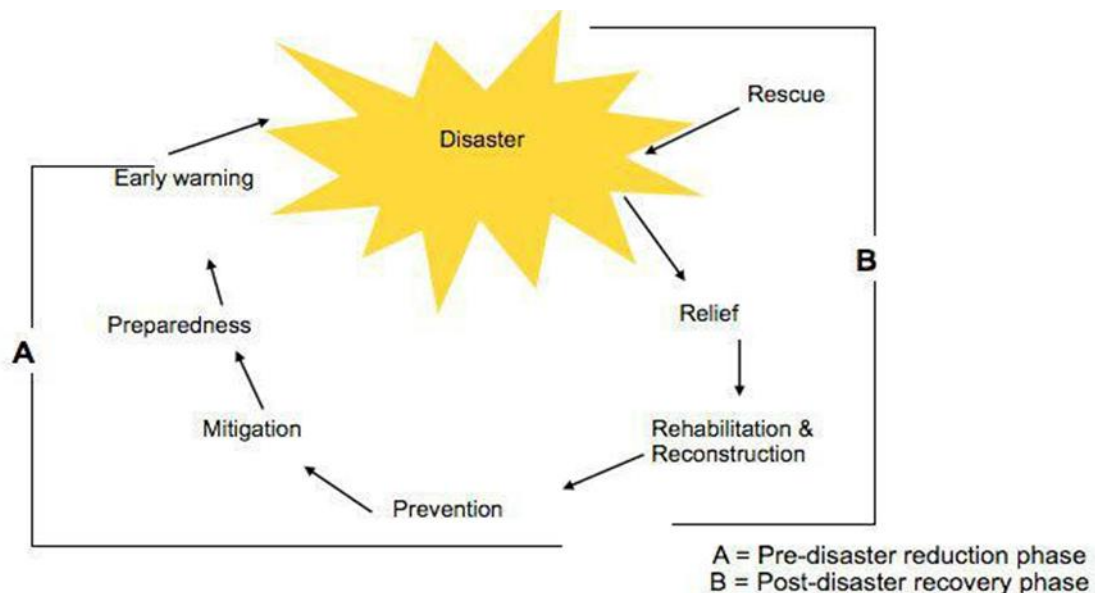
Figure 2.4 The traditional disaster management cycle (van Niekerk, 2010)

The traditional disaster management cycle consists of two phases: the pre-disaster reduction phase, which comes before the disaster, and the post-disaster recovery phase, which follows the event. Early

warning, readiness, prevention, and mitigation occur during the pre-disaster reduction phase. In the phase of recovery that occurs after a disaster has already occurred, all of the processes aimed at recovering from the disaster itself are included. During this stage, efforts to save lives, provide aid, and rebuild will be prioritised alongside rehabilitation and building efforts.

According to the classic disaster management cycle, disaster management in Nigeria entails coordination between six distinct but interconnected categories of tasks. They are national development planning and disaster management, disaster prevention, disaster mitigation, disaster readiness, disaster response, and disaster recovery (Sani, 2012).

Examples of strategies used in national development planning and disaster management include the construction of dams on rivers and preparing urban master plans to reduce the likelihood of floods in urban areas. In addition, planning for the delivery of essential medical care in the face of potential disease pandemics; planning for the enforcement of the Environmental Impact Act to ensure that building projects do not exacerbate existing environmental problems; and fostering interfaith understanding and cooperation through mediating, resolving, and preventing internal conflicts are also included (Ezenyilimba, et al., 2018).

Improved building and land use regulations to prevent population growth in flood-prone areas; flood management in low-lying areas via dams and drainage canals; the creation of security committees at the federal, State, and local levels; and an enhanced intelligence gathering system by Nigeria Police and other relevant organisations are all examples of preventative measures (NEMA Handbook, 2010).

Nigeria has implemented some disaster prevention measures, including building and development control regulations, safety regulations for high-rise buildings and the handling of explosives and other hazardous materials, transportation safety codes for land, water, and air, irrigation projects to deal with drought, and shelterbelts to deal with the effects of drought and desertification (Ezenyilimba, et al., 2018).

Disaster preparedness includes measures taken by all three levels of government, such as incorporating first aid training into school curricula, creating an early warning system, establishing emergency communication networks, stockpiling essentials like food, water, and building supplies, and training and raising public awareness for how to respond in the event of a disaster.

When people talk about "responding to a disaster," they mean taking steps to save lives, care for victims, safeguard property, and fix damaged infrastructure either as it is happening or as soon as possible after that. These operations include search-and-rescue operations, damage assessments, victim evacuations, and mass medical care (NDMF, 2010).

Recovery in disaster management describes the actions taken to restore a disaster-stricken area to its pre-disaster State. Buildings, utilities, and infrastructure damaged or destroyed by the disaster must be repaired or rebuilt as soon as possible so those affected can return to their homes and towns and start putting the ordeal behind them. This responsibility falls on all three levels of government. Rapid action from all three levels of government is required to restore services and replace or repair disaster-damaged buildings, utilities, and infrastructure (Ezenyilimba, et al., 2018).

2.4.3   Coordination in Disaster Management in Nigeria

The many parties involved in disaster management need to be coordinated for this task. It explains the method of coordinating or combining a wide variety of actions to accomplish the goals and aims of disaster management. In addition, it outlines the necessary steps for coordinating the efforts of individuals and organisations to achieve maximum impact and synergy. The National Emergency Management Agency (NEMA) is the body responsible for disaster coordination at the national level. The State Emergency Management Agency (SEMA) and the Local Emergency Management Authority (LEMA) are responsible for disaster coordination at the state and local government levels. In order to obtain the most beneficial results and impact possible, the coordination processes have strict time limits, encourage participant input, are neutral, and are entirely open.

Multi-sectoral, multi-resource, and multi-disciplinary coordination is essential to effective disaster management. This would, among other things, eliminate gaps in services to impacted populations, duplication of efforts, unsuitable support, inefficient use of resources, bottlenecks, blockages, and slow responsiveness to changing conditions. It will also lower the number of people who will be affected.

According to the Disaster Management Handbook (2011), coordinating disaster management in Nigeria requires a combination of horizontal and vertical interlinking between the significant actors or

stakeholders involved in the disaster management process. This is one of the aspects of the coordination process. Figure 2.5 illustrates this concept.

Source: (Disaster Management Handbook, 2011)
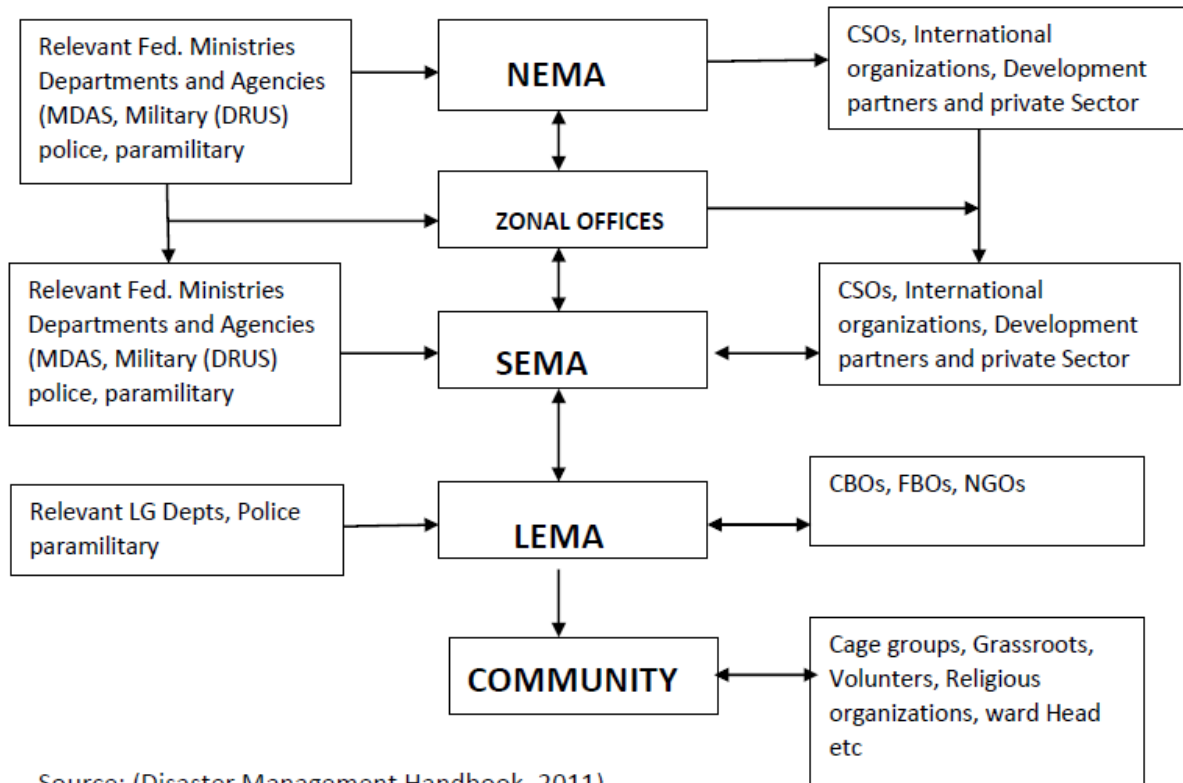
Figure 2.5 Horizontal and Vertical Coordination of Disaster Management in Nigeria

The link between NEMA, SEMA, and LEMA, as well as community entities, is defined by vertical coordination. It relates to NEMA's ability to coordinate the activities and operations of SEMA, LEMA, and community structures using NEMA Zonal Offices. In addition, it refers to SEMA being responsible for reporting to NEMA on the activities and operations of LEMA and community structures. LEMA, which operates at the local government level and reports to SEMA, is responsible for coordinating the activities and operations of community structures.

Being the lead in mobilising and coordinating with crucial Federal Ministries, Departments and Agencies (MDAs), DRUs, Police, Paramilitary, International and Local Non-Governmental Organizations (NGOs), and Development Partners, NEMA exemplifies horizontal coordination, which defines the connection among disaster management stakeholders at different levels of government. At the state level, horizontal coordination refers to SEMA's role in mobilising and collaborating with relevant state ministries, departments, and agencies (MDAs), DRUs, police, paramilitary, civil society

organisations (CSOs), and state branches of international organisations. Development partners are also included in this category. At the local government level, "horizontal coordination" refers to the LEMA taking the lead in mobilising and coordinating with relevant Departments and Authorities (DAs), Police, Paramilitary, Local Non-governmental groups, and development partners. The creation of mutually agreed-upon goals and the distribution of tasks and responsibilities following mandates and capacities must be included among the many coordination mechanisms (both vertical and horizontal).

2.5 Pipeline Disaster in Nigeria

In the 21st century, of all of these man-made disasters related to the processing and transportation of crude oil, the disaster caused by a pipeline has been deemed to be the most common and to have a more significant detrimental effect on both the environment and people's health than any of the others. The landmass of Nigeria is estimated to be 923,800 km^2, and its pipeline network spans a distance of 5120 km. Through its wholly-owned subsidiary, the Products and Pipelines Marketing Company (PPMC), the Nigerian National Petroleum Corporation (NNPC) is in charge of the management of Nigeria's network of pipelines (Omeje, 2005). Pipeline distribution may seem safer, but a single disaster can cause catastrophic environmental and economic consequences to the region affected (Osland, 2015). A burst hydrocarbon pipeline can release significant volatile compounds igniting forests, natural habitats and residential homes (Burke and Dearen, 2010). Pipeline disasters in Nigeria can occur through accidental leaks or explosions. Most of the pipelines from the flow stations are or nearly obsolete. Pipelines have an estimated lifespan of 15 to 20 years and thereby require replacement as at when due, but most pipelines in use today have been in use for over 25 years, becoming susceptible to corrosion and, ultimately, leakages. Most cases of pipeline disasters are through intentional vandalism by political or ethnic pressure groups (Omodanisi *et al.,* 2014).

The pipeline infrastructure that is in operation at the moment presents the Nigerian petroleum industry with a great deal of difficulty. The Niger Delta region is the one that suffers the most as a direct result of these difficulties, which include instances of vandalism and militant activity. Although activities associated with militancy have been significantly suppressed since the amnesty program was established in 2009, actions associated with vandalism have seemingly returned in some locations in

recent years (Okoli, 2013). According to what was found by Ogbeni in 2013, throughout the past ten years, there have been a total of 16,083 pipeline fractures and leaks documented, with 398 of those incidents being the direct result of ruptures. The incidents of vestiges that have been recorded are a direct result of the vandalism that took place, which had a massive impact on Nigeria's economy and environment, ultimately leading to the loss of life and property (Okoli & Orinya, 2013).

The bursting of pipelines is another type of catastrophic event that can occur with pipelines. Pipelines that burst pose significant dangers to people's lives, their property, and the environment. The majority of the pipeline installations appear to have ruptured as a direct result of inadequate maintenance and surveillance, which in turn leads to the corrosion of these pipelines (Onuoha, 2008). Corrosion leads to pipe leakage, resulting in oil spillage in the region. There is a vast network of pipelines in the Niger Delta; thus, this problem is likely to occur (Onuoha, 2009). Furthermore, several pipelines risk rupturing in the onshore regions since they are laid above ground (Onuoha, 2007). In addition to this, because these pipelines do not receive the necessary maintenance and are used beyond their lifespans, typically for 15 years, they become susceptible to corrosion, which can finally lead to rupture (Onuoha, 2009).

2.5.1 Incidence and Causes of Oil Pipeline Disaster

Accidents involving pipelines have resulted in significant losses for Nigeria on multiple fronts, including the country's economy, the environment, and human life. There have been multiple reports of incidents in which many lives have been lost. For example, in December of 2006, an incident occurred at Abule Egba, located in Lagos, and resulted in the loss of nearly 500 lives. As a result of this incident, a dozen homes and three places of worship, including a mosque and two churches, were set on fire (Channels Television, March 16, 2020). In December 2004, the town of Imore was the scene of another tragedy that killed nearly 500 people (Onuoha, 2007).

Any point along the pipeline where there is a rupture poses a threat to both people and the surrounding ecosystem. In addition to the high death toll and the widespread destruction of property, these areas have also experienced a deterioration in their soil, land, water, and air quality. Furthermore, pipeline accidents can disrupt recreational pursuits, including fishing and other sports and hobbies. Due to pipeline vandalism, Nigeria was projected to sustain daily financial losses of up to N29.4 billion naira,

approximately $10.4 million in today's currency. Some sources claim that almost 10% of the world's total oil production, or an average of 200,000 barrels of crude oil daily, is misappropriated (Johnson, 2004; Nwachukwu, 2006).

The Niger Delta region is the one that suffers the most as a direct result of one of the most significant difficulties, which is acts of vandalism and militant activity. Unfortunately, militant groups have been active again, despite their operations being significantly curtailed since the amnesty program was introduced in 2009 (Okoli, 2013).

According to the NOSDRA report, when more than 250 barrels of crude oil spilt into interior waters, or over 2,500 barrels dumped on land, swamp, beach, or open sea, such is classified as large spills. Medium oil spills occur when 25 to 250 barrels of crude oil are spilt into inland waters or 250 to 2,500 barrels spilt on land; minor oil spills occur when up to 25 barrels of crude oil spilt into inland waters, or 250 barrels spilt on land (Sweet Crude Reports, 2021).

The cases of significant oil pipeline disasters obtained from the existing literature are presented in Table 2.2. In this regard, some publications from NNPC, Newspapers and journal publications of (Okoli, 2013), (Onuoha, 2007), The Punch (Thursday, January 3, 2008, p.14) and other recent newspaper publications were consulted. Findings from these sources were streamlined for the period under review (2000 to 2019). From the table, there are about 40 recorded incidents of oil pipeline disasters within the period, with thousands of lives lost as a result. The NNPC Group Managing Director, Mele Kyari, has disclosed that about 45,347 incidents of oil pipeline disasters have occurred in the last 18 years (Fakoyejo, 2020). This indicates that these disasters have increased and will continue until a lasting solution is found.

Table 2.2 Cases of Oil Pipeline Disasters in Nigeria

S/N	Date	Location	Cause	Human Effects	Ecological Effects	Source
1	Feb. 7, 2000	Ogwe, Abia State		17 dead	Damage to farmlands and the environment	(Aljazeera, May 5, 2006)
2	March 20, 2000	Isioma, Abia State		50 dead		(Aljazeera, May 5, 2006)
3	May 2000	Diebu	Vandalisation		Soil, Air and Water Pollution. Loss of arable land. Fishing activities are restricted.	
4	June 21, 2000	Okuedjeba, Warri		28 dead	Damage to farmlands, environmental pollution	(Aljazeera, May 5, 2006)
5	July 10, 2000	Jesse, Delta State		Over 250 people died	Damage to farmlands, environmental pollution, dozens of people injured	(Channels Television, March 16, 2020; Reuters, May 15, 2008)
6	July 11, 2000	Adeje	Sabotage by locals	At least 150 deaths	Damage to farmlands, environmental pollution	(Onuoha, 2007)
7	July 17, 2000	Jesse, Delta State	Sabotage by locals		Soil, Air and Water pollution. Loss of arable land. Loss of aquatic species.	
8	July 23, 2000	Afrokpe, Sapele, Warri		40 dead and 15 more (next day)		(Aljazeera, May 5, 2006)
9	Nov. 30, 2000	Ebute Metta, Lagos	Pipeline leakage	Over 60 lives		(Aljazeera, May 5, 2006; Reuters, May 15, 2008)
10	August 2001	Ishiagu	Sabotage	Loss of lives and properties.	Water and Soil pollution. Loss of arable land.	
11	Nov. 5, 2001	Umudike, Imo State	Oil-leak	15 people died while several		(Aljazeera, May 5, 2006)

				others sustained severe burns.		
12	Jan. 3, 2002	Escravos	Sabotage		Water, Air and Soil pollution. Loss of ecological and aquatic species	
13	Oct. 15, 2002	Akure, Ondo State	Sabotage by locals	20 people died	Air, Water, and Soil pollution	
14	Sept. 29, 2002	Akute-Odo, Ogun State	Vandalisation	Several deaths and plenty of injuries		(Aljazeera, May 5, 2006)
15	June 19, 2003	Umuahia, Abia State	Vandalisation by thieves	125 lives were lost	Dozens of people injured, damage to farmland	(Channels Television, March 16, 2020; Aljazeera, May 5, 2006)
16	Sept. 26, 2003	Forcados	Sabotage		Water, Air, and Soil Pollution. Loss of Ecological and aquatic species	
17	Sept. 17, 2004	NNPC Lagos	VanVandalisation thieves	Over 20 lives		(Reuters, May 15, 2008)
18	Dec. 2004	Imore Village	Sabotage by locals	500 people died	Environmental pollution	(Onuoha, 2007)
19	Aug. 2005	Oso	Sabotage by locals	200 people burnt to death. Loss of property.	Loss of arable land.	
20	March 2006	Nembe	Sabotage by locals	50 people died.	Loss of revenue. Soil, Water and Air Pollution.	
21	May 12, 2006	Inagbe Beach, Lagos		Over 250 lives were lost		(Channels Television, March 16, 2020; Reuters, May 15, 2008)
22	May 2006	Diebu Creek/Brass	Sabotage by locals		Loss of revenue. Soil, Water, and Air pollution.	

23	Dec. 2, 2006	Ijeododo	Pipeline rupture	10 people died.	Environmental pollution and damage to farmlands.	(Onuoha, 2007)
24	Dec. 26, 2006	Abule Egba, Lagos	Vandalisation	Over 500 lives	Incineration of 40 vehicles, a dozen homes including a mosque and two churches, and innumerable business ventures comprising auto mechanic workshops, a saw mill and network of timber shops	(Channels Television, March 16, 2020)
25	Dec. 15, 2007	Ikate, Lagos	Pipeline rupture	About 50 people died. Many injured, mostly youths		
26	Dec. 26, 2007	Lagos		Over 45 lives were lost		(Reuters, May 15, 2008)
27	May 15, 2008	Ijegu, Lagos	Damaged pipeline	150 people died. Loss of properties. Loss of revenue.	Soil, water, and air pollution.	(Reuters, May 15, 2008)
28	Jan. 12, 2013	Arepo, Ogun State	Accidental Leak	At least 3 lives.		(Channels Television, March 16, 2020)
29	May 18, 2014	NNPC Jetty, Okrika	Vandalisation	About 7 lives and several injuries.		(Channels Television, March 16, 2020)
30	Mar. 29, 2016	Agip, Bayelsa	During Pipeline Repair	3 dead. Many injured		(Channels Television, March 16, 2020)

31	June 9, 2016	NPDC, Sanomo Creek, Ogidigben, Warri	Pipeline explosion	None		
32	July 29, 2016	Arepo	Pipeline explosion	105 people died. Loss of properties.	Loss of arable land.	
33	Nov. 8, 2016	NNPC Forcados				
34	July 2, 2018	Ilara, Ogun State				
35	Oct. 12, 2018	Umueze, Abia State	Fuel Scooping from vandals pipeline	19 people		(Channels Television, March 16, 2020)
36	Mar. 2, 2019	Nembe	Accidental leak	50 people died. Loss of revenue.	Soil, Water, and Air pollution.	
37	June 4, 2019	Ijegun	Vandalisation	About 10 lives. Over 30 cars burnt.		(Channels Television, March 16, 2020)
38	June 22, 2019	Komkom, Rivers	During maintenance	10 lives were lost.		(Channels Television, March 16, 2020)
39	August 30, 2019	Abura, Otu-Jeremi, Delta			Spillage in the community.	
40	Dec. 5, 2019	Gloryland Estate, Isheri Olofin, Lagos	Explosion	2 deaths		

Source: Author Generated (from Secondary Data Sources)

Table 2.2 shows the cases of oil pipeline disasters between 2000 and 2019. The table summarised cases of oil pipeline disasters obtained from secondary

sources and their causes and effects.

2.6   Pipeline Vandalism in Nigeria

Throughout history, the petroleum industry in Nigeria has been forced to contend with two exhausting challenges. First, the Niger Delta is plagued with high animosity and acts of vandalism against oil pipelines. This is the root cause of the problems. In contrast to the former, which has significantly decreased due to the amnesty agreement reached in 2009 (Okoli, 2013), the latter appears to have increased in both rate and impact. Pipeline vandalism is defined as intentionally causing damage to petroleum pipelines to steal crude oil and other products related to the petroleum industry (Udofia et al., 2012). Vandalism is defined as any act of destruction, whether it be of public or private property, which is done on purpose. In the public sphere, "vandalism" refers to intentionally destroying public or government property to further a criminal or political agenda. In this context, the term "oil pipeline vandalism" refers to intentionally damaging oil pipelines to steal oil products or undermine the authority of official institutions (Vidal, 2011).

Criminal organisations in Nigeria have been the primary perpetrators of vandalism against oil pipelines. These organisations are motivated to steal oil products for monetary gain. This organised misconduct is frequently sponsored by the agents of the state, which gives it the appearance of being a franchise. Bunkering is another term for oil pipeline vandalism used in Nigeria. It refers to breaking oil pipelines to steal oil products from the pipelines. Several factors, including pipeline vandalism and other pipeline incidents, have severely impacted Nigeria's economy. As a result, there has been a string of plant shutdowns and fires, ultimately resulting in the loss of lives and property. It has also resulted in a scarcity of petroleum products due to a short supply and a decline in the provision of energy, in addition to numerous socioeconomic difficulties related to the vandalism of pipelines.

There were a total of 16,083 pipeline breaks recorded in the most recent ten years, and while 398 of those breaks were due to ruptures, which accounts for 2.4 per cent of all pipeline breaks, the actions of reckless vandals accounted for 15, 685 of those breaks, which accounts for approximately 97.5 per cent of the total number of cases (OPEC, 2012).

Due to the constant attacks on pipelines carried out by unpatriotic thugs over the past two decades, the government of Nigeria is considering the possibility of burying the pipes to a depth of twelve meters below the surface, where they will be less susceptible to attack (Chika-Amanze & Edomaruse, 2000).

The acts of destruction committed by vandals often significantly and negatively impact governments and partners in the oil and gas industry. Without a shadow of a doubt, a demonstration that is carried out with the intent to disrupt and destroy public and private property is understood to be vandalism (Okoli, 2013).

Around ₦174.57 billion in products and the cost of replacing and repairing pipes were lost due to the activities of pipeline miscreants over the past decade, according to the Nigerian National Petroleum Corporation (NNPC). The ecological repercussions include problems with finances, extensive biological damage, and biodiversity loss. In addition, t incidence of vandalism against oil pipelines in Nigeria has increased (NNPC, 2016). According to a report presented in 2013 by the Nigerian Extractive Industry, Nigeria suffered losses from oil theft of around 10.9 billion dollars between 2009 and 2011. (Onoja, 2013). Since the beginning of the 1990s, when the first instance of pipeline vandalism was documented, various instances of pipeline vandalism have been accounted for, and this problem is still growing at an alarming rate. The first instance of pipeline vandalism was documented in the early 1990s (Onuoha, 2007). In 1995, there were seven documented cases, and in 1996, there were an additional thirty-three. This number increased even further to 34 in 1997 and 57 the following year (Special Committee on the Study of Petroleum Product Supply and Distribution, 2000 (Alawode & Ogunleye, 2011).

In the year 1999, Nigerian authorities registered a total of 477 instances of vandalism. In 2003, there were 600 cases reported in Port Harcourt; in 2006, there were 1,650 cases. In a similar vein, there were estimated to be 600 occurrences of pipeline breaches in Warri in 2006 (Amanze-Nwachukwu & Ogbu, 2007). In addition, there have been reports of pipeline ruptures in Northern Nigeria, specifically in Gombe and Kaduna (Onuoha, 2007). The Nigerian National Petroleum Corporation (NNPC) had a total of 2,787 pipelines that were broken between 2010 and 2012.

Consequently, petroleum products worth about ₦12.53bilion were lost due to these pipeline breaks. There have been several other cases of pipeline vandalism as well; Kaduna state recorded 571 cases, Gombe state recorded 850 cases, and Warri had a total of 548 cases of vandalism. Lagos reported 463 cases of pipeline breaks, and Port Harcourt, which had the least recorded 336 cases of vandalism (NNPC, 2011).

In addition, on April 29, 2019, an explosion at a Chevron oil field in Ondo State was triggered by pipeline vandalism. This incident resulted in the deaths of more than 105 persons (Punch, 2019). Similarly, at least 200 people were slain at Abule Egba, according to the statistics made public in 2006 by the Nigerian Red Cross (NPC, 2006). Furthermore, a pipeline explosion in the year 2000 claimed the lives of 250 residents in Warri (Amanze-Nwachukwu & Ogbu, 2007). Previous to this, in 2003, a pipeline caught fire in Ebute, Lagos, killing sixty residents of the neighbourhood.

Pipeline accidents negatively impact the community in which they occur; as a result, appropriate safety precautions need to be taken to ensure the safe operation of pipeline networks connecting oil-producing localities to other parts of the country (Abraka, 2004).

The Niger Delta region of Nigeria is the most common location for acts of vandalism against pipelines. However, it is not certain that acts of vandalism against oil pipelines are confined to the Niger Delta region of Nigeria. In Nigeria, on the coast of the Atlantic Ocean, the delta of the Niger River may be found on the Bight of Bonny, which is just offshore from the Gulf of Guinea. It has a total land area of approximately 112,110 km^2, spanning nine states. Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, and Rivers are the names of these states.

As time passes, the constant vandalism of oil pipelines is reaching a horrifying new level as the criminals responsible for it become more brazen in their activities. In addition, most oil companies are forced to shut down their operations because pipelines have been vandalised. The prevalent culture of high aspiration in Nigeria, which seeks to amass fortunes as quickly as possible to achieve greater economic versatility and empowerment, has been a primary driving force for the widespread destruction of oil pipelines in that country. This is an example of the widespread practice of "primitive collection," which may be found in Nigeria's public and private settings. Nonetheless, it should be recognised that political sabotage has also contributed to pipeline vandalism (Okoli & Orinya, 2013). According to data provided by the Nigerian National Petroleum Corporation, there were a total of 20,965 occurrences of pipeline vandalism in Nigeria between the years 2010 and 2014 (NNPC, 2016). Even though the Petroleum Production and Distribution (Anti-Sabotage) Act of 1975 is on the books, there is still a disturbingly high rate of pipeline vandalism, as demonstrated by the figure up top. This should give rise to actual cause for alarm.

In Nigeria, sabotage is punishable by death or up to 21 years in prison, as stated in the Petroleum Production and Distribution (Anti-Sabotage) Act of 1975. This law states that "any person who wilfully does, aids, incites, or counsels another intending to obstruct or prevent the production/procurement/distribution of petroleum products in any part of Nigeria will be guilty of the offence of sabotage." Unfortunately, the sabotage of oil pipelines persists despite the passage of this law. Many studies have shown that the causes are not issues the Nigerian State cannot handle properly (Adeyemo & Olu-Adeyemi, 2009; Sanusi, et al., 2016; Okoli & Orinya, 2013; Njoku, 2016). This disaster sheds light on the consequences of vandalism as a real problem in the oil business of Nigeria. The repercussions of oil pipeline vandalism concerning Nigeria's security have been proven by its nexus with financial, ecological, and humanitarian calamities and effects. Its nexus has clearly shown with oil prices, the environment, and humanitarian aid (Onuoha, 2009). Consequently, it has been found that vandalism committed against oil pipelines is associated with outcomes that have unfavourable repercussions for the nation.

2.6.1   Causes of Oil Pipeline Vandalism in Nigeria

It was previously mentioned that the primary motivation for oil pipeline vandalism is the nefarious intent of the criminals who break into pipes to remove products to sell them for a profit. However, regardless of the illegal objective, various factors will normally push people to vandalise oil pipelines. Among these factors, poverty, corruption and sabotage, insecurity, militancy, joblessness among young people, corrosive pipelines, and the illegal operation of oil processing plants or refineries are particularly important contributors.

Unavoidable poverty because of unfulfilled promises/guarantees by companies producing oil as well as the Government

Individuals in the Niger Delta have been deprived of their financial backbone, which is land agriculture and fishing, as a result of the degradation of the environment. In addition, residents in the region have less access to clean water, and their economic activities have suffered due to the biological damage caused to the water bodies, farmlands, and territory due to a lack of sufficient and appropriate clean-ups. The result is that more people living along the coast live in poverty. Consequently, some people

who live in the communities traversed by oil pipelines take part in the theft of oil from those pipelines to sell it on the black market and make a profit. Yusuf (2015) states, "the issue of poverty lies at the centre of the dilemma of pipeline vandalism." His argument was strengthened by the fact that he cited the words of Chief Efe Maxwell, an activist from the Niger Delta, who supposedly said the following: *"Suffering and neediness is pretty much too much for individuals to handle."* I am sorry to tell you this, but many of us who live in the Niger Delta region feel we have been swindled even by the ostensibly trustworthy oil firms since they have failed to fulfil their corporate social obligations to an appropriate degree. Along these same lines, this has inspired many people to sabotage pipelines. Similarly, the high expectations that the government and oil companies would improve the Niger Delta by providing provisions for social conveniences such as electricity, medical services, good roads, youth empowerment projects, job creation, and general community development have been generally dashed. As a result, there is almost no government presence in the Niger Delta, contributing to an increase in the region's poverty level.

Corrupt leadership and sabotage in the Oil Sector

Corruption is deeply ingrained and pervasive in every facet of Nigerian culture. According to historical documents, progressive political systems have used the oil industry in Nigeria as "Special rewards" to members of political elites. The growing possession of oil blocs evidences this by Northerners (Daily Trust, 2016). Also, it is a widely held belief that certain dishonest individuals working in the oil industry are complicit in the theft of oil and the destruction of pipelines. As an illustration, Asu (2016) disclosed that "some individuals inside NNPC would plot with the miscreants whom they cautioned at any time while products were being diverted into the pipes." Asu (2016) also credited a similar peculiarity to the situation in Arepo in Ogun State, which he depicted as "the major hotbed of pipeline vandalism and fuel theft." Asu contends that the demonstration of sabotage in the oil sector is mostly the motivation behind why pipeline hoodlums have consistently busted pipelines inside the Lagos zone, that is, at Atlas Cove, the nation's major discharging points for oil-based commodities through pipelines. Asu Hence, vandalism against pipelines is made worse by sabotage and corruption in the oil industry.

Activities of Militant Groups

The Niger Delta's movement toward a more lucrative and equitable distribution of oil revenues has been a long time in the making. Jasper Adaka Boro, who had previously served as a police officer in Nigeria, was the driving force behind a resistance movement in February 1966. This movement was led for the benefit of the Niger Delta. He enlisted the assistance of forty men and formed a group that would later become known as the Niger Delta Volunteer Force. Boro instructed these men to use firearms and explosives while hiding in the underbrush and creeks. On February 23, 1966, the men attacked a police headquarters in Yenagoa, where they stole weapons, ransacked the building, and took a few officials, hostage.

They set off pipeline explosions, engaged the authorities in gunfights, and declared the Niger Delta an independent republic. The resistance was put down in any case, and Boro and his men were sentenced to death for their part. During the 1990s, Ken Saro-Wiwa led a more peaceful campaign for compensation for environmental damage caused by oil drilling and a more prominent cut of oil incomes. Despite this, the state assassinated Saro-Wiwa and his associates because they caused excessive civil unrest. Various political movements and activists have arisen in opposition to the apparent treacheries executed upon individuals of the Niger Delta by the oil companies and the government. Pipeline vandalism in the Niger Delta can be traced back to the advancement of a confrontational struggle for asset control in the area (Adeyemo and Olu-Adeyemi, 2009). Generally speaking, these were peaceful, but in Saro Wiwa's footsteps came other people who, having witnessed the public authority's response to peaceful activism, embraced viciousness as a means of defence against what they saw as the oppression of their family. One activist from the Niger Delta was quoted in Ebiri and Onakemu's (2016) article as saying, "what the people of the Niger Delta have ever desired is to have the right to access our God-given resources to grow at our speed, live in our clean and quiet riverine and mangrove environment." Therefore, the activities of militants beginning around 1999 were primarily political activities directed directly against the Nigerian state and multi-national oil organizations to bring more significant awareness to the ecological degradation occurring in the Niger Delta district (Njoku, 2016). There have been a few instances of pipelines being vandalized due to the return of militant activity in the Niger delta district, led, for example, by the Niger Delta Avengers. According to the information

provided by Abia (2016), "the operations of the Niger Delta Avengers have cut the nation's oil production by 800,000 barrels each day, a disheartening condition in a period in which the economy is doing poorly." According to Onyibe and Ejim (2016), "Shell and Chevron have lost more than fifty per cent of their production capacity as a result of the ongoing besieging of their oil installations by the militants."

Youth Unemployment

Young individuals in Nigeria with some education level are underrepresented in the labour force. As a result, the unemployment rate increased from the previous quarter's 13.9% to the current quarter's 14.2%, as the National Bureau of Statistics reported in 2016. This represents a significant increase (NBS, 2017). As a result, pipeline sabotage, oil robbery, and oil bunkering could ordinarily become a method for monetary subsistence in light of the prevailing monetary challenges that Nigeria is currently experiencing in conjunction with the make-easy-money condition.

Corrosive Pipelines and Insecurity

There are flow lines and pipelines that total over 6000 kilometres in length. However, due to the dangerous terrain, inadequate labour force, and inadequate logistics, policing the large length of the pipelines and the other oil installations has proven to be extremely challenging. Similarly, many of the pipelines utilized in the transportation networks have reached the end of their useful lives due to their advanced age and prolonged exposure to harsh environmental conditions. Consequently, these pipelines are now extremely vulnerable to damage from perforations, breakage, and exposure to criminals, all with the sole intention of wreaking financial havoc and stealing petroleum products.

Activities of Illegal Refineries

Despite being illegal, there are refineries in Nigeria, specifically in the Niger Delta region. These illegal treatment facilities, often known as "bush" or "artisanal" refineries, are the key places that have enabled the vandalism of oil pipelines. The Nigeria Security and Civil Defense Corps has maintained that during 2015 and 2016, it discovered and demolished 250 illegal oil processing plants and successfully prosecuted 40 criminals out of 118 captured in the Niger Delta district (Premium Times, 2016). While

the 'illicit' treatment facilities declare the Nigerian's resourcefulness and inventive capacity to develop, despite the difficulties of his financial climate, one is at an impasse about whether to denounce this 'inventiveness', obviously, in the high-level social orders where human resources are valued. Although advancement is praised, such inventiveness, as displayed by administrators of the alleged illicit processing plants, would make up the basis of innovative development rather than being condemned.

International Dimension of Pipeline Vandalism in Nigeria

Njoku (2016) states, *"there is undoubtedly the worldwide element of pipeline vandalizing and oil robbery in the Niger Delta area, which serves as the primary hub for Nigeria's oil sector."* As a result, the illegal practice of oil bunkering has developed into a significant financial activity. As a result, this has resulted in the formation of a convoluted organization in the Niger Delta, which includes the activities of oil criminals, pipeline hoodlums, and illegal oil bunkers. In order to get raw petroleum that may be sold to oil companies on the global market, many nefarious individuals engage in criminal activities such as vandalizing pipelines and stealing oil.

2.6.2 The Effects of Oil Pipeline Vandalism

The impacts of pipeline vandalism in Nigeria are complex. Major impacts include gigantic financial misfortunes from pipeline and plant closures, degradation of the environment, fire epidemics typically bringing about loss of lives, community displacement and the interruption of the biological system. Other indicators are the shortage of oil-based commodities, just as abatement in gas supply for electricity generation.

Economic Loss

The theft of oil and destruction of pipelines has resulted in an increasing loss of revenue for the government. The financial setbacks can be broken down into three categories: the money-related worth of items lost, the expenditure of closing down a plant, and the cost of repairing the pipes. In February 2016, it was reported that the NNPC had a running deficit of roughly N24.23 billion; however, in March of that same year, the report stated that the corporation had announced a loss of N18.89 billion. *"a severe decline in export sales attributable mostly to the shut-in of around 300,000 barrels of crude oil*

at Forcados Terminal following force majeure issued by Shell on February 15, 2016" was cited as the source of NNPC's financial losses. This explanation was provided in an accounting statement. According to Eboh (2016), who was very definitive about the matter, Nigeria reportedly *"lost N12.566 billion in one month, that is, March 2016, due to the theft of petroleum products and vandalism of the facilities of the NNPC."*

Environmental Degradation

The vandalism of pipelines has led to a high frequency of oil spills, which has, in turn, led to the contamination of the environment and the disruption of the biological system in Nigeria for a longer period. Oil spills threaten all forms of life, including vegetation and aquatic bodies, due to the chemical components of the spill, which can also contaminate groundwater and soil. In addition, these lingering remnants on the surface of the ground might impede the development of yields and create severe bushfires anytime they are kindled.

According to a projection made by Amnesty International (2011), "oil spill accounts for as many as 546 million gallons of oil into the ecosystem of the Niger Delta over the last five decades." This is the equivalent of approximately 11 million gallons being spilt every year. In addition, the comprehensive evaluation report that UNEP conducted in 2011 on environmental injustices in Ogoniland and the Niger Delta revealed several problems, which are elaborated upon in Section 2.8 of the report.

Fire Disasters/Pipeline Explosions

This has been the single most horrifying indicator of the effects that the sabotage of oil pipelines in Nigeria will have. During the previous 15 years, explosions caused by vandalism to pipelines have claimed the lives of more than 2,000 people. The explosion of a pipeline in Jesse in 1988, which claimed the deaths of more than 1,000 people, and the explosion at Atlas Cove in Lagos, which claimed the lives of 500 people, are two unique examples of this danger. In certain instances, the detailed statistics of setbacks suffered due to fire episodes were not provided, and in other instances, the specifics of some incidences were not specified. When these acts of vandalism are committed, vulnerable residents close by, innocent communities, and homes close to these facilities suffer the effect of fire epidemics if these oil-based products are ignited on fire. After one of these explosions, there may be injuries, orphans, and

property loss. Moreover, the fires resulting from these explosions can linger considerably. The problems caused by the oil pipeline have resulted, among other things, in the loss of a population's source of income, the migration of that population, the destruction of family resources, and the pollution of the natural environment.

Loss of Foreign Direct Investment

The current policy engagements of some international oil companies about the divestment of their holdings in Nigeria have been added to by the vandalism committed against pipelines and the theft of oil resources. As an illustration, it was documented that in 2014, Shell decided to dispose of four of its oil fields in Nigeria. Furthermore, according to the Financial Times, cited in Salau (2014), Shell decided in June 2013 to declare "a strategic review of its operations in Eastern Niger Delta, which could result in the divestment of its interests there." This review could lead to the sale of Shell's interests in the region. In addition to this, it was stated that Shell "to have been shifting away from Nigerian onshore oil, which is beset by industrial scale oil theft, security concerns, and oil spills." The diversion of investment by certain multinational oil firms functioning in Nigeria has serious repercussions for the country. In any event, it causes a reduction in the number of production activities taking place in the oil industry of Nigeria's economy, which, in turn, lowers the amount of money being added to the national treasury. In addition, it results in the flight of capital, which causes problems in the large-scale economic operations it affects. Thirdly, it results in a significant decrease in the number of jobs held by Nigerians in the oil industry, depriving these people of how they could otherwise make a living. According to the information provided by Yusuf (2016), the total number of jobs lost by Shell and Chevron across Nigeria and the other countries in which these two multinational corporations operate was around 23,500.

2.7   Pipeline Ruptures

The bursting of pipelines is another major disaster that can occur with pipelines. Pipelines that burst pose significant dangers to people's lives, their property, and the environment. The majority of the pipeline installations appear to have ruptured as a direct result of inadequate maintenance and surveillance, which in turn leads to the corrosion of these pipelines (Onuoha, 2008). Corrosion leads to

pipe leakage, resulting in oil spillage in the region. There is a vast network of pipelines in the Niger Delta; thus, this problem is likely to occur (Onuoha, 2009). Furthermore, several pipelines are at risk of rupturing in the onshore regions because they are above ground (Onuoha, 2007). In addition to this, because these pipelines do not receive the necessary maintenance and are used beyond their lifespans, typically for 15 years, they become susceptible to corrosion, which can finally lead to rupture (Onuoha, 2009).

2.8   UNEP Report on Environmental Pollution of Ogoniland

In response to a request from the government of Nigeria, this report was created with the assistance of UNEP. This particular report was selected for our investigation because it is representative of one of the most difficult on-the-ground evaluations the UNEP has ever conducted. It offers the best available understanding of what has happened to the environment of Ogoniland and the accompanying consequences for the populations harmed due to oil industry operations that have taken place over several years. It provides critical and fundamental information to the government, the stakeholders, and the international community on the scale of the challenge and the priorities for clean-up and restoration. The assessment lasted for two years, bringing together a team of national and internationally recognized experts guided by a collaboration framework to ensure interdependence and that all necessary logistics are provided.

Throughout their 14 months of work, the UNEP team conducted over 200 separate investigations, reviewed 122 kilometres of pipeline rights of way, analyzed over 5,000 medical records, and hosted local community forums attended by over 23,000 people. In addition, extensive tests for soil pollution were performed at 69 separate sites. Water from 142 groundwater monitoring wells drilled for the project and soil samples collected from 780 boreholes were among the over 4,000 samples analyzed. In addition, many groundwater monitoring wells were dug for the research. The report's findings highlight dangers to human health, such as contaminated water supplies and worries about ecosystems' continued viability and production. Pollution of the environment and human activity both contribute to these dangers. In addition, it is possible that the pollution has spread further and permeated deeper than many people had previously believed.

The samples were gathered using protocols for sample handling that are recognized globally, and they were sent for analysis to laboratories in Europe that are accredited according to ISO 17025 standards. The analytes that were analyzed for this study comprised specific groups of hydrocarbons that are known to have negative effects and are, as a result, dealt with selectively during assessing and cleaning up oil spills. The most significant is called BTEX, consisting of benzene, toluene, ethylbenzene, and xylenes. In addition, PAHs also play a significant role (polycyclic aromatic hydrocarbons). The UNEP studies on air quality focused mostly on volatile organic compounds, or VOCs.

The fieldwork was supplemented by in-depth analysis using remote sensing data. In order to finish the study, specialists from around the world examined laws and organizations, as well as the procedures used in the oil business and the many technologies available for environmental cleanup.

2.8.1 Findings

Ogoniland is plagued by widespread contamination, which deleteriously affects various environmental factors. The Ogoni people are forced to endure this pollution daily. Any delay in cleaning up an oil spill in Ogoniland, which experiences high rainfall, results in the oil being swept away, travelling across farmland, and almost often ending up in the creeks. As the oil penetrates the root zone of crops and other plants, the plants begin to show signs of stress and may ultimately perish, which Ogoniland regularly sees. The research discovered substantial contamination at one location, Ejama-Ebubu, in the Eleme local government area (LGA), although clean-up efforts had been made numerous times over the past four decades since an oil spill had occurred there. According to the evaluation findings, environmental management on the ground, particularly enforcement, is negatively impacted by overlapping authority and responsibilities between ministries and a lack of resources within key agencies. This has major repercussions.

In the past two years, remote sensing has shown a dramatic increase in the prevalence of artisanal refining, which refers to distilling crude oil in improvised facilities. According to the study's findings, this unlawful activity is putting people's lives in danger and is responsible for pockets of environmental destruction in Ogoniland and nearby communities.

2.8.2 Contaminated soil and groundwater

i. The report's findings indicate that soil pollution in Ogoniland caused by petroleum hydrocarbons is widespread throughout land areas, sediments, and swampland. Even though contamination from the refined products was only found at three locations, crude oil is responsible for most of the contamination.

ii. The evaluation found that no clay layer is continuous across Ogoniland. This leaves the groundwater in Ogoniland (and beyond) vulnerable to contamination from hydrocarbons spilt on the surface. The UN Environment Program found hydrocarbons in the soil at depths of at least 5 meters in 49 different occurrences. This result has significant repercussions for the type of remediation that will be necessary.

iii. The level of soil contamination at two-thirds of the contaminated land sites close to oil industry facilities subjected to a comprehensive evaluation was higher than the Nigerian national standards outlined in the Environmental Guidelines and Standards for the Petroleum Industries in Nigeria (EGASPIN).

iv. Hydrocarbon pollution has reached the groundwater at levels higher than the standards of Nigeria per the EGASPIN regulation. This has occurred at 41 different sites.

v. The most serious instance of groundwater contamination is at Nisisioken Ogale in Eleme Local Government Area (LGA), close to a product pipeline owned by the Nigerian National Petroleum Company. An eight-centimetre layer of refined oil was found floating on the groundwater that supplies the community wells.

2.8.3 Vegetation

i. As a result of oil pollution in many intertidal streams, mangroves have lost their leaves and stalks, and their roots are now covered with a bitumen-like substance that can be up to one centimetre thick in places. The widespread contamination of these regions harms the life cycle of fish since mangroves are nurseries for juvenile fish and breeding grounds for adult fish.

ii. Any crops grown in regions immediately impacted by oil spills would sustain harm, and root crops like cassava will become unusable. In addition, when farming operations are restarted,

plants frequently exhibit symptoms of stress, and it has been found that yields are lower than in areas that were not harmed.

iii. When an oil spill happens on land, fires frequently break out, which kills the vegetation and creates a crust over the soil, which makes it impossible to clean up the spill or replant new vegetation.

iv. Even several decades since the dredging operation, the enlarged channels and the dredged debris that resulted from it are still easily discernible in satellite pictures. In addition, former mangrove regions that have been cleared and left barren are at risk of being taken over by non-native plants and animals, such as the nipa palm, if the land is not properly rehabilitated (which appears to be more resistant to heavy hydrocarbon pollution than native vegetation).

v. An increase in artisanal refining in Bodo West, located in the Bonny Local Government Area (LGA), between 2007 and 2011 was accompanied by a loss of healthy mangrove cover of 10%, or 307,381 m². If nothing is done to stop it, this could result in the irreparable destruction of the mangrove environment in this region.

2.8.4 Aquatic

i. The UNEP examination discovered that the surface water in all the creeks contains hydrocarbons. There are varying thicknesses of black oil and sheens present in the floating layers of oil. Ataba-Otokroma, located on the boundary between the Gokana and Andoni Local Government Areas (LGAs), had the highest value of dissolved hydrocarbon in the water column, which was 7,420 g/l.

ii. Fish tend to shift away from polluted places in search of cleaner water, so fishermen have to move to less polluted locations to find fish to catch. When fishermen were found in locations known to be polluted, they claimed they went to fishing grounds further upstream or downstream.

iii. The results suggest that the accumulation of hydrocarbons in fish is not a severe health hazard in Ogoniland, despite the community's concerns about the quality of the fish. However, results also suggest that the fisheries industry is suffering due to the degradation of fish habitat in the

mangroves and the very persistent contamination of many of the creeks, making them unfit for fishing.

iv. In areas where many businesspeople have established fish farms in or adjacent to the creeks, such farms have been rendered unprofitable due to a persistent coating of floating oil.

v. The wetland ecosystems surrounding Ogoniland have suffered severe degradation and are in danger of disappearing entirely. According to the study's findings, it is conceivable to restore the effective ecological functioning of the wetlands in a technically feasible way; however, this will only be accomplished if both technical and political initiatives are undertaken.

Plate I. A polluted site in Ogoniland (DW, 2022)

2.8.5 Public health

i. Members of the Ogoni community are sometimes subjected to higher-than-normal amounts of petroleum hydrocarbons in the air outside and in the water they drink. They are also put at risk when they come in contact with toxic soil, sediments, and surface water through their skin.

ii. Considering that Nigeria has an average life expectancy of fewer than 50 years, it is reasonable to assume that most people in the current Ogoniland community have been exposed to persistent oil pollution.

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iii.   Residents of Nisisioken Ogale are drinking water from wells tainted with benzene, a proven carcinogen, at levels that are more than 900 times higher than the guideline established by the World Health Organization (WHO). This is the most immediate cause for concern. According to the research findings, this contamination requires immediate action before subsequent cleanup attempts.

iv.   The water obtained from 28 wells in 10 villages next to polluted sites was contaminated with hydrocarbons. At seven different wells, the samples have concentrations at least 1,000 times higher than the Nigerian drinking water threshold of 3 μg/l. Local populations are aware of the pollution and its dangers, but many have stated that despite this knowledge, they would continue to use the water for drinking, bathing, washing, and cooking because they do not have any other option.

v.   Benzene was found in every air sample, ranging from 0.155 to 48.2 micrograms per cubic meter. One-tenth of one per cent of the benzene concentrations found in Ogoniland were higher than the levels that the World Health Organization and the United States Environmental Protection Agency (USEPA) report as equivalent to a one in ten thousand chance of developing cancer. Due to the widespread use of fuel and several other sources of benzene, many of the benzene concentrations found in Ogoniland were comparable to those measured in other parts of the world. However, the data indicate that some benzene concentrations in Ogoniland were greater than those tested in more economically developed locations, where efforts are being made to decrease benzene exposure, and benzene concentrations are falling.

Plate II. Photo of Community members trying to scoop crude oil out of the water in Opuama (International Policy Digest, 2022).

2.8.6   Institutional issues

i.   From its original publication in 1992, the EGASPIN has served as the operational framework for environmental control in Nigeria's oil industry. However, this vital regulation is internally inconsistent regarding one of the most crucial requirements for managing oil spills and contaminated sites. Specifically, the criteria that either prompt remediation or indicate its closure are internally contradictory (referred to respectively as the "intervention" and "target" values).

ii.   This research shows that EGASPIN is interpreted differently by the Department of Petroleum Resources (DPR) and the National Oil Spill Detection and Response Agency (NOSDRA). Because of this, the oil business can call off the cleanup operation long before the soil has been sufficiently cleaned up to be habitable by humans, animals, and plants again.

iii. The government agencies in Nigeria that are involved do not have sufficient resources or skilled technical specialists. Given that limited resources have been provided to NOSDRA in the five years since its establishment, the organization lacks any proactive capacity for oil spill detection. As a result, the regulatory authority completely relies on the oil sector to provide logistical support when planning inspection visits to certain oil spill sites.

iv.   The Ogoni community and the oilfield in Ogoniland are inextricably linked to one another. One sign that the pipeline operator and the government regulator have lost control is that communities have set up residences and farms along the rights of way.

v.   The UNEP project team visited an abandoned sand mine in Oken Oyaa in the Eleme Local Government Area, where they found hundreds of industrial packing bags containing between 1,000 and 1,500 m^3 of debris. The team believes the waste to be cut from oil drilling activities. However, the fact that such trash is being disposed of in an open pit with no liner reveals that the local chain of custody between the waste generator, the waste transporter, and the disposal facility is not followed.

2.8.7   Oil industry practices

i.   The study's findings indicated a lack of adequate control, maintenance, and decommissioning of oilfield infrastructure in Ogoniland. Public safety problems have arisen due to the lack of application of industry best practices and SPDC's processes.

ii.   Remediation by enhanced natural attenuation (RENA), the sole remediation technique seen by UNEP in Ogoniland until now, has been ineffective. Therefore, at the moment, SPDC only uses this method on the surface layer of the land since it operates under the presumption that, due to the characteristics of the oil, the temperature, and the presence of an underlying layer of clay, hydrocarbons will not go deeper. However, this fundamental premise cannot be maintained

because investigations made by UNEP demonstrate that contamination can frequently penetrate deeper than 5 meters and has already entered the groundwater in many different sites.

iii. Ten out of the fifteen analyzed sites, which SPDC records show as having completed cleanup, continue to have higher pollution levels than the remedial closure values established by SPDC (and the government). In addition, according to the investigation findings, the contamination originally identified at eight sites has now spread to the groundwater.

iv. In January 2010, all Shell Exploration and Production Companies in Nigeria implemented a new Remediation Management System. However, according to the study's findings, even though the recent alterations represent an advancement, they do not yet comply with the standards set forth by the regional regulatory authorities or the worldwide community.

According to the results, it is conceivable to restore Ogoniland's ecosystem, but it could take up to 25–30 years. The paper provides some suggestions that, once put into action, will have an immediate and favourable effect on Ogoniland. These recommendations have longer timeframes and will result in more long-lasting improvements for Ogoniland and Nigeria.

The hydrological link between contaminated land and creeks has significant repercussions for the order in which the cleanup procedures will be carried out. It is pointless to begin cleaning up the creeks before the contamination on the land has been addressed because it will not solve the problem.

2.9 Corporate Social Responsibility and Role of IOCs in Community Engagement

Corporate social responsibility (CSR) refers to the ethical and responsible behavior of companies towards society and the environment (Tillotson et al., 2023; Spence, 2011). International oil companies (IOCs) play a significant role in community engagement through their CSR initiatives (Amadi, 2020). These initiatives involve investments in education, training, peacebuilding programs, and community development projects.

Research indicates that IOCs operating in Nigeria's Niger Delta region have faced challenges in implementing effective CSR practices (Lugard, 2014). Stakeholders in the region have high expectations regarding the social engagement of these companies. However, there have been

frustrations and dissatisfaction among communities regarding IOCs' engagement and CSR activities. Local governments also have limited involvement in these activities.

Despite these challenges, IOCs recognize the importance of community involvement and sustainability. They integrate CSR into their corporate strategies, emphasizing environmental stewardship and social development. These companies invest substantial resources in community projects, aiming to address social, economic, and environmental issues (Lugard, 2014).

However, it is crucial to ensure that CSR initiatives are not merely token gestures but are genuinely impactful and address the needs and expectations of the communities. Stakeholder engagement and collaboration are essential in designing and implementing effective CSR programs. By actively involving local communities, governments, and other stakeholders, IOCs can better understand the community's needs and implement initiatives that create long-term sustainable development (Amadi, 2020).

In conclusion, IOCs have a significant role to play in community engagement through their CSR initiatives. However, there is a need for continuous improvement and effective collaboration with stakeholders to ensure that these initiatives are meaningful, address community expectations, and contribute to sustainable development.

2.10   Chapter Summary

This chapter was centred majorly on the Nigeria oil and gas industry and pipeline disasters in Nigeria. The cases of significant oil pipeline disasters obtained from the existing literature were presented in this chapter. Findings revealed that there were about 40 recorded incidents of oil pipeline disasters within the period, with thousands of lives lost as a result. Causes and effect of pipeline disasters in Nigeria were also presented in this chapter, especially the human and environmental effects. UNEP report of Ogoniland was utilised in explaining the environmental aftermath effects of oil spills/disasters.

CHAPTER THREE

THE STAKEHOLDER THEORY AND REVIEW OF DISASTER MANAGEMENT FRAMEWORK

3.0   Introduction

This chapter encompasses the concept of stakeholder and introduction to stakeholder collaboration. Various forms of collaboration and previous considerations of collaboration in disaster management were also presented in this chapter. Thereafter, current state of multi-stakeholders collaboration in Nigeria was explained. The chapter concludes with roles of stakeholders in disaster management

3.1   Concept of Stakeholder

There is no such thing as an island that is devoid of associations. Each one is constructed from an internal organizational structure, and it lives within a framework consisting of interconnected organizational structures of associations with essential partners such as competitors, benefactors, purchasers, controllers, and the media, amongst others. Certain organizations might prefer to believe they are extremely well-prepared and have all the necessary resources for their continued existence. In reality, such an outlook is extremely detrimental to the cause of progress. Creating value for customers is the ultimate goal of every business (Grant, 2002), and in order for a company to achieve this goal, it cannot ignore the environment in which its employees perform their jobs. In practical terms, an organization of relationships serves as an interface between the organization and many interconnected groups of people and constituents, referred to as stakeholders (Freeman, 1984; Post et al., 2002). As a result, these relationships affect how an organization is represented and are impacted by the company's behaviour. More profoundly, Post et al. (2002) emphasize that "the limit of a firm to create supportable abundance after some time, and consequently the firm's value over time, is dictated by its associations with basic stakeholders" and that any stakeholder relationship could be the most basic one at a specific time or on a specific issue.

The term "stakeholder" can refer to various things depending on the context (Mitchell et al., 1997). As a result, providing a depiction or meaning of who exactly a stakeholder is has been a big challenge for scholars (Phillips and Reichart, 1998). Depending on the researcher (Starik, 1994; Freeman and Reed, 1983), a stakeholder might be referred to as a vested party, petitioner, powerhouse, or constituent.

Regardless of this, to accomplish the purpose of this assessment, which is to identify the most important stakeholders working within the NOGI effectively, it is very necessary to define the term "stakeholder" (Fassin, 2009).

According to Freeman (1984, p.46), a stakeholder *is "any gathering, association, or person who can affect or is impacted by the attainment of the association's aims."* In other words, a stakeholder can affect the association's success. This concept suggests a reciprocal relationship between the association and its constituents (Hillman & Keim, 2001), with the latter being crucial to achieving the former (Minoja, 2012). Concerns have been raised over whether associations should consider the requirements of all stakeholders or should focus only on those crucial to realizing their mission (Friedman and Miles, 2006). Schiller et al. (2013) argued that this definition broadens the scope of what constitutes an association's stakeholder group beyond the representatives, clients, investors, community, and suppliers identified by Cummings and Patel (2009) as the most fundamental stakeholders who might affect the achievement of an association's vision.

The term "stakeholder" was coined by a group of academics who defined it as "an individual or gathering whose assistance is significant to the overall existence of an association, corporation, or organization" (Bowie, 1988). According to Freeman and Reed (1983), any organization that fits into this category should be deemed dependent on influential individuals or groups for its continued existence. This is because these groups are the primary source of the organization's resources. In contrast to this point of view, Rhenman (1964) said that individuals or groups must rely on the association for their well-being to survive. Regardless, different viewpoints' contribution to this analysis is significant because they reliably highlight a dependent "connection" among the various stakeholders. This further suggests that an association and its stakeholders must depend on each other for the organization's sustenance. Correspondence among stakeholders, including efforts and technicalities in intelligence collecting and information exchange, as well as value creation activities, is an issue this viewpoint raises going forward (Harrison et al., 2010; Bosse et al., 2009).

As a result of these definitions, it is possible to deduce that a stakeholder is a person, a group of people, or an organization that contains any concomitant factors, including interest and influence. However, Mitchell et al. (1997) argued that the abovementioned considerations would potentially disqualify some

stakeholders. Following this, authors have suggested that the identification of stakeholders should be based on the ownership of any or all of the following characteristics as a whole: the ability of the stakeholder to affect the company, the authenticity of the stakeholder, and possibly even a guarantee of the stakeholder's sincerity. When a stakeholder theory is accepted in this manner, it demonstrates that partners have a legal claim, a stake or an interest in each other, or the potential to affect one another. Thus, an organization and its constituents must be conceptualized as a group capable of participating appropriately (Polonsky, 1999). Stakeholders such as customers, employees, and investors directly related to an association can undoubtedly withdraw their contributions. However, others, such as non-governmental associations and the population whose contribution does not directly impact the organization, firm, or association, will regularly involve the use of force (Phillips, 2003). Along these lines, this study needs to research the characteristics that define a stakeholder.

3.2 Stakeholder Theory and Stakeholder Management

Many definitions of stakeholders, according to Hillman and Keim (Hillman & Keim, 2001), imply that the organization and its stakeholders are interconnected and that the organization's goals can only be fulfilled with the assistance and support of its stakeholders (Minoja, 2012). The Stakeholder Theory is based on a consensus framework for reducing risk and increasing value through collective efforts involving all relevant parties. It claims that other groups, even if they are not shareholders, should be considered important and brought into the evaluation process to determine how effectively a company provides its services.

This process of integrating stakeholders includes, first and foremost, a reliable and precise identification method (also known as "the normative theory of stakeholder identification") and, second, an efficient engagement strategy (the instrumental stakeholder approach) (Phillips, 2003). The concept of stakeholders depicts the relationships between the many different groups of actors inside and outside the company. The ethical and moral standards organizations should uphold another aspect addressed by stakeholder theory. According to Roloff, stakeholders, which include representatives from business, civil society, and governmental or international institutions, should come together to find a common

solution to a problem that affects all of these groups and is too complex to be effectively addressed without the involvement of multiple parties (Roloff, 2008).

Stakeholder management refers to the process of identifying, analyzing, engaging, and managing stakeholders to ensure their needs and expectations are considered and addressed throughout a project or initiative (Granville et al., 2016). One may argue that the framework for stakeholder participation in the petroleum industry is more well-established and defined in developed countries. Given this argument, it is puzzling that applying the Stakeholder Theory in Nigerian oil pipeline disaster management and mitigation has not received more attention in the existing literature.

Stakeholders in the context of the present study are individuals, groups, or organizations that have an interest, influence, or are affected by oil pipeline disasters in Nigeria.

Stakeholder management in the context of oil pipeline disaster management refers to the process of identifying, prioritizing, and engaging with individuals, groups, or organizations that have an interest, influence, or are affected by pipeline disaster management initiative or project. It involves maintaining positive relationships, ensuring their needs and expectations are considered, and addressing any concerns or conflicts that may arise.

In achieving this, the following steps according to CERC (2014) and MindTools (2023) are required;

   i.   Identification: the first step is to identify the stakeholders involved in the disaster management initiative. This includes both internal stakeholders, such as government agencies, emergency responders, and NGOs, as well as external stakeholders, such as affected communities, local businesses, and media organizations.

   ii.   Prioritization: once stakeholders are identified, they need to be prioritized based on their level of influence, importance, and potential impact on the disaster management initiative. This helps allocate resources and attention appropriately.

   iii.   Engagement and Communication: effective stakeholder management involves establishing open and transparent communication channels with stakeholders. This includes regular updates, consultations, and feedback mechanisms to ensure stakeholders are informed and have opportunities to provide input.

iv. Needs and Expectations: stakeholder management requires understanding and addressing the needs, expectations, and concerns of stakeholders. This involves actively listening to their feedback, considering their perspectives in decision-making processes, and managing any conflicts or issues that may arise.

v. Relationship Building: building positive relationships with stakeholders is crucial. This includes establishing trust, demonstrating transparency, and actively addressing stakeholder concerns. Strong relationships can lead to increased support, collaboration, and successful disaster management outcomes.

vi. Monitoring and Evaluation: stakeholder management is an ongoing process that requires continuous monitoring and evaluation. This involves assessing stakeholder satisfaction, tracking changes in stakeholder needs and expectations, and adjusting strategies and actions accordingly (MindTools, 2023).

By effectively managing stakeholders in the context of disaster management, organizations can enhance coordination, collaboration, and the overall success of their disaster management initiatives.

3.3 Stakeholders' Collaboration

The English term "collaboration" is derived from the Latin word *"collaborare,"* which can be translated as "to collaborate" (Briggs, et al., 2006). The Latin term *"collaborare"* derives from the Latin words *"labore",* which means "to work", and *"com",* meaning "with". This means that collaborative activities are done as a group rather than solo. According to Briggs et al. (2006), collaboration can be defined as "an endeavour to find solutions through group efforts and to turn a situation in which people would typically act separately into one in which they work together to accomplish shared purposes." Given the subject matter, it is possible to argue that collaboration is best described as "an endeavour to find solutions through group efforts." The process of working together involves the establishment of standard operating procedures and organizational frameworks that govern the character of the connection and the conduct of the businesses involved.

The process of entities sharing information, resources, and duties to collectively plan, implement, and assess a program of activities to attain a common objective jointly is called collaboration (Camarihna-

Matos & Afsarmanesh, 2008). Himmelman stated that to accomplish a shared objective; parties should collaborate by exchanging knowledge, modifying efforts, sharing resources, and cultivating the potential of one another in order to achieve a mutually beneficial purpose (Himmelman, 2001). Camarihna-Matos and Afsarmanesh explained, with the help of a diagram, the relationship between the ideas of networking, coordinated networking, cooperation, and collaboration, as well as the differences between the four concepts (Camarihna-Matos & Afsarmanesh, 2008). As illustrated in the model (Figure 3.1), cooperation was placed one step farther ahead than the other four ideas since it includes common objectives, identities, and responsibilities achieved by all individuals working together.
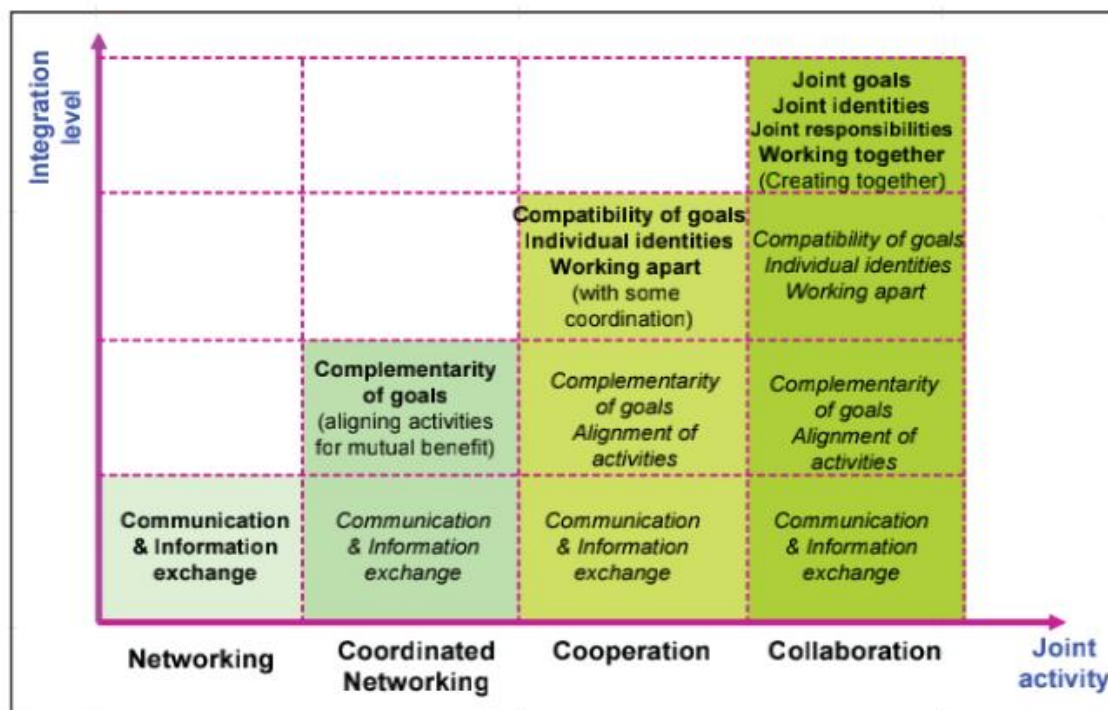
Figure 3.1 Examples of Joint Endeavour (Camarihna-Matos & Afsarmanesh, 2008)

Most of Nigeria's problems, from the economic to the political to the social to the educational to the religious to the technological, would benefit from international cooperation. Hence, some policymakers and government officials have urged for greater coordinated efforts to bring about a more long-term developmental endeavour, including: minimizing the threat that Boko Haram poses to the lives and security of the country (Mustapha-Koiki, 2019; Usman, 2014); preventing the theft of oil and the vandalism of pipelines (Premium Times, 30th December 2019); advancing scientific and technological knowledge; increasing economic growth; and so on.

Long-term expansion of the oil industry and the rest of the economy would be possible if Nigeria's officials could formulate an effective plan for the country's future using the information presented here regarding the advantages of collaborating with other stakeholders and even other stakeholders' nations.

3.3.1   Forms of Collaboration

The act of working together with others can be accomplished in a variety of ways. The term "public-private partnerships" more commonly refers to "social partnerships," which are ad hoc alliances comprised of traditionally independent organizations from both the public and commercial sectors (Scott, 2022). Examining patterns, making suggestions for alternative future scenarios, and establishing ideas and goals for the community are the focuses of forums (also known as search conferences). These future initiatives may include electronic networks that use computer networks to connect different civic, educational, commercial, and governmental entities in a neighbourhood or area, as well as school-community partnerships, in order to enhance social services for children, families, and other community members (Scott, 2022).

3.3.2   The Need for Collaboration

The collaborative approach provides many potential benefits, provided it is investigated thoroughly. Following the National Environmental Policy Act (NEPA, 2007), the following are some of the many advantages of this law. This list, however, is not exhaustive:

i.   More Accurate Information: a collaborative group can reach a more well-informed consensus and provide direction to decision-makers if they bring together various experts to discuss the issue. Similarly, collaboration inspires creative thinking by creating a variety of perspectives, transparency, and openness, all of which can lead to better judgments that are more informed (Olaniyan, 2015).

ii.   A more Equitable Process: successful collaboration entails the participation of the parties concerned in a given issue, the vast majority if not all. Consequently, those with vested interests, particularly those from historically disadvantaged or under-represented groups, are more likely to be requested to participate.

iii. Improvements in Integration and Coordination: cooperation can increase party integration and coordination since it emphasizes sharing ideas, viewpoints, and resources. Utilizing the multidisciplinary framework provided by NEPA, for instance, can enable government agencies to simplify the process of conducting multiple assessments and analyses that are linked to a variety of legal or permitting requirements, thereby reducing wait times and increasing the degree of predictability (Emerson & Baldwin, 2019)

iv. Conflict Prevention: when parties collaborate, they frequently avoid or at least decrease the impact of future conflict by addressing issues as they occur. This can be accomplished by working together to handle existing problems.

v. Social Capital: using collaborative tactics builds trust among individuals who will work together on future projects, encourages the formation of partnerships, and increases the public's confidence in the government.

vi. Easier Implementation: the process of putting a decision into action can be simplified through collaborative efforts. Those stakeholders with a vested interest in the outcome of a decision will also have a vested interest in how the decision is implemented. In addition, their decisions regarding monitoring, enforcement, and other topics may benefit from the lessons they have learnt during the collaboration process.

vii. Collaboration has the potential to improve environmental responsibility by fostering mutual understanding and cooperation, which in turn may encourage better stewardship of both people and the resources of the environment.

viii. There will be fewer litigation instances due to key stakeholders being included early on, problems being solved at the most fundamental level feasible, and parties agreeing. Collaborative efforts can reduce the risk of litigation. Even if legal action is taken, a collaborative approach could assist in alleviating some of the worries and make the situation more amicable.

It is impossible to stress the importance of working together in Nigeria. According to Lawal and Oluwatoyin (2011), additional developmental plans that the Nigerian government attempted but were unsuccessful include the following: the Operation Feed the Nation Green Revolutionary Program; the

Structural Adjustment Program; Vision 2010; the National Economic Empowerment and Development Strategy; and the Seven-Point Agenda by previous administrations. The government's developmental measures have been unsuccessful up to this point because of corrupt officials, non-involvement on the part of stakeholders, the country's mono-economic base, and poor leadership.

This global village we now live in makes it imperative that nations work together to ensure their success. According to Lawal and Oluwatoyin point of view, the most effective way for Nigeria to move forward is for the country to model its developmental successes after those of Asian nations. However, Nigeria will need full commitment from its leaders, stability and the continuation of its existing programs (Lawal & Oluwatoyin, 2011).

3.4   Interagency Collaboration

Various security agencies (including the military, paramilitary organizations, and private security organizations) must work together effectively to achieve better results at cheaper costs, a form of interagency collaboration. This partnership strives to strengthen national security (Salome, 2019). In addition, it is a method by which companies can combine their assets to serve a common purpose better while sharing the risks, responsibilities, and benefits of doing so.

Researchers such as (Eme, 2018; Ogbeide, 2011) feel that interagency collaboration is a cure for all of society's problems; nevertheless, they do not pay enough attention to the factors that determine its influence, including its causes, barriers, and challenges.

Cooperation between different agencies is not a novel idea within the context of the management discipline. The early proponents of administrative theory emphasized the importance of collaboration and coordination between agencies and among them. The landscapes of public administration in several prosperous countries have recently witnessed a comeback in the spirit of collaboration. Numerous different terminologies have characterised the systems that focus more on a horizontal orientation in governance than a hierarchical one. Networks and partnerships are included in this category, as well as interagency, multiagency, inter-sectoral, cross-border, and joined-up government, as well as the whole-of-government approach. In academics, there is still much doubt surrounding how to define

collaboration correctly and put it into reality (Warmington et al., 2004). Because of the complexity of the topic, academics cannot investigate all of the alternatives.

In order for an organization to gain an advantage from working collaboratively with other organizations, it must first collaborate with those organizations in order to build something new that no single organization could have produced on its own and to accomplish its goals more effectively than it could have done so on its own.

When two or more businesses work together to achieve a common goal, each organization must be able to do it more efficiently than it could on its own for the cooperation to succeed. This idea emphasizes the necessity of doing so. According to Apostolakis (2004) and Kanter (1994), developing the partnership practice requires high-value and ambitious collaboration. Because the outcomes of collaboration are the primary emphasis of the collaborative advantage, participating in this activity can be seen as an investment worth making. McQuaid states, *"it depends on the kind of the obstacle"* (1994, p.16). For example, improved coordination across (and inside) corporations can significantly increase the effectiveness and efficiency of a single firm, resulting in synergy between the numerous entities. This is also possible within an organization. According to Huxham (2004), the core elements of the notion of collaborative advantage can elevate collaboration and legitimize it as a valuable investment of time and money when partners struggle to implement their objectives. This is because, in 2004, Huxham invented the concept of collaborative advantage. The concept acts as a "guiding light" for various partnerships to rehabilitate local areas. Bringing together businesses with access to diverse resources and areas of expertise could result in a competitive advantage for the companies involved in the collaboration (Huxham and Vangen, 2004; Lasker, Weiss, and Miller, 2001). Vangen and Huxham's explanation (2011, p. 732) states, *"the realization of collaborative advantage can be hampered by both congruence of, and variation across, organizations' aims."* Consequently, partners must actively participate in an ongoing process that aims to improve collaboration within the context of partnership working.

Traditional ideas of cooperation between or between enterprises and inter-organizational collaboration methods and platforms are not always straightforward to disentangle (Kaiser 2011; Halligan et al. 2011; Luft 2013; Kouch and Jurek 2016). More importantly, the likelihood of success and the quality of the

outcome increase when the relationship is well-structured and established and when the relationship is strong regarding shared activities. Instead of viewing coordination as a unification of command, the concept should be viewed as a unification of purpose. It is not enough to collaborate; rather, attention must be paid to how the contributions of each participant complement one another. When people advocate for collaboration as a solution, however, they usually fail to consider both this approach's positive and negative aspects. This presents a related problem. According to Weiss (1987, p. 94), *it is far easier to argue for collaboration than it is to carry it out*, and he also claims that its usage may be restricted in the same ways that its absence can.

3.5   Inter-agency Collaboration in Nigeria

The operations of armed resistance in the Niger Delta eventually evolved into real violence, including the abduction of hostages and the bombing of pipelines. In response, the government of Nigeria dispatched military personnel to the area to end the escalating war. Because of this, in May of 2009, the Joint Military Task Force (JMTF), also known as Operation Restore Hope, was sent to the Niger Delta. JMTF consists of members from the Nigerian Army, Navy, Air Force, Police, and State Security Service (SSS). The Nigerian government initially entrusted them with guarding oil facilities and rivers in the Delta region. This was done in response to persistent concerns that ethnic youth activists were destroying oil infrastructure in the area (Chiluwa, 2011).

As a result of the emergence of transnational crimes such as terrorism, illegal drugs, the spread of weapons, kidnapping, murder, and people trafficking, as well as the effects of globalization, the task of maintaining national security goes beyond the purview of individual agencies. It requires the cooperation of all other authorities (Ngunan, 2013). The Federal Republic of Nigeria established the Multinational Joint Task Force (MNJTF) in 1994, intending to end trans-border armed banditry in the general area of the Lake Chad Basin (LCB) and facilitate free movement along Nigeria's northeast border. The MNJTF is comprised of many different nations. At first, the Force consisted solely of soldiers from the Nigerian Army, although it worked in conjunction with the armed forces and security agencies of the other countries that are part of the Lake Chad Basin Commission (LCBC) (Alufoge & Duruji, 2020). However, in 1998, the Force was boosted and made fully multinational by including

troops from Chad and Niger. These soldiers, along with their Nigerian counterparts, were tasked with the mission of addressing common cross-border security challenges within the Lake Chad Region. In addition, in 1998, the Force was mandated to deal with common cross-border security challenges. The establishment of this Force had a considerable impact in turning the tide of events in the region and dramatically reducing instability in the LCB until 2009, when the terrorist organization Boko Haram first arose. During its 484th Meeting of Heads of State and Government, which took place on January 29, 2015, in Addis Ababa, the African Union Peace and Security Council decided to assist the efforts of the LCBC Member States and Benin by authorizing the deployment of the MNJTF. As a direct consequence, the Minnesota Joint Task Force was reorganized, made operational, and given an increase in troop capacity of around 10,000. It also has a new headquarters in N'Djamena, located in Chad (MNJTF, 2022). The new Force has been instructed by the LCBC to "create a safe and secure environment in the areas affected by the activities of Boko Haram and other terrorist groups, in order to significantly reduce violence against civilians and other abuses, including sexual and gender-based violence, and assist in the implementation of overall stabilization programs by the LCBC Member States, in complete compliance with international law, including international humanitarian law, and in full compliance with the provisions of the United Nations Security Council Resolutions (MNJTF, 2022). Cameroon, Chad, Niger, and Nigeria were the nations that contributed troops to the Force when it first began operations on July 30, 2015, and each of these nations has a Sector of Brigade strength headquartered within their borders (Alufoge & Duruji, 2020).

According to Gimba, the anti-human trafficking units' collaboration with various interested parties and development partners has been impressive and forward-thinking (Gimba, 2007). The most visible of these partners is NAPTIP, the National Agency for the Prevention of Traffic in People and Other Related Issues, which acts as the country's central point of contact for all issues on human trafficking. To prevent human trafficking and other forms of exploitation, NAPTIP was founded in 1993. He reveals that 12 officers (varying in rank from sergeant to deputy superintendent) are the initial NAPTIP Task Force investigators. This shows the Nigerian Police's dedication to their objective and makes them a proud partner in the program's development. The Department of Police also has a voice in NAPTIP's quarterly National Consultative Conference of Anti-Human Trafficking Stakeholders.

Before the fieldwork began, the Independent National Electoral Commission coordinated with the Federal Government and the highest levels of the various security agencies to establish a common ground where overlapping areas of concern could be peacefully resolved. This was done in preparation for the election (Mbumega & Cyril, n.d.). Inter-Agency Consultative Committee on Election Security (ICCES) was the committee's name. Its members came from the Office of the National Security Adviser, the Police Service Commission, the Nigerian Air Force, the Nigerian Army, the National Intelligence Agency, the Nigerian Immigration Service, the Federal Road Safety Corps, the Nigerian Prisons Service, the Nigerian Police Force, the Ministry of Police Affairs, the Nigerian Navy, the State Security Service, and the National Drug Law Enforcement. It was the major instrument that INEC used to maintain order and prevent disorder. This cooperation between the electoral management body and the security sector has emerged as a best practice, and consequently, other election management bodies are interested in emulating it because of its potential benefits (Jega, 2012).

Before the widespread use of smartphones in the country, banks and technology companies in Nigeria had a working relationship in which the latter would build platforms and deliver the services. Companies like Interswitch and Systemspecs assisted financial institutions in the early 2000s in extending their services across several platforms and collecting payments, thereby paving the way for the present growth in the fintech industry (Olaoluwa, 2020). Today, financial technology startups and traditional banking institutions work together to build platforms and deliver financial services. Fintech companies started as marketplaces for individual products but are increasingly beginning to bundle their services in ways analogous to the early stages of traditional banking (TechCabal, 2020). Fintech companies and traditional banking institutions collaborate in several ways, some of which may already reflect this frontend-backend interaction. For example, the app-based bank Kuda has arrangements with traditional financial institutions GT Bank and Zenith Bank that enable consumers to fund their app-based accounts by making over-the-counter deposits at these conventional financial institutions. Kuda is a digital-only bank (Levin, 2019). Additionally, through a partnership with Access Bank, Kuda can provide its customers with free cash withdrawals from ATMs. Piggyvest, an online platform for managing savings and investments, has partnered with Providus Bank to provide customers of the fintech with direct deposit account numbers (Olaoluwa, 2020).

In addition to other significant catalysts, such as increasing mobile and broadband coverage, adopting the Bank Verification Number has been essential to the rise of fintech in Nigeria (Levin, 2019). Since their inception in 2014 by the Central Bank of Nigeria and the Bankers' Committee, Bank Verification Numbers (BVNs) have proven to be an indispensable tool for coordinating client information across various platforms. Currently, fintech companies routinely request it to validate consumers as a tool for the Know Your Customer process (Olaoluwa, 2020; TechCabal, 2020). As the industry grows, creating new tools analogous to BVNs will facilitate increased collaboration.

On March 9, 2020, President Muhammadu Buhari established the Presidential Task Force on COVID-19 to direct and coordinate the multi-sectoral intergovernmental efforts of Nigeria to stem the spread of the COVID-19 pandemic in Nigeria and to mitigate the consequences of the pandemic (Premium Times, 2021). The members of the Task Force included Mr Boss Mustapha, the Secretary to the Government of the Federation, who also holds the position of Chairman of the Task Force, Dr Sani Aliyu is serving as the committee's National Coordinator at this time. Other members include Prof. Osagie Ehanire, who is the Minister of Health; Ogbeni Rauf Aregbesola, who is the Minister of the Interior; Hadi Sirika, who is the Minister of Aviation; Sadiya Umar-Farouk, who is the Minister of Humanitarian Affairs, Disaster Management, and Social Services; Adamu Adamu, who is the Minister of Education; Mohammed Mahmoud, who is the Minister of the Environment. The Task Force was successful in achieving a satisfactory level of compliance with its mandates (StateHouse, 2020).

Nigeria and Equatorial Guinea have inked a historic Memorandum of Understanding (MoU) to transport gas from Nigerian offshore fields to the nearby Equatorial Guinea Gas Processing Facility at Punta Europa as part of a strategic engagement in economic cooperation across the Gulf of Guinea. The two nations have reached this agreement in their ongoing strategic partnership (Vanguard, 2022). Large natural gas deposits can be found in Nigeria, which complements the excellent Gas Processing and Liquefaction infrastructure found in Equatorial Guinea. This deal would make it possible for a Nigerian offshore gas asset to reach the market as quickly as possible, making it possible for a major percentage of that stranded gas to enter the global gas market within 18 to 24 months, which will be the fastest time to market imaginable. The Nigerian National Petroleum Corporation (NNPC) and its joint venture

partners can now profit from gas that would otherwise be left stranded offshore due to inadequate infrastructure.

3.6 Previous Considerations of Collaboration in Disaster Management

Under Decree No. 12 of 1999, the Federal Government of Nigeria established the National Emergency Management Agency (NEMA) as the leading public sector body for the management of emergencies. This was done due to the disturbing trend of increasing natural disasters nationally. NEMA can be understood as a coordinating body due to the use of words like "co-ordinate," "liaise," "monitor," and "collect" in the enabling legislation (UNEP, 1999).

The findings have shown that the stakeholders' perceptions of their collaborative relationship follow regular structures. For instance, when handling oil spills and disasters, there is an "uneven" connection between oil companies, government agencies, and local people, as described in the NOPR. Many government agencies operate independently of one another and only collaborate in response to catastrophic events. The government's interaction with oil companies is being conducted without the communities' knowledge. Even when the government takes action, affected community members are not included in the decision-making process.

Similarly, while looking at stakeholders' obligations, it was discovered that each type of stakeholder has its own unique set of interests, practices, motivations, and obstructions. The handling of the oil disaster has been helped along in various ways by various stakeholders at some point or another. On the other hand, these stakeholders have never truly collaborated as a group toward a shared objective. The roles of the government agencies, MNOCs, security and health agencies, the media and academia, and the host communities in the NOPR significantly influence the decisions made about managing the oil pipeline tragedy. In their stakeholders' treatise on the oil leak case, for instance, the Shell Petroleum Development Company of Nigeria (SPDC) repeatedly highlights its collaborative cooperation with the National Coalition on Gas Flaring and Oil Spills in the Niger Delta (NACGOND). Similarly, the SPDC shares their perspectives on community relations (Orji, 2018).

Environmental problems caused by oil production have led to significant environmental deterioration and harmed the lives of the people in Nigeria's oil-producing region (NOPR). The research that has

been done up to this point has suggested that the collaboration of stakeholders in monitoring ecological issues is important. Therefore, Onuoha developed a framework for collaborating with stakeholders to build upon previously gathered knowledge and develop a collaborative environmental management strategy in the NOPR (Onuoha, 2007). In addition, the institutional analysis and development (IAD) framework was developed by Ostrom. In that framework, the theory of a common pool resource were expanded in order to provide more context for the collective responsibilities that stakeholders play in the management of environmental problems addressed in the NOPR. Also, observing the theoretical recommendations of the stakeholder analysis and the IAD framework makes it possible to conduct an exhaustive assessment of the stakeholders' collaborative efforts. According to the research findings, Nigerian government agencies, multinational oil firms, and host communities are the most important stakeholders.

3.7 Collaboration as a Disaster Mitigation Technique

Many scholars have concluded that cooperation among important stakeholders can be extremely useful in preventing, managing, and recovering from natural disasters. For example, it has been established that a collaborative approach is significant and effective in reducing farmer-herdsmen disputes in North-central Nigeria (Rashid, 2011). Bodin and Nohrstedt looked into how well collaborative disaster management tactics worked from the perspective of a Swedish wildlife response (Bodin & Nohrstedt, 2016). Additional works on collaboration include Shah et al.'s case study on inter-agency collaboration and disaster management in the wake of the 2005 earthquake in Pakistan (Shah, et al., 2022), and Supply Chain Resilience: Unleashing the Potential of Collaboration in Disaster Management (Umar & Wilson, 2021). Another is Multi-agency disaster management collaboration in Sri Lanka: addressing the challenges (Abdeen, et al., 2021). Nguyen et al. (2017) examine a case study of hotel partnerships for disaster risk management in Matsushima, Japan (Nguyen, et al., 2017). Analyzing the development and difficulties of hybrid network governance in disaster management collaboration in Turkey (Hermansson, 2015); Collaborative disaster management: an interdisciplinary approach (Noran, 2014); Sitas et al.'s Encouraging collaboration for knowledge and action in disaster management in South Africa (Sitas, et al., 2016). These studies are summarized in Table 3.1

Table 3.1 Review of Related Literature on Collaboration as a Disaster Mitigation Technique

AUTHORS	TITLE	METHODOLOGY	CHALLENGES
Shah et al., 2022.	Inter-agency collaboration and disaster management: A case study of the 2005 earthquake disaster in Pakistan.	Data for this study were collected through structured and semi-structured interviews from government officials, representatives of NGOs and relief agencies and ordinary women and men in the earthquake stricken localities of Balakot and Mansehra districts of Pakistan.	This study provides only limited snapshot of vast and expanded inter-agency collaboration established during 2005 earthquake therefore, it may be interesting to compare the results with other inter-agency collaboration in similar settings.
Umar & Wilson, 2021.	Supply Chain Resilience: Unleashing the Power of Collaboration in Disaster Management	A multiple case study approach has been adopted to investigate the role of collaboration within food supply chains of two different South Asian regions.	This research was focused more on finding the extant underlying activities within collaborative efforts that are associated with supply chain resilience in a developing country context.
Saeed & Narimah, 2019	Role of Stakeholders in Mitigating Disaster Prevalence: Theoretical Perspective	The method used in assembling relevant data is a review of the relevant literature.	The authors did not capture the roles of security agencies in disaster management especially as regards oil pipeline disasters.
Orji (2018)	Management of environmental issues in the Nigerian oil-producing region: A framework for stakeholders' collaboration	While analysis of selected documents of the key stakeholders was conducted to explore the roles of stakeholders, semi-structured interviews were conducted with a select heads of departments and managers to examine their perception regarding their	The findings from both the document analysis and the review of recommended environmental management practices were synthesized to develop the framework for stakeholders' collaboration.

		collaborative roles and critical success factor for stakeholders' collaboration.	
Nguyen et al., 2017.	Public-private collaboration for disaster risk management: A case study of hotels in Matsushima, Japan.	Through surveys and interviews, this study found that hotels can play a key role in working together with the local Government towards disaster risk management of coastal destinations.	Collaboration gaps between the stakeholders limited the extent of the adoption of hotel-based disaster risk management initiatives.
Hermansson, 2016.	Disaster management collaboration in Turkey: Assessing progress and challenges of hybrid network governance.	Through the use of 24 semi-structured interviews, this article's objective is to assess the applicability of prior theoretical assumptions regarding inter-organisational collaboration in a political-administrative context different from that in which they were originally developed.	This study fails to focus on how hybrid networks actually perform during disaster response operations.
Bodin & Nohrstedt (2016)	Formation and performance of collaborative disaster management networks: Evidence from a Swedish wildfire response	Using unique empirical data from the response to a major wildfire in Sweden, we examine how individual actors select collaboration partners and tasks during the formation the collaborative crisis response network.	This study only demonstrates how complex actor-and task selection processes can be empirically reconstructed using a minimal building block approach combined with stochastic multilevel network models.
Mojtahedi & Oo, 2014	Stakeholders' approaches to disaster risk reduction in built environment	Using a review of existent literature, this work scrutinizes disaster theories and their	It requires classification of respective Stakeholders in applying the idea of this paper. Furthermore, it does not attempt to

		applications in the built environment to develop a theoretical framework for perceiving stakeholders' proactive and/or reactive approaches in DRR	validate the proposed theoretical framework empirically, but combines stakeholder and decision-making theories by which this could be undertaken.
Noran, 2014.	Collaborative Disaster Management: An Interdisciplinary Approach	Based on previous research and applications	The proposed approach will be further developed and applied to several case Studies in various areas in order to verify, validate and refine it.
Rashid (2011)	Management of Farmer-Herdsmen Conflicts in North-Central Nigeria: Implications for Collaboration between Agricultural Extension Service and other Stakeholders	Multi-stage cluster random sampling technique was used to select 300 farmers and 60 cattle herdsmen for the research, using an interviewer-administered questionnaire for data elicitation.	The research suggests the setting up of a three-tier farmer-herdsmen conflict management committee
Onuoha, (2009)	Why the poor pay with their lives: oil pipeline vandalisation, fires and human security in Nigeria	Adopting the method of Literature review, the paper focused on how disasters associated with oil pipeline vandalisation have impacted human security in terms of causing bodily injuries and death, destroying livelihoods and fracturing families.	It recommends the adoption of a comprehensive and integrated framework of disaster management that will ensure prompt response to key early warning signs, risk-reduction and appropriate mitigation and management strategies.
Moe et al., 2007	Balanced scorecard for natural disaster management projects	The Balanced Score Card (BSC) approach.	Applied to a real flood disaster management in Hat Yai Municipality,

			Southern Thailand. May not be suitable for other disasters.
Onuoha, 2007	Poverty, Pipeline Vandalisation/Explosion and Human Security: Integrating Disaster Management into Poverty Reduction in Nigeria	This paper interrogates the common official refrain to attribute vandalisation-induced pipeline explosion to poverty in the country.	Having laid bare these misconceptions, it advocated the adoption of an integrated disaster management framework as part of government's efforts to reduce poverty in the country and enhance the security of its citizens.
Moe and Pathranarakul, 2006	An integrated approach to natural disaster management	Case Study Approach: A detailed case study of the tsunami was carried out to identify specific problems associated with managing natural disaster in Thailand.	This study identifies the specific problems associated with natural disasters management based on a detailed case study of managing tsunami disaster in Thailand in 2004.

Literature Gap

From literature, not much has been done as regards Management and Mitigation of Oil Pipeline Disasters using Stakeholders Collaboration especially in Nigeria. Considering the various methods adopted by previous researchers, a combination of both quantitative and qualitative methodologies is necessary especially for novel research ideas such as this. The study's findings reaffirmed the importance of moving beyond the responsibility of a single actor to a disaster and instead adopting a collaborative strategy involving all stakeholders. This will allow for more precise decisions and actions to lessen the disaster's impact. The cooperation network may be impacted by certain issues, such as figuring out how to integrate the actions and responsibilities of multiple parties.

In addition, prior academics have spent much time discussing individual actors' roles in handling disasters (Moe, et al., 2007; Saeed & Narimah, 2019). On the other hand, natural disasters provide many societal and environmental difficulties beyond the boundaries and capacities of individual players; hence, complicated collective activities must be taken (Barnes, et al., 2019). In addition, research rarely looks into the potential for collaborative approaches in preventing and managing disasters. As a result, this research aims to evaluate the consequences of coordinated efforts made by various stakeholders concurrently during and after the oil pipeline accident in Nigeria. Therefore, more discussion is required

3.8   Current State of Multi-agency Response to Oil Spill Incidents in Nigeria

Certain elements of the legislation that are now in effect in the country support the multi-agency response paradigm. However, these principles, found in various sources, frequently result in the formation of parallel and competing institutions. As a direct consequence, the concept of a coordinated response from multiple agencies has not been successfully implemented. Uncoordinated spill detection requirements and tiered response mechanisms across various agencies are two obstacles to successfully implementing a multiagency response regime. In addition, there is a lack of institutional coordination among key agencies and ministries, which is another obstacle (Olaniyan, 2015). These problems make it difficult to put a multi-agency plan into action in Nigeria for detecting oil spills and cleaning them up once they occur. This does not mean that the concept cannot be utilized; nevertheless, its capacity to be operationally defined in practice as a model for addressing oil spill disasters is being seriously

questioned. This does not mean that the concept cannot be utilized. The response should get underway when an oil leak is found or reported (EGASPIN, 2002).

3.9   Management and Mitigation of Oil Pipeline Disaster in Nigeria

Preparedness, reaction, and recovery are the three aspects of pipeline disaster management that comprise the whole process. The first section, which is titled "readiness," is focused on the process of putting up safeguards against the occurrence of disastrous events. In terms of reaction, this term refers to the actions taken to prevent the onset of a disaster and lessen the severity of its aftermath and impact. Finally, recuperation involves measures to redesign the oil exploration processes and communities impacted by the disaster (Altay & Green, 2006; Moe & Pathranarakul, 2006). Several stakeholders are responsible for different tasks when it comes to managing pipeline disasters, and the collaboration of multiple stakeholders is necessary to establish robust systems that will aid in preventing pipeline disasters.

Pipeline disasters in Nigeria might significantly reduce the frequency and severity of various parties working together more effectively to coordinate their activities and collaborate on solutions. This research evaluates the collaborative efforts of multiple stakeholders in addressing oil and gas-related disasters, as well as the relevant government policies that support their collaboration in managing and mitigating disasters. The research also examines the policies that support the collaboration of these stakeholders. According to the findings of this study, it would be possible to exert a large amount of control over a disaster if all of the relevant parties had a clear understanding of their respective roles and if there were clear policies in place to facilitate the development of cooperative efforts.

Analysts from various companies have categorized the many different approaches that can be used to handle pipeline disasters efficiently. As an illustration, Gupta suggested a model for administering emergencies. Database, Logistics, Technical Requirements, Self-Sufficiency, Correspondence Framework, Crisis Preparation, and Forecasting were all elements included in the template. In addition, Mojtahedi and Oo noted that several critical stakeholders are always involved in pipeline incidents (Mojtahedi & Oo, 2014). Because of their efforts, there is a greater chance that a pipeline accident may occur. Therefore, they are also essential in managing and reducing the effects of a pipeline accident.

Members of the affected community and representatives of the various governments, ministries, departments, agencies, health sectors, non-governmental organizations, academic institutions, and media outlets are included among the stakeholders.

3.9.1   Role of Government at Different Levels

When it comes to preventing and mitigating the effects of pipeline disasters, the government is often seen as the most important stakeholder. One of the responsibilities of the stakeholders in disaster management is the prevention and control of natural disasters. They involve the government at all levels, from the federal to the state and local levels, as well as ministries at the federal level. Their operations are dependent on the administration of the crisis being carried out effectively. Shaw (2012) states that their actions can be broken down into four distinct but interconnected stages.

i.   Mitigation refers to the process of identifying any potential hazards and formulating a strategy for reducing those hazards;

ii.   Readiness entails being ready to combat any hazard by building a reaction flow, preparing and getting personnel ready, and taking the appropriate courses of action with diverse places for sharing assets, pointing out jurisdictional obligations, and other similar activities.

iii. Response: includes carrying out the plans that have been laid forth, lowering the likelihood of any potential risks, making preparations for the recuperation stage; and

iv.   Recovery is the final stage of the process. It addresses the reintroduction of emotional support networks, such as, for instance, mending and utilizing a pipeline that is either weak or old, enhancing the policies governing the right of way.

There is no such thing as a community that is completely safe from natural disasters, yet, pipeline disasters occur in countries that produce oil. Most nations that have had incidences of pipeline disasters have devised ways to regulate and reduce the number of disasters related to oil and gas production and pipeline accidents (Islam and Walkerden, 2015). As a direct result of this, the government of Nigeria will be required to allocate a sizeable portion of its budget to managing disasters. On the 21st of August 2019, at the Council of Chambers in Aso rock, the Nigerian government announced a new Ministry of Humanitarian Affairs, Disaster Management, and Social Development, whose sole purpose is to rebuild

communities that have been devastated by disasters and to strengthen the mitigation and management processes.

3.9.2   Role of Government Agencies

In light of the repeated destruction caused by petrochemical operations, the Nigerian government has set up some ministries and agencies to oversee these operations and strive to reduce the likelihood of connected disasters, such as pipeline accidents. These ministries/agencies include The Federal Emergency Management Agency (FEMA), the Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development (FMHDSD), and the National Oil Spill Detection and Response Agency (NOSDRA).

The Nigerian government has given the Federal Environmental Protection Agency (FEPA) the authority to create rules to ensure the country's air, water, and land quality. Regulations that govern environmental standards in the oil and gas industry are formulated by this department, which is currently known as the Federal Ministry of Environments. In 1991, the Department of Petroleum Resources in Nigeria published a second set of rules for environmental standards for petrochemical sites in Nigeria. These guidelines were comparable to those that the FEPA provided.

The establishment of preventative safeguards to ensure the continued health of Nigeria's natural habitat falls under the purview of the Federal Ministry of Environment (Ntukekpo, 1996). The National Policy on the Environment stipulates that oil companies must conduct their business by the following guidelines:

i.   Keep all safety measures current and implement them. This includes all of the provisions of bringing materials and installations up to date, preventing land, water, soil, and air pollution of any kind, and taking prompt steps to control, maintain, and repair equipment in order to prevent spillage or leakage and cause "as little environmental damage as possible."

ii.   Allow residents to access roads and transportation systems built inside the operating zones.

Separate entities, the National Oil Spill Detection and Response Agency (NOSDRA) and the National Oil Spill Contingency Plan (NOSCP), were set up in 2006. Nigeria formed these organizations to fulfil its obligations as a signatory to the International Convention on Oil Pollution Preparedness, Response,

and Cooperation (OPRC). To help prevent pipeline disasters and assess the damage when they occur, these businesses are tasked with ensuring environmental safety and the compliance of oil and gas corporations with security regulations (Oil and Gas, 2005).

3.9.3   Role of Non-Governmental Organisations (NGOs)

Any nation's disaster management system should include non-governmental organizations as an essential component (Renaud et al., 2013). As a result, the global network gives the participation of nongovernmental organizations (NGOs) much credit. In addition, non-governmental organizations (NGOs) forums are active in pre- and post-disaster management activities. (Athukorala, 2012). These roles according to Rouhi et al. (2019) and Park & Yoon (2022) are further explained to include;

i.   Pre-Disaster Preparedness: NGOs contribute to pre-disaster preparedness by conducting risk assessments, developing emergency response plans, and implementing mitigation measures. They work closely with local communities, government agencies, and other stakeholders to build resilience and enhance preparedness for potential disasters.

ii.   Emergency Response and Relief: NGOs are often at the forefront of emergency response efforts. They provide immediate assistance, such as search and rescue operations, medical aid, food, water, shelter, and other essential supplies to affected communities. NGOs collaborate with local authorities and other organizations to ensure a coordinated and effective response.

iii.   Rehabilitation and Recovery: NGOs play a vital role in the rehabilitation and recovery phase following a disaster. They support affected communities in rebuilding infrastructure, restoring livelihoods, and addressing the long-term needs of the affected population. NGOs provide assistance in areas such as housing, education, healthcare, livelihood support, and psychosocial support.

iv.   Advocacy and Awareness: NGOs advocate for policies and practices that promote disaster risk reduction, resilience building, and sustainable development. They raise awareness among the public, policymakers, and other stakeholders about the importance of disaster preparedness, risk reduction, and the needs of affected communities. NGOs also work to ensure that the voices of affected communities are heard in decision-making processes.

v. Capacity Building and Training: NGOs contribute to building the capacity of local communities, organizations, and government agencies in disaster management. They provide training on various aspects, including disaster preparedness, early warning systems, first aid, and response coordination. By building local capacity, NGOs help communities become more resilient and self-sufficient in managing future disasters.

vi. Coordination and Collaboration: NGOs play a crucial role in coordinating and collaborating with various stakeholders involved in disaster management, including government agencies, international organizations, and local communities. They facilitate information sharing, resource mobilization, and coordination of efforts to ensure a comprehensive and effective response to disasters.

In Nigeria, several NGOs are involved in disaster management (IFRC, 2020; ICRC, 2020; NDMF, 2010). These include;

i. Nigerian Red Cross Society: The Nigerian Red Cross Society is a humanitarian organization that provides disaster response and relief services in Nigeria. They play a significant role in disaster management, including emergency response, first aid, and community preparedness.

ii. Christian Aid: Christian Aid is an international NGO that works in Nigeria and other countries to support communities affected by disasters and emergencies. They provide emergency relief, rehabilitation, and long-term development assistance.

iii. Oxfam Nigeria: Oxfam is a global NGO that works in Nigeria to address poverty, inequality, and social injustices. They also play a role in disaster management, providing emergency response and recovery support in times of crises.

iv. ActionAid Nigeria: ActionAid is an international NGO that works in Nigeria to support vulnerable communities. They engage in disaster risk reduction, emergency response, and recovery efforts, focusing on the needs of women and children.

Overall, NGOs bring valuable expertise, resources, and community-driven approaches to disaster management. Their involvement enhances the overall effectiveness and inclusivity of disaster management efforts, ultimately contributing to the well-being and resilience of affected communities. The contributions made by NGOs might take the form of funding and also of physical work. However,

most of these actionable contributions come as training and crusades directed toward affected individuals and communities on various levels. In addition, the aftermath of a natural disaster often necessitates the modification of instalment programs in order to facilitate recovery.

3.9.4   The Role of the Health Sector

In the event of a disaster, specialists in the field of public health have significant duties as well as opportunities, such as the prevention of pipeline disasters and the handling of emergencies. In areas devastated by a natural disaster, the goal of every health practitioner is to safeguard and preserve human life while also ensuring that people can live healthy lives. In any emergency, workers in the healthcare industry will always be asked to cooperate to ensure rescue efforts go well. In the event of any disaster, those who work in the medical field have the most difficult and obvious responsibility in the response. Failure on their part is extremely hazardous and expensive regarding the lives lost, environmental damage, and political and technical fallout (NDES, 2017).

Professionals in the public health field must prepare by following the stages outlined here, which are as follows: a) conceiving strategies, b) influencing national policies, and c) putting efforts for disaster reduction into action. The Health Sector is also interested in reducing the risk of natural disasters.

3.9.5   Role of Local and International Donors

Donors play an essential role in nation-building and are also important in emergencies (Alexander, 2014). The international community comes together to assist any nation hit by a natural disaster to speed up recovery. Support is provided in the form of financial and material resources. Organizations such as the United Nations (UN) and the Disaster Response Group have representatives stationed in various parts of the world to manage the collection and distribution of these aid resources. In addition, societies such as the International Federation of the Red Cross also support disaster prevention activities and materials (Athukorala, 2012). It has been observed that the contributions made by donors on both the local and international levels significantly impact the prevention of disasters in various areas.

3.9.6   Role of Media

Given the media's extremely important role in disaster management, the media can be considered a relevant stakeholder in every country (Alexander, 2014). The participation of the media can assist in

disseminating information regarding the danger associated with pipeline vandalism and its effect, as well as inform communities on their roles as patriots to support the government in implementing the safety procedures currently in place.

3.9.7 Role of Academia

Regarding crisis management and risk reduction, the contributions made by the academic community cannot be overstated. Only the academic world of a community can determine whether or not the appropriate level of awareness regarding disasters and their immediate hazards has been achieved. The academic community disseminates knowledge and instruction to the populace, enlightening them on the perils of committing wrongdoing against the oil and gas business and the repercussions that will befall a town in the aftermath of a disaster. In public and private higher education institutions, academia is vital in creating awareness to protect a nation from the dangers of using petroleum products (Haworth and Bruce, 2015).

3.9.8 Role of Community and Citizen

Since the community is typically the one that is affected when a natural disaster takes place, they should be considered important stakeholders in the process of formulating policies that will take into account the needs of the environment while also ensuring the safety of people and their belongings. The community could get support through education and training in first aid and disaster prevention by implementing awareness campaigns and training exercises (Haworth and Bruce, 2015).

3.9.9 Regional Cooperation

One community cannot manage a disaster on its own; therefore, the immediate communities that make up the oil-producing region are relevant stakeholders in managing disasters related to petroleum products (Cutter, 2012). Since the actions of any of these communities in this region could be to blame for a catastrophic event that could impact all of these communities, all of these communities must be aware of their roles as stakeholders in the effort to mitigate the effects of catastrophic events. When dealing with problems that affect people and their environment, such as accidents involving oil pipelines, it is helpful to have a plan that addresses the worries of the local population and factors those

worries into the decision-making process. This enables a more concerted effort to be made to eradicate the threat. A significant cause of disagreement has been the inability of the local community, international oil businesses, and other stakeholders in the chain to communicate effectively. It is possible that the local community, in addition to other stakeholders, will be required to make large investments in community capacity development in order to establish and maintain community participation in such collaborative arrangements (Pearson and Craig, 2001). On the other hand, Barr and Huxham (1996) argue that attention should be placed on the practical leverage that may be accomplished, even though involvement from the community is extremely important.

3.10   Quality Management, Collaboration and Disaster Management

Quality management in the context of disaster management refers to the systematic approach and processes implemented to ensure that disaster management activities meet established quality standards and objectives (Mogdil et al., 2020). The concept of quality management involves the following key aspects (Liu et al., 2022; Mogdil et al., 2020);

i.   Definition of Quality in Disaster Management: in the context of disaster management, quality can be defined as the degree to which disaster management activities and interventions meet the needs and expectations of disaster-affected populations and stakeholders. It involves ensuring that the response and recovery efforts are timely, effective, and appropriate to address the specific needs and vulnerabilities of the affected communities.

ii.   Quality Planning: quality planning in disaster management involves establishing clear objectives, processes, and guidelines for disaster response and recovery. It includes identifying the resources, expertise, and capacities required to effectively manage disasters, as well as developing plans to ensure that quality standards and requirements are met throughout the entire disaster management cycle.

iii.   Quality Assurance: quality assurance focuses on ensuring that disaster management activities and interventions comply with established quality standards and requirements. It involves the implementation of quality management systems, audits, and reviews to monitor and verify the

effectiveness, efficiency, and appropriateness of the disaster management processes and interventions.

iv.   Performance Monitoring and Evaluation: performance monitoring and evaluation are essential components of quality management in disaster management. It involves collecting and analysing data on the performance and outcomes of disaster management activities to assess their effectiveness, identify areas for improvement, and make informed decisions. This includes monitoring key performance indicators, conducting post-disaster evaluations, and incorporating lessons learned into future disaster management strategies.

v.   Stakeholder Engagement and Accountability: quality management in disaster management emphasizes the importance of stakeholder engagement and accountability. It involves actively involving disaster-affected populations, local communities, government agencies, non-governmental organizations (NGOs), and other relevant stakeholders in the planning, decision-making, and implementation processes. This helps ensure that their voices are heard, their needs are addressed, and that they have a sense of ownership and accountability in disaster management efforts.

vi.   Continuous Improvement: continuous improvement is a fundamental principle of quality management in disaster management. It involves ongoing efforts to enhance the performance, efficiency, and effectiveness of disaster management activities. This includes incorporating lessons learned from previous disasters, adapting to emerging challenges, and integrating new technologies and best practices into disaster management strategies.

In summary, quality management in disaster management aims to ensure that disaster response and recovery efforts meet established quality standards and objectives. By implementing effective quality management practices, organizations can enhance the timeliness, effectiveness, and appropriateness of their disaster management activities, leading to improved outcomes for disaster-affected populations and stakeholders.

3.11   Linking Quality Management, Stakeholder Collaboration, and Disaster Management

Quality management principles, such as continuous improvement, customer focus, and process optimization, can be applied to disaster management to enhance preparedness, response, and recovery efforts. Collaborating with stakeholders, including government agencies, emergency responders, NGOs, and affected communities, can help ensure that quality standards are met, feedback is incorporated, and resources are effectively utilized (FEMA, 2011).

Quality management principles can guide stakeholder collaboration in disaster management by emphasizing the importance of continuous improvement, customer satisfaction, and stakeholder engagement (Mogdil et al., 2020). By integrating quality management practices into stakeholder collaboration processes, organizations can foster a culture of collaboration, innovation, and excellence in disaster management.

Quality management in the context of disaster management refers to the systematic approach and processes implemented to ensure that disaster management activities meet established quality standards and objectives. Here are some key points related to the concept of quality management in disaster management:

Quality management, collaboration, and disaster management are interconnected and play crucial roles in ensuring effective preparedness, response, and recovery from disasters. Here are some key links between these aspects:

i.   Effective Disaster Management through Quality Management: quality management principles and practices can enhance the effectiveness of disaster management efforts. By implementing quality management systems, organizations can ensure that their disaster management processes meet established standards and continuously improve over time. This includes identifying and addressing potential risks, monitoring performance, and incorporating lessons learned from previous disasters.

ii.   Collaboration as a Key Component of Quality Disaster Management: collaboration among various stakeholders is essential for effective disaster management. By actively involving government agencies, local communities, non-governmental organizations (NGOs), and other

relevant parties, organizations can tap into diverse expertise, resources, and perspectives. Collaboration promotes information sharing, coordination, and synergy, leading to more comprehensive and coordinated disaster management strategies.

iii. Stakeholder Engagement and Collaboration for Quality Disaster Management: stakeholder engagement, including local communities, is crucial for quality disaster management. Engaging stakeholders in the planning, decision-making, and implementation processes helps ensure that their needs, concerns, and expertise are considered. This fosters a sense of ownership and promotes the development of context-specific and effective disaster management approaches.

iv. Continuous Improvement and Learning from Disasters: quality management principles emphasize continuous improvement. After each disaster, organizations should conduct thorough evaluations and reviews to identify areas for improvement. Collaboration among stakeholders facilitates the sharing of lessons learned, best practices, and innovative approaches. This enables organizations to adapt and enhance their disaster management strategies based on real-world experiences and emerging challenges.

v. Quality Standards and Performance Monitoring: quality management systems often involve the establishment of quality standards and performance indicators. These standards provide benchmarks for evaluating the effectiveness of disaster management efforts. By monitoring performance against these standards, organizations can identify areas of strength and areas that require improvement. Collaboration among stakeholders can help establish consensus on the relevant quality standards and facilitate the collection and analysis of performance data.

In summary, quality management, collaboration, and disaster management are interconnected and mutually reinforcing. By integrating quality management principles, fostering collaboration among stakeholders, and continuously improving disaster management processes, organizations can enhance their preparedness, response, and recovery capabilities, ultimately contributing to more effective and resilient communities.

3.12   Chapter Summary

The chapter considered the concept of stakeholder and stakeholder management. It observed that stakeholder management involves the process of identifying, analysing, engaging, and managing stakeholders in order to achieve successful outcomes in a project or organization, which in this case, is effectively managing and mitigating oil pipeline disasters. Collaboration has been considered in a number of areas in Nigeria ranging from management of the Covid-19 pandemic to a number of joint military operations to combat terrorism and even in the financial sector of the country. Roles of stakeholders, including government and government agencies, NGOs, health sector, media, academia and local community in disaster management were explained. Links between quality management, stakeholders' collaboration and disaster management were explained.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.0   Introduction

This chapter discusses the theoretical and practical considerations with regards to the application of an appropriate methodology in addressing the research aim and objectives. This ultimately allows for the attainment of the research aim and objectives as set out in the previous chapters. The chapter commences with the research paradigm and then philosophical underpinning of the research, to include ontological, epistemological and methodological. Thereafter, the methodological aspect of the research, the mixed-method approach was presented. The research case study was then justified and the data collection methods were explained. The research involves a pilot study conducted at the early stages. The pilot instruments, results and observations were also presented in this chapter. The main study instruments, procedures, data analysis, reliability and validity of data were reported. The chapter concludes with ethical consideration in the course of the research and finally, the summary of the chapter.

4.1   Research Paradigm

The purpose of the research technique is to make sure that the study objectives are addressed logically. This will guarantee that the study's goals are achieved and that the intended research will allow for the development of factual findings. The groundwork has been laid for articulating a methodology based on the pilot studies and theoretical argument towards accessing multi-stakeholder collaboration efforts during and after oil pipeline disasters by discussing the research problems, objectives, and research questions as a review of pertinent literature.

A research problem is solved systematically using research methodology. It can also be described as the study of how to conduct scientific research (Kothari, 2004). A mixed social research methodology that adhered to the norms of collaborative planning was used to achieve the research's aims (Lane and McDonald, 2005; Margerum, 2002; Healey, 1997). This technique looked at new developments for the synergetic planning system and practice, which emerged from the British planning system. Nevertheless, it also offers recommendations for designing systems all across the world.

Implementing designs that may contain philosophical supposition and theoretical frameworks and integrating both qualitative and quantitative data constitutes the mixed-method approach (Creswell, 2014). The mixed approach method offers a more comprehensive view of the research issue, including answers to the study's qualitative and quantitative research questions. Quantitative data provide information that can be analysed statistically, whereas qualitative data are often exploratory and employed when the potential consequences of research are uncertain (ACAPS, 2012).

The argument for this strategy is that it enables the researcher to address all facets of the suggested study research questions thoroughly. Additionally, it enables the researcher to concentrate on the actual relationship experience to gather in-depth knowledge about and understand research participants' assessments and evaluations of the relationship, quantify data, and extrapolate findings from a sample to the population of interest. According to Johnson and Leon (2020), natural disasters, weak political factors, poverty, and unemployment are Nigeria's leading causes of pipeline disasters. Other contributing factors include pipeline vandalism, joint and valve failure, black market sales of petroleum products, operational failures, major technical failures, such as inadequate maintenance and regular inspection, and operational failures.

4.2 Philosophical Underpinning of the Research

The research's philosophical underpinning involves how the researcher understands and interprets the world being researched. It significantly relates to how knowledge in a particular field is conceptualised. It also determines the research strategy and methods of realising the research aims adopted by the researcher (Saunders, Lewis and Thornhill, 2012). The aspect of philosophy as it relates to research is very detailed and rich content-wise; however, the prevalent belief of a research paradigm directs the understanding of the researcher philosophically in ways which are either ontological, epistemological as well as methodological (Guba and Lincoln, 1998). This is illustrated in Figure 4.1. Every one of these ways possesses an underlining deviation from one other. These fundamental deviations affect the manner a research process is thought about or considered. This helps to guide the researcher in making sure that he or she is well prepared to juxtapose and justify the selected research strategy, method and techniques for data collection (Saunders, Lewis and Thornhill, 2012).

This study follows this pattern as this section explains the philosophical assumptions regarding ontological, epistemological, and methodological viewpoints.
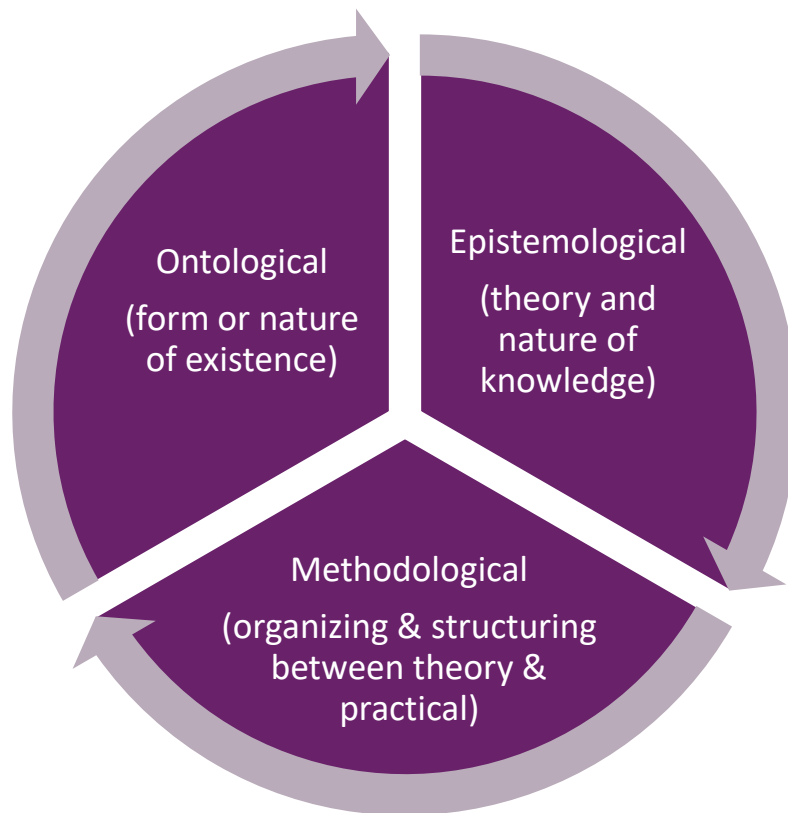
Figure 4.1 Philosophical Underpinning of the Research

4.2.1 Ontology

Crotty (1998) opined that ontology encompasses the form or nature of reality. This prioritises how the researchers perceive manner and nature regarding reality (Saunders, Lewis and Thornhill, 2012). This implies that all assumptions made under this stance majorly concern what can be strictly regarded as reality, which can be referred to as things that exist. Therefore, researchers need to be clear when categorising what exists, how they exist, and how things work. Ontology is also the study of how we determine if things exist or not, as well as the classification of existence. It attempts to take things that are abstract and establish that they are, in fact, real.

Studying the effect of stakeholders' collaboration in the management of oil pipeline disasters in Nigeria, the choice of research philosophy and ontology is important in shaping the research approach and

perspective. To help understand the existence of oil pipeline disasters in Nigeria, the reality of its devastating aftermath effects and the need to effectively manage these disasters, three area of ontology namely; positivism, interpretivism and critical realism was employed. In the context of studying the effect of stakeholders' collaboration in the management of oil pipeline disasters, a positivist approach involve collecting quantitative data on collaboration efforts, disaster management outcomes, and stakeholder involvement levels. Statistical analysis can then be used to assess the relationships between variables and determine the impact of collaboration on disaster management. In the context of studying stakeholders' collaboration in the management of oil pipeline disasters, an interpretivist approach may involve conducting interviews with stakeholders to understand their experiences, perspectives, and the role of collaboration in disaster management. Critical realism in the context of the subject, stakeholders' collaboration in the management of oil pipeline disasters, involves collecting both quantitative and qualitative data to understand the objective impact of collaboration on disaster management outcomes, as well as the subjective experiences and interpretations of stakeholders involved.

4.2.2 Epistemological

The question of what generally comprises sufficient knowledge in any field is considered epistemological (Crotty, 1998; Denzin and Lincoln, 1998). According to Bryman and Bell (2007, p.15), *"a particular central issue in this context is whether the social world can and should be studied according to the same principles, procedures, and ethos as the natural sciences"*. Denzin and Lincoln (2003) established a relationship between the researcher and the objects being researched. This relationship is considered interactive, so research findings and discoveries are only obtained as progress is made in the research.

With regards to the epistemology in the context of studying stakeholders' collaboration in the management of oil pipeline disasters, several epistemological approaches were relevant. Among these are objectivism, constructivism and pragmatism. In terms of epistemology, objectivism aligns with the positivist approach, which emphasizes the use of quantitative data and statistical analysis to study phenomena. An objectivist approach to this research topic involve collecting quantitative data on collaboration efforts, disaster management outcomes, and stakeholder involvement levels, and using

statistical analysis to assess the relationships between variables and determine the impact of collaboration on disaster management.

Constructivism is a research philosophy that emphasizes the subjective nature of reality and the role of social construction in shaping knowledge. It holds that knowledge is actively constructed by individuals through their experiences and interpretations. From an epistemological perspective, constructivism aligns with the interpretivist approach, which focuses on qualitative data collection methods such as interviews, observations, and document analysis. A constructivist approach to this research topic involved conducting interviews with stakeholders to understand their experiences, perspectives, and the role of collaboration in disaster management. Lastly, from an epistemological perspective, pragmatism acknowledges the value of both objective and subjective knowledge. A pragmatic approach to this research topic involved collecting both quantitative and qualitative data to understand the objective impact of collaboration on disaster management outcomes, as well as the subjective experiences and interpretations of stakeholders involved.

That is to say that the epistemological stance in this study is to ascertain the level of collaboration amongst stakeholders by understanding and analysing the collected data. To achieve this, there must be a close interaction between the respondents being interviewed or questioned and the researcher to achieve the required knowledge base for the study, thereby confirming the researcher's assumptions.

4.2.3   Methodological

Lastly, questions on how the researcher intends to obtain the basic knowledge required to achieve the research aims comprise the methodological aspect of the research philosophy. Therefore, researchers must review their philosophical and historical assumptions to develop a suitable methodology for the research issues (Guba and Lincoln, 1998).

The mixed method of data collection was adopted as this method encompasses both quantitative and qualitative data collection. Interview data were collected from the natural setting of agencies of government, multi-national oil companies, local communities, and other stakeholders interviewed. This made it possible for the researcher to meet the participants face-to-face and conduct in-depth interviews to gain insight into their everyday lives (Creswell, 2007). In Della Porta and Keating's (2008) words,

"participants have their realities and perspectives, and qualitative research offers access to explore those perspectives and meanings to understand, describe and explain social processes".

4.3 Methodology

4.3.1 Mixed Method Approach

The quantitative research strategy examines the relationship between variables measured mathematically and scientifically (Saunders et al., 2012). This approach, which has its roots in the rationalist school of thought, was developed to measure the degree of variation in a phenomenon using a large sample size (Kumar, 2014). Additionally, it produces statistics through systematic interviews and surveys. The elements of the quantitative research method, including the objectives, design, sample, and questionnaire, are predetermined. However, qualitative research does not follow a predetermined process.

A qualitative research strategy is an experimental, non-statistical method to better understand people's ideas, thoughts, and underlying motivations (Bryman 2002). In order to elicit a detailed response from participants, its unstructured data-gathering method analyzes attitudes, opinions, and experiences through interviews or focus groups (Dawson, 2009). According to Spencer et al. (2003), qualitative research aims to thoroughly understand people's perspectives, opinions, experiences, and histories in a particular situation. Researchers Blaikie, 2000; Cavana et al. 2001; Cramer, 2003; Maxwell, 2005; Berg, 2007; Creswell, 2003; and Thomas, 2003, have distinguished the techniques mentioned earlier. The discrepancies between the techniques are shown in Table 4.1. The process, however, is the critical distinction between the two methodologies (Elgobbi, 2008). More importantly, each of the approaches, as mentioned earlier, has its advantages and disadvantages; neither is superior to the other (Dawson, 2009; Ackroyd and Hughes, 1992:30). Accordingly, the mixed-method approach was adopted to minimise the weaknesses of the individual 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 different perspectives on what the mixed-method approach entails. The first occurs when a study mixes qualitative and quantitative methods using a mixed-method methodology. A mixed-method approach *"focuses on gathering, analyzing, and combining both qualitative and quantitative approaches, in combination, to produce a greater understanding of research problems than either strategy alone,"* claim Creswell & Clark (2007:5). Inductive and deductive thinking are favoured by qualitative and quantitative research, respectively, and the mixed technique is linked to abductive reasoning (Saunders et al., 2012). However, according to Morgan (2007: 71), deductive reasoning is theory-driven and employed in quantitative research, whereas inductive reasoning is data-driven in qualitative research, and abductive reasoning is a transition between the two.

Researchers favour the first school of thought because it offers a practical method of conducting social research (Creswell and Clark, 2011; Brew and Hunter, 1989; Teddlie and Tashakkori, 2009; Bernard, 1994). The methodologies also aid in quantifying and investigating a phenomenon, contributing to the study's precision and breadth (Kumar, 2014). In addition, the methodology relies on the researcher's capacity for in-depth comprehension and confirmation of findings, enhancing the accuracy and relevance of the study's conclusion (ibid). The second school of thinking, supported by Alexander et al. (cited in Gilbert 2008: 126), asserted that the mixed-method approach is appropriate when focus groups and in-depth interviews are utilized as methods from the same paradigm.

The first school of thinking is applied in this study, fusing qualitative and quantitative methodologies. The study employs convergent parallel design, also known as the contemporary approach, for its mixed-method structure (design), analyzing the questionnaire and the interviews independently before combining the approaches during the discussion stage (Edmonds and Kennedy, 2010). The methodology is predicated on the idea that it enables the researcher to thoroughly understand a situation and corroborate the findings, improving the precision and significance of the study's conclusion (ibid). The second school of thinking, supported by Alexander et al. (cited in Gilbert 2008: 126), asserted that the mixed-method approach is appropriate when focus groups and in-depth interviews are utilized as methods from the same paradigm.

The qualitative and quantitative data are independently collected, analyzed, and combined in this approach before being discussed to determine whether there has been convergence. The purpose of the

convergent design is to deepen understanding by considering the problem from various angles. As a result, the study commenced with the quantitative methods (pilot study and the primary survey), followed by qualitative methods (in-depth interview and then validation of findings). The selected approach is difficult and time-consuming (Tashakkori and Teddlie, 2003; Onwuegbuzie and Johnson, 2004; Creswell, 2006). Despite that, the mixed method was selected because:

i.   It would investigate the reasons for and consequences of pipeline disasters from a qualitative and quantitative viewpoint.

ii.   When comprehensive and correct data from a single source is difficult to collect;

iii.   To improve and broaden the study's accuracy, validity, and reliability; and

iv.   To provide context for the study's results (Kumar, 2014).

4.3.2   Research Strategy: Case Study

The research endeavours to infer knowledge that may be summed up through extensive and efficient methods. This study was planned and executed to provide supporting evidence for or against a broad, testable hypothesis to resolve a research question (Cooper et al., 2009; Crotty, 1998; Eisenhardt, 1989). This study focuses on a current phenomenon to develop a strategy for utilizing cooperation to lessen the impact and frequency of oil pipeline disaster management in Nigeria. According to the stated goals and objectives, the study questions were formulated as "How," "Which," "What," and "Why" inquiries. Substantive research, on the other hand, uses a mixed-methods data collection strategy and a case study research strategy in line with the principles of collaborative planning and corporate social responsibility to advance the sustainable development of oil pipeline management in Nigeria before and after natural disasters.

Pettigrew (1990) argues that researchers must consider several factors before adopting a methodology. They are: i. the study's goals, objectives, and questions; ii. the extent to which the researcher influences the outcomes of the experiments; and iii the study's emphasis on the past or the present.

Research objectives are of utmost importance while selecting an investigation's methodology. This is because the main purpose of the investigation is to study the research objectives to answer the research

questions. In addition, regardless of whether the research is contemporary, perspective, or historical, the technique chosen to answer the research questions is influenced by the type of research.

When the stakes are high, when existing theories or explanations are weak, when the phenomena being studied are novel, and when further investigation must be conducted in their natural setting, case-based research becomes invaluable (Creswell, 2007; Kohlbacher, 2006).

When choosing a case study as the chosen design, the sampling (number and selection of cases) and the analysis unit are crucial factors to consider (Yin, 2014). Additionally, it is suggested that when choosing a study case, the case's contents must be determined by the nature of the research phenomena (Patton, 2002), providing rich material for the issue under inquiry. Consequently, the case is chosen and identified on purpose in order to properly comprehend the occurrence (Ritchie et al., 2003). In this instance, the focus is on disaster management in Nigeria, particularly regarding oil pipeline disasters. This has been a significant challenge. As a result, this study focuses on the causes and effects and how to properly manage and mitigate them by proposing a collaboration framework composed of relevant stakeholders to overcome the aftermath effects of these disasters in Nigeria.

Warfield (2005) defines disaster management and mitigation as every measure put in place by disaster management experts before a disaster occurs with the primary purpose of reducing the impact of the disaster on vulnerable people as well as minimising the socio-economic consequences on the affected community. This phase of the disaster management process is known as the first phase of the disaster management process. Disaster management and mitigation are also known as phase one of the disaster management process. According to World Development Reports (1998), mitigation entails reviewing building codes, bringing the vulnerability analysis up to date, managing and planning zoning and land use, reviewing building use regulations and safety codes, and putting preventive health measures into place. In order to answer the question of the impact multi-stakeholder collaboration has on the management and mitigation of pipeline disasters, several scenarios, both those in which collaboration does and does not take place, was analyzed and compared. This will primarily consist of analysis, and the information will be based on previously published material.

This research has the Niger Delta region of Nigeria as its case study. As the Nigerian government defines, the Niger Delta region consists of nine states: Abia, Akwa-Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo and River States. However, attention will be focused on the states with the most prevalent oil pipeline disaster cases: Bayelsa, Delta and Rivers. However, this study's findings apply to all areas and communities where the oil pipeline network traverses.

The above data and information will help formulate or propose a framework, model or system to guide stakeholders' collaboration as a disaster mitigation technique and determine the type of collaboration and the channel for communication amongst the stakeholders before, during and after occurrences.

4.3.3 Research Design

The selected research strategy establishes the study design, including the procedures for gathering and analyzing the necessary data to respond to the research questions. There is a long academic debate on the validity of quantitative and qualitative research approaches in various settings (Figure 4.2). Bryman (2008), however, argued that what initially set them apart was not the quality of the evidence their use produced but rather their distinctive philosophical underpinnings (Yin, 2008; Moustakas, 1994).

The approach used for the study, the problem it intended to address, and the tools used to collect the data were all considered. There are primarily two methods for acquiring data to address the study issue (s). These are both primary data, gathered directly from sources using qualitative or quantitative methods and secondary data, gathered from previously published works of writers, such as articles, census data, and official documents. Both primary and secondary data are incorporated into this study. Observations, textual analysis, and interviews are only a few examples of the methods used in qualitative research. Interviews were deemed the most suitable strategy for this study's qualitative component.
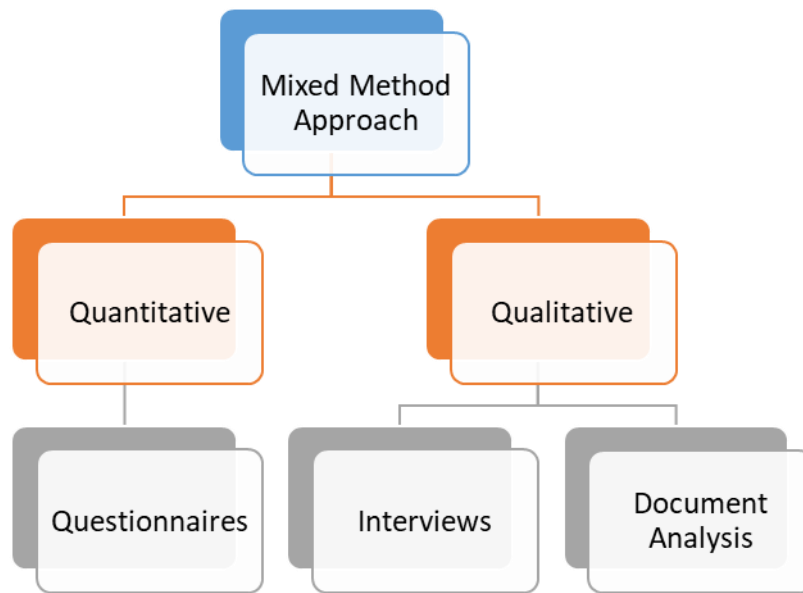
Figure 4.2 Mixed Method Approach

Interviews are divided into three categories: structured, semi-structured, and unstructured. In-depth or life history researchers should use unstructured interviews, also known as life history interviews (Dawson, 2009). This aids in gaining a comprehensive understanding of the respondents' perspectives (ibid). In structured interviews, questions are verbally administered from a preset list with little to no change and room for follow-up inquiries to responses that demand further in-depth discussion (Gill et al., 2008). This makes this procedure quick and straightforward without requiring a thorough study. Finally, the semi-structured interview (Figure 4.3) sits in the middle of the abovementioned techniques. The semi-structured interview features (loosely) established main topics to identify regions to be investigated, but it also leaves room for the interviewee or interviewer to veer off course and explore an idea or response in more detail (Britten 1999).
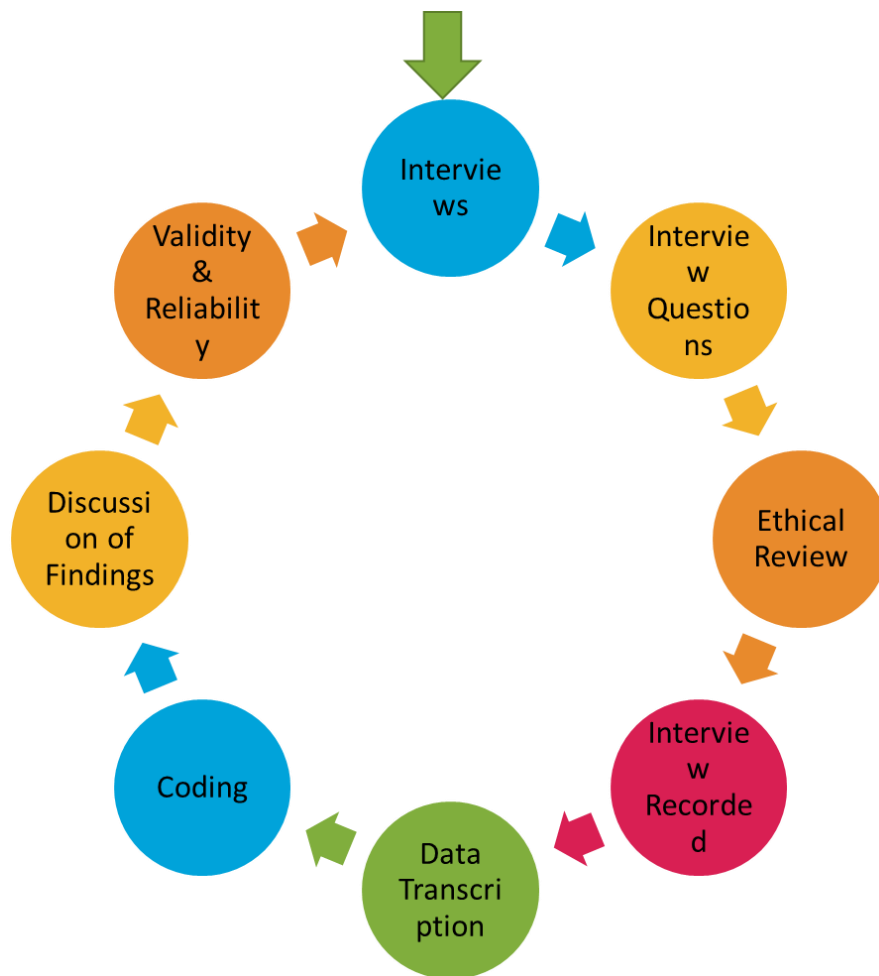
Figure 4.3 Research Strategy (Interviews)

In gathering the primary data, semi-structured interviews were conducted to collect opinions from stakeholders and disaster management experts in the oil pipeline section of the Nigerian oil and gas sector. For the qualitative portion of the study, the researcher used semi-structured interviews (Figure 4.3) and focus groups (for validation of the framework). This technique enables the researcher to explore study-relevant concerns initiated outside of the timetable (Neuman 2006). Furthermore, Parahoo (2006) adds that this approach is adaptable in enabling the researcher to switch words to refocus the respondents. Further, according to Parahoo (2006:329), *"validity is strengthened since responders can be guided in understanding the questions, and interviewers can clarify questions and press for more information, as needed."*

On the other hand, the researchers' expertise and experience significantly impact the quality of responses when employing semi-structured interviews (Robson 2002). According to Gill et al. (2008),

including questions in the interview schedule is critical to help answer the research questions and objectives. Therefore, these questions must be pertinent. In addition, when formulating interview questions, appropriate questions in qualitative research should be relevant to the study, unbiased, sensitive, and intelligible (Britten, 2009).
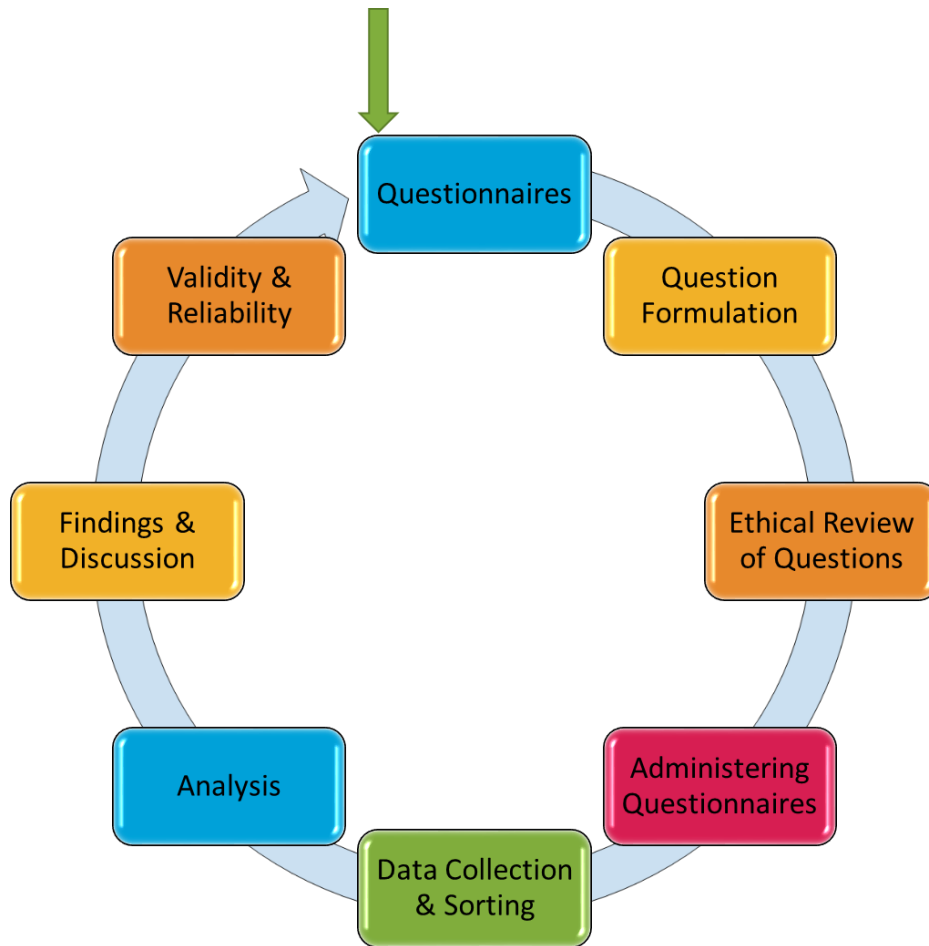
Figure 4.4 Research Strategy (Questionnaires)

A questionnaire was used for the research's quantitative component (Figure 4.4). There are three types of questionnaires: closed-ended, open-ended, and hybrid; a questionnaire with prepared answers or "close-ended questions" with predetermined answers. The open-ended questionnaire, which includes questions where respondents can submit replies without any constraints, is typically used in qualitative research. Figure 4.4 illustrates the various stages of the quantitative aspect of this study from formulation of the questions to validity and reliability of the findings.

Also utilised as a research strategy in this research is the strategy of document analysis (Figure 4.5). In this strategy, relevant information from the existing literature is reviewed and analysed appropriately. It involves deductive reasoning from existing literature relevant to the study and correlating such with the primary data. Such literature include information obtained from publications, company websites or journal articles.
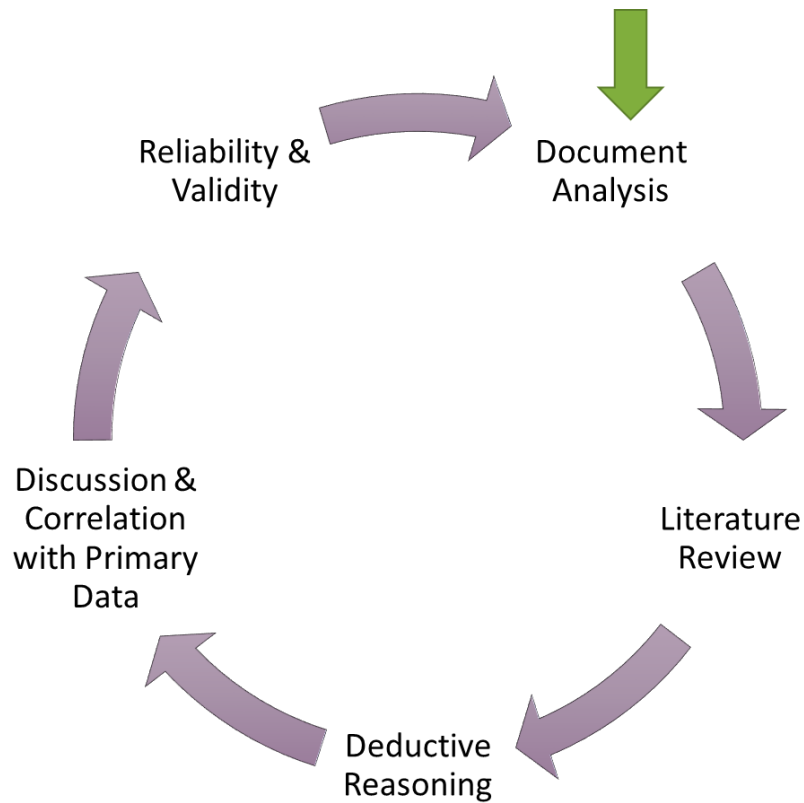
Figure 4.5 Research Strategy (Document Analysis)

4.4 Method of Data Collection

There are basically two methods of data collection. These are; primary data collection and secondary data collection methods. They are further discussed in subsections 4.4.1 and 4.4.2.

4.4.1 Primary Data Collection

Primary sources include preliminary investigation conducted as a pilot study through direct observation and interview of disaster management personnel, while the central study involves questionnaire investigation on relevant stakeholders' responses to previous oil pipeline disaster cases. Direct observation, as defined by Webb and Kevern (2001), is focused on conditions in which the observer does not interfere with the subjects or signals in the events being seen in any way, either by being obstructive, intrusive, or passive.

It is important to highlight that the interview data-gathering method has become the most trusted and widely used primary data collection method (Bryman, 2008). Interviews let the researcher acquire first-hand information that speaks to the study's primary questions, goals, and objectives (Lethbridge et al., 2005; Roos, 1987). The interview format also allows the interviewee to ask clarifying questions and for more information to be elicited through follow-up questions.

Questionnaires

For the primary data collection, well-structured questionnaires were distributed amongst the target stakeholders, having been earlier identified from the pilot study to include selected community members and leaders of identified oil pipeline disasters locations across Nigeria, oil and gas company staff and management, Local and State government officials and officials of fire service departments in the study area with adequate explanation and guide for putting them to the correct response from their perspective. The study did not fail to examine the level of awareness of pipeline disasters among respondents using the primary source of data collection. The analysis of the quantitative data was done using IBM SPSS Software. It is further discussed in Section 4.7

Interviews

The research uses semi-structured interviews, which were carried out with the most critical stakeholders and with industry experts, to obtain an unbiased opinion. In addition, this research aims to determine

whether or not collaborations exist between various stakeholders on risk mitigation. Therefore, semi-structured interviews are strongly recommended since they make it possible to ask penetrating questions in the context of the research emphasis, making room for follow-up inquiries and extensive involvement (Kvale & Brinkmann, 2009). Interviews were conducted for ten relevant stakeholders. These stakeholders were identified from the findings of the pilot studies and questionnaire responses. Table 4.2 provides further information in this regard.

In order to get a comprehensive understanding, the interview was first taped and then listened to multiple times. After that, a transcription was completed (Braun & Clarke, 2006). The transcribed data were coded into structured codes, making it simple to infer themes based on the hierarchical organization of the categories (Yin, 2018). The Nvivo program (Creswell & Poth, 2017) served as a map for the researcher to follow during the study process; however, the researcher was responsible for analytical thinking (Marshall & Rossman, 2016). This resulted in a summary, a description, and an analysis of the results. This was checked further with some people who participated in the research before presenting the final results and the discussion (Yin, 2018).

Table 4.2: Stakeholders Interviewed

Interviewee	Code Name	Role
01	RP/NEMA/01	National Emergency Management Agency
02	RP/NNPC/01	Nigeria National Petroleum Corporation
03	RP/CRS/01	Community Resident
04	RP/CRL/01	Community Leader
05	RP/SA/01	Security Agency (Civil Defence monitoring Pipeline)
06	RP/NOSDRA/01	National Oil Spill Detection and Response Agency
07	RP/MNOC/01	Multi National Oil Company 1
08	RP/MNOC/02	Multi National Oil Company 2
09	RP/HS/01	Health Sector
10	RP/FMHDSD/01	Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development

Source: Author Generated

The stages outlined by Braun and Clarke were utilized in the interview recording analysis, which was carried out with the assistance of the Nvivo software (Braun & Clarke, 2006). Analysis of the interview

was carried out as illustrated in Figure 4.3. The recorded interview was transcribed before uploading on the Nvivo platform. It should however be noted that the Nvivo software can also be used to carry out the transcription. However, trnasiption was done by the researcher so as sieve out irrelevant aspect of the interview. Themes were created according to the objectives of the research. These temes were based on the qualitative aspect of the study. The transcribed data were coded accordingly into categories and units. This operation comprise segmenting the data into discrete units and coding them into categories. Normally, the categories from this methodology fall into two types: those obtained from the participant's behaviours and words and those that the researcher considers significant to the research's area of inquiry. The process elicits thoughts and mental processes, leading to descriptors and explanations. The development of memos served as a tool for elucidating ideas and determining their connections to various other notions. On the information that was being coded, the researcher utilized strategies such as iterative reflection and constant comparison of concepts. Lastly, information based on the categories created were used in analysing the research findings.

Focus Groups

Focus groups are a commonly used research method in qualitative research. They involve bringing together a small group of individuals to participate in a guided discussion on a specific topic or research question. Implementation issues were understood thanks to a focus group session that included representatives from several stakeholder groups. Very few recommendations on standardized methods for validating collaboration can be found in the existing literature. Similar to semi-structured interviews, this approach is a qualitative methodology. A focus group is a group conversation about a specific topic organized for research purposes (Gill et al., 2008). The researcher, a moderator or facilitator, guides, monitors, and records the discussion (Kitzinger, 1994; Morgan, 1998). This method can determine what people think about a topic as a whole and what they think those thoughts mean. This technique helps elicit detailed accounts of people's perspectives and backgrounds (Morgan, 1999). In addition, participants can ask each other follow-up questions, which provides the researcher with a richer set of data and prompts participants to recall details they might have forgotten (Dawson, 2015). It is on this note that a meeting with stakeholders was scheduled, which took place in Lagos and Abuja, Nigeria.

The research topic was presented on these two occasions, followed by the objectives and the outcome. Stakeholders were then presented with the outcome, a framework for preventing pipeline disasters in Nigeria, for debate and approval. Considering the vast majority of the critical success factors established while validating the stakeholders' collaboration framework is crucial to effectively implementing the framework's components.

Stakeholders in the Nigerian Oil and Gas Industry (NNPC and oil companies), Government agencies (NEMA, NOSDRA, and FMHDSD), Civil Society Organizations (CSOs), and academia (Universities and R&D centres) were all sent formal letters (via email) asking for permission to participate in the study before the discussion. These organizations were picked because of their essential roles (and because of the expertise and recommendations they provide) in putting into effect many types of policy, from regulation to policymaking. Due to the location, two venues were chosen to accommodate the stakeholders. Group discussion was held at Lagos Island for participants in Lagos, including stakeholders from MNOCs, NNPC, NEMA and residents from the study area. The group discussion for participants in Abuja took place at the University of Abuja and involved stakeholders from the academia, the media, civil society organization and emergency service agencies. Table 4.3 summarizes the focus group's composition and areas of expertise, totalling nine participants.

Table 4.3 Summary of Focus Group Data

Participants	Focus Group Participants' Code Name	Organization	Position
Lagos			
01	FG/NNPC/01	NNPC	Deputy Director
02	FG/MNOC/02	MNOC	Director
03	FG/NEMA/03	NEMA	Assistant Director
04	FG/CSO/04	CSO	Policy Analyst
Abuja			
05	FG/ACA/05	Lecturer	Professor
06	FG/ACA/06	Lecturer	Doctor
07	FG/NOSDRA/07	NOSDRA	Deputy Director
08	FG/FMHDSD/08	FMHDSD	Assistant Director
09	FG/MED/09	Media	Newspaper Editor

Source: Author Generated

Both sessions lasted close to two hours, with breaks for refreshments in the middle. First, the researcher or the group must establish topical contexts for the conversation in advance (Kumar, 2014). This gives a general conversation framework, followed by more focused discussion questions. The following is an outline of the steps that were taken during the meeting:

i. The participants were asked for permission to record the interview. Then, in an eight-minute presentation, the researcher presented the research topic after receiving permission from the participants. This presentation was done to inform the participants of the research objectives. These preliminary steps were crucial in making the research setting comfortable for the researcher and the participants (Berg, 2007; Strauss and Corbin, 1998).

ii. The researcher, as the moderator, proceeded with the discussion. Then, with the aid of a projector, the presentation was done, and the framework was presented for validation stage by stage.

iii. Framework validation stage. Printed copies of the models were circulated to participants, and the discussion followed. Participants were asked to review the framework to; make recommendations on the framework components and identify any missing components.

iv. After a thorough discussion, the meeting ended here.

4.4.2   Secondary Data Collection

Secondary sources include previous research publications on incidences of oil pipeline disasters and major newspaper publications on incidences and Government response to these disasters.

All secondary data were derived from information that already existed. The researcher used a formal application in situations in which the documents sought were governed by statutory authorities or permissions where permissions needed to be requested from the authors. This approach was adapted to gather this type of information since, in such a scenario, the authorities would be required to maintain records of the identities of applicants and recipients. This guarantees that the information does not fall into the wrong hands (Atkinson and Brandolini, 2001).

The research reviews existing literature on oil pipeline disasters from 2000 to 2019 (secondary data) to validate the above findings as the general causes of pipeline disasters and propose a solution to address

further occurrences through collaborative base management. Secondary data supplied more readily accessible data in larger volumes, which served as a basis for comparison (Saunders et al., 2012). Secondary source data was examined, cleaned, highlighted for helpful information, and examined rigorously.

4.5   Sample Selection Method

Sampling is choosing research subjects or cases for a particular study (Saunders et al., 2007). Comparably, a case sample mainly specifies the broader group to which it belongs (Ragin, 2007). Probability-based (random) and nonprobability sampling are the primary categories (Teddlie and Yu, 2007, Saunders et al., 2007; Ragin, 2007). By concentrating on data from sub-groups instead of all conceivable examples or aspects, the above strategies reduce the data gathered and the resources needed for a study (Saunders et al., 2007). Probability sampling is most frequently used in quantitative research, which entails selecting a sizable sample of a population at random (Tashakkori and Toddlie, 2003). However, unlike probability sampling, which chooses examples at random, non-probability sampling chooses cases based on a specific objective.

Additionally, while probability concentrates on representativeness and generalization of results, non-probability sampling concerns the depth of information gathered (Teddlie and Yu, 2007). The purposive sampling technique and snowballing sampling strategy are the two non-probability sample types used in the study. According to Jewell and Hardie (2009: 62), Purposive sampling is choosing qualified respondents to respond to your research questions. The strategy mentioned earlier was employed in this study to choose respondents with the qualities, knowledge, and awareness of pipeline disasters and stakeholders' collaboration necessary to meet the stated goals of the investigation.

Stakeholder purposive sampling was used to "identify important stakeholders who are involved in the design, giving, receiving, or managing the programme or service being assessed, and who may otherwise be influenced by it," It was more specifically used (Palys, 2008, p.697). This approach makes the sample quantity less significant than the sample quality (Koerber and McMichael, 2008). Snowballing sampling, another approach investigated for the study, involves choosing a sample using networks (Kumar, 2014). When it is challenging to identify study participants, snowball sampling is

used (Saunders et al., 2007). In order to identify and recommend possible stakeholders for the study, the researcher first gathers data from important participants using the snowball sampling technique.

Up until the point of saturation, both snowballing and purposive data collection techniques were used. This idea is relevant when collecting data to the point of diminishing returns, and no new data is added (Bowen, 2008; Miles and Hubrman, 1994). Arguments supporting the study's findings show that data saturation happens at around 11 or 12 participants in homogeneous groups (Guest et al., 2006).

4.6   Pilot Study

A pilot study is a preliminary test run or a smaller version of the intended study. The term "feasibility study" is commonly used to describe this research method. However, this could also refer to the extensive pre-study testing of research instruments like questionnaires and interview schedules (Van Teijlingen & Hundley, 2001).

Pilot research will, in most cases, come before a more extensive study, to which it will be closely tied (Eldridge et al., 2016). The phrase "feasibility study intended to inform the preparation of a large-scale investigation" (also known as "pilot") is frequently used interchangeably with "pilot" (Thabane et al., 2010). Pilots are a risk-reduction approach that can be used to reduce the likelihood of a larger project failing.

However, as Eldridge et al. (2016) point out, pilot study definitions frequently focus on an experiment, project, or development before a future giant experiment, project, or development. The word "pilot" has numerous diverse connotations in the research literature. In other words, a pilot study is "a small-scale experiment or set of observations undertaken to decide how and whether to launch a full-scale project" because it helps decision-making and therefore serves as *"a small-scale experiment or set of observations undertaken to decide how and whether to launch a full-scale project"* (Collins English Dictionary, 2014).

It is common practice to conduct a pilot study in order to determine whether or not specific procedures, methods, questionnaires, and interviews are feasible and how well they work together within a specific setting; a pilot study may also uncover ethical and practical issues that could impede the primary study (Doody & Doody, 2015). Before beginning a more extensive study, it is helpful for researchers to

conduct pilot studies so that they can identify flaws in the study's design, improve their data collection and analysis plans, gain experience working with the research team, evaluate recruitment procedures, and acquire crucial information regarding participant burden (Beebe, 2007). For example, if respondents have difficulties filling out survey instruments, this may inspire researchers to adjust the phrasing of individual items, rearrange the sequence in which questions are presented, or make other adjustments to the format of the instrument (Conn et al., 2010). The research supports the premise that pilot studies should be conducted to identify and mitigate risks related to study design, sample size, sample selection, data collection, management, and analysis. These risks may include but are not limited to: (Moore et al., 2011).

In social research, pilot studies were carried out to validate questionnaires and other survey instruments, such as those used for structured, semi-structured, and unstructured interviews (van Teijlingen et al., 2001). In both quantitative and qualitative research, these have been demonstrated to be quite helpful (Perry, 1998).

Pilot studies have been effective for refining and designing survey instruments, structuring questions, collecting background data, and adapting the research method to the challenges of the research setting, whether the research takes a qualitative, quantitative, or hybrid approach to data collection (Peck et al., 2000; Stake, 1995).

According to Yin (2008), the pilot study permits researchers to enhance the research's conceptual framework and data collection technique. This is true regarding the data's substance, and the processes followed to gather the data.

4.6.1   Pilot Study in the Current Research

In order to cross-validate the information that was already available on pipeline disaster management, a pilot research was carried out utilizing online questionnaires (which were collected using the kobo toolbox data collecting tool) and skype interviews. The well-structured questionnaire was used to collect data from places with a high prevalence of pipeline disasters and elicit stakeholders' responses regarding these events.

The pilot study's goals were to (1) determine whether or not it was possible to recruit a representative sample of participants; (2) determine whether or not the questions were clear and concise; and (3) determine whether or not the technology utilized to administer the surveys was user-friendly.

Methods

Online surveys were created using the kobo toolbox software and sent by web links, and Skype was chosen as the way to use as a response to the pandemic caused by the coronavirus in 2020 in Nigeria. This pandemic resulted in a total and partial lockdown of the country. This was consistent with the COVID-19 recommendations, focusing on social distancing as a specific point of emphasis. Emails and SMS messages containing the web link (https://ee.kobotoolbox.org/x/fa9RGCwo) were issued to those who participated in the survey.

KoBoToolbox is a suite of tools for collecting data in the field that is open source and free to use. It is designed for use under challenging circumstances. It enables the use of mobile phones, tablets, paper, and laptops for data collection in the field. It is always being enhanced and streamlined by supporting needs assessments, monitoring, and other data-gathering activities, especially for humanitarian actors in emergencies and harsh field conditions. Specifically, this is being done to improve and optimise the system. The KoBo Toolbox was adapted for use in the humanitarian sector by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), the Harvard Humanitarian Initiative (HHI), and the International Rescue Committee (IRC) (https://www.humanitarianresponse.info/en/applications/kobotoolbox).

Participants

The researcher who carried out this pilot study believed that, when engaging in any conversation of this kind, it is necessary to consider the aims of the research activity carefully. When this is done, the target respondents can be easily identified.

At first, it was envisaged that the pilot testing would contain a sample of up to twenty respondents. However, it is essential to strike a balance between the significant stakeholders involved in pipeline disasters. As a result, the pilot sample size was increased so that more extensive testing could be conducted on the response rate, the possibility of generating a viable sample for the pilot testing of the

survey instrument, and the research processes planned for the main study. After further analysis, the total number of people who responded was closer to fifty.

Instrument

In order to obtain the viewpoints of respondents coming from a variety of stakeholder groups involved in disaster management as well as people of communities that have been affected by such disasters, an online survey design was utilized. The purpose of the questionnaire was to gain an understanding of the participants' perspectives on a variety of topics, including the following: oil pipeline disasters; their causes; their effects; the existence of stakeholders' collaboration in the management of disasters; and the effect of such collaborations.

The pilot study provided an opportunity to test the content and appearance of the final questionnaire in the field and to collect data on its clarity, mistakes, readability, objectivity, and suitability for the intended audience and the time required to complete the questionnaire.

While the pilot survey's majority of questions were structured along a Likert scale, there was also room for free-form responses on topics such as emergency preparedness, the effects of pipeline accidents, and the efficacy of current inter-agency cooperation.

Questions regarding the number of cases of oil pipeline disasters that have been experienced, the factors that lead to pipeline disasters, the types of people who are most negatively impacted by the aftermath of oil pipeline disasters, and the role that various stakeholders play in the management of oil pipeline disasters were also included in the questionnaire.

The survey questions were structured so that they were most directly related to personal, institutional, and contextual variables whenever possible. In addition, efforts were made to remove any potential for bias and to ensure that the survey was conducted according to generally accepted standards of excellence (Friedman & Amoo, 1999). The Likert rating scale style and open-ended questions were used in the final version of the pilot survey, which had 45 questions. These questions were designed in Kobo Toolbox, an online Open Source Survey Application, and were used to design the survey.

Process

The pilot testing process occurred between 1st November 2020 and 30th November 2020 (4 weeks). The target respondents had been previously identified; one respondent from the target group was, after that,

met physically. These individuals served as contact persons through whom other respondents were contacted.

An initial electronic invitation was sent out via email or text message. It explained the research and survey, extended an invitation to participate, and provided a link to the website. Then, three days following the initial invitation, individuals who had not responded were sent a reminder message. Finally, after submitting the survey, participants received a message thanking them for their time. The researcher successfully tested the survey by sending and receiving the necessary emails, providing easy access to the survey itself, and accurately recording responses in the Kobo toolbox system.

A total of 56 people were invited to participate in the study, and they were informed that the survey link would expire after a week. This was to ensure that they responded to the questionnaires sooner than later. Five of the sms texts indicated they were sent but were not delivered. However, another text was sent three days later and followed by phone calls.

4.6.2   Results of the Pilot Study

Response Rate

Stakeholders in pipeline disasters and citizens of areas with frequent oil pipeline disasters gave fairly even replies. A total of 89.29% of those who were sent invitations ended up responding, as shown in Table 4.4

Table 4.4 Response Rate of Pilot Study Participants

Category of Respondent	Number of Invitees	Number of Responses
Other Stakeholders	37	34
Community Residents	19	16
Total	**56**	**50 (89.29%)**

Response Pattern

Twenty individuals answered the survey within a few hours following the initial invitation. There were no additional responses till the following day. A text message and an email as a reminder were delivered on the third day. This shows that individuals are more likely to respond immediately after receiving the

email invitation but tend to forget afterwards. Within a few hours of the SMS and email reminders being sent, eleven individuals responded. The following is a portion of a reply. "I appreciate the reminder about the survey, I ultimately decided to complete it."

The researcher contemplated sending another reminder on the fifth day but finally opted against it to spare the subjects extra annoyance. Seven more individuals had answered the poll, bringing the total number of replies to 39 by the deadline. In the following days, eleven more responses were received, totalling fifty.

4.6.3   Observations for Improving the Instrument and Methodology

Contacting Participants

The participant's second phone numbers were not collected during the contact detail collection. As a result, some participants had more than one phone number, such that their WhatsApp numbers differed from those used for calls and text messages. This led to the non-delivery of two of the text messages sent.

The researcher decided that for the main study, a provision will be made for those with more than one phone number when requesting phone numbers. It was also decided that those whose invitation emails bounced back would be contacted by phone.

Reminder emails/texts

According to the participants' responses to the reminder emails, integrating reminders in the main trial would not have a negative effect. Figure 4.6 illustrates that the number of completed questionnaires increased from 22 to 32 on the third day of the pilot research after giving the reminder.
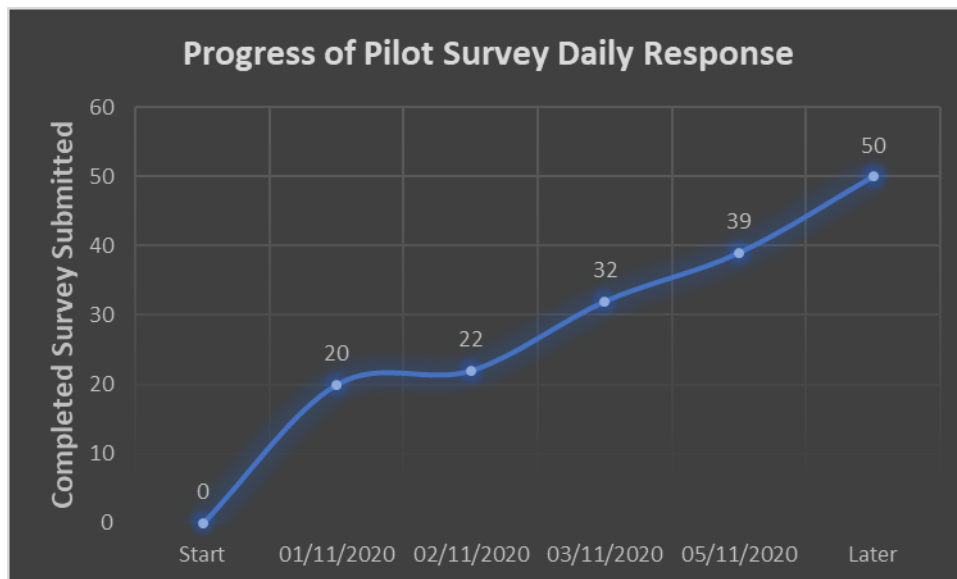
Figure 4.6 Daily Progress of Pilot Study Response

4.6.4   Pilot Instrument

Time to complete the survey

According to the guidelines for the survey, all 45 questions should be answered in less than twenty minutes. In contrast, the pilot study found that respondents need approximately fifteen minutes to complete the survey. The time is taken to complete a survey influences response rates (Cook et al., 2000; Walston et al., 2006). According to the results of numerous research, respondents are more likely to complete a survey "if it is perceived to take less than 10 minutes to complete" and less likely "if it is perceived to take more than 30 minutes to complete" (Koskey et al., 2015).

The study concluded that a satisfactory response rate from the targeted group could be attained if an average completion time of 20 minutes was used. As a result, the instructions for the survey will be updated for the preliminary study to reflect that it may be completed in roughly twenty minutes.

Revisions to the Instrument

Participants gave suggestions for enhancing the instrument, despite not being formally asked for input on the survey's content or methodology. As a result, some questions will be changed in response to the pilot, and some will be removed if they do not contribute to achieving the goals. In addition, we will be editing the survey's main content to make it easier to understand and finish, which includes making questions shorter when possible, presenting and ordering questions to narrow subsequent questions

based on prior responses and relevance to the participant's specific circumstances, and allowing multiple answers when relevant.

The environmental repercussions of the pipeline disaster were under-reported in the pilot research but will be investigated in the full report. The researcher also decided to add the following remark to the bottom of the questionnaire to allow for as much adaptability as possible throughout the primary investigation: "You may return to the questionnaire at any time to alter your responses." It was also decided to include questions asking for feedback on the survey, as this information could be useful for future studies.

Limitations of the Pilot

This pilot project's principal objective was to assess the technical and navigational aspects of the online survey process and the instrument itself to establish whether or not it would be possible to recruit research participants successfully. As a warm-up for the primary investigation, the pilot study allowed us to refine our methods for conducting research. In addition, participants in the pilot sample were limited to citizens and stakeholders. Due to these two considerations, it may be impossible to extrapolate the pilot study's findings to other populations.

Conclusion

The anticipated participant recruiting approaches, the questionnaire's usability, and the data collection equipment were evaluated. Positive participant responses and a relatively high response rate during the pilot study suggested that conducting a more extensive investigation using a slightly revised technique would be viable.

Furthermore, the pilot study confirmed that the online open-source survey was suitable for data collection, lending credence to the researcher's dedication to maintaining transparency throughout all stages of the learning and research process.

4.7   Main Study

For this study, a technique known as purposive sampling was employed. Purposive sampling, also known as judgmental sampling, is a method in which specific places, individuals, or events are selected

on purpose in order to provide information that cannot be obtained through other means (Maxwell, 1996). It refers to the situation in which the researcher includes instances or individuals in the sample because he or she believes that doing so is justified. The Niger Delta Region has a population of 30 million occupants according to the 2006 census (NPC, 2006), with generally 75% of the inhabitants living in creeks and villages (NDDC, 2010). Considering this population size, **300** respondents were targeted for this stage of the data collection process. This aligns with KMT (Krejcie & Morgan Table), which suggests that a sample of 384 is sufficient for a population of 1,000,0000 or more (Memon et al., 2022). Similarly, for a population of 100,000 and above, 95% confidence level and a 5% margin of error, 385 have been recommended, while 267 are recommended at a 6% margin of error (Raosoft, 2022; SurveyMonkey, 2022).

The target stakeholders have been previously identified during the pilot survey. This made it very easy to disseminate the survey link. Three (3) persons per stakeholder group, one from each of the three target case study states identified during the pilot stage, were sent the link to the online questionnaire. These persons served as contact persons within the study area. These already identified persons helped distribute the online link within their folds. The submissions were monitored thoroughly throughout the entire data collection stage.

4.7.1   Instrument

An online survey design was employed to gain respondents' perspectives cutting across stakeholders in disaster management and residents of the communities that have experienced such disasters. The questionnaire was designed to obtain the perception of participants regarding oil pipeline disasters, causes, effects, and the existence of stakeholders' collaboration in managing disasters and the effect of such collaborations.

The Questionnaire contained 48 Questions comprising;

- Yes/No Questions
- Open-Ended Questions requiring the respondent to fill in his/her response
- Likert rating scale format questions

4.7.2 Process

The instrument was deployed on 14th October 2021. The first submission was received on the same day. Five submissions were received that day. A total of 20 submissions were received the following day, 15th October 2021. Daily monitoring of the submissions was done via the koboToolbox platform (Figure 4.7). Two hundred fifty-two submissions were received between October 14th and November 12th. Forty-eight submissions were received between November 13th and November 17th. The 300th submission was received on 17th November 2021. The instrument was archived immediately to prevent it from receiving further submissions.
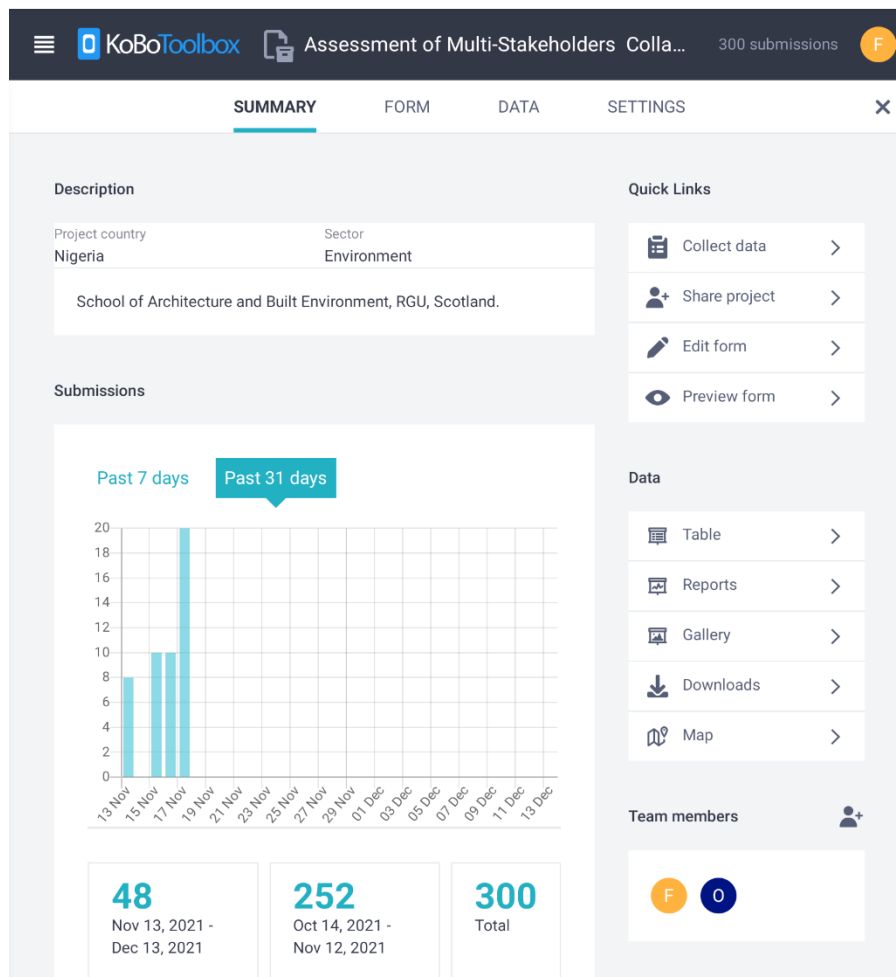
Figure 4.7 KoboToolbox Environment showing Responses Received

4.7.3   Time to complete the survey

Completing this survey's 48 questions was expected to take no longer than twenty minutes. In contrast, the average time to complete the survey was approximately 18 minutes, 2 minutes less than anticipated. This was highly encouraging because the time it takes respondents to complete a survey affects the proportion of responses they provide (Cook et al., 2000; Walston et al., 2006). For example, according to the results of numerous research, respondents are more likely to complete a survey "if it is perceived to take less than 10 minutes to complete" and less likely "if it is perceived to take more than 30 minutes to complete" (Koskey et al., 2015).

4.7.4   Analysis

The desired number of participants in this survey, selected using a purposive selection strategy, was 300. The questionnaire was put in the archive as soon as it was determined that the goal had been reached so that no additional responses would be received. Having obtained the required responses from the survey, analysis commenced. The quantitative data was analysed using SPSS Software (Statistical Package for Social Sciences), using Tables, Charts and Graphs where necessary. Scores were allocated to the Likert scale responses and interpreted appropriately.

This is the first stage of the questionnaire data analysis. The participant responses are automatically summarized and described in the Kobo toolbox platform, making it easy to interpret the data through a graphical representation. After then, the collected data were transferred to Microsoft Excel software for modification. The quantitative data is revised to remove contradictions and gaps (Kumar, 2014). This procedure can be accomplished by carefully reviewing the finished research instruments to find and minimize misclassification and informational gaps in the respondents (ibid). At this point, respondents' incomplete responses are discarded. Data from additional respondents, if any, is entered into Excel to complete all of the survey responses.

The data were routinely entered into SPSS for descriptive analysis and reliability testing, determining if they accurately reflected the variables they were supposed to measure. According to Healey (1990), descriptive statistics make summarising, describing, and presenting results clearly and succinctly easier. In order to confirm the reliability, the obtained data was subsequently put through a Cronbach's Alfa

internal consistency test. In addition, the mean and standard deviation help order the variables. Chapter 6 goes into further detail on the study of the questionnaire.

4.8 Reliability and Validity of Data

Data that forms part of the research work has to be screened to ensure that only information is ascertained to be reliable. This is achieved using the appropriate techniques for obtaining primary and secondary data. Considering Golafshani's (2003, p. 601) assertion, reliability and validity are *"two factors which any qualitative researcher should be concerned about while designing a study, analysing results, and judging the quality of the study"*. However, Kirk and Miller (1989) argued that *"reliability is the extent to which measurement procedure yields the same answer however and whenever it is carried out"*, while *"validity is the extent to which it gives the correct answer"*.

4.8.1 Test of Reliability and Validity for the Quantitative Data

Cronbach's alpha was used to determine reliability in this investigation. According to Taber (2018), an alpha of 0.6 or higher for Cronbach's is considered satisfactory. Cronbach's Alpha assesses the inter-item consistency and measures the coefficient that represents how effectively items in a set are positively associated (Islam, et al., 2011). Cronbach's alpha values below 0.6 are deemed inadequate; alpha values between 0.7 and 1.0 are deemed excellent.

A correlation analysis, namely Pearson's product-moment correlation coefficient (r) for parametric statistics and Spearman's Rank correlation for non-parametric statistics, should be used to specify the application and strength of the linear relationship between variables. Pearson correlation displays the strength of the association as a number between -1.00 and +1.00, where 0 denotes no correlation between the variables. Before diving into several data analyses, ensuring the data is normally distributed is crucial. The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to check if the field survey data were normally distributed. Since most of the items examined were under 10, the Shapiro-Wilk test has garnered more attention because it is better suited to this goal. The test's null hypothesis is that the population follows a normal distribution. If the p-value is less than the chosen alpha level, the null hypothesis is rejected, and it is shown that the tested data are not regularly distributed. However, if the p-value is smaller than the predetermined alpha level (for example, if the predetermined alpha level is

0.05 and the p-value is less than 0.05, then the null hypothesis that the data are from a normally distributed population is rejected), then the alternative hypothesis is accepted (JMP, 2004).

4.8.2   Test of Reliability and Validity for the Qualitative Data

According to Riege (2003), cross-validation is achieved when the research is designed in successive stages. First, information obtained from the critical review of existing literature is further subjected to content analysis and concurrence by comparing it with what was obtained during the interview. After that, data obtained through the primary source is triangulated with existing data obtained from secondary sources. Thirdly, primary data collected through direct observation and interviews will be triangulated with data from secondary sources to ensure conformity. Finally, at the end of the whole process, a validation process is conducted to test the data collection techniques and research framework to ensure the research's reality and the effectiveness of the framework and the chosen techniques.

When drawing an inference, researchers should take into account all alternative explanations and alternatives, as recommended by Sheridan et al. (1996), to ensure internal validity. The research design's framework, created from the literature review and baseline data from the Nigerian oil and gas industry and the pilot study, would be used to manage data validation. The research framework will first justify the data requirements. Second, the researcher will conduct a pilot study to verify the feasibility of the case study procedure before finalizing the survey instruments to ensure the collected data's accuracy. After extensive consultations during the pilot study and preceding stages, during which phone calls were made to Nigerian oil and gas industry practitioners, the interview stakeholders were carefully selected. Transcription of the interviews will be done to ensure as little error as possible; in some cases, interviewees were sent drafts of the transcripts and asked for their feedback; in all cases, the accuracy of the transcription was confirmed.

The selection criteria used in this study were consistent throughout to guarantee the quality and accuracy of the results.

4.9   Ethical Considerations

While conducting research of this nature, certain ethical challenges are encountered (Beaulieu and Estalella, 2012). According to Denscombe (2010), this occurs due to gaining access to documents, people and events, especially when the data sought is sensitive. Robert (2015) added that these challenges vary depending on the research's purpose and data collection mode. These ethical considerations also extend to how data was collected, analysed, and reported during the research. As a result, the researcher needs to consider and be fully aware of all ethical issues that could affect the study to balance the potential risks and benefits of the research carefully.

In order to meet the legal and ethical standards set by Robert Gordon University (RGU), prior to commencement of data colection, approval was obtained from the research board of RGU. The following legal and ethical standards bind Robert Gordon University;

    i.   A breakdown of the work to be done

    ii.   Methods and processes for gathering data

    iii.   The sensitivity of the information being collected.

    iv.   The impact of the study on the researcher, the participants, and outsiders are also required.

    v.   The expected result of this study's findings should be provided.

    vi.   Participants' permission or informed consent is required.

    vii.   The researcher must be shielded or protected from harm.

These regulations allow the researcher to consider and address any ethical concerns arising from their work. The following ethical issues were considered at various stages of the research.

4.9.1   Prior to the Data Collection and Analysis

Ethical concerns prior to data collection and analysis take into consideration the research procedural process, reflection on proposed research methodology, and potential harm to research participants. Approval was sought from the research board arm of the Robert Gordon University (RGU) in order to ensure compliance with the necessary legal and ethical requirements. Details of this approval are contained in Appendix 2 of this report. Among the ethical factors considered prior to data collection were; 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. Questions on these implications/risks were adequately assessed in the Research student and Supervisor Assessment (RESSA) form. Some of the concerns addressed in this stage include; the nature of information and how it relates to individual human subjects, groups, organisations and animals; privacy or confidentiality of the research information; potential harm that could be imposed on the research participants, the researcher or even third parties; negative consequences on completion of the research for research subjects amongst other questions; requirement of informed consent or approval forms from research participants, subjects or external bodies; the need for safeguarding or protection of the research subjects, etc. Having satisfied all these concerns satisfactorily and ensuring that no potential risk exists, the research was continued. A request letter (shown in Appendix 4) was thereafter sent to the respective participants.

4.9.2   During the Data Collection and Analysis

Ethical approval was obtained before data collecting began. A consent request was sent along with the interview request to all stakeholders that were to be interviewed (Appendix 3). Details of anonymity and confidentiality were clearly stated in the consent request to ensure that the interviewee is assured to prevent withholding necessary information. Before recording the interview conversation, the consent of the participants was also sought. Participants in the study were given clear and comprehensive information about the study's goals and procedures. The anonymity and confidentiality of the study's participants and the collected data's safety and security were carefully protected, following all applicable ethical standards and regulations. This is in line with what Robert (2015, p. 318) referred to as the "usually necessary" practice of obtaining "informed permission from research participants."
The consenting participants were informed that the interviews would be transcribed and used only for the purposes of the research. Voice recording was done for both interviews and group discussions, after verbal consent has been sought. The interview questions were also structured in a way that allowed the participants to comfortably answer the questions without the risk of invasion to privacy, damage to participants' personal integrity, financial and social standing.

These ethical considerations are important in qualitative research and they offered the researcher the opportunity to gain access, consent and maintain the confidentiality of the participants.

4.10   Chapter Summary

This chapter discussed in detail various methods adopted for the research and the justification for such methods. The mixed method approach of data collection was embraced for this research due to the multi-faceted nature of the research questions. It ensured that justice was done to the objectives of this study. It allowed for a quantitative approach to data collection and a qualitative approach as needed, ensuring that attention was paid to all elements of the research. In addition, it allowed for the provision of details by the stakeholders to some questions already captured in the survey questionnaire, thereby making it possible for concurrence. In addition to the quantitative, the qualitative has given this research details and enriched the report's content. Having successfully analysed the quantitative data, the researcher has been fully armed regarding the areas that require more attention, thereby serving as a guide during the qualitative session with the stakeholders, amongst whom collaboration is sought. Findings from the research will be presented in the next two chapters, while the final chapter will present the summary of the findings and conclusion of the study.

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CHAPTER FIVE

STAKEHOLDERS'COLLABORATION IN OIL PIPELINE DISASTER MANAGEMENT AND MITIGATION

5.1 Introduction

The collaboration of multiple stakeholders is intended to broaden and deepen knowledge to identify with stakeholders the various aspects of collaborative roles in the disaster mitigation of oil pipeline disasters and the management of environmental issues in the oil-producing region of Nigeria. To achieve this, interviews were conducted with key stakeholders such as the National Emergency Management Agency (NEMA), multinational oil companies, the Nigeria Fire Service (NFS), the National Oil Spill Detection and Response Agency (NOSDRA), health services, and host communities. This chapter is the logical presentation of interview responses, document analysis, majorly from existing literature (journals and stakeholder websites) on key concepts regarding stakeholders' collaboration in the management and mitigation of oil pipeline disasters. The chapter commences with concept of collaboration and its significance in managing disasters. Thereafter, the level of stakeholder collaboration in the study area was presented. Elements of collaboration relevant to this research as well as channels of communication during disaster occurrences were reported. Also presented in this chapter are roles of stakeholders in preventing/managing oil pipeline disasters. The chapter concludes with limitations of collaboration and possible challenges of collaboration.

5.2 Collaboration and its Significance in Managing Disasters

The scientific community is growing interested in collaboration to address complex societal issues (Raab et al., 2015). Multi-stakeholder collaboration makes it easier for government agencies, civil society organizations (CSO), and corporate sectors to form partnerships that support the study and formulation of applicable policies. Hence, multi-stakeholder collaboration is a form of strategic cooperation that brings together many organizations that can participate in a joint assembly with public authorities to make mutually acceptable decisions (Desportes et al., 2016). The ability of collaboration to strengthen networks and relationships between stakeholders by developing interpersonal trust, which can be important in a disaster, is one of the benefits of this type of activity (Desportes et al., 2016).

**5.3	Level of Stakeholders' Collaboration on Disaster Management in Nigeria**

The Nigerian Emergency Management Authority is the government agency in Nigeria that is responsible for disaster management and is charged with that responsibility (NEMA). An investigation into numerous press stories published in 2018 and beyond revealed that there are no active collaboration measures between the various stakeholders in Nigeria for interoperability; nonetheless, there are measures regarding interaction. This situation was also noticed during the interview. A selection of the responses were included in the research's Appendix section.

Even in situations where collaboration occurs, this alone is not enough. For example, a participant who was interviewed stated that his ministry only works with one other agency, which also happens to be part of his ministry.

In April 2019, the head of NEMA noted that the participation of stakeholders in disaster management was crucial in limiting the impact of the disaster on people (Sumaina, 2019). According to the official website of NEMA, the Director-General of NEMA issued a call for collaboration in which he urged the enhancement of the existing working relationship between the agency and the military to an interoperability level. The DG also stated that 70 Disaster Response Units (DRUs) were created nationwide in Army, Navy, and Air force formations to boost the emergency response. These 70 DRUs were created to boost emergency response (OCHA, 2018).

**5.4	Elements of Collaboration**

A literature review reveals that trust, accountability, mutual interdependence, and transparency are the essential components of a collaborative pact. When it comes to constructing, cultivating, and managing their relationships, collaborative partners will benefit tremendously from understanding the nature of trust and how to put that knowledge to use. According to Faehnle and Tyrvainen, it is beneficial for partners to reflect on what they have learnt and how that learning strengthens the partnership as the working process is carried out (Faehnle & Tyrväinen, 2013). One of the most critical challenges that need to be tackled in order to build trust in collaborative environments is the deliberate establishment of trust mechanisms.

According to Willems and Van Doreen (2012), accountability is a component of the checks and balances system of the organization, and it is linked to the partners' internal commitments. They contend that "accountability" refers to a broader concept than "being held accountable" and that "accountability" might result in significantly more severe repercussions. It is considered that accountability may be more effectively achieved in formal partnerships when the goals and obligations are clearly outlined and when these things are publicly disclosed as part of the partnership (Buse & Walt, 2000).

According to the governance ethics definition, transparency is defined as the right of each partner agency to be informed about issues and decisions that affect the partnership process (Lockwood, 2010). Helpful decision-making aids include concise and understandable explanations of the pros and cons of each potential course of action and exhaustive details of the reasoning behind each choice (Willems & Van Doreen, 2012). These proponents believe closer collaboration between partners will generate better trust, resulting in a more fruitful collaboration between the parties involved. Because of this, they will have increased levels of productivity as well as self-assurance throughout the process of collaboration. In conclusion, the elements of collaboration in partnership working as defined by this research are as follows: (a) the parties participating in the cooperative agreement's "mutual dependency", (b) a shared sense of "trust" among those involved in the partnership; (c) "transparency" in decision-making procedures related to disaster mitigation; and (d) the partners' "accountability" to one another and to the communities they are working with (Figure 5.1).
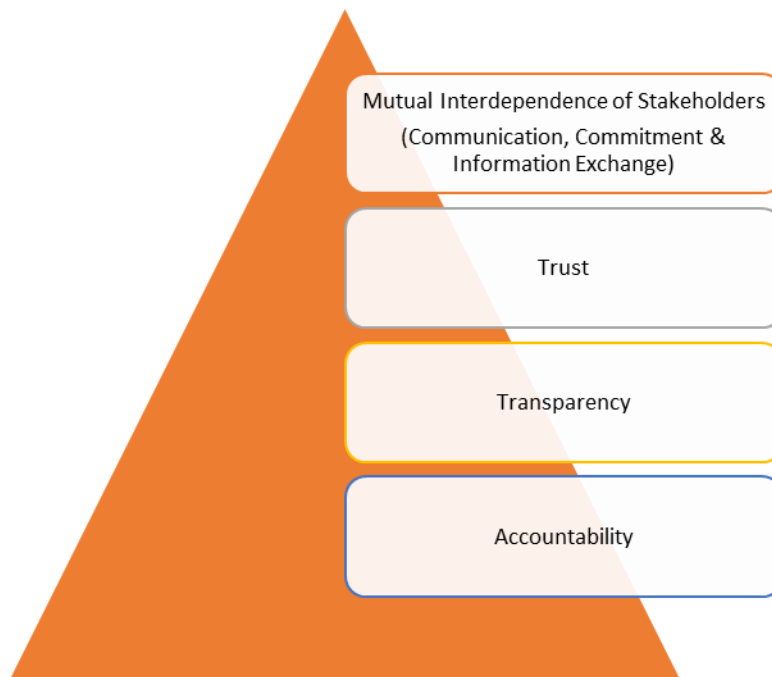
Figure 5.1 Elements of Collaboration in Pipeline Disaster Management (Author Modified).

5.5 Channels of Communication Before, During and After Oil Pipeline Disasters

According to Goodman and Dion, communication is the formal and informal exchange of information that is reliable and pertinent to one another (Goodman & Dion, 2001). It is impossible to overestimate the significance of communication in forming a successful collaboration between many parties. Establishing additional lines of communication is essential because this factor can affect the decision-making process (Andrews & Entwistle, 2010). According to Kasper-Fuherer and Ashkanasy, adequate attention must be paid to the collaboration procedures within the cooperation framework to ensure that trust and transparency are effectively communicated (Kasper-Fuehrer & Ashkanasy, 2001). Within the context of the collaborative framework, it is essential to maintain a level of reciprocal dependency, trust, transparency, and responsibility.

For this strategy to succeed, communication must be prompt and dependable, particularly in pipeline accidents. Therefore, the framework will establish the communication manner utilized before, during, and after oil pipeline disasters. This communication model will be the information exchange medium before, during, and after the occurrence of oil pipeline disasters. Depending on the circumstances, this may involve email, text messaging, emergency phone lines, and virtual meetings.

It is in light of this that some of the stakeholders interviewed have suggested that;

"…………..to make the suggested method of collaboration possible, I also suggest that communication technologies should be largely adopted before, during and after the occurrence of pipeline disasters. Mobile phones, video conferencing, emailing, and instant messages should be utilised so stakeholders can connect, share data, and work together on projects and assignments whenever they choose. Physical meetings can be adopted as it creates trust and confidence." RP/FMHDSD/01

"…………..before and after these occurrences, I suggest periodic meetings, which can either be physical or virtual. Much progress has been made in the area of virtual meetings these days. People can do a lot while still far away from each other. This should be considered to make it easier for the participation of the relevant stakeholders. In the eventual occurrence of these disasters, designated and dedicated telephone lines should be utilised in communication as it becomes a national emergency." RP/HS/01

While studies have shown that the internet has greatly improved global collaboration regarding information sharing, it has some restrictions. One of these constraints is that the internet cannot substitute in-person participation in brainstorming and conducting experiments. Such in-person interactions are essential for building the trust and confidence that underpin successful partnerships (Kabanda, 2008). The following was mentioned by a respondent during the interview and is relevant here:

"……………..for this purpose, I think stakeholders should engage in physical meetings at least quarterly while meeting virtually at other times. This is before the occurrence of pipeline disasters. During disasters, dedicated phone lines should be used due to the nature of the emergency while physical meetings should be conveyed after such occurrences to discuss way forward." RP/CRL/01

Other suggestions and opinions are;

"…………..emails and text messages are recommended as means of communication amongst stakeholders before the occurrence of pipeline disasters. During disasters, phone calls using a dedicated emergency line should be adopted while adopting virtual and physical meetings after such disasters and should be held periodically." RP/NEMA/01

"………..the best channel of communication before the occurrence of pipeline disaster is emails and virtual meetings. During an oil pipeline disaster occurrence, I suggest dedicated emergency telephone lines. After the occurrence, I suggest physical meetings to discuss the causes and ways of preventing future occurrence." RP/CRS/01

phone calls and secured social media groups of only identified relevant stakeholders can be instrumental before, during and after pipeline disasters. *RP/SA/01*

If properly utilised, social media can be a veritable tool in sourcing information relating to oil pipeline disasters and disseminating similar information, especially when information is to be passed to the outside community. However, emergency lines strictly dedicated to these purposes should be utilised for sensitive information. *RP/NOSDRA/01*

"…………..certain means of communication like telephones, virtual meetings, town hall meetings and emails should all be utilised depending on the nature of the information that is to be passed across." *RP/MNOC/01*

"………before the occurrence of disasters, the major issue of discussion is how to prevent these disasters. In that case, I suggest town hall meetings and physical meetings. In the event of a disaster, emergency telephone lines should be adopted while on-the-spot assessment of all stakeholders should be followed by virtual meetings after disasters to discuss the causes and ways of preventing future occurrence." *RP/MNOC/02*

An overview of the communication model is illustrated in Figure 5.2

Before
- Virtual Meetings, Video Conferencing
- Emails and Text Messages
- Web Based Collaboration e.g. Teams

During
- Emergency Call Lines
- Emergency Online Chatrooms

After
- Physical Meetings
- Townhall Meetings
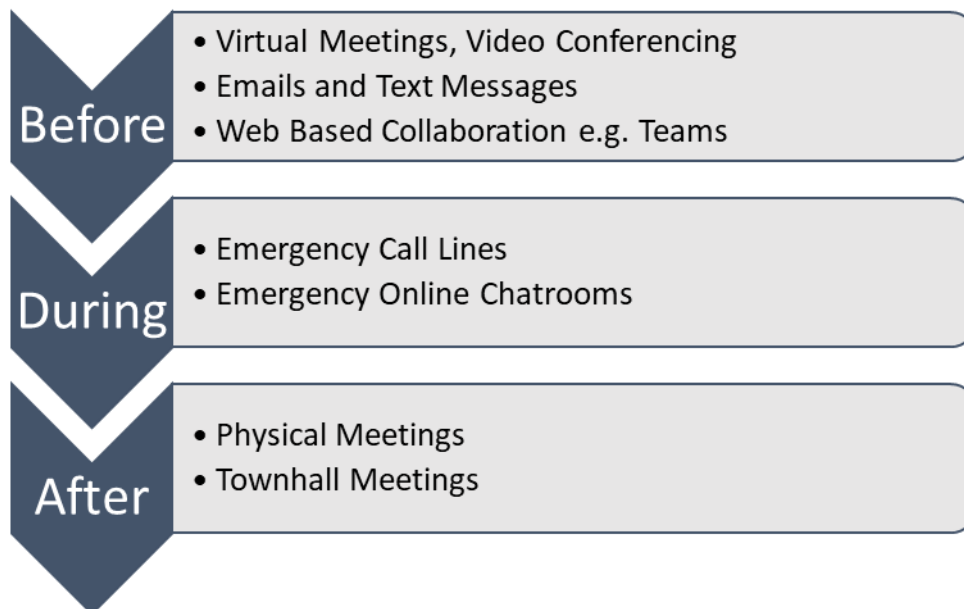
Figure 5.2 Communication Model (Author Generated).

This approach suggests using a virtual method of communication prior to the occurrence of pipeline disasters since it will be more practical and open the door to increased meeting frequency and information sharing. In the event of a natural disaster, it is suggested that emergency call lines and

chartrooms be set up due to the nature of the occurrence. In the aftermath of natural disasters, it is suggested that physical meetings be set up so that an on-site assessment can be achieved, particularly among the organizations responsible for the cleanup of the environment and the rehabilitation of victims.

5.6   Role of Stakeholders in Preventing/Managing Oil Pipeline Disasters

Several roles need to be fulfilled by relevant stakeholders to efficiently prevent and reduce the adverse effects of oil pipeline disasters. As shown in Figure 5.3, a word cloud was produced during the interview analysis using the Nvivo 12 software employed for the study. While considering the question, "who do you think is relevant in the prevention, management, and risk reduction of oil pipeline disasters, and what should be their roles? " the figure contains several words that appear frequently. Words like "agencies" (meaning "government agencies"), "security," "community," "government," and "businesses" (meaning "oil corporations") are examples of some of these words that are used rather frequently.

Figure 5.3 Word cloud on relevant stakeholders in preventing and mitigating oil pipeline disasters.

These terms appear frequently and refer to those vested in averting oil pipeline disasters and reducing their associated risks. Moreover, respondents identified several of these roles during the interview (Table 5.1). As a result, the framework now includes these functions organized in a more streamlined manner.

Table 5.1 Roles of Stakeholders in Managing/Mitigation Pipeline Disasters

Do you Collaborate With other Stakeholders?	Roles of Stakeholders	Your Efforts
"……..Occasionally, yes. We collaborate with security agencies, fire service, NGOs and health agencies. Though such collaborations always exist during disaster occurrence." RP/NEMA/01 *"……..Collaborate with Community Leaders and residents as well as government agencies, though mostly at discussion levels." RP/MNOC/01*	*"……..Government agencies are very relevant in the prevention, management and risk reduction of pipeline disasters. These agencies should be charged with the responsibility of early warning signals and prompt response to disaster cases." RP/NEMA/01* *"……..Government and government agencies are key stakeholders in this regards as they coordinate the activities of all other stakeholders towards achieving the desired goal. Security agencies should provide security and strict surveillance to detect oil leaks and prevent the activities of vandals and miscreants. The health agencies and other emergency services like fire service should provide immediate response during the occurrence of disasters. The community residents should serve as partners in securing pipelines as well as aid during search and rescue missions. NGOs should partner in sensitization activities and assist in providing relief materials to victims of oil pipeline disasters. RP/FMHDSD/01*	*"……I have been involved in the assessment of the level of destruction of the environment as a result of these disasters and drawing up plans for clean-up exercises." RP/FMHDSD/01* *"……Oversee the national oil spill contingency plan. We monitor oil spill drill exercises and carry out inspection and investigation visits. My agency is also tasked with clean-up of spilled sites to remediate the environment as much as possible with the aid of a baseline environmental sensitivity index map (ESI)" RP/NOSDRA/01*
"……..we relate majorly with our host communities as well as government representatives from time to time. No concrete collaboration exist between us and other stakeholders." RP/MNOC/02	*"……..Government agencies charged with the responsibility of handling oil spills and oil disasters, security agents should also be involved. Health agencies are also very important in the risk reduction. The multi-national oil companies should be more involved in the prevention of oil pipeline disasters. The media should organize sensitization in conjunction with NEMA to discourage people involved in oil bunkering." RP/NNPC/01*	Shell Plc. Website: *"………..Large spills of crude oil, oil products and chemicals associated with our operations can harm the environment, and result in major clean-up costs, fines and other damages. We have requirements and procedures designed to prevent spills. We design, operate and maintain our facilities with the intention of avoiding spills. To further reduce the risk of spills, Shell has routine programmes to reduce failures and maintain the reliability of facilities and pipelines.* *For oil spills, we have created a global response network that enables us to deal more*

effectively with oil spills, supplementing local response capability. We routinely perform large-scale exercises with local regulatory and response organisations to practice, and improve, our response capability.

"……my efforts include but not limited to coordinating search and rescue, coordination of emergency response services, provision of relief materials and providing shelter for displaced persons."RP/NEMA/01

"…….Yes, we do, especially when such disasters occur. We usually collaborate with NEMA during such occurrences. We recommend a better collaboration framework or pattern with other agencies as well as NGOs and also the community residents so that we can move past this ugly incidence."RP/NNPC/01

"…….We only join efforts with some stakeholders when these disasters have occurred."RP/CRL/01

"…….Not really. We only respond when our attention is called."RP/HS/01

"……No"RP/SA/01

"……..the government been at the helm of affairs have the number one responsibility. They need to get their acts together. Having created a number of agencies to handle such cases, they should equip these agencies to deliver on their mandate. Among them include NEMA who coordinates all activities relating to disasters in Nigeria. Health agencies, security agencies and we, the community should be involved also.RP/CRL/01

"………..I first and foremost recognize the role of the community in the prevention and mitigation of these disasters. The National Emergency Management Agency needs to do more in this regards as they are at the centre of any form of disaster in Nigeria. National Oil Spill Detection and response Agency is also very relevant as well as the Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development of Nigeria. Also very relevant are the health agencies and NGOs."RP/SA/01

"………Government agencies charged with the responsibility of handling oil spills and oil disasters, security agents should also be involved. Health agencies are also very important in the risk reduction. The multi-national oil companies as well as NNPC should be more involved in the prevention of oil pipeline disasters. The media should organize sensitization in conjunction with NEMA to discourage people involved in oil bunkering."RP/CRS/01

"…….I was involved in granting first-aid attention to some of the victims of the resulting fire as a result of the oil pipeline explosion."RP/HS/01

"……..Yes, we work hand in hand with NOSDRA."RP/FMHDSD/01

"……….Other sister agencies in the Federal Ministry of

"……….All government agencies saddled with this responsibilities as well as the multi-national oil companies and the community where these pipelines pass through."RP/NOSDRA/01

"……..we the oil companies together with all government agencies as well as the

Environment."	*local communities and security agencies*
RP/NOSDRA/01	*all have a role to play in this all important struggle."RP/MNOC/01*
	"……..the host communities where pipeline traverse are very important in the prevention of pipeline disasters. When they are partners in progress, they serve as security for these pipelines. Other relevant stakeholders previously outlined include government at all levels, government agencies charged with specific responsibilities in the oil and gas sector, security agencies, health agencies and NGOs."RP/MNOC/02
	"………everyone is relevant as far as disasters in Nigeria is concerned. However, in light of the topic been discussed, I consider the community residents as relevant stakeholders in the effective management of these disasters. I also consider government agencies who serve as representatives of the government in this case. The oil companies are also very relevant in this regards as well as security agencies."RP/HS/01

5.7 Collaboration in the Context of Oil Pipeline Disasters

This section is divided into six (6) thematic areas, with conclusions drawn from the survey conducted, interviews, newspaper publications, companies' websites, and other secondary sources adequately referenced. These six areas include; benefits of collaboration in the context of oil pipeline disasters, requirements and processes of achieving collaboration in oil pipeline disaster management, lack of collaboration as one of the causes of oil pipeline disasters in Nigeria, collaboration as a panacea to some of the significant causes of oil pipeline disasters (including vandalism, ecological factors, inadequate maintenance, inadequate surveillance), collaboration in the aftermath of oil pipeline disasters, and lastly, possible challenges of collaboration in the context of oil pipeline disasters.

5.7.1 Benefits of Collaboration in the Context of Oil Pipeline Disasters

The United States ensured that multiple government agencies and businesses were involved in pipeline security and recovery activities in recognition of how crucial stakeholder engagement is for the oil pipeline industry (US Department of Homeland Security, 2010). In the United States, the National

Response Framework (NRF) and NRF Support Annexes give an overview of how Federal, State, local, and tribal institutions collaborate with the private sector to plan and carry out practical procedures for efficient incident management (US Department of Homeland Security, 2010). According to the National Incident Management System (NIMS) principles, the Plan acknowledges that these governmental bodies are responsible for occurrence management and recovery operations following an incident.

Collaborative planning proponents contend that contributions from all parties enhance discourse and promote solutions to local issues (Healey, 1998; Innes and Booher, 1999). Consensus-building efforts by a sizable, devoted, and varied stakeholder group can result in long-lasting solutions to challenging issues (Innes, 2004). Inter-agency collaboration is essential, which is what prompted Rosenbaum (2002) to emphasize that collaboration is anticipated to increase organizational accountability, reduce service fragmentation and duplication, build interagency links, and permanently alter how agencies conduct business by placing more emphasis on strategic planning, data-driven decision making, prevention, and inter-agency cooperation. As mentioned earlier, exploring the relationships between the organizations tasked with managing disputes and providing security has become crucial in light of those relationships.

McEntire (2002) discovered during a study on the tornado incident in Fort Worth, Texas, that effective disaster management depends heavily on cooperative relationships based on knowledge of the resources and roles played by the various agencies. Findings have shown that poor collaborative networks are at least partially to blame for the unsuccessful outcomes of disaster management (McGuire & Silvia, 2010). An excellent example of a significant disaster with numerous collaboration challenges is storm Katrina (Kiefer & Montjoy, 2006). Additionally, writers like (Cigler, 2007) and (Kettl, 2006) have noted how poor teamwork harms society. International humanitarian professionals, both civilian and military, have resolved that overcoming organizational and professional boundaries with other organizations to fulfil crucial liaison tasks is correlated with successful responses to large-scale disasters (Burkle and Hayden, 2001). Additionally, according to Burkle and Hayden (2001), present collaborative techniques are ineffective unless they are thoroughly institutionalized in disaster planning and

preparedness. To manage disasters effectively, it is evident that multi-agency collaboration is a crucial component that should be practised across all stages of disaster management.

Other stakeholders' input is necessary when the NNPC or oil firms cannot handle a persistent problem, such as oil pipeline mishaps. This calls for a concerted effort from various stakeholders, including the National Emergency Management Agency (NEMA), the National Oil and Safety Disaster Response Authority (NOSDRA), the Fire Service, the Oil Industry, the Media and the Academic Community. This, therefore, necessitates a re-evaluation of the current roles of these critical stakeholders, and the design of a collaboration framework, that places these stakeholders as equal partners in oil pipeline disaster management and mitigation.

Evidence suggests businesses can learn from one another, cut costs, and expand their resources through collaboration and partnership (Bevc et al., 2009; Celik & Corbacioglu, 2010; Comfort, 2007; Moore et al., 2003; Thompson, 2010). Conversely, poor collaboration can have disastrous results, as shown during Hurricane Katrina (Sapat, et al., 2019; Cigler, 2007).

Nigeria's National Emergency Management Agency (NEMA) head says that no organisation can handle disaster management independently (NAN, 2018). Unfortunately, oil pipeline disasters are not left out in this regard. As a result, the agency has tried to enlighten the populace on the benefits of encouraging collaboration of relevant stakeholders in managing disasters in Nigeria. Collaboration involves combining two or more people, groups, partners or stakeholders who have put the time, skills and resources together to achieve a common aim. When people collaborate, there is a larger pool of available human and capital resources, making it possible to quickly realise the aim of setting up the collaboration pact.

Among the benefits of multi-stakeholders collaboration is that it provides a more articulated method of managing these disasters, considering developed nations of the world where collaboration has worked in disaster management in general. A respondent during the interview said;

"………...as keenly anticipated by all actors involved, it is believed that multi-stakeholders collaboration will reduce the frequency of occurrences of these disasters as it tends to develop a well-articulated means of managing and mitigating it."RP/MNOC/01

"…………a lot has been achieved in the developed nations of the world from stakeholder collaboration in the area of disasters as well as other critical sectors where such is required. The case of Nigeria will not be different. I anticipate that stakeholders' collaboration will be beneficial in this regard."RP/HS/01

At a one-day stakeholders' conference hosted by the National Oil Spill Detection and Response Agency (NOSDRA) on Monday, December 30, 2019, in Umuahia, a cross-section of representatives from 20 oil-producing and pipeline host communities voiced a desire for increased stakeholder collaboration to improve security around the country's oil pipelines and prevent oil bunkering.

When discussing the management and response to oil pipeline disasters in Nigeria, the term "multi-stakeholders" describes the various organizations, businesses, and individuals collaborating on these efforts. This method has numerous benefits. They include:

i. Agencies involved in the multi-agency response would communicate information more freely and effectively if they knew that all agencies were working toward the same goal: managing and mitigating oil pipeline disasters.

ii. Decisions are better coordinated thanks to a multi-agency strategy to avoid oil pipeline accidents.

iii. When numerous authorities collaborate on a project and carry out their duties to the letter, the result is a coordinated response and prompt intervention to clean up the spill.

iv. Responses to oil pipeline crisis occurrences are more expedient than when stakeholders operate in isolation.

As a result of the timely response required when oil pipeline disasters occur, only a multi-stakeholders approach can guarantee this when adequately articulated.

5.7.2 Requirements and Processes of Achieving Collaboration in Oil Pipeline Disaster Management

The multi-stakeholder strategy aims to provide quick, adequate, and effective responses to oil spills by bringing together various ministries, services, agencies, specialists, and other vital players from the oil sector. The United Nations recommends the following steps to establish a multi-stakeholder approach framework: identifying key contacts and agency representatives; establishing personal connections between the various agency contacts; developing multi-agency training; jointly assessing local priorities and creating strategies and action plans; sharing intelligence and data; developing protocols for working together; agreeing on management structures and the procedures for developing the framework; and establishing a multi-stakeholder approach (United Nations, 2015). The 2010 Deepwater Horizon oil leak in the United States is a good example of the multi-agency plan in action. The United States Coast Guard dispatched an "on-scene coordinator" (OSC) to the site of the oil spill to oversee and coordinate the efforts of federal, state, municipal, and commercial institutions (including BP and its contractors) against the spill (Lamseur & Hagerty, 2015).

According to McNamara (2012), the following are required for a workable collaboration framework to be more beneficial to a society in need: design (where shared power arrangements between the agencies are present), Information sharing (open and regular interactions through formal and informal channels), the formality of the agreement (that is, both informal and formal agreements), organizational autonomy, shared decision-making, and formality of the agreement; respect (there need for absolute trust among the collaborating agencies). In a similar vein, Mayer and Kenter (2015) identified the following as essential elements of collaboration: communication, consensus decision-making, diverse stakeholders, goals, leadership, shared resources, a shared vision, and most importantly, trust, which is necessary for stakeholders to share resources.

These fundamental elements or components are also applicable in the case of oil pipeline disasters, just like other disasters. The multi-stakeholders should have a shared goal as well as a shared vision. These goals can, however, only be achieved when there is trust among stakeholders. When people work together, they do so with the same goals in mind. Sharing includes not only the resources and the

consequences but also the participation and the decision-making. The risks are shared in the same proportion as the rewards. However, equitable distribution is not the same as equal treatment. Depending on what they do, various people may have different "levels of involvement". For collaboration to be a process, several generic phases must be established (Giesen, 2002). Organization of a meeting of the identified key stakeholders is one of these processes, as are defining the objectives of the collaboration and the desired results, the leadership structure, the roles and responsibilities of the stakeholders, the channels and processes for communication and decision-making, the availability of resources, the planning and milestones for the collaboration, the metrics, techniques, and procedures for review and assessment, and the identification of risks and opportunities.

Collaboration requires creating a "cooperation space," or an atmosphere, that permits and supports the collaborative process. The kind of collaboration there is what gives this place its identity. While cooperation may co-occur, it can happen at different times (asynchronous collaboration). It is possible to collaborate virtually or remotely, as well as in person (collocated collaboration) (Winkler, 2002). While reacting to the question of collaboration space or environment, a respondent said;

"…………before and after these occurrences, I suggest periodic meetings, which can either be physical or virtual. Much progress has been made in the area of virtual meetings these days. People can do a lot while still far away from each other. This should be considered to make it easier for the participation of the relevant stakeholders. In the eventual occurrence of these disasters, designated and dedicated telephone lines should be utilised in communication as it becomes a national emergency."RP/HS/01

It is common practice for responsibility to be spread thin in group projects. However, working together more efficiently requires a division of labour that lasts even after the collaboration ends.

A respondent during the interview revealed that;

"…………I suggest web-based collaboration with an organized structure where stakeholders put forward coordinating efforts, working on individual tasks towards attaining common key objectives and brainstorming to discover the best ideas or approaches to managing pipeline disasters and problem-solving to reduce these issues."RP/FMHDSD/01

In the process of achieving collaboration, Weiss (1987) proposed a three-step process. First, for collaboration in managing and mitigating oil pipeline disasters in Nigeria, this procedure is optimal for the numerous stakeholder discussions.

According to Weiss (1987), there are three steps involved in establishing the institutional capacity for cooperation: (a) the perceived problem must be shared across agencies; (b) resources must be available to solve the problem jointly; and (c) collaboration must be mounted. Goal congruence is, therefore, crucial for fostering inter-agency or multi-stakeholder collaboration. As exchange interactions between agencies are less likely to happen if agency aims are highly at odds, it is crucial to look at how similar the agencies' goals are. Meyers et al. (2001) operationally define goal congruence and examine the significance of operational goals. According to their definition, goal congruence is the degree of agreement between political leaders' formal or official policy goals and the operational goals of the organizations or networks responsible for implementing that policy. Meyers et al. (2001) stated that operative goals, rather than formal goals, tell what the organization is attempting to accomplish. They become the benchmarks by which the organization's actions are assessed, and decisions are made, transcending the lifespan of a specific contact. They serve as a crucial gauge of how policy is implemented because they reveal the preferences and decisions of individuals in charge of organizational resources (Meyer et al., 2001).

Goal congruence is crucial in the cooperation process, according to implementation studies. According to Lundin (2007), "diverging objectives may limit cooperation, but a shared interest can be a significant facilitator of cooperation." Mutual commitment (shared responsibilities or objectives), according to Das (2005), "offers a way of boosting the robustness of collaboration and lowering the attractiveness of defection." To lessen the possibility of collaboration failing during the provision of services, Tett et al. (2003) found that it is crucial to identify the reason for cooperation and give the operators time to work together to generate a common sense of purpose they were dedicated to implementing. This agreement aims to control and minimize oil pipeline disasters with the participation of all designated stakeholders. The stakeholders are already interested in this objective because they are all devoted to attaining it individually. Consequently, it becomes much simpler as a group.

Agencies must identify resources to help the cooperative process in the second step of Weiss' Process Model of Cooperation (Frazier, 2014). According to Weiss (1987), the process comes to a complete standstill if no initiative, energy, funds, or sufficient employees are made openly accessible for cooperative activity. The literature has identified these numerous resources or elements as the most crucial mechanisms for agencies to advance to the third stage of Weiss' process cooperation model (Dyer & Singh, 1998; Serrano, 2000; Daft, 2007). In addition, several sources, including but not limited to government funds, non-governmental organizations (NGOs), local and international donors, and oil companies, could give resources for the effective and efficient management of disasters. These materials should be readily accessible whenever they are required.

Chaskin (2001) offers a proper operational definition of capacity when discussing the third stage of Weiss' Process Model of Cooperation. In order to solve shared issues and enhance or preserve a community's well-being, he adds that "community capacity is the mix of a community's human capital, organizational resources, and social capital. It may function through unorganized social dynamics or other means (Chaskin, 2001). The degree and amount of delivery mechanism diversity between potential partners (e.g., technology, communication information systems, clear procedures, operational terminology, and professionalism) are profoundly influenced by external influences (e.g., legal mandates, unanticipated societal needs, and financial resources) (Foster-Fishman et al., 2001; Skelcher, Smith &Mathur, 2004; Carmeli&Tishler, 2004). This depends on the nature of the activity, which can range from a minor matter involving reliance on existing processes to a significant undertaking involving the development of new infrastructure, as Weiss (1987) explained. Only if an honest and practical approach is supported may a joint program start and continue to be successful.

In this framework, stakeholders pool their strengths regarding external influences such as legal mandates, unanticipated societal demands, financial resources, and diversity in delivery mechanisms (e.g., technology, communication information systems, clear procedures, operational terminology, and professionalism). These requirements and processes are summarized in Table 5.2 for this research aims.

Table 5.2 Requirements and Processes of Stakeholders' Collaboration

Requirements	Processes
Mayer and Kenter (2015) Communication, consensus decision-making, Diverse stakeholders, Goals, leadership, Shared resources, Shared vision and most importantly, Trust	i. Identifying key stakeholders; ii. Organising a meeting of identified relevant stakeholders; iii. Defining the scope of the collaboration and the expected outcomes; iv. Defining the structure in terms of leadership, roles, responsibilities, ownership, channels and processes for communication and decision-making, resource access, planning and milestones for collaboration; v. Defining the metrics, techniques, and procedures for review and assessment; vi. Identifying key potential risks and design methods of action (Giesen, 2002)
Design Formality of the Agreement Organizational Autonomy Information Sharing Decision Making Resolution of serious issues Resource Allocation Systems Thinking Trust McNamara (2012)	Weiss (1987) model: i. Perceived problem must be shared across agencies; However, it is worth noting that sharing does not mean being on an equal footing. Different parties may have different "levels of involvement," depending on their roles. ii. Resources must be available to handle problem cooperatively; and iii. Institutional capacity has to be established to mount cooperation.

Source: Mayer and Kenter (2015); McNamara (2012); (Giesen, 2002); Weiss (1987)

5.7.3   Lack of Collaboration and Oil Pipeline Disasters in Nigeria

It is necessary to understand in what context does lack of stakeholder collaboration cause oil pipeline disasters which was observed from the survey results (Figure 6.5). In the figure, 261 respondents indicated that the lack of stakeholders' collaboration constitutes oil pipeline disasters in the study area.

When collaboration between stakeholders is lacking or insufficient, the ability to decrease risks and plan efficiently is diminished. This was determined by a comprehensive examination of the relevant literature and the perceptions of key stakeholders. According to McGuire and Silvia (2010), at least a portion of the failure of disaster management can be ascribed to inefficient collaborative networks. Hurricane Katrina is an example of a severe disaster that posed several collaboration-related issues (Kiefer & Montjoy, 2006). In addition, scholars such as Cigler (2007) and Kettl (2000) have emphasized the harmful implications of inefficient collaboration in society.

In addition, there is a lack of collaboration and cooperation between the many levels of government and government agencies, from the federal to the state and even the local levels. This was observed in Table 6.11 in chapter 6. In that Table, 215 respondents indicated no interagency collaboration between their firm/institution and other stakeholders. This accounted for 71.67%. Nigeria's emergency response management system faces significant difficulty due to the lack of meaningful coordination. Since local and community levels cannot minimize risks and establish disaster plans, this issue becomes more severe.

On the question of the level of collaboration and insufficiency of collaboration networks, respondents opined;

"…………We usually collaborate with NEMA during such occurrences. We recommend a better collaboration framework or pattern with other agencies, NGOs, and community residents to move past this ugly incidence."RP/NNPC/01

"……..we relate majorly with our host communities and government representatives from time to time. No concrete collaboration exists between other stakeholders and us."RP/MNOC/02

Adopting mitigation measures may receive less attention if stakeholders have little interest in hazard mitigation. For example, low-stakeholder interest issues have hampered efforts to address the dangers of electricity transmission lines (Cotton and Devine-Wright, 2012). In addition, limited stakeholder engagement can lessen the urgency for a solution, even though stakeholder involvement can impact the policies implemented in some situations (Groves et al., 2013; Osland, 2013).

Pipeline hazards are a regional issue. Pipeline ruptures outside a community's planning area can impact the community, even if local regulations have been adopted to reduce pipeline hazards within the jurisdiction. Liquid pipeline spills, for instance, may move from one jurisdiction to another (Transportation Research Board, 2004). Therefore, inter-governmental collaborations on cross-border concerns can benefit public security and hazard reduction (Comfort, 2002; May and Deyle, 1998).

5.7.4   Collaboration as a Panacea to Some of the Major Causes of Oil Pipeline Disasters

Governments must mount a reaction to disasters of any size, and this response almost always necessitates the implementation of emergency management plans. The managerial responsibility for developing the framework that will enable communities to lessen their sensitivity to risks and respond to disasters is known as emergency management (FEMA, 2007). Emergency management typically requires a cooperative strategy that always incorporates emergency services and organizations from other sectors, including the utility sector (Schraagen and Van de Ven, 2008; Van Scotter et al., 2012). For this research, the emergency services are the search and rescue, relief materials, fire agencies, first aiders and ambulance agencies (sometimes called first responders).

Vandalism

Pipelines are frequent targets of terrorist attacks using weapons of mass destruction, explosives, and other physical force (Okafor & Olaniyan, 2017). It is also well known that pipelines are susceptible to cyber-attacks. For instance, since 1993, guerrillas in Colombia have bombed the Cao Limón oil pipeline over 950 times other pipelines (Parfomak, 2017). The London police are said to have thwarted an Irish Republican Army plot to attack gas pipes and other utilities around London in 1996 (Parfomak, 2017). Between July and September 2007, bombs were reportedly detonated along Mexican oil and natural gas pipelines (Okafor & Olaniyan, 2017). The Nigeria oil pipeline system has not been spared in this regard as vandals have attacked pipelines and related facilities severally, including the bombing of three oil pipelines in May 2007, amongst many others (Okafor & Olaniyan, 2017). These activities are recognized crimes punishable under the laws of the Federation.

The destruction, damage, or obstruction of petroleum installations and transportation infrastructure intending to impede petroleum production and distribution is illegal under Section 1 of the Nigeria

Petroleum Products and Distribution (Anti-Sabotage) Act of 1975. (Petroleum Products and Distribution Act, 1975). Due to this law, willful interference with or prevention of petroleum production or distribution is now a crime in Nigeria (US Energy Information Administration, 2016).

Pipe vandalism, explosions, obstructing production or distribution, acquiring petroleum products, and blocking vehicles transporting petroleum products like kerosene, motor spirits, gas oil, diesel oil, automotive gas oil, fuel oil, aviation fuel, and lubricating oil or grease are all illegal under the Act. Sabotage is punishable by death or a maximum of 21 years under this Act (Okafor & Olaniyan, 2017). This law aims to punish both the primary criminal and anyone who encourages, encourages, counsels, or obtains another person to conduct an act of sabotage, regardless of whether the other person commits the act. Although this Act forbids blowing up and vandalizing petroleum distribution pipelines, a major contributor to oil spills in the Niger Delta, very few arrests and convictions have ever been made per this provision. The Niger Delta has a culture of impunity due to the law's lack of consistent enforcement. All cases of pipeline sabotage in Nigeria must be thoroughly investigated, and all proven cases must receive the full scope of the law's criminal sanctions.

One of the ways collaboration has been explored in combating vandalisation in Nigeria, Niger Delta region particularly, to curtail the activities of oil thieves operating in the creeks of the region years ago was a Military Joint Task Force code-named Operation Pulo or Operation Oil Shield. Pipeline damage, crude oil theft, illegal oil refining, and illegal oil bunkering were only some of the crimes that this reformed JTF set out to combat. According to Lt Col Timothy Antigha, the JTF included representatives from the Nigerian Prisons Service, the Nigerian Customs Service, the Nigerian Immigration Service, the Nigerian Maritime Administration and Safety Agency, and the Presidential Council on Maritime Safety and Security. Other organizations that contributed to this effort were the Nigerian Ports Authority, the Economic and Financial Crimes Commission, oil-producing companies, and the Nigerian National Petroleum Corporation (NNPC). The service area of this security firm includes nine different states. These include the states of Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, and Rivers (Vanguard, 2012). In this regard, several achievements were made. For instance, on November 14, 2014, while transporting suspected crude oil from two vessels, MT CERGEN-D and MT ELIMINA,

the men of this Joint Task Force (Operation Pulo) intercepted some individuals aboard MB SKYE in Brass Waters near Nigerian Agip Oil Corporation (NAOC) in Bayelsa State.

Abia State, Nigeria's oil communities acknowledge the need to protect the state's oil pipelines from vandalism and oil bunkering; hence they have called for increased cooperation among the stakeholders (Premium Times, December 30th 2019). They demanded more concrete steps to stop the phenomena and blamed security failings on alleged security operative compromise for the ongoing pipeline vandalism. The people said that certain dishonest security personnel assigned to protect the pipelines and the vandals worked together unlawfully. In order to safeguard the pipelines in their villages, Samuel Nwachi, the Traditional Ruler of Okwe in Ukwa West, encouraged oil corporations and the appropriate government authorities to include the leaders of oil-bearing communities in their preparations (Premium Times, 30th December 2019). According to Mr Nwachi, community leaders, including young people, are always concerned about pipeline vandalism and the ensuing oil spill and are eager to contribute.

One respondent stated that oil corporations are eager to collaborate with other interested parties to stop vandalism:

"…….we have tried to reduce agitations that usually result in vandalisation. We have also given our inputs whenever and wherever required and are willing to collaborate with relevant stakeholders when needed." RP/MNOC/02

NNPC personnel's carelessness has contributed to pipeline vandalism in several ways. First, they fail to repair old pipelines or do integrity tests on their lifespan, making them extremely brittle. Drilling holes in the pipes to siphon the oil products requires very little energy, where corrosion has significantly weakened their strength. Second, the likelihood of stopping the increasing number of attacks is diminished without effective pipeline monitoring. Such governmental incompetence has frequently caused pipeline disasters that have taken several lives (Adeniyi, 2007; Akosile, 2007; Isaacs, 2003). For example, following the May Ilado fire event, the chairman of Amuwo Local Government Area in Lagos State made the following remark:

"…….NNPC is lacking in its responsibility of monitoring pipelines, and as we have been writing to them and they refused, then they should be held liable for the loss of all these lives, and they should make reparation for them the families of the dead ones (cited in Benson et al., 2006, p. 1).

Thirdly, the failure of the relevant entity to remove the government-acquired right-of-way for these pipes reveals an exceptionally negligent disposition. Due to the illegal construction of structures on the right-of-way, it is nearly impossible to determine who is responsible for the vandalism. As a direct result of the joint agreement, sensitization and awareness programs may be developed to educate vandals about the adverse effects of their actions on the environment, human lives, and the deterioration of infrastructure. As observed from a respondent and cited below, such sensitisation can be strengthened when more stakeholders are included.

"……Within my domain, I have continuously organized sensitization among my kinsmen to stay away from all acts of sabotage that could lead to pipeline leaks or tantamount to vandalisation. Also, when these disasters eventually occur, we combine efforts with other stakeholders to manage the situation."RP/CRL/01

The government should be willing to collaborate with non-governmental organizations to improve the effectiveness of the governance system. In this regard, organizations that are part of civil society should utilize their expertise to assist initiatives that aim to increase public awareness and hold those in positions of authority accountable for their actions. It is vital to develop a chain of responsibility that will serve as a line of accountability to identify all individuals, groups, and organizations whose acts or inactions contributed to the onset of a disaster. This responsibility chain must be established. Such campaigns can be created by stakeholders working with state governments to educate the public about the hazards and repercussions of vandalism and encourage them to abstain from any acts of it. For example, the billboards in Figures 5.4 and 5.5 could be very useful.

Figure 5.4 A signboard to campaign against oil pipeline vandalism in Yenagoa, Nigeria.

(Source: Reuters/Akintunde Akinleye)
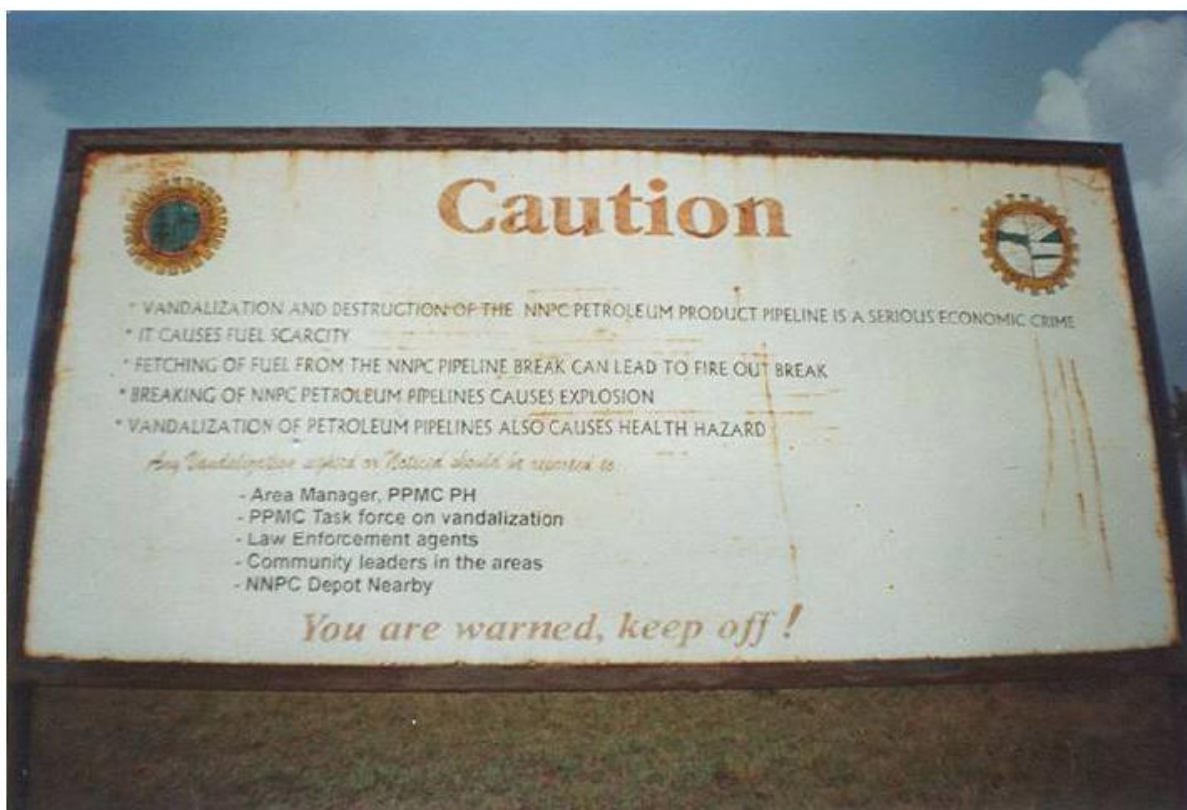
Figure 5.5 NNPC Bill-Board Warning of Dangers of Pipeline Vandalisation and Health Hazard

Ecological factors

Oil pipeline spills cause human-caused environmental damage due to corrosion, erosion, tectonic movements, and contact with ship anchors and bottom trawls (Okafor and Olaniyan, 2017). In addition, pipeline problems may cause short-term to long-term leaks or leaks that may explode.

Corrosion occurs when manufacturing infrastructures such as pipelines and tanks becomes extremely old and does not receive regular inspection and maintenance thereby, leading to ruptures or leaks (Onuoha, 2008). Since the Niger Delta has small oilfields, corrosion significantly impacts oil leaks. The extensive network of pipelines connecting the fields and the numerous small networks of flow lines provide various potentials for leakage (Okafor and Olaniyan, 2017). Most pipes and flow lines in onshore locations are installed above ground. Old and prone to corrosion, pipelines have an anticipated lifespan of only 15 years (Okafor and Olaniyan, 2017). All these factors can be adequately monitored when stakeholders work as a group. Primary data required for appropriate monitoring could be obtained by stakeholders on site and sent for analysis by the agency in charge.

According to Shell Plc, as obtained from the website,

"………We used pipe with larger walls and buried it deeper than needed by standards. We pre-tested all welds with the use of ultrasound and X-ray machines. The pipeline can endure pressures nearly double its average operating pressure."

International best standards should be duly followed. Agencies such as NNPC, NOSDRA, and the Ministry of Environment can ensure compliance when collaborating and even relevant NGOs in these areas. When stakeholders work as one body united towards achieving a common aim, this monitoring and compliance process becomes simplified.

".....Our global standards and operating procedures establish our expectations for the controls and physical barriers required to minimise the risks of mishaps. To prevent the accidental release of hydrocarbons, offshore wells must have at least two separate barriers installed in the flow direction. We regularly inspect, test and maintain these barriers to ensure they meet our standards. We use a dual approach to potential situations. We analyze potential threats to determine their seriousness and then take action to lessen or eliminate them. We are also ready to respond to any incidents that may arise."
(Shell Global, 2022)

The collaborative pact involves relevant stakeholders cutting across the media and the academia, in collaboration with other key stakeholders, carrying out investigations and facts findings in the aftermath of oil pipeline disasters to brainstorm and develop ways of preventing or reducing future occurrences in this regard.

"………We incorporate lessons learned from industry incident investigations into our technical safety standards. Our training programmes help to create a working culture that increases risk awareness and prevents safety incidents". (Shell Global, 2022)

A pool of resources exists in stakeholders' partnership, including advanced technology ready for deployment towards regular inspections and monitoring activities.

Inadequate Maintenance

Inadequate maintenance is another major cause of oil pipeline disasters. This was observed in chapter 6, where respondents disagreed with some of the issues raised. From the survey, maintenance checks are not conducted regularly on oil pipeline systems, oil spill response equipment is not readily available on-site, and there are no robust emergency preparedness measures in place to respond to cases of oil

pipeline disasters, according to the respondents. In addition, most of the agencies charged with the responsibility of ensuring quality compliance have failed in this regard.

One of the oil companies during the interview responded;

"……..our pipeline maintenance has become more regular, and checks are conducted periodically. We have also given our inputs whenever and wherever required and are willing to collaborate with relevant stakeholders when needed." RP/MNOC/02

When stakeholders, even those on the receiving end of these disasters, are a part of the compliance system, the possibility of taking shortcuts and inefficiencies is significantly reduced, if not eliminated. Methods for ensuring pipeline integrity could be researched and approved through stakeholder debate. This category includes procedures such as in-line geometrical inspection (ILI), in-line ultrasonic inspection, cathodic protection monitoring, depth of cover survey, exterior non-destructive testing (NDT), coating disbandment and damage survey, and hydrostatic testing (Alawode & Ogunleye, 2011). Extensive testing must be done on pipeline networks to ensure pipelines comply with safety regulations.

These procedures aid in locating particular types of flaws, such as corrosion, which is the loss of material from the pipe wall as a result of chemical or electrochemical attack; gouging, which is the mechanical removal of metal from a small area of the pipe's surface; and metallurgical anomalies, such as hard spots, laminations, slivers, scabs, and inclusions, as well as cracks brought on by fatigue stress corrosion and weld flaws. Notably, hydrostatic testing is the primary approach for determining the durability and dependability of a pipeline section that can be put into service (Okafor & Olaniyan, 2017).

Inadequate surveillance

Security of oil pipelines is crucial since they are not ordinary assets, particularly in a nation like Nigeria, where oil pipelines are the principal means of transporting crude oil. Nigeria depends on this mode of transportation, which has endured numerous physical assaults by militant organizations and vandals over the years. Since crude oil is the primary resource supporting the Nigerian economy, its transportation has been impacted, putting it in danger. Therefore, collaboration or synergy is crucial for handling conflicts and controlling insecurity. This is so they can complement one another, as each

security agency has a specific competence and operational expertise. James (2000) and Ahmed (2007) classified the three main components of national or instruments of internal security in Nigeria as the military component (armed forces), law enforcement agencies, and secret intelligence agencies for simplicity of study and comprehension. Gbanite (2001) also anticipated this kind of inter-agency cooperation to address internal security issues. He contends that Nigeria needs the commitment of security personnel and financial mobilization to improve all security agencies.

The United States adopted stakeholder collaboration in pipeline cybersecurity, which was mainly successful. The Pipeline Cybersecurity Initiative (PCI) was created to aid the Transportation Security Administration (TSA), CISA (CyberSecurity & Infrastructure Security Agency), and other interagency partners in better understanding the cybersecurity posture of the American oil and natural gas (ONG) pipeline industry (CISA, 2022). Since its establishment in 2018, the PCI has closely partnered with pipeline stakeholders to pinpoint critical flaws in ONG pipeline operational technology systems, increase industry awareness of emerging trends, and work with public and private sector partners to develop and implement workable mitigation strategies to address known problems. As a result, the PCI has successfully brought about observable change within the sector, empowering government action and assisting ONG owners/operators in justifying pipeline cybersecurity upgrades. In order to capitalize on the success of the project, the PCI and its operations are transferring to ongoing programs in TSA and CISA as government departments and agencies play a more active role in pipeline cybersecurity (CISA, 2022). The Agency's risk management strategy depends on successful cooperation to guarantee a unified effort toward enhancing pipeline cybersecurity. Therefore, the Agency is working with Sector-Specific Agencies (SSAS) to coordinate information sharing, awareness raising, and risk reduction measures to ensure the safety of all aspects of pipeline infrastructure. In addition, the Agency is working with the private sector through partnerships like the one with the ONG Subsector Coordinating Council (SCC), which consists of pipeline owners, operators, and other critical stakeholders, to make sure that its activities are informed by both internal analysis and priority setting and the self-identified needs of those involved.

This collaborative involvement ensures that industry and government efforts are coordinated, stakeholders can obtain timely information, and work is completed efficiently. The Federal Government of Nigeria has engaged private security companies and outfitted men and officers of the Nigerian armed forces to guard government buildings as part of its efforts to strengthen the security of the pipelines. These, however, have not stopped the rapid destruction of oil facilities and pipelines. In addition, criminal gangs with ties to other countries have emerged (Adishi & Hunga, 2017). One result is that the considerable investment in pipeline security is still not fully justified, and the security mechanism is considered ineffective.

Given the functions of these security institutions, it is appropriate to say that violent conflict in society will be low if these constitutional functions are carried out efficiently, particularly in mutual collaboration, as anticipated by society (Odoma, 2012). However, despite the emphasis on the growing necessity for inter-agency cooperation, little seems to have changed about the agencies' mistrust of one another and lack of cooperation. Even the top tier of the services seems concerned about the problem, but they cannot overcome the institutional barriers (Nigerian Tribune, 2013).

In modern Nigeria, this mindset has exposed society to numerous conflicts and violent crimes. Success is hindered in many ways wherever there is a lack of collaboration and cooperation. Insurgency and crime fighting are ineffectual in Nigeria due to constant rivalry amongst the security services. Top security officials at an inter-agency peace-building conference held by the Nigerian Security and Civil Defence Corps (NSCDC) in Abuja noted that the failure of the nation's security agencies to work together was one of the causes of the emergence and success of Boko Haram terrorist assaults (Sunny, 2013).

An operative of the Nigerian Security and Civil Defence Corps (NSCDC) interviewed in the course of this research said;

"………..As a security agents, we are responsible for patrolling and providing security along the pipeline right of way. We also prevent vandalisation of the pipeline by hoodlums."RP/SA/01

This task becomes more accessible and efficient if all security operatives and experts in the collaborative pact work as a group. By so doing, there is unlimited access to modern surveillance systems and other resources at their disposal.

To properly secure the pipeline networks in Nigeria, pertinent security services, including the Nigerian military, police, and NSCDC, must be well-equipped. Security agencies are motivated to perform their duties effectively with adequate funding. Corruption is a significant issue that typically hinders their efficacy. Bribing security personnel is a simple way to undermine pipeline security. They may be more productive in their surveillance work if they receive a reasonable compensation package.

Additionally, the security organizations defending vital infrastructure like oil pipelines should have the most recent technology to safeguard the pipelines. Oil pipelines are long and span much ground. The surveillance of these oil pipelines would be acceptable using drone technology. We also cannot underline how crucial it is for all security services to work together to stop oil theft in the country. The government ought to strongly support this. Finally, given that Nigeria is not the only oil-producing nation in the world, the government should study the best practices of the industrialized nations to overcome obstacles of this kind permanently.

5.7.5   Collaboration in the Aftermath of Oil Pipeline Disasters

Collaboration is a notion that, if fully adopted in the aftermath of the oil pipeline disasters, will significantly contribute to adequately managing the disasters. During the investigation, numerous findings were made. One of these is that respondents to the study were firmly opposed to the notion that oil pipeline accident sites are routinely cleaned up (Table 6.10). In such a case, the engagement of many stakeholders in developing committees that will monitor and follow up on the clean-up actions following oil pipeline disasters can significantly aid in resolving the issue as quickly as feasible.

During natural disasters, nongovernmental organizations (NGOs) must collaborate more closely to ease service delivery, exchange information, and avoid resource duplication. A considerable number of non-governmental organizations (NGOs), many of which are faith-based, frequently provide relief to individuals in need in the aftermath of a natural disaster. A strategy should be developed to enable a system in which all stakeholders may draw on the cumulative strength of one another and establish a

formidable group of highly mobile, motivated, dedicated, and trained disaster managers. This system should be designed to facilitate the formation of a formidable group of disaster managers who are highly mobile, motivated, and trained.

When accidents involving oil spills or other hazardous substances occur in the United States, the nation's highly developed infrastructure ensures the appropriate management and mitigation of the resulting dangers to the general public and the environment. Very infrequently, a spill of national significance, or SONS, can occur. Significant Oil Incident of National Significance (SONS) refers to an oil spill that has reached a level of severity, size, location, the actual or potential impact on public health and welfare or the environment, or a response effort that requires extraordinary coordination of resources from the federal government, state and local governments, and the responsible party (RP) (Department of Interior, 2022). Regional Environmental Officers (REOs) of the United States Coast Guard (USCG) or the Environmental Protection Agency (EPA) report oil discharges and hazardous material spills to the Office of Environmental Policy and Compliance (OEPC). OEPC is responsible for notifying the relevant DOI bureaus and offices about discharges and releases. In addition, information is transmitted to the Interior Operations Center in order to maintain situational awareness. OEP is responsible for ensuring that the Department of the Interior's requests for assistance or knowledge is forwarded to the proper bureaus or offices (s). The OEPC also represents the Department of the Interior (DOI) during activations of the National Response Team (NRT), the Regional Response Teams (RRTs), and the International Joint Response Teams. OEPC also contributes to and participates in press conferences and media briefings.

Each year, thousands of incidents involving the release (or threatened release) of hazardous materials or oil spills occur in the United States (Department of Interior, 2022). In the event of a spill of any size, from the smallest to the largest, rapid response and the evacuation of nearby towns are required. Therefore, the Department of the Interior (DOI) has designed a comprehensive preparedness and response system in collaboration with the states' governments, tribal organizations, and certain other nations. In addition, via its Natural Resource Damage Assessment and Restoration Program, the Department of the Interior plays a crucial role in the cleanup activities following an oil spill.

There are frequent oil spills in the Niger Delta region, which contains a significant portion of Nigeria's oil and gas deposits, due to the numerous problems that exist there. In order to safeguard people's lives, their property, the environment, and their financial assets, extreme measures must be taken to stop the recurring oil leaks. Therefore, several ministries, services, agencies, specialists, and other significant parties from the oil industry collaborate to provide prompt, adequate, and effective responses to oil spills. This collaboration is required to achieve these results.

Oil spills harm the local ecosystem. To avoid irreparable environmental harm, it is vital to have a timely reaction and efficient coordination among all relevant authorities and parties while dealing with oil spill situations. A prompt and well-coordinated response is necessitated by the fact that a single leak might have catastrophic effects on neighbouring communities and areas further away than the actual spill site. The response strategy for every given spill disaster involves some distinct stakeholders, each of which plays a unique role in the approach. These stakeholders include the federal government, private oil firms, associations representing the oil industry, and local communities. In order to minimize significant losses, it is therefore essential to have a response that is well-coordinated and involves various agencies. For the response to an oil spill to be successful, close coordination among the institutions involved is essential.

Moreover, considering the multiagency oil spill response model must account for the significance of institutional harmony and cooperation across important ministries and agencies. In this regard, organizations such as the Federal Ministry of the Environment and the State Ministries of the Environment are crucial, particularly in the Niger Delta region. The Department of Petroleum Resources (DPR), the National Oil Spill Detection and Response Agency (NOSDRA), the National Oil Pollution Management Agency (NOPMA), the Nigerian Maritime Administration and Safety Agency (NIMASA), and the National Emergency Management Agency (NEMA) are now on-site. Several vital parties, including oil firms and the Clean Nigeria Associates, are also involved in the Nigerian oil spill cleanup activities. Clean Nigeria Associates is a non-profit oil spill response cooperative organization of the second tier (Olaniyan, 2015). Significant legislation, rules, and regulations have been enacted to improve Nigeria's multiagency response to oil spills.

Some of the responses obtained in this regard are:

Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development (FMHDSD):

"……I have been involved in assessing the level of destruction of the environment due to these disasters and drawing up plans for clean-up exercises." RP/FMHDSD/01

National Oil Spill Detection and Response Agency (NOSDRA):

"……Oversee the national oil spill contingency plan. We monitor oil spill drill exercises and carry out inspection and investigation visits. My agency is also tasked with the clean-up of spill sites to remediate the environment as much as possible with the aid of a baseline environmental sensitivity index map (ESI)" RP/NOSDRA/01

Shell Plc. Website:

"………..Damage to the environment and the enormous cost of cleaning it up could arise from accidental releases of crude oil, oil products, or chemicals used in our activities. We have requirements and procedures designed to prevent spills. We design, operate and maintain our facilities to avoid spills. Shell conducts routine programmes to reduce failures and maintain the reliability of facilities and pipelines, thereby lowering the danger of oil spills.
To enhance local response capacity, we have established a global network for oil spill response that allows us to respond more efficiently to oil spills. In order to hone our response capacity, we routinely engage in large-scale drills with regional regulatory and response organizations. (Shell Global, 2022)

National Emergency Management Agency (NEMA):
"…….my efforts include but are not limited to coordinating search and rescue, coordination of emergency response services, provision of relief materials and providing shelter for displaced persons." RP/NEMA/01

A respondent from the Health Sector:
"…….I was involved in granting first-aid attention to some of the victims of the resulting fire due to the oil pipeline explosion." RP/HS/01

Each stakeholder has articulated their duties and responsibilities concerning oil spills and oil disasters; nevertheless, they lack the collaborative efforts necessary to combine these efforts for increased effectiveness and efficiency.

The National Emergency Management Agency (NEMA) and the National Information Technology Development Agency (NITDA) have expressed their willingness to work together to identify novel ways to lower risks during times of calamity for the country (Thisday Live, 2022). In order to install

ICT infrastructure, digital tools, and platforms that would guarantee quick and life-saving search and rescue operations during major disasters, NEMA said it is looking for support and closer cooperation with NITDA. According to Kashifu Inuwa Abdullahi, director general and chief executive officer of NITDA, NEMA's operations call for the use of contemporary technology. He continued, "to work effectively and efficiently, you need ICT, and technology can assist you in acquiring insight and forecasting a crisis even before it happens". NEMA, SEMA, and civil society organizations would act quickly in the case of a fire outbreak to reduce casualties by offering medical and logistical services. Civil society organizations would collaborate closely with NEMA to ensure openness in providing relief supplies to disaster victims and helping reunite families split up by the tragedy. The federal or state government would compensate victims through NEMA or SEMA, while the private sector would give relief supplies and cash contributions.

5.8   Limitations of Collaboration

Some authors discuss partnerships that could not produce tangible results because they lacked resources, did not have the backing of influential locals, or became stuck in a stalemate because of conflicting interests among participants. Many well-intentioned initiatives to involve the public in government decisions, for example, are "exercises in aggravation," according to Barbara Gray, and they frequently make the problem worse rather than alleviate it (Scott, 2022).

It is advisable not to collaborate if

i.   one side has undeniable sway over the outcome;

ii.   when the disagreement is rooted in deep-seated ideological differences;

iii.   when power is unequally divided;

iv.   when constitutional issues arise or precedents need to be set in the law;

v.   If a lawful convener cannot be found.

5.9   Possible Challenges of Collaboration in the Context of Oil Pipeline Disasters

According to Caroline, the seven barriers to multi-agency cooperation are communication, environmental, social, political, inter-organizational, intra-organizational, and infrastructure concerns (Caroline, et al., 2001). Communication was viewed as the primary challenge due to the absence of a

technological platform and transparent criteria for data exchange among the agencies, which prevented them from developing a shared understanding of the context of the crisis.

The focus of the most recent study on network and partnership management of natural disasters and other types of natural hazards has been on the challenges and limitations of working together. Some authors, for instance, have emphasized the need for companies to immediately and clearly explain their operations and goals (Sani, 2012). Others have brought up the issue of how the flow of information across companies might make collaboration more challenging, mainly when providing services in a complex and uncertain environment, such as during disaster response and recovery (Sani, 2012). It has also been discovered that the lack of shared norms and trust significantly affects the level of collaboration (Nolte & Boenigk, 2012).

Communication between and among emergency agencies, developing and maintaining regular situation awareness; and inter-organizational understanding was identified as the three distinct challenges to collaboration between and within emergency agencies by the findings of a workshop led by Eide et al. (Eide, et al., 2014).

According to the research that was done and the opinions of the various stakeholders on the topic, it is likely that multi-stakeholder collaboration will face several challenges. However, if these challenges can be effectively resolved, the collaborative pact will be able to deliver its goals successfully. Among these problems are the following:

    i.   Disputes in Shared Responsibilities: this issue can become a substantial challenge if not correctly addressed. For instance, it may be easy for the NOSDRA and the DPR, two government agencies, to disagree regarding their respective competence areas. However, the NOSDRA is the statutory agency tasked with organizing the nation's response to oil spill accidents. The provisions of the National Oil Spill Detection and Response Agency (Establishment) Act No.15, 2006, lay forth the standards that must be met in order to fulfil this vital responsibility (NOSDRA Establishment Act). In compliance with the Act, the National Oil Spill Disaster Response Agency (NOSDRA) is responsible for organizing and implementing Nigeria's National Oil Spill Contingency Plan. These sections make it very clear

that NOSDRA is the agency that is responsible for responding to oil spills and that it is given that task.

However, per the Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN), the Director of Petroleum Resources must be notified of all oil leakage incidents (EGASPIN, 2002). As a result, the previously indicated EGASPIN requirement breaches subsection (1) of section 6 of the NOSDRA Establishment Act (b). Furthermore, these contradictory regulations allow for "double reporting," which wastes time and defeats the purpose of having an efficient multi-agency response to oil spill situations, which is to offer a prompt and effective response. However, the goal of having such a response is to offer a prompt and effective response. Therefore, such a language that conflicts with other provisions should not be included in the industry's regulations.

ii. Insufficient Resources: organizations entrusted with mitigating oil pipeline disasters usually lack the appropriate budget, necessary equipment, and experienced employees. This is a problem because oil pipeline disasters are widespread. A few of these organizations are group members that work together to investigate the source or the factors that led to an oil spill or an oil disaster. A joint investigation team must be established no later than twenty-four hours after receiving spill notification (EGASPIN, 2002). According to the Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN), the joint investigation team is responsible for investigating the cause of the oil spill. It is anticipated that the team will reach a consensus on and jointly sign a report confirming the spill's cause, in addition to providing other essential information, such as the amount of oil spilt and the impacted area. However, it is essential to point out that the joint investigative system relies heavily on the oil companies, effectively making it their responsibility to report any discovered findings. Oil companies generally give transportation to the scene and technical expertise lacking in regulatory agencies such as NOSDRA and the DPR. Oil companies also schedule investigations. Due to this, some requirements, such as the "spill detection" responsibility of NOSDRA, are virtually nonexistent or, at best, inadequate. One example of this is the obligation to report spills.

iii. Poor Enforcement of Environmental Laws and Guidelines: it is evident that many regulations address multi-agency responses to oil spills; nevertheless, inadequate enforcement of these rules is a problem. On the other hand, due to one or more failings from the relevant agency or the government, strict compliance with the legislation will never be a non-problem. Thus, the terms of the National Oil Spill Contingency Plan (NOSCP) and the National Oil Spill Detection and Response Agency (Establishment) may Act No.15 of 2006 that regulate the reaction of numerous agencies would not be adhered to in a precise manner. The benefits of a well-coordinated multi-stakeholder response to oil pipeline disasters in the country are, therefore, impossible to attain until existing environmental laws and standards relating to multi-agency responses to oil spills are rigorously enforced and implemented by relevant support agencies. Until this occurs, the benefits of a well-coordinated multi-stakeholder response to oil pipeline disasters in the country will remain unattainable.

iv. An Inefficient Communication System: if this is not adequately managed, it could also become a significant obstacle. In this context, the development of new technology and advances within the information and communications technology field should be supported and promoted.

5.10   Chapter Summary

The chapter outlined the various aspects of stakeholders' collaboration in the context of managing and mitigating oil pipeline disasters in Nigeria. The qualitative aspect of this research was extensively discussed. Concurrence was achieved by comparing information obtained from the interview responses with those obtained from the critical review of existing literature. Discussed in this chapter include; level of stakeholders collaboration in oil pipeline disaster management, roles of stakeholders in the prevention of pipeline disasters, benefits of collaboration, collaboration as a panacea to oil pipeline disasters, limitations of collaboration and possible challenges of collaboration.

CHAPTER SIX

QUANTITATIVE FINDINGS

6.1   Introduction

This chapter presents the quantitative findings from the study, including those obtained from secondary sources and the survey conducted. In addition, data analysis on respondents' background, level of awareness of oil pipeline disasters, causes of pipeline disasters, and human and ecological effects of oil pipeline disasters obtained from the survey carried out, as well as those obtained from existing literature, was done. Also analysed in this chapter are data on relevant stakeholders for collaboration on pipeline disaster mitigation, the present level of collaboration among stakeholders, and collaboration as a disaster mitigation technique.

6.2   Respondents' Background and Awareness Level

This section provides a general background of the respondents with focus on the firms/institutions that the respondents work for, their awareness level of oil pipeline disasters and the level of participation of the firms/institutions.**6.2.1   Respondents, Firm/Institutions**

The respondents' firms or institutions are detailed in Table 6.1. They were broken down into main stakeholder groups, including anything from disaster emergency services to the communities these oil pipelines pass through. With 55 respondents, the oil corporations and maintenance firms, the legal owners of the oil pipelines, had the highest participation in this survey. Disaster emergency services closely followed this with a total of 54 respondents. These included NEMA, SEMA, LEMA, the fire service, and the Red Cross. There were 49 respondents from the government and government agencies, including the civil service, NNPC, NOSDRA, local government staff, and the Delta State Oil producing region development commission. The security agencies in the study region, which included police, civil defence, and other security organizations, accounted for 35 of the respondents. The local community, which included community inhabitants, traders, fishermen, and fisherwomen, had 31 respondents, while respondents from the academic community had 17. A total of 16 respondents worked for NGOs, while just six were affiliated with the media.

Table 6.1 Respondents' Firm/Institution

Firm/Institution	Frequency	Percentage
Emergency Services	54	18.00
Oil Corporations & Servicing Firms	55	18.33
Security Agencies	35	11.67
Local Community	31	10.33
Health Services	15	5.00
Government and Government Agencies	49	16.33
Media	6	2.00
Academia	17	5.67
Private Firms	22	7.33
NGOs	16	5.33
Total	**300**	**100**

Source: Survey Data, 2021

6.2.2 Level of Awareness amongst Stakeholders

Figure 6.1 shows that 211 people from the Niger Delta region participated in the survey. This figure represents more than 70 per cent of the total respondents. In addition, 95.3% of respondents (286) said they knew about this disaster. As seen in Figure 6.2, a significant portion of the respondents have suffered some monetary or non-monetary loss as a direct consequence of an oil pipeline disaster. These respondents' experiences range from as few as one to as many as three or more instances of oil pipeline disasters.
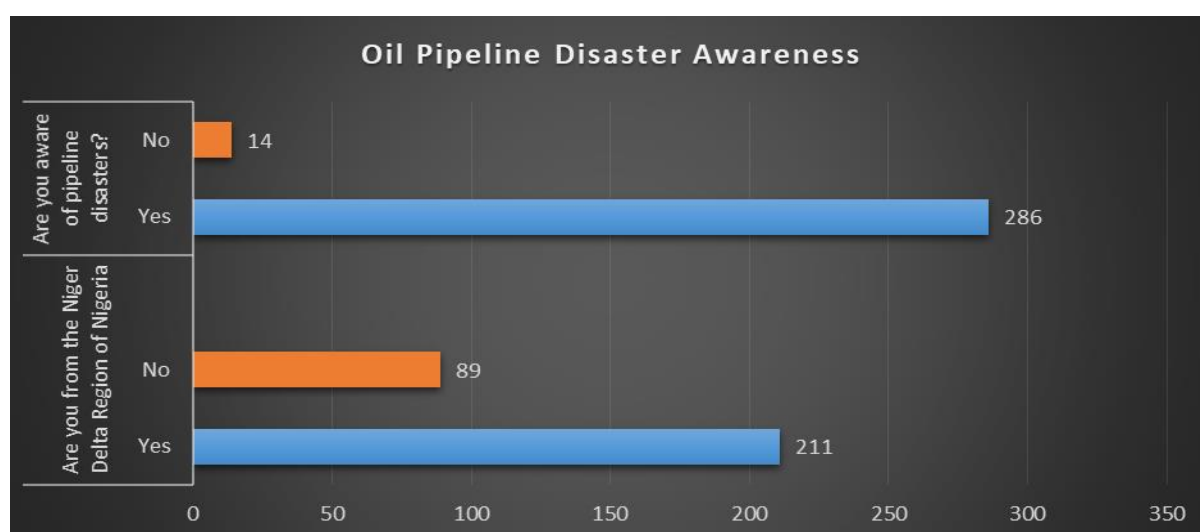
Figure 6.1 Oil Pipeline Disaster Awareness

Table 6.2 Cross-tabulation of Niger Delta Region Residency and Awareness of Pipeline Disasters

		Are you from the Niger Delta Region of Nigeria?		
		No	Yes	**Total**
Are you aware of pipeline disasters?	No	5	9	14
	Yes	84	202	286
Total		89	211	300

Source: IBM SPSS Analysis Software

The cross-tabulation of respondents from the Niger Delta region of Nigeria and their awareness of oil pipeline disasters is presented in Table 6.2. According to the data presented in the table, 202 of the 286 respondents who reported awareness of pipeline disasters come from the Niger Delta region, while 84 of the respondents do not come from the region. There are only 14 respondents who are unaware of the pipeline disasters; nine of those respondents are from the region, while the other five are not from the region.
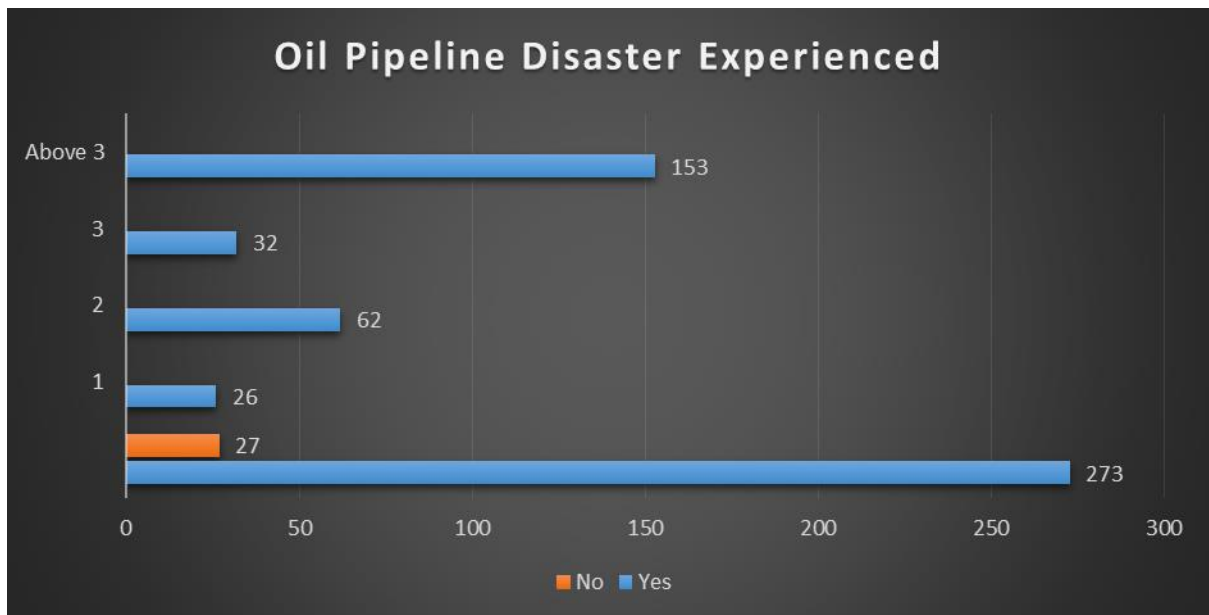
Figure 6.2 Oil Pipeline Disaster Experienced by the Respondents

Table 6.3 Cross-tabulation of Cases of Pipeline Disasters Experienced and Number of Cases Experienced

		How many cases of oil pipeline disaster have you experienced?					
		0	1	2	3	Above 3	Total
Have you personally experienced any loss of life or property as a result of oil pipeline disaster?	No	27	0	0	0	0	27
	Yes	0	26	62	32	153	273
Total		27	26	62	32	153	**300**

Source: IBM SPSS Analysis Software

6.2.3   Firms/Institutions' Participation in Oil Pipeline Disaster Management

Only 226 of these respondents, listed in Table 6.1, were experts in disaster management (Figure 6.3), and almost half of the respondents said that their company or institution does not participate in oil pipeline disaster management (Figure 6.4). This is, without a doubt, a very depressing development. However, this observation may be due to a lack of a collaborative medium in the oil and gas industry, which would bring together the key players in this highly crucial sector of the economy.

Figure 6.3 Illustration of Disaster Management Experts among the Respondents
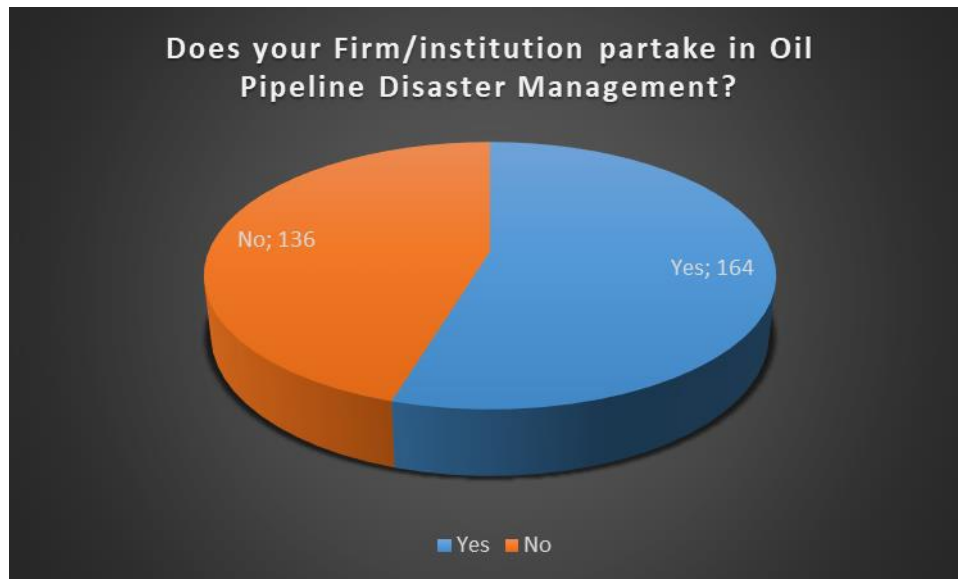
Figure 6.4 Firms/Institutions' Participation in Oil Pipeline Disaster Management

6.3   Causes of Oil Pipeline Disasters

A few days after an oil pipeline explosion in the Ekoro area of Abule-Egba, Lagos, which resulted in the loss of life and houses, the Nigerian National Petroleum Corporation (NNPC) announced that 45,347 such occurrences had occurred in the previous 18 years (Fakoyejo, 2020).

265 out of 300 respondents agree that vandalism is one of the significant causes of oil pipeline disasters (Figure 6.5). Next to vandalism is the lack of collaboration among stakeholders. Two hundred sixty-one respondents believe from their responses that lack of collaboration among stakeholders has contributed immensely to the occurrence of oil pipeline disasters in the study area. This is further discussed in section 5.7.3 of the previous chapter of this report. In addition, inadequate maintenance, operational error, and mechanical failures are also great contributors to oil pipeline disasters. 4 respondents believe that among other causes of oil pipeline disasters not mentioned in the questionnaire are bunkering, Metal Fatigue, Defective Products, Damage caused by Chemicals as well as violation of applicable codes.

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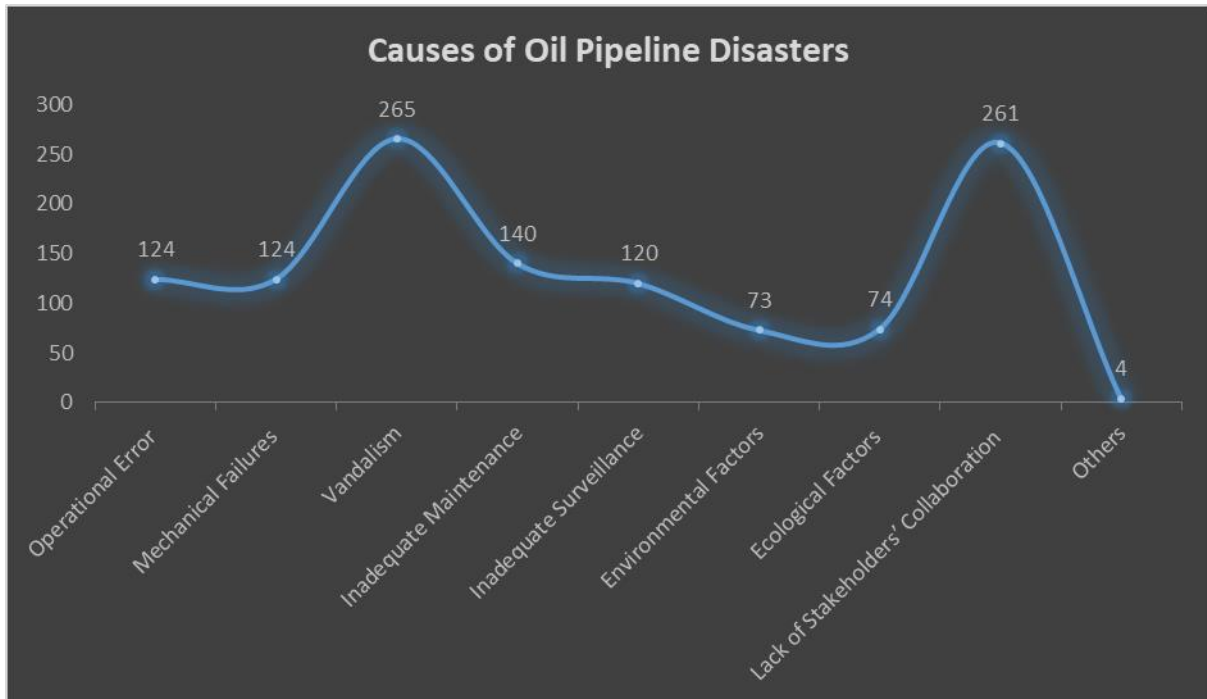
Figure 6.5 Causes of Oil Pipeline Disasters

Table 6.4 Causes of Oil Pipeline Disasters

	N	Minimum	Maximum	Mean	Std. Deviation
Operational Error	300	.00	1.00	.4133	.49325
Mechanical Failures	300	.00	1.00	.4133	.49325
Vandalism	300	.00	1.00	.8833	.32156
Inadequate Maintenance	300	.00	1.00	.4667	.49972
Inadequate Surveillance	300	.00	1.00	.4000	.49072
Environmental Factors	300	.00	1.00	.2433	.42981
Ecological Factors	300	.00	1.00	.2467	.43179
Lack of Collaboration amongst Stakeholders	300	.00	1.00	.8700	.33687
Others	300	.00	1.00	.0133	.11489

Source: IBM SPSS Analysis Software

The results of the statistical analysis of the causes of oil pipeline disasters are presented in Table 6.4. According to the data in the table, the mean score for Vandalism is 0.8833, and its standard deviation is 0.32156. Most respondents believe that the most significant factor in oil pipeline disasters is the act of vandalism committed by individuals. Lack of collaboration amongst stakeholders (mean = 0.8700, S.D = 0.33687) is also a major cause of oil pipeline disasters; other contributing factors are inadequate maintenance (mean = 0.4667, S.D. = .49972), operational error (mean = 0.4133, S.D. = 0.49325), mechanical failure (mean = 0.4133, S.D. = 0.49325), inadequate surveillance (mean = 0.4000, S.D. =

0.49072), ecological factors (mean = 0.2467, S.D. = 0.43179), environmental factors (mean = 0.2433, S.D. = 0.42981, as well as others (mean = 0.0133, S.D. = 0.11489). During the on-site investigation, several factors that contributed to the catastrophic failure of the pipeline were uncovered. These factors included metal fatigue, a defective product, damage brought on by chemicals, and violating appropriate codes.

6.4   Human and Ecological Impacts of Oil Pipeline Disasters

Exports of crude oil account for more than half of Nigeria's foreign exchange and more than half of the country's government revenue. A majority of the crude oil in Nigeria is buried beneath fields and rivers, making it the country's most valuable export. Unfortunately, one of the most polluted locations on the planet has been created by six decades of oil spills and gas flaring in the region, home to roughly 6.5 million people whose livelihoods rely on fishing and farming. These spills have devastated fisheries, marshes, agricultural land, and groundwater.

More than 2 million barrels of oil have been spewed into the environment since 1976 in 2,976 different oil accidents, while the region still experiences roughly 300 oil leaks each year. For example, Shell's Bonga Field had a spill in 2011 that dumped 40,000 barrels of oil into the environment (Chijioke, 2021). In addition, thirty thousand fishermen and 350 farming villages lost their livelihoods due to the spill. As a result of oil disasters, the inhabitants of the Niger Delta have watched their futures evaporate. According to statistics gathered from the National Oil Spill Detection and Response Agency, there were 327 oil leak events in Nigeria in 2020 alone, which resulted in the loss of 17,169.872 barrels of crude oil. The loss of 17,169.872 barrels of crude oil equated to a loss of $772,644.22 at the average crude oil price of $45 per barrel and the average exchange rate of N379 to a dollar (Sweet Crude Reports, 2021). According to an Amnesty International analysis, Shell has acknowledged 1,010 incidents since 2011, while Italian oil and gas firm Eni has reported 820 spills since 2014 (Chijioke, 2021).

On the impact of the oil pipeline disaster, Table 6.9, most respondents have been greatly affected by pipeline disasters by losing their properties. Some have been affected by losing their relations and people close to them. Some respondents have lost their jobs, while others have experienced scarcity of food and increased prices of essential commodities due to scarcity caused by these disasters. The

negative impacts of these disasters have been felt by humans alone, and the environment has also been greatly affected. Table 6.5 indicates that the contamination of water has impacted the environment adversely. Next in line with this is the destruction of farmlands and then the loss of vegetation as well as pollution of the air.

Table 6.5 Impact of Oil Pipeline Disaster

		Frequency	Percent	Cumulative Percent
Ecological Impacts	Water Contamination	53	17.7	17.7
	Environmental Pollution	20	6.7	24.3
	Destruction of Farmlands	42	14.0	38.3
	Deforestation	25	8.3	46.7
	Air Pollution	31	10.3	57.0
	Environmental degradation	30	10.0	67.0
	Loss of Vegetation	36	12.0	79.0
	Destruction of Aquatic Ecosystem	31	10.3	89.3
	Destruction of Plants and Animals	27	9.0	98.3
	Not Affected	5	1.7	100.0
	Total	300	100.0	
Human Impacts	Loss of Life	17	5.7	5.7
	Loss of Property	160	53.3	59.0
	Loss of Job	10	3.3	62.3
	All of the above	35	11.7	74.0
	I have not been affected	73	24.3	98.3
	Others	5	1.7	100.0
	Total	300	100.0	

Source: IBM SPSS Analysis Software

The aftermath effect of oil pipeline disasters is illustrated in Figure 6.6. From the illustration, the environment suffers most from the aftermath of oil pipeline disasters, with 159 respondents attesting to this. As expected, the people are next to the environment, as they are also greatly affected in the aftermath of such disasters. Water bodies also suffer greatly in this regard. Government properties, oil companies, vegetation, and then wildlife are also affected in this regard. One of the respondents noted that the topsoil is also affected as a result of oil pipeline disasters.
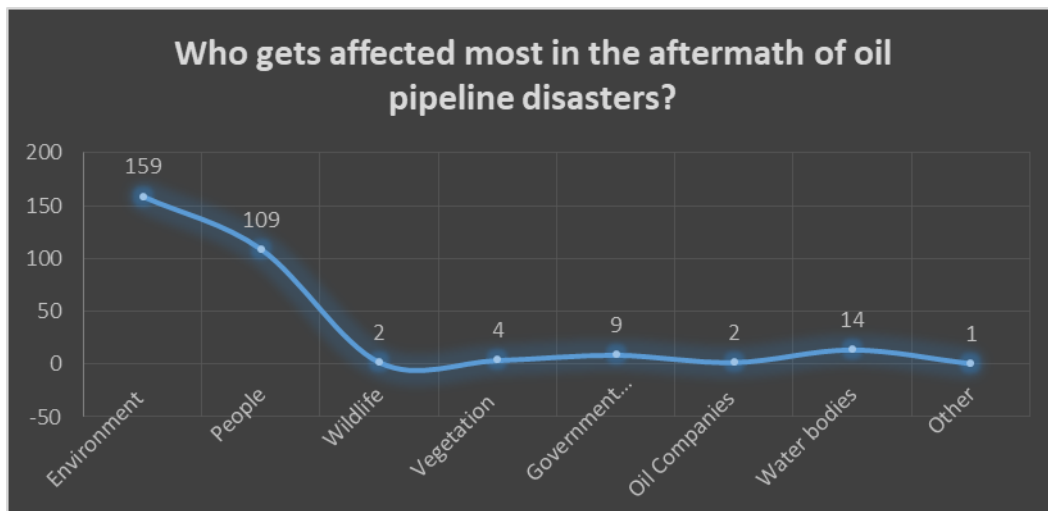
Figure 6.6 Aftermath Effect of Oil Pipeline Disasters

The environment is the biggest victim of oil pipeline disasters (53%), while oil companies are considered the least affected (0.7%). Others include people (36.3%), vegetation (1.3%), government properties (3%), and water bodies (4.7%), amongst others.

6.5   Emergency Preparedness Rating

The emergency preparedness rating describes the rating of measures and level of preparedness to respond to cases of oil pipeline disasters in case of occurrence. In this study, these rating includes; robust emergency preparedness measures, swift response of stakeholders during previous disasters, regular maintenance checks, replacement of worn-out pipes, regular security checks, sufficient security personnel to protect pipelines from vandals, and availability of emergency response equipment on site.

On a scale from 0 to 5, where five indicates highly agree, four indicates agree, three indicates neutral, two indicates disagree, one indicates strongly disagree, and 0 indicates that the respondent does not know, Table 6.6 displays how the respondents rated the emergency preparation of some of the criteria that were previously identified.

Table 6.6 Emergency Preparedness Rating

		Frequency	Percent	Cumulative Percent
There are robust emergency preparedness measures in place to respond to cases of oil pipeline disaster	Don't Know	3	1.0	1.0
	Strongly Disagree	32	10.7	11.7
	Disagree	174	58.0	69.7
	Neutral	34	11.3	81.0
	Agree	53	17.7	98.7
	Strongly Agree	4	1.3	100.0
	Total	300	100.0	
In previous oil pipeline disasters, the response of stakeholders has been swift	Don't Know	2	.7	.7
	Strongly Disagree	17	5.7	6.3
	Disagree	102	34.0	40.3
	Neutral	36	12.0	52.3
	Agree	130	43.3	95.7
	Strongly Agree	13	4.3	100.0
	Total	300	100.0	
Maintenance checks are conducted regularly on oil pipeline systems	Don't Know	6	2.0	2.0
	Strongly Disagree	21	7.0	9.0
	Disagree	192	64.0	73.0
	Neutral	47	15.7	88.7
	Agree	31	10.3	99.0
	Strongly Agree	3	1.0	100.0
	Total	300	100.0	
Worn out / Overdue pipes are replaced on regular basis	Don't Know	10	3.3	3.3
	Strongly Disagree	25	8.3	11.7
	Disagree	163	54.3	66.0
	Neutral	71	23.7	89.7
	Agree	28	9.3	99.0
	Strongly Agree	3	1.0	100.0
	Total	300	100.0	
There is sufficient security to protect oil pipelines from vandalism	Don't Know	8	2.7	2.7
	Strongly Disagree	28	9.3	12.0
	Disagree	203	67.7	79.7
	Neutral	36	12.0	91.7
	Agree	22	7.3	99.0
	Strongly Agree	3	1.0	100.0
	Total	300	100.0	

Oil spill response equipment are readily available on site	Don't Know	20	6.7	6.7
	Strongly Disagree	30	10.0	16.7
	Disagree	161	53.7	70.3
	Neutral	53	17.7	88.0
	Agree	33	11.0	99.0
	Strongly Agree	3	1.0	100.0
	Total	300	100.0	

Source: IBM SPSS Analysis Software

Table 6.7 Interval Interpretation of the Scales

Level	Scale	Interval Length	Lower Limit	Upper Limit	Interval
Don't Know	0	0.83	0	0.83	0 – 0.83
Strongly Disagree	1	0.83	0.83	1.67	0.83 – 1.67
Disagree	2	0.83	1.67	2.50	1.67 – 2.50
Neutral	3	0.83	2.50	3.33	2.50 – 3.33
Agree	4	0.83	3.33	4.17	3.33 – 4.17
Strongly Agree	5	0.83	4.17	5.00	4.17 – 5.00

Source: Author Generated

The various intervals for the Likert scale utilized in the survey for the study are displayed in table 6.7. For example, don't know is represented by the interval 0–0.83, strongly agree is interpreted as 0.83–1.67, disagree is represented by 1.67–2.50, neutral is represented by 2.50–3.33, agree is represented by 3.33–4.17, and strongly agree is represented by 4.17–5.00. The interval 0–0.83 indicates don't know.

Table 6.8 Emergency Preparedness Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Interpretation
There are robust emergency preparedness measures in place to respond to cases of oil pipeline disaster	300	0	5	2.38	.972	Disagree
In previous oil pipeline disasters, the response of stakeholders has been swift	300	0	5	3.05	1.111	Neutral
Maintenance checks are conducted regularly on oil pipeline systems	300	0	5	2.28	.856	Disagree
Worn out / Overdue pipes are replaced on regular basis	300	0	5	2.30	.910	Disagree
There is sufficient security to protect oil pipelines from vandalism	300	0	5	2.15	.827	Disagree
Oil spill response equipment are readily available on site	300	0	5	2.19	1.020	Disagree

Source: IBM SPSS Analysis Software

Table 6.8 shows the various emergency preparedness ratings' mean scores and standard deviation. From the table, the swiftness of stakeholders in previous oil pipeline disasters had the highest mean score (Mean = 3.05, S.D. = 1.11); this mean score is considered neutral. The least mean score was the sufficiency of security personnel to protect oil pipelines from vandalism (Mean = 2.15, S.D. = 0.827). Others are regular replacement of worn out or overdue pipes (Mean = 2.30, S.D. = 0.910) and availability of spill response equipment on site (Mean = 2.19, S.D. = 1.020). Only the swiftness of stakeholders in previous oil pipeline disasters is rated "neutral", and all other items are considered "disagreed.

6.6   Aftermath of Oil Pipeline Disasters

After the occurrence of oil pipeline disasters, specific actions are expected to be carried out to reduce the risk factors, reduce the impact of the disasters on humans and the environment, and prevent future occurrences as much as possible. In this study, the examined factors include; the clean-up of areas where pipeline disasters occurred, compensation of victims, identification of disaster causes to prevent re-occurrence and ensuring that lessons were learnt.
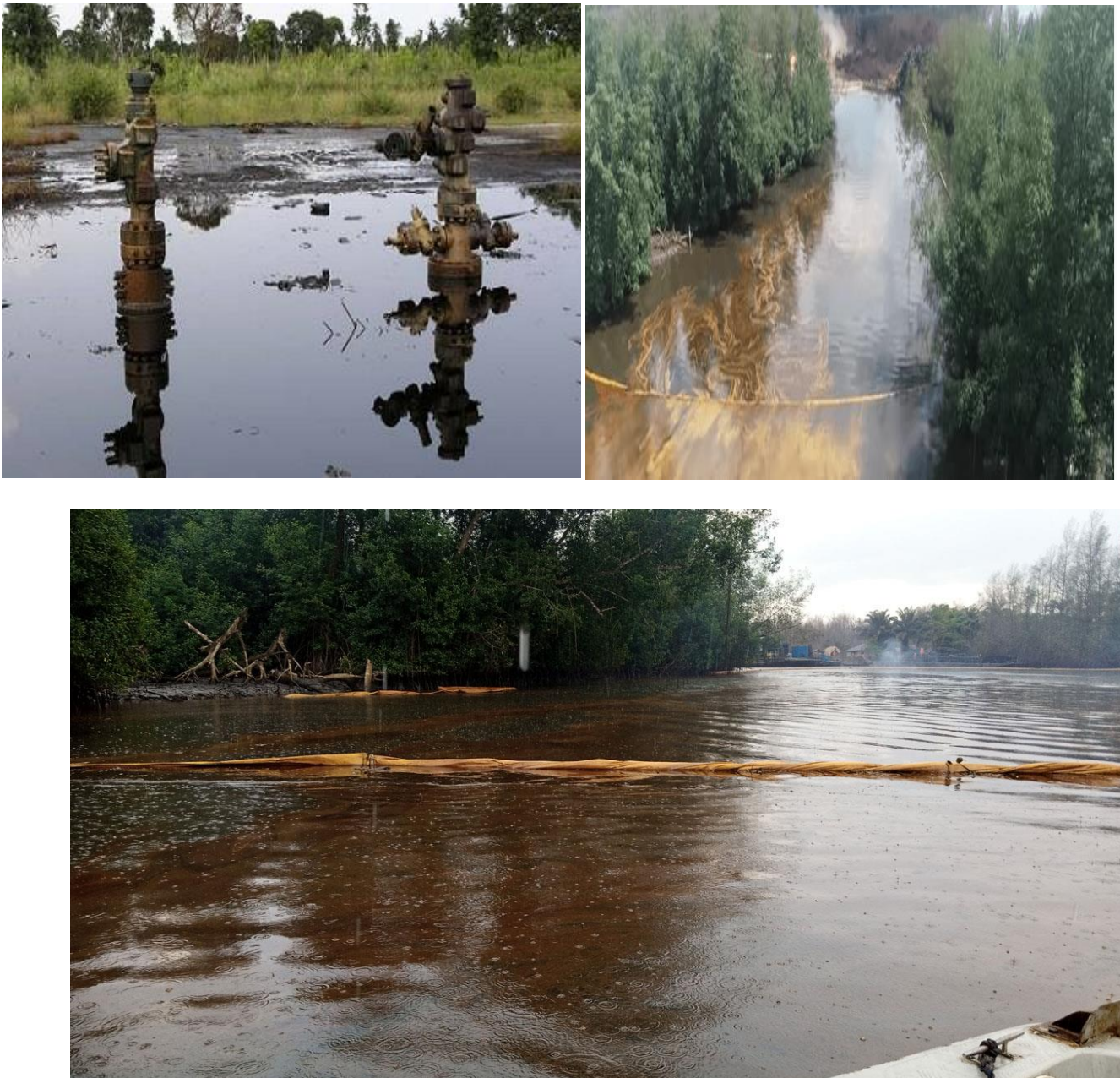
Plate III. Pictures from a spill site in Nembe Community

On a scale from 0 (don't know) to 5 (strongly agree) and everything in between, Table 6.9 displays how respondents felt about the highlighted criteria.

Table 6.9 Aftermath of Oil Pipeline Disasters

		Frequency	Percent	Cumulative Percent
Areas where oil pipeline disasters occurred are often deserted	Don't Know	1	.3	.3
	Strongly Disagree	8	2.7	3.0
	Disagree	17	5.7	8.7
	Neutral	18	6.0	14.7
	Agree	155	51.7	66.3
	Strongly Agree	101	33.7	100.0
	Total	300	100.0	
Areas where oil pipeline disasters occurred are often cleaned up	Don't Know	5	1.7	1.7
	Strongly Disagree	31	10.3	12.0
	Disagree	112	37.3	49.3
	Neutral	56	18.7	68.0
	Agree	89	29.7	97.7
	Strongly Agree	7	2.3	100.0
	Total	300	100.0	
Victims of oil pipeline disaster are compensated financially	Don't Know	44	14.7	14.7
	Strongly Disagree	18	6.0	20.7
	Disagree	106	35.3	56.0
	Neutral	103	34.3	90.3
	Agree	22	7.3	97.7
	Strongly Agree	7	2.3	100.0
	Total	300	100.0	
Investigations were usually carried out to identify the cause(s) of the disaster	Don't Know	27	9.0	9.0
	Strongly Disagree	16	5.3	14.3
	Disagree	76	25.3	39.7
	Neutral	71	23.7	63.3
	Agree	103	34.3	97.7
	Strongly Agree	7	2.3	100.0
	Total	300	100.0	
Lessons were learnt	Don't Know	23	7.7	7.7
	Strongly Disagree	13	4.3	12.0
	Disagree	44	14.7	26.7
	Neutral	66	22.0	48.7

Agree	137	45.7	94.3
Strongly Agree	17	5.7	100.0
Total	300	100.0	

Source: IBM SPSS Analysis Software

Table 6.10 Aftermath of Pipeline Disasters Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Interpretation
Areas where oil pipeline disasters occurred are often deserted	300	0	5	4.07	.956	Agree
Areas where oil pipeline disasters occurred are often cleaned up	300	0	5	2.41	1.117	Disagree
Victims of oil pipeline disaster are compensated financially	300	0	5	2.21	1.206	Disagree
Investigations were usually carried out to identify the cause(s) of the disaster	300	0	5	2.76	1.289	Neutral
Lessons were learnt	300	0	5	3.11	1.299	Neutral

Source: IBM SPSS Analysis Software

The mean and standard deviation of the factors that relate to the aftermath of pipeline disasters are displayed in Table 6.10. According to the data in the table, most people agreed that the regions surrounding oil pipeline accidents tend to be deserted (mean = 4.07, standard deviation = 0.956). Respondents believed that victims of oil pipeline disasters do not receive monetary compensation (mean = 2.21, standard deviation = 1.206). Many court rulings mandating some multinational oil firms to compensate victims have been disobeyed. With a mean response of 2.41 and a standard deviation of 1.117, the respondents disagreed that regions where oil pipeline disasters occurred, are usually cleaned up.

6.7 Current Level of Interagency Collaboration

This section of the research indicates the extent of interagency collaboration that is currently obtainable. In addition, the respondents' perceptions regarding the existence of collaboration, the response to

instances of oil pipeline disasters, and the means of communication between stakeholders were put to the test.

Table 6.11 Cross-tabulation of Existence of Inter-agency Collaboration and Response to Incidences of Oil Pipeline Disasters

		Has your firm/institution ever responded to incidences of oil pipeline disaster?		Total
		No	Yes	
Are there any interagency collaborations between your firm/institution and other stakeholders?	No	113	102	**215**
	Yes	13	72	**85**
Total		**126**	**174**	**300**

Source: IBM SPSS Analysis Software

According to the data in Table 6.11, 215 respondents reported no interagency coordination between their company or institution and the other stakeholders. As a result, just 102 have responded to incidents involving oil pipeline disasters, while 113 have not. Similarly, 85 respondents reported interagency collaboration between themselves, their company or institution, and other stakeholders. 13 of these have not responded to incidents involving oil pipeline disasters. In contrast, the remaining 72 have responded to incidents involving oil pipeline disasters.

Table 6.12 Level of Inter-agency Collaboration Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Has your firm/institution ever responded to incidences of oil pipeline disaster?	300	.00	1.00	.5800	.49438
Are there any interagency collaborations between your firm/institution and other stakeholders?	300	.00	1.00	.2833	.45137

Source: IBM SPSS Analysis Software

Table 6.12 shows almost no interagency coordination between the respondents' firms/institutions and other stakeholders (mean = 0.2833, standard deviation = 0.45137). However, the average response of companies and institutions to oil pipeline accidents is fair, scoring 0.5800 on a scale from 0.0 to 1.0.

Table 6.13 Cross-tabulation of Inter-agency Collaboration and Channel of Communication between Stakeholders

		Are there any interagency collaborations between your firm/institution and other stakeholders?		Total
		No	Yes	
What are the main channels of communication between your firm/institution and other stakeholders?	Telephone calls	0	45	45
	Designated social media platform	0	3	3
	Email	0	30	30
	None	215	0	215
	Other	0	7	7
Total		215	85	300

Source: IBM SPSS Analysis Software

Table 6.13 shows that out of 85 respondents that indicated the existence of interagency collaboration between them of their firm/institution and other stakeholders, 45 of such collaboration communicate via telephone calls, 30 via emails, and three via designated social media platforms. In addition, seven communicate via other channels like letters, faxed documents, and town hall meetings.

Table 6.14 Current Collaboration Level

Current Collaboration Level		Frequency	Percent	Cumulative Percent
My firm/institution has clear policy and practice for collaboration with other agencies	Don't Know	35	11.7	11.7
	Strongly Disagree	23	7.7	19.3
	Disagree	87	29.0	48.3
	Neutral	55	18.3	66.7
	Agree	82	27.3	94.0
	Strongly Agree	18	6.0	100.0
	Total	300	100.0	
The current level of collaboration between my firm/institution with other agencies has been effective in responses to cases of disaster management	Don't Know	31	10.3	10.3
	Strongly Disagree	8	2.7	13.0
	Disagree	100	33.3	46.3
	Neutral	70	23.3	69.7
	Agree	77	25.7	95.3
	Strongly Agree	14	4.7	100.0
	Total	300	100.0	
In my experience, collaboration between stakeholders has been an effective tool in disaster management	Don't Know	7	2.3	2.3
	Strongly Disagree	4	1.3	3.7
	Disagree	32	10.7	14.3
	Neutral	18	6.0	20.3
	Agree	93	31.0	51.3
	Strongly Agree	146	48.7	100.0
	Total	300	100.0	

Source: IBM SPSS Analysis Software

Table 6.14 shows respondents' perceptions of some questions regarding the current level of collaboration amongst stakeholders. These questions include the firm/institution having clear policy and practice for collaboration with other agencies, the effectiveness of the current level of collaboration in response to cases of disaster management as well as the effectiveness of collaboration in disaster management using a Likert scale of 5 for strongly agree, 4 for agree, 3 for neutral, 2 for disagree, 1 for strongly disagree and 0 for don't know.

Table 6.15 Current Level of Collaboration Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Interpretation
My firm/institution has clear policy and practice for collaboration with other agencies	300	0	5	2.60	1.417	Neutral
The current level of collaboration between my firm/institution with other agencies has been effective in responses to cases of disaster management	300	0	5	2.45	1.303	Disagree
In my experience, collaboration between stakeholders has been an effective tool in disaster management	300	0	5	4.18	1.210	Strongly Agree

Source: IBM SPSS Analysis Software

As seen in Table 6.15, the respondents have a firm agreement that collaboration, if accepted, has the potential to be a very effective instrument in disaster management. The mean score is 4.18, and the standard deviation is 1.210. Likewise, there was disagreement regarding the effectiveness of the current degree of collaboration between firms/institutions and other stakeholders (mean = 2.45, standard deviation = 1.303). In conclusion, there is a general lack of distinction between enterprises and institutions regarding whether or not they have a defined policy and practice for working together with other agencies (mean = 2.60, standard deviation = 1.417).

6.8 Collaboration as a Disaster Management Technique

In this section, the respondents' perspectives on the idea of collaboration as a strategy for disaster management and mitigation were investigated. It takes into account the consensus of stakeholders about this view. Most respondents (72.3%) believe working together is an effective strategy for managing oil pipeline accidents (Table 6.16).

Table 6.16 Collaboration as Disaster Management Technique

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	83	27.7	27.7	27.7
	Yes	217	72.3	72.3	100.0
	Total	300	100.0	100.0	

Source: IBM SPSS Analysis Software

Table 6.17 Collaboration as Disaster Management Technique Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Does your firm/institution consider collaboration with other stakeholders as a disaster management technique?	300	.00	1.00	.7233	.44810

Source: IBM SPSS Analysis Software

Table 6.17 shows a high degree of agreement that collaboration is an appropriate pipeline disaster management approach, as indicated by the mean score of 0.7233.

Figure 6.7 Hypothesis Test Summary (IBM SPSS Software)

The null hypothesis that "collaboration with other stakeholders is not a technique for disaster management" cannot be supported based on the evidence shown in Figure 6.7.

6.9   Relevant Stakeholders in Oil Pipeline Disaster Management

An insight had already been obtained during the pilot stage of this research. The field survey, however, reiterated this by pointing out the level of relevance of each stakeholder in managing and mitigating pipeline disasters. Analysis of the interview data specified the level of involvement (section 7.2.1) and the role of the stakeholders in preventing/managing oil pipeline disasters (Section 5.6).

The relevant stakeholders in Oil Pipeline disaster management, as identified during the survey, are presented in this section. With a mean of 0.95, government agencies ranging from NEMA, NOSDRA, and NNPC are important. Security agencies are also critical stakeholders (mean = 0.9033, S.D = 0.29600), followed by the local community/citizens (mean = 0.8933, S.D = 0.30920). The role of the health agencies (mean = 0.7500, S.D = 0.43374), Media (mean = 0.6467, S.D = 0.47880), and Academia (mean = 0.5367, S.D = 0.49949) are also emphasized. NGOs are not left out (mean = 0.4033, S.D = 0.49139), as well as local and international donors (mean = 0.3, S.D = 0.45902) (Table 6.18).

Table 6.18 Relevant Stakeholders in Oil Pipeline Disaster Management

	N	Minimum	Maximum	Mean	Std. Deviation
Government Agencies	300	.00	1.00	.9500	.21831
Non Governmental Organizations (NGOs)	300	.00	1.00	.4033	.49139
Security Agencies	300	.00	1.00	.9033	.29600
Health Agencies	300	.00	1.00	.7500	.43374
Local and International Donors	300	.00	1.00	.3000	.45902
Media	300	.00	1.00	.6467	.47880
Academia	300	.00	1.00	.5367	.49949
Community and Citizen	300	.00	1.00	.8933	.30920
Regional Cooperation	300	.00	1.00	.4933	.50079

 Source: IBM SPSS Analysis Software

6.10   Reliability and Validity

6.10.1 Test of Reliability

Cronbach's alpha was utilized in this study to assess internal consistency (Section 5.8.1). Acceptable levels of internal consistency have a Cronbach's alpha of 0.6 or higher. It is commonly accepted that

Cronbach's Alpha values below 0.6 indicate low reliability, whereas values in the 0.7–0.9 range indicate moderate reliability, and values closer to 1.0 indicate excellent reliability.

Table 6.19 Cronbach's Alpha Reliability Test

	Cronbach's Alpha	No. of Items
Causes of Oil Pipeline Disasters	.658	9
all the likert scale items tested	.745	14
Relevant stakeholders	.704	9

Source: IBM SPSS Analysis Software

From 6.19, a value of 0.658 was obtained as Cronbach's Alpha value for causes of pipeline disasters. This value is significantly acceptable when the number of items tested does not exceed 10. An average value of 0.745 was obtained on all Likert scale categories, including assessments of emergency readiness, the situational impact of the oil pipeline disaster, and the degree of cooperation between relevant parties. Indicative of the validity of the data collected, this is quite encouraging. For data on relevant stakeholders, a reliability of 0.704 was obtained. This value shows good reliability of the data obtained.

6.10.2 Test of Validity

In the appendix of this paper, a bivariate correlation matrix of the factors is provided. Cohen's (1988) criteria are used to interpret the values in the correlation matrix, with small (r =0.10 to 0.29), medium (r = 0.30 to 0.49), and large (r = 0.50 to 1.0) categories. Pearson's correlation coefficient was used to look at the relationship between the overall factor variables, and it turned out there was a positive correlation.

6.10.3 Test of Normality

Before beginning multiple data analyses, it is essential to validate the normalcy of the data. The Kolmogorov-Smirnov and Shapiro-Wilk tests were utilized in this investigation to determine whether or not the data obtained from the field survey adhered to a normal distribution. Since most of the items tested were less than 10, interest is on the Shapiro-Wilk test, which is more suitable for this purpose.

These tests show whether the distribution is parametric or non-parametric. It is a statistical tool in SPSS software used to check for a test of normality.

The Shapiro-Wilk test is insignificant at the levels tested (less than 0.05). This test illustrates a non-parametric distribution model for items tested. The results are shown in the appendix section of this report.

6.11   Chapter Summary

This chapter presented the quantitative findings from the study, including those obtained from secondary sources and the survey conducted. The collected survey data revealed a high level of reliability and validity. There are various causes of pipeline disasters; the most prominent are vandalism and lack of collaboration among stakeholders. Other contributing factors are inadequate maintenance, operational error, mechanical failure, inadequate surveillance, ecological factors and environmental factors. Oil pipeline disasters have huge impacts on humans and the environment, with the environment as the biggest victim of oil pipeline disasters. After an extensive literature review, the chapter concludes that interagency collaboration between the respondents' firms/institutions and other stakeholders is virtually non-existent and that collaboration of stakeholders is a perfect oil pipeline disaster management technique. Government agencies, including NEMA, NOSDRA, NNPC, security agencies, health agencies, the local community, the media, and academia, are critical stakeholders in mitigating and managing oil pipeline disasters.

CHAPTER SEVEN

QUALITATIVE FINDINGS

7.1   Introduction

The fundamental assumption is that when the relevant stakeholders identified during the survey collaborate to mitigate and manage oil pipeline disasters, Nigeria will drastically reduce oil pipeline disasters.

Achieving this requires assessing the stakeholder's role in such a collaborative pact. Such assessment will aid in identifying and concentrating on the most appropriate method of collaboration and the most suitable means of communication before, during and after the occurrence of pipeline disasters.

This chapter presents the qualitative findings from the study. It explains the responses, stakeholder involvement, identification of stakeholders, developing the collaboration framework for managing oil pipeline disasters and validation of the framework.

7.2   Analysis of Interview Responses

This section presents the analysed data of the interview responses analysed using the Nvivo software. It explains the responses, mapping of key themes and their respective coding structure.

7.2.1   Stakeholder Involvement

When an oil pipeline disaster occurs, some relevant agencies and stakeholders ensure that the response is provided immediately to minimize the effects, especially to victims and to reduce the loss of lives and properties. The extent of participation might range from providing relief supplies to participating in search and rescue operations or providing first aid treatment, among other activities. During the interview, the level of involvement of major stakeholders in managing oil pipeline disasters was obtained.

On the question, "have you been involved in managing oil pipeline disasters? If yes, what are your efforts?" some of the interviewees responded;

".....Yes, I have. The agency I work with is in charge of managing varieties of natural and man-made disasters in Nigeria. As a result, I have been directly involved in managing and mitigating these types of disasters....."

*"…….my efforts include but are not limited to coordinating search and rescue, coordination of emergency response services, provision of relief materials and providing shelter for displaced persons."*RP/NEMA/01

"…..My involvement has been more of the aftermath of the disaster, especially regarding the environment……."

"……I have been involved in assessing the level of destruction of the environment due to these disasters and drawing up plans for clean-up exercises." RP/FMHDSD/01

"…….Yes, I have. At NNPC, several ways of preventing pipeline disasters, especially oil and gas pipelines, have been discussed and are still being discussed. The major task has been on prevention and risk reduction of these devastating disaster…….."

*"….We have swung into immediate action in areas where pipeline leaks are reported, as well as prevented vandalism as much as we can, even though the problem persists."*RP/NNPC/01

"……Oversee the national oil spill contingency plan. We monitor oil spill drill exercises and carry out inspection and investigation visits. My agency is also tasked with the clean-up of spill sites to remediate the environment as much as possible with the aid of a baseline environmental sensitivity index map (ESI)" RP/NOSDRA/01

The community is not left out in this regard, as members who were also part of the interview responded in the same line as their level of involvement.

"……Reported the incidence to the security agents and prevented siphoning off the crude oil by residents of the area." RP/CRS/01

*"……Within my domain, I have continuously organized sensitization among my kinsmen to stay away from all acts of sabotage that could lead to pipeline leaks or tantamount to vandalisation. Also, when these disasters eventually occur, we combine efforts with other stakeholders to manage the situation."*RP/CRL/01

The multi-national oil companies, referred to as oil companies, were not left out. They have been actively involved in ensuring that pipelines are maintained regularly and engaging residents of the host communities to discourage them from involving themselves in vandalisation and other activities harmful to the pipelines.

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Interviewees under this category responded thus;

"……..reducing tensions in the host communities by diffusing rivalries and giving compensation just to discourage people from vandalisation. We have also funded students' scholarships and training militia members for peace-keeping and community-building efforts." RP/MNOC/01

"…….we have tried to reduce agitations that usually result in vandalisation. Our pipeline maintenance has become more regular, and checks are conducted periodically. We have also given our inputs whenever and wherever required and are willing to collaborate with relevant stakeholders when needed." RP/MNOC/02

Security agencies and health agencies were not left out;

*"………..As a security agents, we are responsible for patrolling and providing security along the pipeline right of way. We also prevent vandalisation of the pipeline by hoodlums."*RP/SA/01

"…….as a health practitioner, I have been involved in managing some of these disasters…….

*""…….I was involved in granting first-aid attention to some of the victims of the resulting fire due to the oil pipeline explosion."*RP/HS/01

7.2.2   Managing and Mitigating Pipeline Disasters

Multi-stakeholder collaboration is a type of strategic cooperation that brings together many organizations to participate in a shared assembly with public authorities to make good decisions for all parties. The ability of collaboration to strengthen networks and relationships between stakeholders by developing interpersonal trust is one of the benefits of working together. This trust can be constructive in the event of a crisis. Table 7.1 summarizes the responses of the interviewees as regards the present level of collaboration, roles of collaborating stakeholders and impact of stakeholders' collaboration.

Table 7.1 Stakeholders' Collaboration in Disaster Management

Present Level of Collaboration	Roles of Collaborating Stakeholders	Impact of Stakeholder Collaboration
"……..Occasionally, yes. We collaborate with security agencies, fire service, NGOs and health agencies. Though such collaborations always exist during disaster occurrence." RP/NEMA/01	*"……..Government agencies are very relevant in the prevention, management and risk reduction of pipeline disasters. These agencies should be charged with the responsibility of early warning signals and prompt response to disaster cases." RP/NEMA/01*	*"………..as keenly anticipated by all actors involved, it is believed that multi stakeholders collaboration will reduce the frequency of occurrences of these disasters as it tends to develop a well-articulated means of managing and mitigating it." RP/MNOC/01*
"…….Collaborate with Community Leaders and residents as well as government agencies, though mostly at discussion levels." RP/MNOC/01	*"…….Government and government agencies are key stakeholders in this regards as they coordinate the activities of all other stakeholders towards achieving the desired goal. Security agencies should provide security and strict surveillance to detect oil leaks and prevent the activities of vandals and miscreants. The health agencies and other emergency services like fire service should provide immediate response during the occurrence of disasters. The community residents should serve as partners in securing pipelines as well as aid during search and rescue missions. NGOs should partner in sensitization activities and assist in providing relief materials to victims of oil pipeline disasters. RP/FMHDSD/01*	*"………….there are obviously very positive effects of multi stakeholders' collaboration on managing and mitigating oil pipeline disasters. It is said that two good heads are better than one. When stakeholders put their efforts and experiences together, they will be a tremendous achievement in the reduction of pipeline disaster occurrences." RP/MNOC/02*
"…….we relate majorly with our host communities as well as government representatives from time to time. No concrete collaboration exist between us and other stakeholders." RP/MNOC/02	*"……..Government agencies charged with the responsibility of handling oil spills and oil disasters, security agents should also be involved. Health agencies are also very important in the risk reduction. The multi-national oil companies should be more involved in the prevention of oil pipeline disasters. The media should organize sensitization in conjunction with NEMA to discourage people*	*"………….a lot has been achieved in the developed nations of the world from stakeholder collaboration in the area of disasters as well as other critical sectors where such is required. The case of Nigeria wont be different. I anticipate that stakeholders' collaboration will be very helpful in this regards." RP/HS/01*

	involved in oil bunkering."RP/NNPC/01	
".......Yes, we do, especially when such disasters occur. We usually collaborate with NEMA during such occurrences. We recommend a better collaboration framework or pattern with other agencies as well as NGOs and also the community residents so that we can move past this ugly incidence."RP/NNPC/01	*"..........the government been at the helm of affairs have the number one responsibility. They need to get their acts together. Having created a number of agencies to handle such cases, they should equip these agencies to deliver on their mandate. Among them include NEMA who coordinates all activities relating to disasters in Nigeria. Health agencies, security agencies and we, the community should be involved also.RP/CRL/01*	*"..........at this point, only multi stakeholders' collaboration efforts can possibly save us from the ever occurring disaster. When all stakeholders directly and indirectly involved come together with a singular aim of managing and mitigating these disasters, only then can we begin to heave a sigh of relief." RP/CRS/01*
".......We only join efforts with some stakeholders when these disasters have occurred."RP/CRL/01	*"...........I first and foremost recognize the role of the community in the prevention and mitigation of these disasters. The National Emergency Management Agency needs to do more in this regards as they are at the centre of any form of disaster in Nigeria. National Oil Spill Detection and response Agency is also very relevant as well as the Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development of Nigeria. Also very relevant are the health agencies and NGOs."RP/SA/01*	*"...............when collaboration in a multi stakeholder scale is adopted and practiced as it should be, there will be a tremendous improvement in the management and mitigation of pipeline disasters." RP/FMHDSD/01*
".......Not really. We only respond when our attention is called."RP/HS/01	*".........Government agencies charged with the responsibility of handling oil spills and oil disasters, security agents should also be involved. Health agencies are also very important in the risk reduction. The multi-national oil companies as well as NNPC should be more involved in the prevention of oil pipeline disasters. The media should organize sensitization in conjunction with NEMA to discourage people involved in oil bunkering."RP/CRS/01*	*"..............the possible effects of multi-stakeholder collaboration is a rapid reduction in the number of cases of oil pipeline disasters as have been observed in other sectors where collaboration has been practiced."RP/NNPC/01*

*"……..Yes, we work hand in hand with NOSDRA."*RP/FMHDSD/01	*"……….All government agencies saddled with this responsibilities as well as the multi-national oil companies and the community where these pipelines pass through."*RP/NOSDRA/01	*"……….if properly organized and arranged, collaboration by multi stakeholders will help reduce these incidences drastically."*RP/NOSDRA/01
"……….Other sister agencies in the Federal Ministry of Environment." RP/NOSDRA/01	*"…….we the oil companies together with all government agencies as well as the local communities and security agencies all have a role to play in this all important struggle."*RP/MNOC/01	*"…………..as earlier stated, multi stakeholders' collaboration is the only way to go as far as this issue is concerned. It will possibly ensure that this menace is reduced drastically if not completely eliminated."*RP/CRL/01
	*"……..the host communities where pipeline traverse are very important in the prevention of pipeline disasters. When they are partners in progress, they serve as security for these pipelines. Other relevant stakeholders previously outlined include government at all levels, government agencies charged with specific responsibilities in the oil and gas sector, security agencies, health agencies and NGOs."*RP/MNOC/02	*"……….multi stakeholders' collaboration will effectively mitigate and manage oil pipeline disasters as it will bring every single relevant actor in this sector together to resolve this devastating problem."*RP/SA/01
	*"………everyone is relevant as far as disasters in Nigeria is concerned. However, in light of the topic been discussed, I consider the community residents as relevant stakeholders in the effective management of these disasters. I also consider government agencies who serve as representatives of the government in this case. The oil companies are also very relevant in this regards as well as security agencies."*RP/HS/01	*"…………..Multi-stakeholder collaboration will reduce to the barest minimum, occurrence of pipeline disasters as it will aid the efficient management as well as mitigate these occurrences."*RP/NEMA/01

Collaboration is crucial in Nigeria for many reasons. One hopes that the government has learned from its mistakes and will make the necessary adjustments regarding stakeholder participation to prevent future oil pipeline disasters. However, the respondents' outlook on this matter is positive. Several

respondents believe stakeholder participation is essential for effectively mitigating and managing oil pipeline disasters.

Better information/intelligence sharing, better decision-making, more significantly coordinated and timely intervention, and improved response are benefits of stakeholder collaboration.

7.3   Approach to Design of a Framework for Stakeholders' Collaboration

The collaboration process is challenging, and its success is likely contingent on some elements. According to Sapat et al. (2019), for two or more individuals to collaborate effectively, they need to work toward a shared goal or address a problem. It is not enough for the parties to have the same vision (Caroline, et al., 2001). For cooperative endeavours to be successful, several prerequisites must be met, including but not limited to the necessity of working together. Moreover, the people involved must agree with the contributions made by one another. Because of this, both sides now have an accurate representation of the skills possessed by the other.

In order to accomplish this goal, the procedures must be clearly outlined. Table 7.2 illustrates these processes according to Giesen (2002).

Table 7.2 The Collaboration Process

Processes
i.   The process of identifying important stakeholders;
ii.   The organization of a meeting of key stakeholders who have been identified as relevant stakeholders;
iii. The process of defining the scope of the collaboration and the desired outcomes;
iv.   Defining the structure in terms of leadership, roles, responsibilities, ownership, channels and processes for communication and decision-making, resource access, planning, and milestones for collaboration;
v.   Defining the metrics, techniques, and procedures for review and assessment;
vi.   Identifying key potential risks and designing methods of action for mitigating those risks; (Giesen, 2002)

In addition, O'Brien and Toms argue that a conceptual framework must deal with these three concerns. Firstly, the most crucial question is the framework's purpose. Second, how do you see it playing out?

Thirdly, what exactly are the constituent parts? The first question lays the groundwork for the overall purpose of the investigation. The framework's objective is to achieve pipeline disaster management and mitigation as its goal. Stakeholders are expected to work together throughout several stages of the disaster, including before, during, and after its occurrence, as a result of the framework that is being developed. The primary components captured by the framework include the roles played by the stakeholders, the communication medium, and the feedback models.

7.3.1 Identification of stakeholders for collaboration

Those who have a vested interest in something are referred to as stakeholders. According to the available research, some different stakeholders have been identified. The results of the pilot tests that were carried out during the preparatory stages lend credence to this assertion. Figure 7.1 presents a visual representation of the relevant stakeholders that have been identified. The responsibility for carrying out the disaster management procedures depicted in Figure 7.2 will rest with the multi-stakeholders involved. Functions such as preventing, mitigating, responding to, and recovering from disasters fall under this category. Disaster prevention and mitigation involvement will come from various sources, including early warning systems. Others will be involved in the disaster response and recovery efforts, including search and rescue operations, the distribution of relief supplies, the cleanup of affected areas, and the rehabilitation of victims. These will all be accomplished through cooperative efforts on the part of all of the stakeholders.

Figure 7.1 Stakeholders Engaged in Management and Mitigation of Pipeline Disasters in the Research Area (adapted from the study of (Saeed & Narimah, 2019) to reflect the participation of Security Agencies).

According to this concept, the national, state, and local emergency management agencies (NEMA, SEMA, and LEMA) are responsible for coordinating the overall actions involving the collaboration of stakeholders. In order for them to accomplish this goal, they will, among other things, be responsible for the formulation of policies, the monitoring of preparedness, the collection of data to improve forecasting and planning, the mobilization of financial resources from donors and partners, and the collection of materials for distribution.

Communities, including community-based organizations (CBOs), non-governmental organizations (NGOs), and neighbourhood associations, will conduct sensitization and capacity building for an initial response. This will ensure that community members are committed to being prepared, will mobilize resources, and will build the community's capacity and resilience to prepare for, respond to, and mitigate the effects of disasters. In addition, they will participate in activities that enhance awareness of Disaster Risk Reduction (DRR) and Early Warning Systems (EWS), as well as training and retraining on core

first aid skills.

Disaster Response Units, or DRUs, assist in search and rescue operations, emergency medical care, logistical support, and firefighting. These DRUs are formed in designated military formations and include members of the police, the Red Cross, and volunteers.

The primary responsibilities of the media will consist of distributing press releases and conducting interviews, while the academic community will be responsible for education, research, and training.

7.3.2   The Disaster Management Model

According to the definition provided by the United Nations Development Program (UNDP, 1992), disaster management comprises a wide variety of policy and administrative decisions in addition to operational procedures, and it applies to all levels of disasters. In order to construct an appropriate framework to consider these factors, it is necessary to investigate specific fundamental ideas from a cooperative point of view. As a result of the disasters that occurred with the oil pipelines in Nigeria, the processes that comprise the ideal disaster management components, as stated by Sani (2012), have been modified to include disaster prevention, disaster mitigation, disaster preparedness, disaster response, and disaster recovery (Figure 7.2).
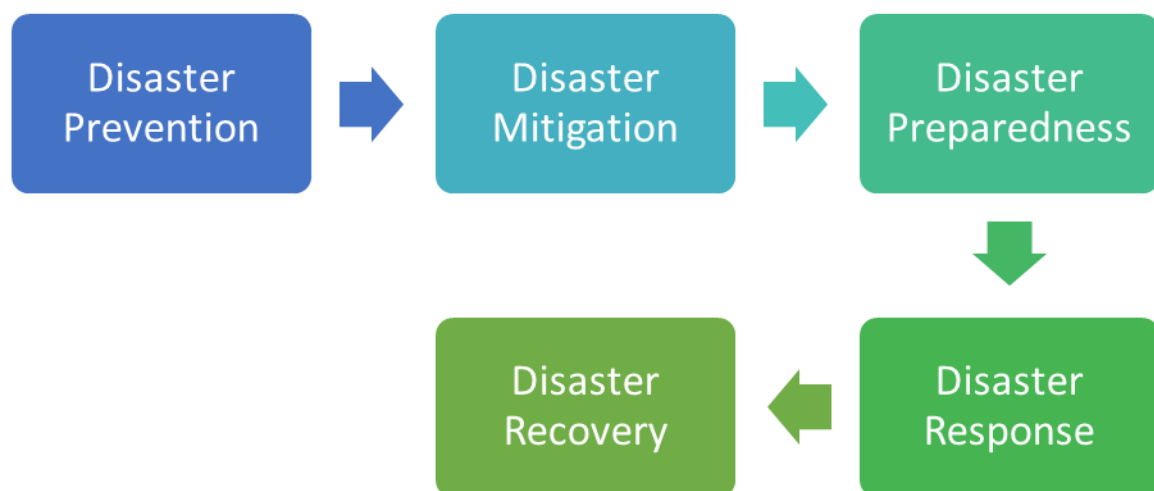
Figure 7.2 Oil pipeline disaster management model (Author Modified).

The framework design (Figure 7.3) for stakeholders' participation followed a path consistent with logic. It has been suggested that using this strategy to enable collaborative decision-making might be beneficial (Kareko & Siegel, 2003; Couillard, et al., 2009). As seen in Figure 7.2, the technique for crisis management is broken down into three distinct stages, which correspond to the structural components of the framework for the participation of stakeholders. This is broken down into further detail in the following sections.
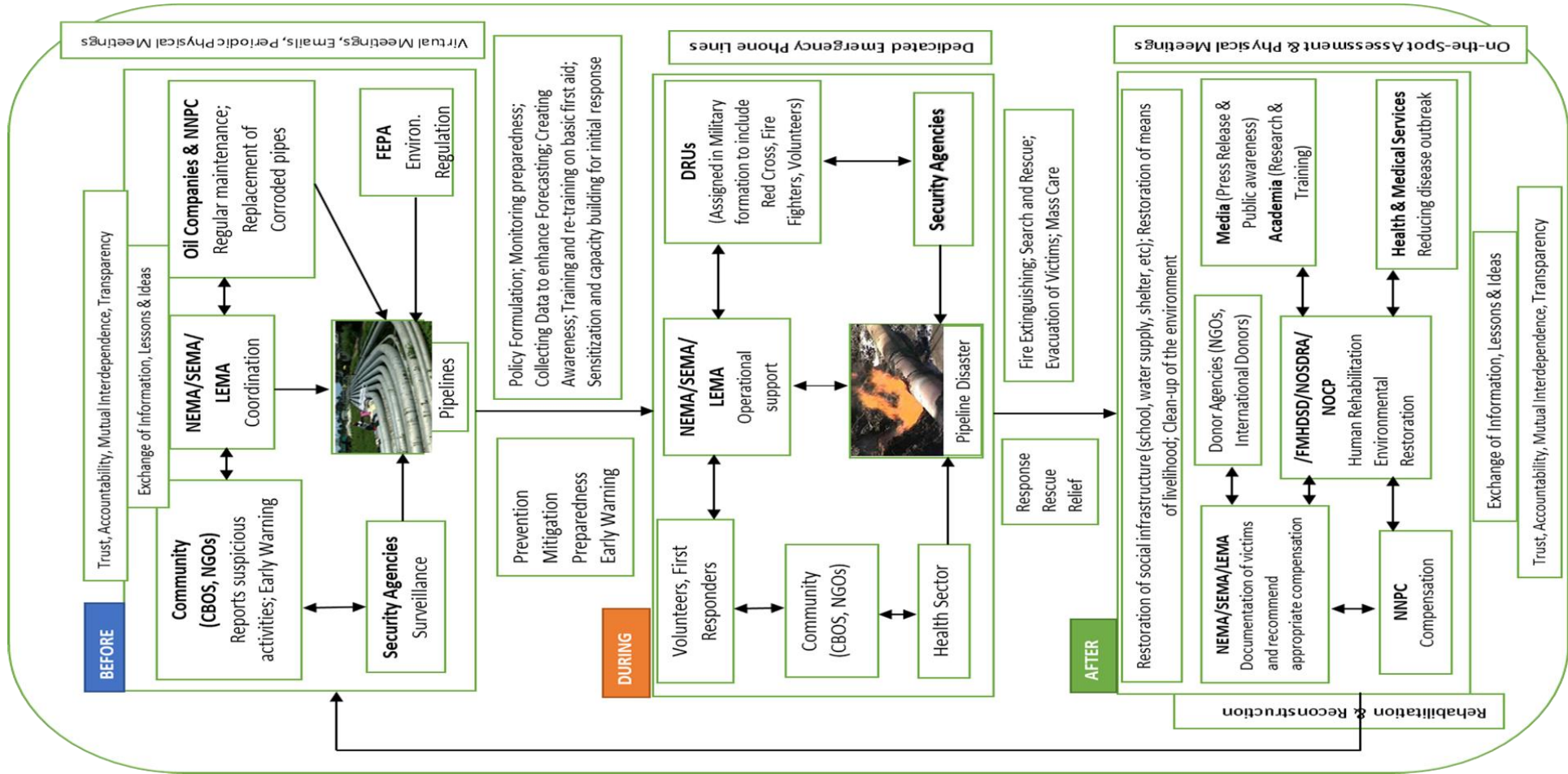
Figure 7.3 Framework for Stakeholders' Collaboration in Pipeline Disaster Management

Before Disaster Occurrence

The management of disasters is broken down into these three stages within this framework. The first phase occurs before the disaster and concerns prevention, mitigation, early warning, and preparedness (Figure 7.4). Measures taken to avert disasters are intended to either lessen the likelihood that a disastrous event will occur or lessen the likelihood that a disastrous event will devastate people, infrastructures, and the economy. If a natural or man-made disaster strikes in Nigeria, disaster mitigation measures will be in place to lessen or at least mitigate the effects of the disaster. The activities and precautions that comprise disaster preparedness are those conducted in advance to make it simpler for individuals and all levels of communities to respond promptly and effectively in the event of a disaster. Emergency Management Agencies (NEMA, SEMA, and LEMA) are significant players directly involved in this stage of the process. These agencies are tasked with the responsibility of coordinating all actions that involve emergencies and disasters. The many parties involved in disaster management must be coordinated for this step. It explains the method of coordinating or combining various operations to meet the goal and objectives of oil pipeline disaster management. In addition, it outlines the necessary steps for coordinating the efforts of individuals and organizations to achieve maximum impact and synergy.

The multi-national oil companies (MNOCs), often known as oil firms in this framework, are responsible for guaranteeing proper maintenance of pipelines and replacing pipelines that have been corroded. They also ensure close relationships exist between themselves and the communities where they operate to prevent problems that could lead to uprisings and conflicts. The Federal Environmental Protection Agency (FEPA), which operates under the supervision of the Federal Ministry of Environment, is also active in the stage of disaster prevention (Figure 7.4). They are tasked with ensuring that the required precautions are taken to prevent an oil spill, which would contaminate the environment. The presence of these individuals will function as a disincentive to oil firms that engage in environmentally questionable activities. Because the communities act as guardians of the pipelines, they play significant roles in the process. The security authorities are responsible for maintaining a surveillance system for the pipes and preventing illegal refineries and vandals from damaging them. Other measures that are taken into consideration during this stage of the framework for oil pipeline disaster management include

relief stocking, which can include things like building materials, blankets, buckets, and food items; early warning systems, which refer to an organized structure for predictions and dissemination of timely and practical information; emergency communication systems; public education programs; and so on. In this pre-disaster phase, respondents have advocated regular virtual meetings, emails, and physical meetings held occasionally as the ideal communication channel.
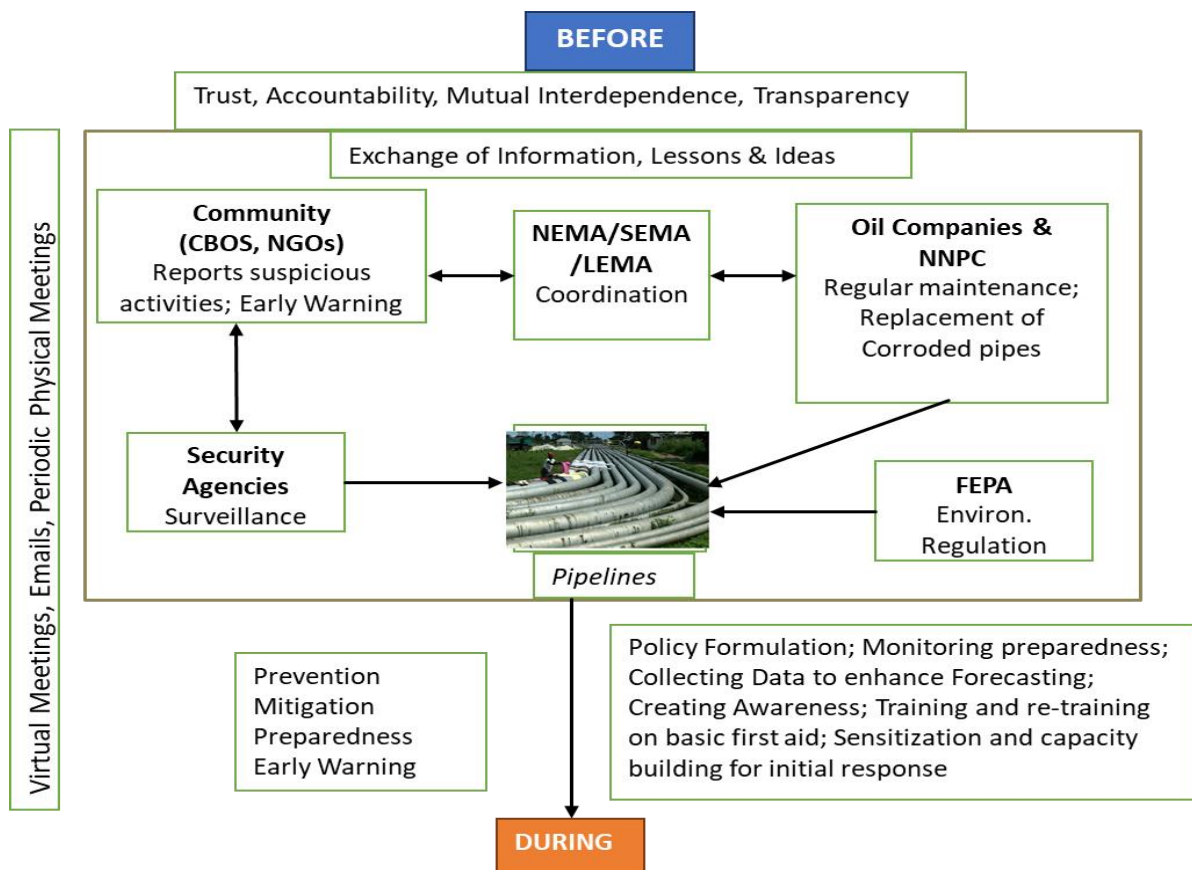
Figure 7.4 Before the Occurrence of Disasters

During Disaster Occurrence

The National Emergency Management Agency (NEMA), the State Emergency Management Agencies (SEMA), and the Local Emergency Management Agencies (LEMA) are responsible for coordinating all disaster response activities if an oil pipeline disaster occurs (Figure 7.5). The primary objective of these agencies is to eliminate the cause of the disaster and minimize its effects on humans and the environment. The term "disaster response" refers to the actions that must be taken either in the midst of or shortly after the impact of a disaster in order to save lives, care for the victims, safeguard properties,

and make urgent repairs to infrastructure. This framework suggests a synergy between the coordinators, the community, volunteers and first responders, as well as security agencies and disaster response units aligned in military formations, such as the Red Cross and Fire Fighters, amongst others, to accomplish this goal efficiently. The mission is to assist victims of oil pipeline disasters with an adequate reaction, including search and rescue operations and aid distribution. They include activities such as putting out fires, organizing search and rescue operations, evacuating victims of disasters, and providing mass medical care to those affected. Despite the existence of any disaster response outfits in Nigeria, including both governmental and non-governmental agencies, some things were lacking that made the response to certain disasters as well as incidents of civil strife that have occurred in various parts of the country, not as timely and effective as they should have been. These incidents have occurred in various parts of the country. The lack of effective coordination, inadequate training, inadequate equipment, inadequate relief resources, and an inadequate early warning system are all examples of these inadequate conditions. This framework proposes that the following things take place: adequate training of people for search and rescue and relief operations; adequate first aid training for the Nigerian Police Force, Fire Service, Nigeria Security and Civil Defence Corps, and all other paramilitary structures for effective emergency response; effective coordination of the efforts of the numerous disaster responders with the Emergency Management Agency (NEMA, SEMA, LEMA) at the centre. At this point in the framework for disaster management, stakeholders have suggested that emergency phone lines should be explicitly dedicated to communication among stakeholders.
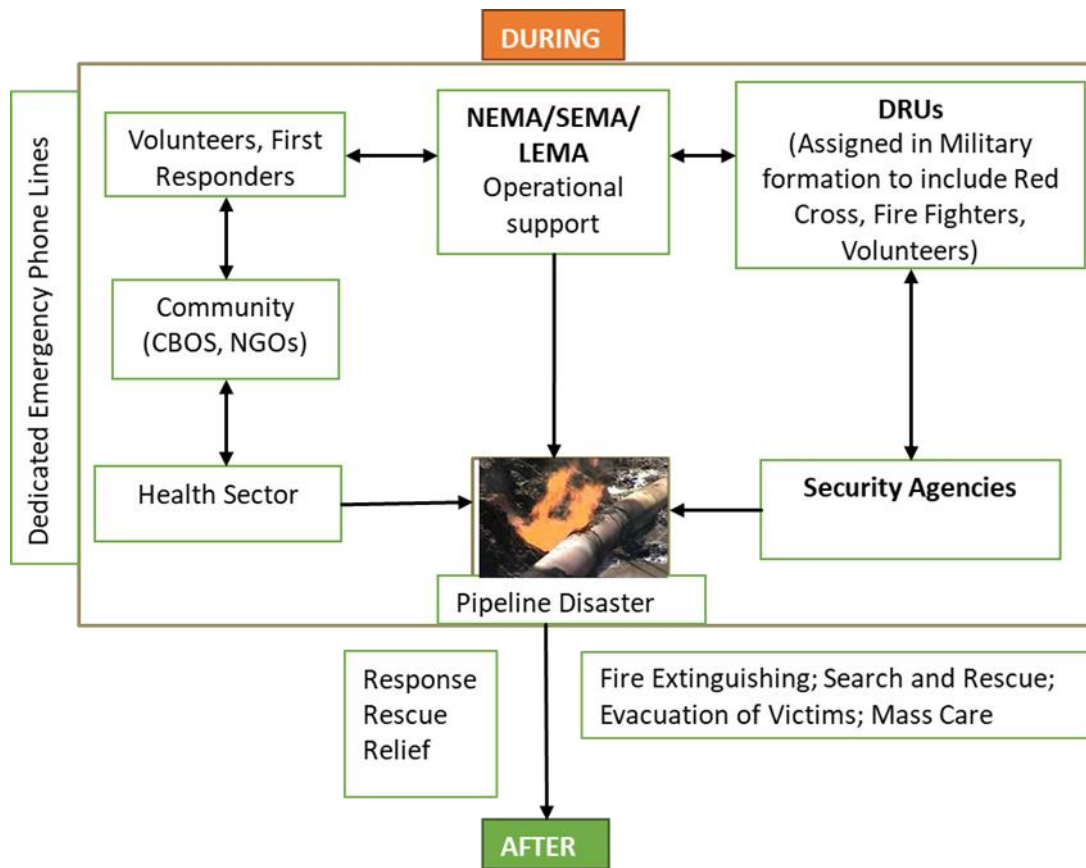
Figure 7.5 During the Occurrence of Pipeline Disasters.

After Disaster Occurrence

In the aftermath of the oil pipeline accident (Figure 7.6), significant areas of concern are the rehabilitation of persons, the restoration of the ecosystem, and the prevention of future occurrences. The process of recovering from a disaster is entailed here. The process by which a region affected by a disaster returns to how it was before the tragedy is referred to as recovering from the disaster. It is the responsibility of all three levels of government to ensure expeditiously: the restoration of damaged properties, essential services, and infrastructure; the rehabilitation of affected individuals or displaced persons so that they can put their traumatic experiences in the past and return to their lives and ways of making a living as they were before the disaster; and the prevention of further damage to the environment. In order to accomplish this goal, various stakeholders, including those from oil corporations, the media, academic institutions, emergency management agencies, health and medical services, and government organizations such as FEPA, FMHDSD, and NOSDRA, among others, will need to work together. These government entities are primarily involved with restoring the environment

and cleaning up any oil spills caused by the disasters that have occurred. These government agencies, such as the Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development (FMHDSD), and the National Oil Spill Detection and Response Agency, are staffed with personnel and resources that enable them to identify activities that may endanger the environment. According to the findings of the interview that was carried out, they need to be involved in activities relating to restoration and rehabilitation as well as preparedness for their performance to be effective. Donors, including non-governmental organizations (NGOs) and international donor agencies, amongst other types of donors, play a significant role in the aftermath of pipeline accidents. They maintain communication with the National Emergency Management Agency in order to aid in reaching out to victims of the disaster and determine how to carry out human rehabilitation. The aftermath of pipeline disasters is generally disastrous and requires a significant amount of resources for reconstruction, rehabilitation, and restoration; as a result, the requirement for external sources of finance from donor organizations is essential. While the academic community should be active in research and training on preventing such occurrences, the media has a role in granting interviews and press releases. At this stage of the framework, the function of health and medical services is to ensure optimal adherence to healthy guidelines and reduce the outbreak of diseases, while the oil companies should be involved in compensation and how to restore means of livelihood for the communities that have been impacted. First and foremost, all parties concerned in the scenario ought to conduct an on-the-spot evaluation of the predicament. Such on-the-spot assessment should be followed by physical meetings of the parties involved to deliberate the next step.
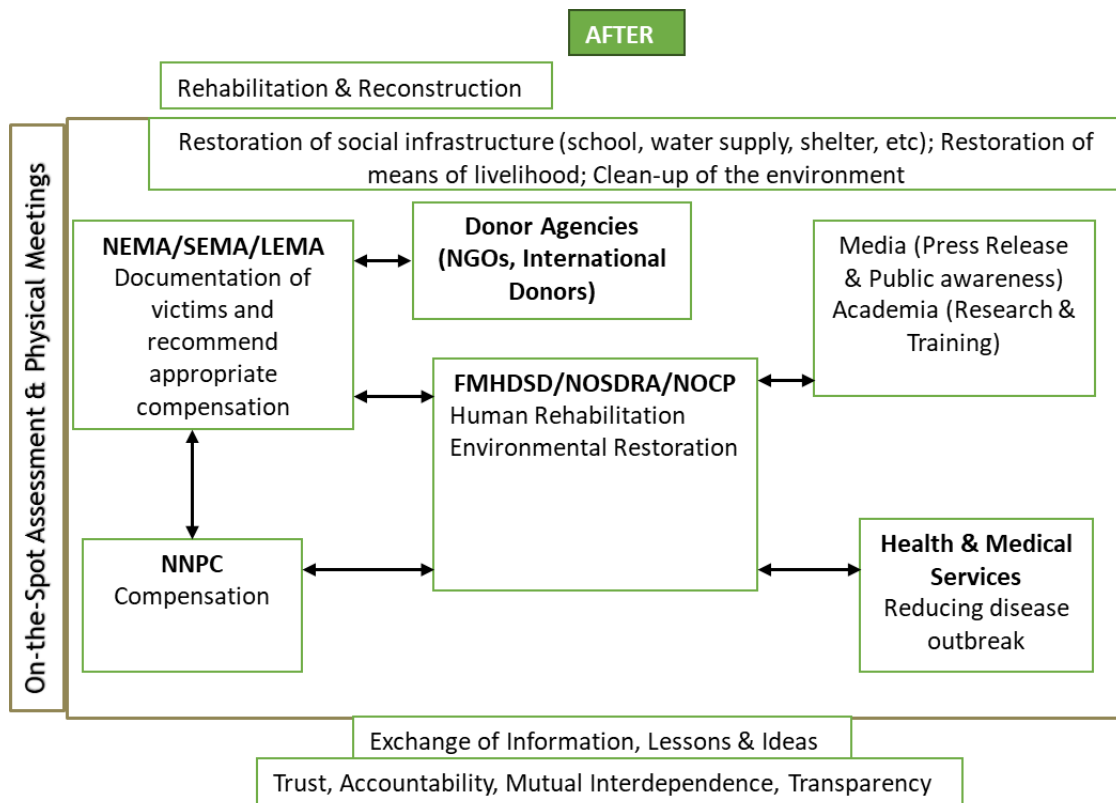
Figure 7.6. The aftermath of Pipeline Disaster Occurrence.

7.4 Framework Validation

7.4.1 Introduction

For the designed framework's components to be most effective in reducing the severity of pipeline disasters and increasing the likelihood that they will be implemented, validation through the participation of the stakeholders is essential. Therefore, the framework was revisited and validated by relevant stakeholders. The framework is divided into pre-disaster preparation, crisis management, and post-disaster analysis.

7.4.2 Framework Revisited

Stakeholders will be better able to evaluate the impact of their roles and pinpoint areas for improvement if the factors that motivate them to work together to prevent oil pipeline disasters are known and understood. Given the preceding discussion, the question of how the parties involved should work together can be answered by looking at their respective areas of interest. As a result, they will be better

able to examine the disaster management and mitigation framework at their disposal, embrace their interest, and understand the obstacles to working together.

The framework is meant to help those managing pipeline disasters in Nigeria prioritize their interests. However, before a stakeholders' collaboration framework can be successfully applied, the stakeholders should consider critical success factors, such as the drivers and barriers, within the context of an integrated structure for stakeholders' collaboration, due to the potential influence of both the drivers and the barriers that they are taken into account if the purpose of the framework is to be realized.

7.4.3   Validation Questions

The validation process commenced with a brief introduction to the research topic and the objectives of the research. The stakeholders' collaboration framework is the product of a series of research procedures which encompasses a literature review, pilot studies, and analysis of quantitative and qualitative findings, which have been carefully mapped out to identify the relevant stakeholders in pipeline disaster mitigation, the stage and level of collaboration, their roles, and communication models.

In validating the proposed framework, specific questions were adopted to guide the process. These questions were necessary to check the relevance of the framework components as well as critical success factors and possible barriers to the implementation of the framework. Some of the questions asked include: what is your level of training and area of expertise? Are the goals and components of the framework pertinent to the statement of the problem (which focuses on the prevention of oil pipeline disasters)? Is there a particular aspect of the problem scenario that calls for a deviation from the guidelines that govern the components of the framework? What elements contribute to the success of stakeholders working together, and how do these aspects relate to the drivers of stakeholders working together? What are the possible barriers to stakeholders' collaboration proposed by this framework? In entertaining other aspects which may not directly be related to the collaboration framework, a question was provided to obtain the stakeholders' response on any other issue not discussed that they wish to put across.

7.4.4 Adjustments in the Framework

The stakeholders involved in the validation process were all pipeline and pipeline disaster management professionals. Some participants were professionals in the Oil and Gas Industry, senior staff with the National Emergency Management Agency (NEMA), disaster Management Experts (Private) and staff of Nigeria National Petroleum Company (NNPC) now. There was a general convergence on the relevance of the framework components to the research objectives. One of the participants opined that

"........from experience, I do not think there are circumstances that require an exception to be made on the components I see on this framework. However, I think there should be a link between the aftermath of pipeline disasters and the pre-occurrence of these disasters. It should be in a cyclic order such that lessons learnt from the aftermath can be useful in preventing future occurrence..........." FG/NEMA/03

There was a general agreement that NEMA should champion the entire coordination processes before and during disaster occurrence. This is because, by legislation, disaster management coordination in Nigeria is a primary role of the National Emergency Management Agency (NEMA). There must be parity of treatment for all of the participating stakeholders. On the other hand, the group concluded that the Federal Environmental Protection Agency (FEPA), which the Federal Ministry of Environment oversees, should be included in the stage of disaster prevention (Figure 7.7). They are tasked with ensuring that the required precautions are taken to prevent an oil spill, which would contaminate the environment. The presence of these individuals will function as a disincentive to oil firms that engage in environmentally questionable activities.

In response to a question on the role that security services play in providing surveillance systems for pipelines and in preventing illegal refineries and acts of vandalism, one of the participants stated:

"..............there should be cohesion between the police and National Security and Civil Defence Corps (NSDSC) and few instances where the military needs to be involved. There are situations where there is a struggle for who should be in control and who is more experienced. This should not be the case; all security operatives involved should work like a team........" FG/ACA/05
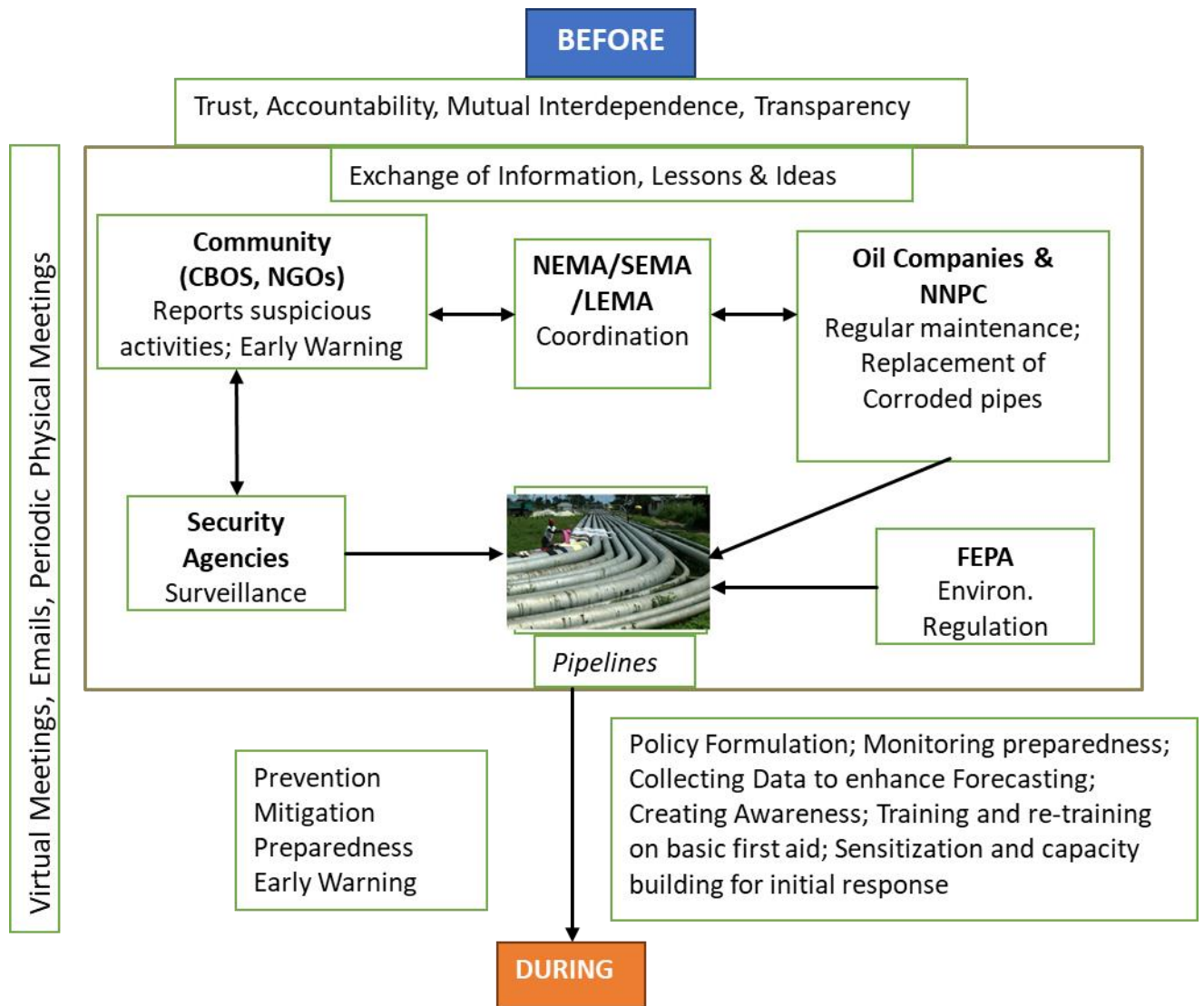
Figure 7.7 *Validated Framework for Pipeline Disasters Mitigation (Before Occurrence)*

Regarding communication before, during and after pipeline disasters, the stakeholders concluded that

the proposed communication model should be adopted, especially virtual meetings, making it easy for

people to connect and pass vital information occasionally.
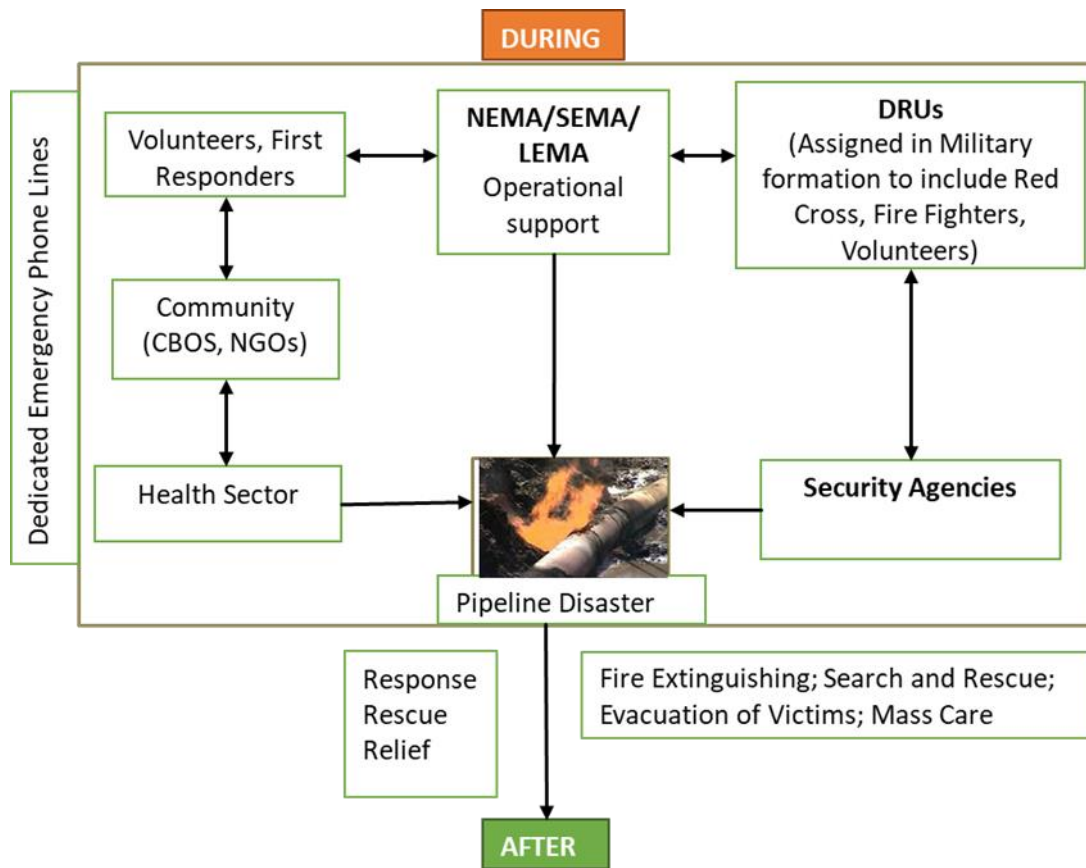
Figure 7.8 *Validated Framework for Pipeline Disasters Mitigation (During Occurrence)*

Participants were generally satisfied with the framework for managing pipeline disasters in the event of

an eventual occurrence. However, it is hoped that by this framework, disasters do not occur in the first

place.
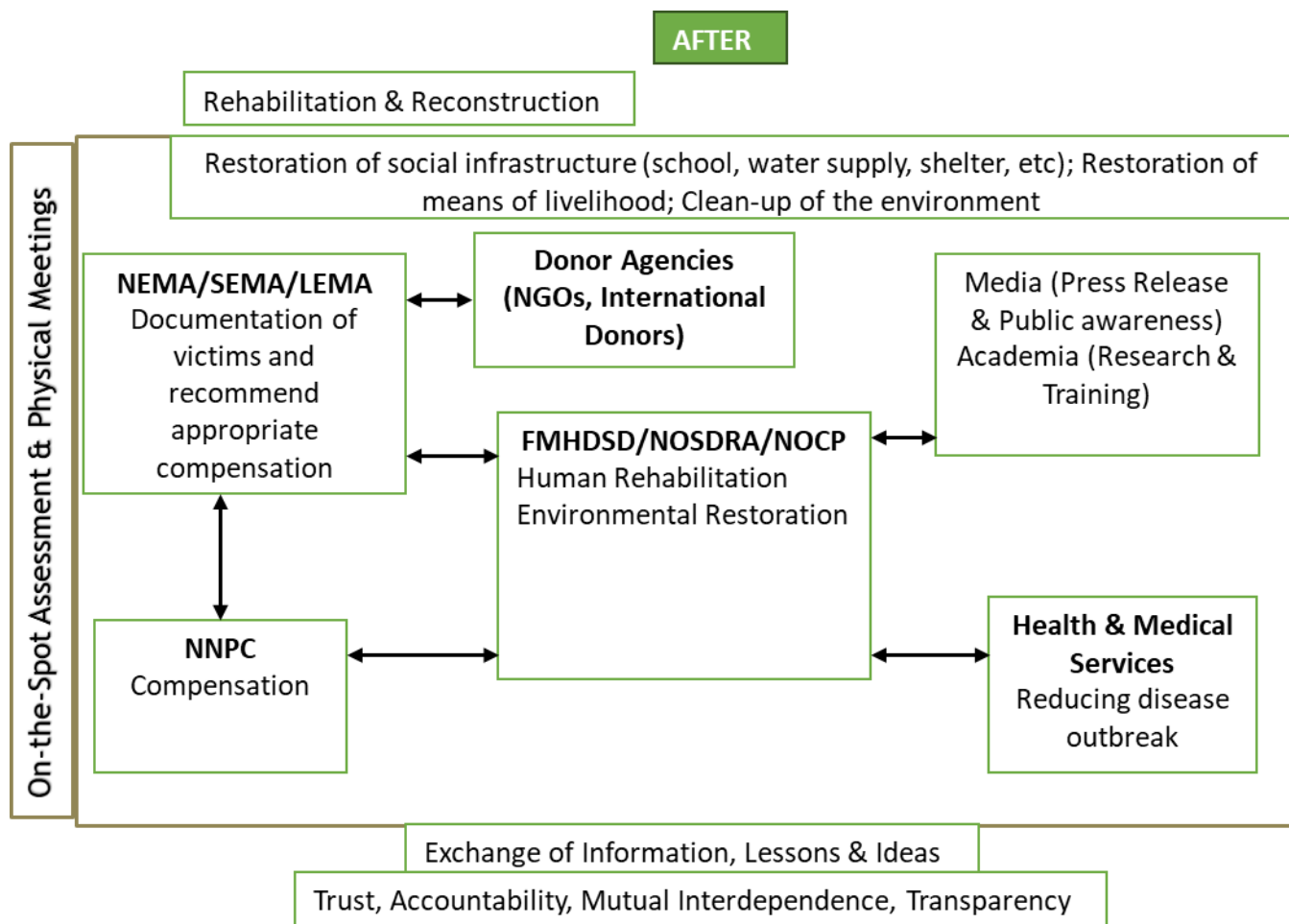
Figure 7.9 *Validated Framework for the aftermath of Pipeline Disaster Occurrence*

At the end of the validation, the framework in Figure 7.9 has been modified to capture the role played by donors in the aftermath of pipeline disasters. Non-governmental organizations (NGOs) and international donor agencies are two examples of this. These donors will be in communication with the National Emergency Management Agency in order to aid in reaching out to victims of the disaster and determining how to carry out human rehabilitation.

The aftermath of pipeline disasters is generally disastrous and calls for a significant amount of resources for reconstruction, rehabilitation, and restoration; as a result, the requirement for finance from outside sources is essential.

7.4.5 Periodic review

Finally, UNEP (2014) suggests conducting a periodic assessment of the framework with input from all relevant parties. When taken as a whole, this clause provides in-depth details about the areas of operation and management that could want tweaking. The findings from the document analysis and the interviews indicate that, although stakeholders do have an interest in reviewing the project's implementation, the issues of lack of transparency, corruption, and challenges connected to the money mindset and divide and rule must be addressed before any meaningful results can be accomplished through the participation of stakeholders.

Stakeholders concluded that the framework should be reviewed at least once in two years.

7.4.6 Conclusion

The question at the heart of validating the framework for stakeholders' engagement is whether or not the framework as a policy tool can effectively manage and mitigate the effects of oil pipeline disasters in Nigeria. This procedure enables the researcher to engage in conversation with the people who participated in the research and understand their perspectives on the many aspects of the framework. In light of this, each stakeholder can be assigned a level of involvement in applying the stakeholders' collaboration in disaster management in Nigeria. A participant said during the validation that;

"…….people should be held accountable for their actions. NNPC must be made to pay for compensation, and pipeline vandals must be punished accordingly to serve as a deterrent. The system must be such that there are checks and balances…….." FG/CSO/04

The drivers and hurdles to implementing the stakeholders' framework were identified during the validation process. It has been noticed that the primary stakeholders are interested in being engaged and given the authority to participate in decision-making and consultation before implementing a project linked to disaster mitigation. When these critical factors, such as drivers and barriers to stakeholders' collaboration, are understood, it is possible to engage all key stakeholders in the decision-making process in a heterogeneous manner. These stakeholders include government agencies, oil companies, and host communities.

To be successfully implemented, the stakeholders' collaboration framework must provide detailed information on these success elements. According to the reiteration of one participant, the identified drivers and barriers would make it possible for the stakeholders to prioritize disaster prevention, and this would define the level of participation they would have:

"...........The success factors, from my perspective, include Trust, Accountability and total inclusiveness. With proper coordination, this framework can be successfully implemented......."
FG/MNOC/02

On implementation, one of the stakeholders recommended that security operatives adopt technologies such as CCTV and drones to provide surveillance for oil pipelines.

A lack of 'genuine' collaboration has resulted in the fragmentation of the players involved in reducing oil pipeline disasters in Nigeria, which has jeopardised such efforts. So, the framework for the collaboration of stakeholders established for this research implies that critical stakeholders should be integrated into the collaboration to handle these disasters effectively.

7.5   Chapter Summary

This chapter gave a complete overview of the research findings based on findings from the quantitative analysis presented in the previous chapter (chapter 6), as well as interview analysis presented in this chapter (chapter 7), extensive literature review and interview participants' opinion and views on multi-stakeholders collaboration as a means of mitigating, managing and risk reduction of oil pipeline disasters in Nigeria. In addition, a framework for this collaborative pact was developed, concluding the survey results, interviews, newspaper articles, companies' websites, and other secondary sources adequately referenced. Finally, the framework that had been created was revisited and validated. According to the findings, stakeholder cooperation can significantly help prevent, manage, and mitigate oil pipeline disasters in the NOPR and Nigeria.

<div align="center">**CHAPTER EIGHT**</div>

<div align="center">**CONCLUSION AND RECOMMENDATIONS**</div>

8.0   Introduction

This chapter brings this research to a close, summarises its design, methodology, and findings, summarizes the main research contributions, offers recommendations for implementing a framework for stakeholders' collaboration, acknowledges the limitations of the research, and offers suggestions for further research.

8.1   Summary of the Research Approach

In accomplishing the research objectives, a mixed social research technique predictable with the standards of collaborative planning was utilized (Lane and McDonald, 2005; Margerum, 2002; Healey, 1997). The mixed-method approach integrates both qualitative and quantitative forms of data with the application of designs that may involve philosophical assumptions and theoretical frameworks (Creswell, 2014). As a result, the mixed approach method provided a complete understanding of the problem under study, thus providing solutions to the study's qualitative and quantitative research questions.

This approach is justified because it enables the researcher to deal comprehensively with all aspects of the proposed study research questions. This is especially important when considering the nature and complexity of stakeholders' collaboration in managing oil pipeline disasters in Nigeria. In addition, it enables the researcher to concentrate on the relationships between the stakeholders and their experiences working together. This is done to acquire in-depth knowledge and comprehension concerning the research participants' assessments and evaluations of the challenge posed by the oil pipeline disaster. Furthermore, it enables the researcher to quantify data and generalize results from a sample to the population of interest.

This research aimed to examine the role of stakeholders' collaboration in mitigating life and environmental losses during oil pipeline disasters in Nigeria. This aim was pursued through the following objectives:

i.   To examine the level of pipeline disaster awareness among stakeholders.

ii.   To identify the causes of oil pipeline disasters and assess the human and ecological impacts of such occurrences.

iii.   To identify relevant stakeholders in disaster management and examine the current multi-stakeholder collaboration level.

iv.   To examine the roles of stakeholders in preventing and managing oil pipeline disasters.

v.   To design a framework for the management and mitigation of oil pipeline disasters in Nigeria.

vi.   To identify the benefits of stakeholders' collaboration via the framework as a disaster management technique and the possible collaboration challenges.

In fulfilling the objectives of the research, the following questions arose, which the research provided answers to:

i.   What is the current level of awareness about pipeline disasters amongst different stakeholders?

ii.   What are the causes of pipeline disasters in Nigeria and what are the human and ecological impacts?

iii.   Who are the relevant stakeholders in pipeline disaster mitigation and management?

iv.   Are there collaborations between stakeholders on risk mitigation of pipeline disasters in Nigeria?

v.   How should the collaboration of stakeholders be modelled to ensure effective management of oil pipeline disasters?

vi.   What are the benefits of stakeholders' collaboration and the possible challenges?

8.2   Summary of the Research Methodology

The research strategy utilized is a mixed-method approach, which allows for collecting quantitative and qualitative data. This strategy was chosen to investigate the study goals from a qualitative and quantitative viewpoint. The former would provide an in-depth analysis, while the latter would focus on actual figures. Doing so improves precision, validity, and dependability. Quantitative information was

gathered by a web-based survey developed with the help of the kobo toolbox program and distributed over online links (https://ee.kobotoolbox.org/x/fa9RGCwo) through emails and SMS. For the qualitative data, semi-structured interviews were used.

This study used a purposive sample strategy to collect data from 300 people. The survey was closed to new responses as soon as the goal was reached and archived afterwards. The survey data was retrieved in Microsoft Excel format from the KoboToolbox management portal, and the data summary was extracted onto a Microsoft Excel Workbook. The gathered information was sorted into categories and tabulated. IBM SPSS Statistics were used in the analysis. Cronbach's alpha was used to determine reliability in this investigation. Values of Cronbach's alpha above 0.6, as recommended by Taber, are considered reliable (Taber, 2018). Cronbach's alpha, a measure of the consistency between items and a coefficient reflecting the degree to which individual items in a set are positively associated, is used by Islam et al. to uphold this significance (Islam, et al., 2011). According to the researchers, a Cronbach's Alpha score below 0.6 indicates poor reliability. The closer the reliability coefficient gets to 1, the better. Nonetheless, anything above the 0.7 range is excellent.

The interviews were taped, then listened to multiple times, and finally transcribed to gain complete comprehension (Braun & Clarke, 2006). Following a hierarchical classification system, the transcribed data were categorized into structured codes, which made it simple to derive themes from the data (Yin, 2018). While Nvivo software served as a map for the research to follow (Creswell & Poth, 2017), the researcher was responsible for the analytical reasoning (Marshall & Rossman, 2016). After that, a summary of the results, description, and critical analysis was produced. Before the outcome of the final result and discussion, this was further validated by some of the people who participated in the research (Yin, 2018). Finally, the recorded interview was analyzed using Nvivo software, with the help of the procedures outlined in (Braun & Clarke, 2006). From an ontological, epistemological, and methodological stance, the present investigation is consistent with the philosophical assumptions.

To ensure complete adherence to all legal and ethical requirements outlined by Robert Gordon University (RGU), the university's research board arm was consulted before the start of data collection.

In addition, the anonymity and confidentiality of the study's participants and the reliability and safety of the collected data were protected by our strict adherence to all applicable ethical protocols and norms.

8.3   Summary of the Research Outcome

Two hundred eighty-six respondents, accounting for 95.3% indicated awareness of oil pipeline disasters. In addition, most of those who participated in the survey suffered monetary or non-monetary damage due to an oil pipeline accident. This figure ranges from as few as one case to as many as three or more oil pipeline accidents.

Almost half of the people who participated in the survey (45.33%) stated that neither their company nor their institution was involved in handling oil pipeline disasters. This could result from lacking a collaborative medium to bring together necessary players in this highly significant oil and gas business. This is an indication of the present state of disaster management which this framework intends to address. Most responders (88.3%) believe that vandalism is one of the primary factors leading to oil pipeline accidents. Aside from vandalism, the lack of collaboration among various stakeholders accounts for 87% of the problem; hence, collaboration is an immediate requirement.

On a scale that ranged from 0 for "don't know" to 5 for "strongly agree", 4 for "agree", 3 for "neutral", 2 for "disagree", 1 for "strongly disagree", there was a consensus that the areas surrounding oil pipeline disasters are frequently devoid of inhabitants. Most respondents do not believe that victims of oil pipeline tragedies receive financial compensation. Court rulings have been violated, including those that ordered certain international oil companies to compensate victims for their losses. The respondents were also not convinced that the resulting oil pipeline disasters were often cleaned up after the incidents. According to the responses, there are insufficient security guards to prevent vandalism at oil pipelines. The vast majority of respondents shared this perception. In addition, replacing pipelines that are worn out or overdue does not occur regularly, and the equipment needed to respond to spills is not easily accessible on-site.

According to the respondents' perceptions of interagency collaboration between the respondents' firms/institutions and other stakeholders, interagency collaboration is almost non-existent (mean = 0.2833, standard deviation = 0.45137). The responders are in complete agreement that, if adopted,

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collaboration has the potential to be a beneficial strategy in crisis management. However, it was also observed from the responses obtained that the current level of collaboration between the respondent's firms and other stakeholders has not been adequate. This was another point of contention. In conclusion, there is a general lack of agreement regarding whether or not businesses or institutions have clear policies and processes for working with other authorities (mean = 2.60, standard deviation = 1.417).

The statement that "Collaboration with other stakeholders is not a viable technique for disaster management" was rejected by 72.3% of the respondents. This is because, 72.3% of the respondents actually agree that collaboration can be a perfect technique for managing oil pipeline disasters if adequately harnessed. This results in the rejection of the null hypothesis (significance level < 0.05).

Improved information and intelligence sharing, better decision-making, more significant coordinated and timely intervention, and enhanced response are some benefits resulting from stakeholders working together. On the other hand, conflicts in shared responsibilities, a lack of resources, lax enforcement of environmental laws and guidelines, and ineffective communication systems are all obstacles that can hinder collaboration. However, if these difficulties are appropriately addressed, the intended outcomes of the cooperative agreement will be carried out promptly and efficiently.

The findings of the qualitative component of this study revealed that the level of involvement ranges from the provision of relief supplies to search and rescue efforts, as well as the provision of first aid treatment, amongst other things. This was visible in some of the responses obtained. An investigation into numerous press reports published in 2018 and beyond revealed that there are no active collaborative measures between the various stakeholders in Nigeria regarding interoperability; however, there are measures regarding interaction. Several of the stakeholders who were questioned agreed with this assessment. Even in situations where collaboration occurs, this alone is not enough.

Research has shown that partnerships and collaboration result in more successful outcomes, providing organizations with benefits such as opportunities for organizational learning and cost reductions, as well as access to a greater variety of resources (Comfort, 2007; Moore, et al., 2003; Prizzia, 2008; Moynihan, 2008). Conversely, inadequate teamwork, such as during the Hurricane Katrina response, has been linked to adverse outcomes for the communities involved (Sapat, et al., 2019; Cigler, 2007). In addition,

authors have discussed how ineffective teamwork can negatively impact society (Cigler, 2007; Kettl, 2006).

A pool of resources, including cutting-edge technology, is made available for deployment in the service of routine inspections and monitoring activities thanks to the collaboration of various stakeholders. When stakeholders, including people on the receiving end of these disasters, are a part of the compliance system, the potential for cutting corners and inefficiency is greatly minimized, if not eliminated. For example, techniques for maintaining pipeline integrity could be investigated and approved at the level of debate involving stakeholders. Within the scope of this investigation, the advantages of stakeholders working together include but are not limited to improved information and intelligence sharing, decision-making, enhanced coordinated and timely intervention, and improved response.

Regarding oil pipeline disasters in Nigeria, the Weiss model from 1987 has been adopted to facilitate cooperation between relevant parties in managing and preventing such events (Weiss, 1987). This method works best when considering the various conversations that need to occur with stakeholders. Weiss outlines a three-step process for achieving practical interagency cooperation, which includes (a) agreement on the existence of a problem, (b) the availability of sufficient resources to address the problem cooperatively, and (c) the development of sufficient institutional capacity to implement the strategy.

A rational procedure was followed to build a stakeholder cooperation framework. Collaboration in decision-making can be improved with the help of this technique, which has been proposed (Kareko & Siegel, 2003; Couillard, et al., 2009). As a result of using this approach, the framework for stakeholder input has been broken down into three distinct phases. Results from the survey and document indexing and charting showed that there are discernible patterns in the stakeholders' views of their working relationship. Similarly, looking at stakeholders' roles, it became clear that they all have unique priorities, concerns, and obstacles. This was found by examining stakeholder contributions to oil pipeline disaster management and risk reduction. Trust, accountability, mutual interdependence, and openness are central to this framework's conception of collaboration. This framework proposes effective coordination of the many disaster responders with the Emergency Management Agency (NEMA, SEMA, LEMA) in the centre. Disaster management measures recommended in this framework include proper search and

rescue and relief operations training and adequate First Aid training for the Nigerian Police Force, Fire Service, Nigeria Security and Civil Defense Corps, and all other paramilitary formations. Emergency phone lines have been proposed to communicate between key stakeholders in this phase of the disaster management framework. Key areas of focus in the wake of an oil pipeline disaster include human rehabilitation, environmental restoration, and the prevention of further disasters. To put it simply, this is the disaster recovery procedure.

All parties engaged should conduct an on-the-spot evaluation of the issue first and foremost, which can be followed by physical meetings of the stakeholders to debate the way forward.

8.4   Academic Contribution/Theoretical Framework

The findings of this study have implications for policy implementation, practice, and baseline studies. This is especially relevant in light of Nigeria's recent pipeline crisis problems, especially in oil-producing regions. Findings reveal an "uneven" relationship between oil firms, government agencies, and communities concerning the management of oil-related disasters (Orji, 2018). Several government entities function alone and only work together in response to catastrophic situations. The government's interactions with oil firms are undertaken without the knowledge of the communities. Members of the impacted communities are not included in the decision-making process, even when the government takes action.

Similarly, in examining the responsibilities of stakeholders, it was observed that each type of stakeholder had a unique set of interests, practices, motives, and obstacles. Diverse parties have, at various times, contributed to the handling of the oil disaster in diverse ways. On the other hand, these parties have never coordinated well toward a common goal. This study has shown that pipeline disasters can be mitigated considerably when stakeholders collaborate with common goals in mind.

The Stakeholder theory proposes that the best way to mitigate risk and maximize value is to work with many interested groups to reach a consensus on how best to proceed. It argues that non-shareholder groups are essential in their own right and should be included in judging how effectively an organization provides its services and whether or not those services are efficient. In light of the preceding reasoning,

it is inexplicable that the existing body of research does not dedicate adequate attention to applying the Stakeholder Theory to the management and mitigation of oil pipeline disasters in Nigeria. Therefore, the theory provides the groundwork for evaluating the study's central premise, which asserts that a sustainable strategy for mitigating and managing oil pipeline disasters can be achieved through the participation of stakeholders.

Based on the information available at the time, Onuoha designed a framework for the participation of stakeholders in order to improve collaborative environmental management in the Nigeria Oil Producing Regions (NOPR) (Onuoha, 2007). This collaboration framework combines the pre-disaster occurrence, when disaster eventually occurs, and the disaster recovery phase, clearly stating each stakeholder's roles.

Also, previous researchers have elucidated the significance of individual actors in disaster management in great detail (Moe, et al., 2007; Saeed & Narimah, 2019). On the other hand, natural disasters are known to bring about many socioeconomic and environmental challenges beyond the capabilities of a single actor, necessitating the necessity of implementing complex cooperation solutions (Barnes, et al., 2019). In addition, academic research seldom focuses on collaborative methods for preventing and managing natural disasters. As a result, this study aimed to analyze the effects of collaborative efforts made by these stakeholders both during and after the accident at the oil pipeline in Nigeria.

In this study, the efficacy of a collaborative method including all stakeholders involved in disaster management in Nigeria is evaluated, with the specific goal of reducing the number of pipeline accidents. It provides evidence that the participation of stakeholders can affect mitigation. This is one of the limited studies examining Nigerian stakeholders' collaborative efforts in preventing pipeline disasters. The findings enlighten policymakers and planners on the occurrence of pipeline disasters in Nigeria, their ecological and human impacts and sustainable strategies for mitigating the effects of such disasters.

Summarily, the research makes the following contributions;

    i.   The research is relevant for the Nigeria Government, Oil Companies, Disaster Management Agencies, Host Communities and policymakers in recognizing the impact of multi-stakeholder collaboration in managing and mitigating oil pipeline disasters.

ii.   The research provides a framework broken down into the 3 major phases of pipeline disaster management (before, during and after occurrence).

iii.   The research contributes to the academic literature on disaster management strategies.

iv.   The findings provide policy makers and planners with information about the occurrence, ecological and human impacts of pipeline disasters in Nigeria and sustainable approaches to mitigate them.

8.5   Recommendations

In order to improve the efficiency of the existing system of governance, the government should be willing to engage in cooperative efforts with non-governmental organizations (NGOs). In this sense, organizations that are considered to be part of civil society should make use of the expertise that they possess in order to lend support to campaigns that aim to raise public awareness and efforts that are made to hold those in positions of authority accountable for the actions that they take. It is necessary to establish a chain of culpability that will serve as a line of accountability in order to determine all of the people, groups, or organizations whose actions or inactions contributed to the occurrence of a disaster.

Secondly, the legislation relevant to the nation's multi-agency response to oil disasters should be strictly implemented and enforced by the proper support agencies. This should be done to ensure everyone is held accountable for their actions. Due to insufficient law enforcement and implementation by relevant agencies, legislation becomes ineffective, and relevant agencies lack the coordination necessary for a successful multiagency response process. This is a direct consequence of insufficient law enforcement and implementation. The capacity of the responsive agencies to collaborate appropriately is a crucial factor in determining whether or not the multi-agency response system will be successfully implemented. In order to guarantee a prompt response that is not only speedy but also efficient from the relevant agencies, implementation and enforcement are both requirements. The damaging effects of oil spills on the environment can be lessened significantly if adequate response mechanisms are implemented.

Governments at all levels must address the issue of insecurity by using an existing legal framework to firmly combat corruption, militancy, vandalism, and oil theft. Responding to an oil disaster effectively

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will be challenging if insecurity is not promptly addressed, as the responders themselves will not be safe. The Federal Government must allocate adequate funding to security services to combat insecurity in Nigeria. The Nigerian Navy, Nigerian Army, Nigerian Police, and the Nigerian Security and Civil Defence Corps (NSCDC) must have sufficient authority to combat insecurity.

Exploring a variety of funding sources, including but not limited to government funding, non-governmental organizations (NGOs), local and foreign donors, and oil companies, is necessary for the effective and efficient management of disasters. These resources should be readily accessible whenever they are required.

As UNEP (2014) recommended, stakeholders should regularly review this framework to keep abreast of new developments, particularly in environmental protection. When taken as a whole, these provisions provide comprehensive information on the management approaches and operational procedures that require improvement. However, despite the stakeholders' interest in reviewing the project implementation, document analysis reveals that corruption, lack of transparency, a money-centric mindset, and an approach of divide-and-rule must be resolved to achieve the desired results of stakeholders' cooperation.

Lastly, it is recommended that security operatives adopt technologies such as CCTV and drones to provide surveillance for oil pipelines.

8.6   Research Limitations

Similar to most qualitative research designs, this one includes limitations to consider when interpreting the findings. The research's conclusions depended on primary data from semi-structured interviews with key participants in the NOPR's environmental management, such as Nigerian government agencies, oil companies, and residents.

Due to the coronavirus pandemic's restrictions, on-field data collection was not possible though the online data collection method proved very efficient. Social distancing was ensured during the interview process. The unease created by the covid-19 situation was experienced during the data collection.

Also, the research was initially envisaged to carry out an on-the-spot assessment of the aftermath effect of pipeline disasters on the environment, this could not be realized. In this regards, the UNEP report on Ogoniland was adopted to explain the environmental damage resulting from oil spills and oil dissters. While acknowledging the subjective nature of this type of qualitative research design, it was impossible to conduct an in-depth comparative analysis when examining the roles of research subjects, particularly given that multistakeholders' collaboration is still lacking among the critical stakeholders in this industry. When interpreting the results, these constraints should be taken into account.

8.7   Further Research

Qualitative data has been collected in this research from 10 participants and the framework validation was conducted among 9 stakeholders. There is the opportunity for improvement for future work if more data is obtained from a larger number of participants involved in disaster management.

Also, similar frameworks for disaster mitigation and management should be developed to address other major disasters in Nigeria. Some of these disasters include flooding, insurgencies and transportation disasters.

REFERENCES

Abang, B. E., 2005. *Threats to the built environment in Nigeria by possible disaster event at Lake Nyos and the Cumbre Vieja volcano." Pp. 17-28 in Alabi, A.S. and Sam-Epelle, A.O. (eds.).* s.l., Proceedings of the 1st National Built Environment Summit Organized by the Nigerian Institute of Architects and the Nigeria Institute of International Affairs, Victoria Island, Lagos, 8-10 February 2005, Nigerian Institute of Architects: Lagos..

Abdeen, F. N. et al., 2021. Challenges in multi-agency collaboration in disaster management: A Sri Lankan perspective. *International Journal of Disaster Risk Reduction,* 62(102399), pp. 1-14.

Abegg, N., Butler, H. & Witsman, S., 2022. *Collaborative Technology, Management Report Summary.* [Online].

Abraka, N., 2004. The Nigerian oil industry: Environmental diseconomies, management strategies and the need for community involvement. *Journal of Human Ecology,* 16(3), pp. 203-214.

Adenugba, A. & Dipo, S., 2013. Non-oil exports in the economic growth of Nigeria: A study of agricultural and mineral resources.. *Journal of Educational and Social Research,* 3(2), p. 403.

Adeyemo, D. & Olu-Adeyemi, L., 2009. *'Amnesty in a Vacuum: The unending Insurgency in the Niger Delta of Nigeria" in Oil Violence in Nigeria: Checkmating its resurgence in the Niger Delta,.* Berlin: Lambart., Victor Ojakorotu and Lysias Dodd Gilbert (eds).

Administration, US Energy Information, 2016. *US Energy Information Administration, "Country Analysis Brief: Nigeria".* [Online] Available at: https://www.eia.gov/beta/international/analysis_includes/countries_long/Nigeria/nigeria.pdf [Accessed 31 August 2017].

Aiyebelehin, A., 2021. "Add-my-name" as a parody of research collaboration among Nigerian researchers. *Accountability in Research,* pp. 1-10.

Akinlo, A., 2012. How important is oil in Nigeria's economic growth?. *Journal of Sustainable Development,,* 5(4), p. 165.

Akosile, A., 2007. *Pipeline explosion: FG dragged to African commission,* Lagos: ThisDay Newspaper.

Alawode, A. J. & Ogunleye, I. O., 2011. Maintenance, security, and environmental implications of pipeline damage and ruptures in the Niger Delta Region. *PJST,* Volume 12, p. 565.

Aljazeera, May 5, 2006. *Timeline of Nigeria Pipeline Disasters.* [Online] Available at: https://www.aljazeera.com/news/2006/5/12/timeline-of-nigeria-pipeline-disasters

Altay, N. & Green, M., 2006. OR/MS research in disaster operations management.. *European Journal of Operational Resources,* Volume 175, p. 475–493.

Alufoge, O. & Duruji, M., 2020. • November 2020. Multinational Joint Task Force's Fight against Insurgency in the Lake Chad Basin Region. *WSEAS Transactions on Environment and Development,* Volume 16, pp. 794-801.

Amadi, P. U. 2020. Corporate Social Responsibility (CSR) and Human Rights Accountability in Nigerian Petroleum Industry: From Voluntarism to Legal Positivism. US-China Law Review; 17(6), pp. 250-260, doi:10.17265/1548-6605/2020.06.003

Amanze-Nwachukwu, C. & Ogbu, A., 2007. *"Kupolokun Cries over Pipeline Vandalisation." ,* s.l.: ThisDay (Lagos). 15 January..

Andrews, R. & Entwistle, T., 2010. Does Cross-Sectoral Partnership Deliver? An Empirical Exploration of Public Service Effectiveness, Efficiency, and Equity.. *Journal of Public Administration Research and Theory,* 20(DOI:10.1093/jopart/mup045.), pp. 679-701.

Anejionu, O., Ahiarammunnah, P. & Nri-ezedi, C., 2015. Hydrocarbon pollution in the Niger Delta: Geographies of impacts and appraisal of lapses in extant legal framework. *Resources Policy,* Volume 45, pp. 65-77.

Anifowose, B., Damian, M., D, L. & C. L., 2011. Attacks on oil transport pipelines in Nigeria: a quantitative exploration and possible explanation of observed patterns. *Appl Geogr,* Volume 32, p. 636–351.

Asumi, J., 2009. *Blood oil in the Niger Delta. Special Report 229, ,* s.l.: United States Institute of Peace. 20p..

Asuni, J., 2009. *Understanding the armed groups of the Niger Delta..* s.l., s.n.

Balogun, T., 2010. *Mapping Impacts of Crude Oil Theft and Illegal Refineries on Mangrove of the Niger Delta of Nigeria with Remote Sensing Technology, Mediterranean Journal of Social Sciences,*   Vol.   6,.   [Online] Available at: http://www.mcser.org/journal/index.ph [Accessed 8 January 2020].

Barnes, B., Dunn, S. & Wilkinson, S., 2019. (2019). Natural hazards, disaster management and simulation: a bibliometric analysis of keyword searches. *Natural Hazards,* 97(1), pp. 813-840.

Benson, D., Nwokocha, J. & Usman, E., 2006. *'We will investigate pipeline vandalisation'.,* s.l.: Vanguard Nespaper.

Bodin, Ö. & Nohrstedt, D., 2016. Formation and performance of collaborative disaster management networks: Evidence from a Swedish wildfire response. *Global Environmental Change-human and Policy Dimensions,* Volume 41, pp. 183-194.

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

Briggs, R. O., Kolfschoten, G. L. & Gert-Jan de Vreede, D. D. L., 2006. *Defining key concepts for Collaboration Engineering. AMCIS 2006.* America, s.n., pp. 121 - 128.

Britton, N., 2002. A new emergency management for the new millennium. *Australian Journal of Emergency Management,* 16(4), pp. 44-54.

Burkle, F. M. & Hayden, R., 2001. The concept of assisted management of large-scale disasters by horizontal organizations. *Prehospital Disaster Med.,* 16(3), p. 128–137.

Buse, K. & Walt, G., 2000.) 'Global Public-Private Partnerships: Part I — A New Development in Health. *Bulletin of the World Health Organisation,* Volume 78, p. 549–561.

Camarihna-Matos, L. M. & Afsarmanesh, H., 2008. Concept of Collaboration.. *Encyclopedia of Networked and Virtual Organizations,* pp. 311-315.

Caroline, S. W. et al., 2001. Science and Technology Collaboration: Building Capacity in Developing Countries. *Prepared for the World Bank, RAND Science and Technology MR-1357.0-WB*, March.

CERC, 2014. Crisis Emergency Risk Communication (CERC). Stakeholder and Partner Communication. US Department of Health and Human Services. Center for Diseases Control and Prevention. Accessed on 10/08/2023 from https://emergency.cdc.gov/cerc/ppt/CERC_Stakeholder_and_Partner_Communication.pdf

Channels Television, March 16, 2020. *Major Pipeline Explosions that took place in Nigeria.* [Online] Available at: https://www.channelstv.com/2020/03/16/major-pipeline-explosions-that-took-place-in-nigeria/

Chika-Amanze, N. & Edomaruse, C., 2000. *Nigeria: Vandalism-Federal Government Opts for Underground Pipelines,* s.l.: ThisDay, 13 October.

Chiluwa, I., 2011. Media Representation of Nigeria's Joint Military Task Force in the Niger Delta Crisis. *International Journal of Humanities and Social Science,* 1(9), pp. 197-208.

Cigler, B., 2007. The "big questions" of Katrina and the 2005 great flood of New Orleans. *Public Administration Review,* Volume 67, p. 64–76.

Collins, N. & Jürgen, E., 2012. Negative impacts of oil exploration on biodiversity management in the Niger De area of Nigeria. *Impact Assessment and Project Appraisal,* 26(2), pp. 139-147.

Comfort, L. K., 2007. Crisis Management in Hindsight: Cognition, Communication, Coordination, and Control. *Public Administration Review,* 67(1), p. 189–197.

Cotton, M. & Devine-Wright, P., 2012. Making electricity networks "visible": Industry actor representations of "publics" and public engagement in infrastructure planning. *Public Understanding of Science,* 21(1), pp. 17-35.

Couillard, J., Garon, S. & Riznic, J., 2009. The Logical Framework Approach – Millenium. *Project Management Journal,* 40(4), pp. 31-44.

Couillard, J., Garon, S. & Riznic, J., 2009. The logical framework approach–millennium. *Project Management Journal,* 40(4), pp. 31-44.

Creswell, J. & Poth, C., 2017. *Qualitative Inquiry and Research Design: Choosing among Five Approaches..* New York: Sage Publications.

Daily Nigerian, 2019. *Stakeholders Collaborate to Tackle Disasters in Sokoto.* [Online] Available at: https://dailynigerian.com/30-stakeholders-collaborate-to-tackle-disastersin-sokoto/ [Accessed 8 October 2020].

Daily Nigerian, 2019. *Stakeholders Collaborate to Tackle Disasters in Sokoto.* [Online] Available at: https://dailynigerian.com/30-stakeholders-collaborate-to-tackle-disastersin-sokoto/ [Accessed 8 October 2020].

EGASPIN, 2002. *Containment Procedures and Clean-Up of Spills, para 2.6.3,* Nigeria: Environmental Guidelines and Standards for the Petroleum Industry in Nigeria.

Ehie, I. & Muogboh, O., 2016. Analysis of manufacturing strategy in developing countries: a sample survey of Nigerian manufacturers.. *Journal of Manufacturing Technology Management,* 27(2), pp. 234-260.

Eide, A. et al., 2014. *Key challenges in multiagency collaboration during large-scale emergency management..* Pisa: Italy, In In AmI for crisis management, international joint conference on ambient intelligence..

Emerson, K. & Baldwin, E., 2019. (2019) Effectiveness in NEPA decision making: in search of evidence and theory. *Journal of Environmental Policy & Planning,* 21(4), pp. 427-443.

Ereibi, A. G., 2011. *Oil Exploitation And Challenges Of Development In The Niger Delta Region. A Project Report Presented To The Department Of Political Science, Faculty Of The Social Sciences.* s.l.:University of Nigeria, Nsukka In Partial Fulfillment Of The Requirements For The Award Of Master Of Science (M.Sc) In Political Science (International Relations).

Etounovbe, A. K., 2011. *The Devastating Effect of Flooding in Nigeria.* [Online] Available at: http://www.fig.net/pub/fig2011/papers/ts06j/ts06j_etuonovbe_5002.pdf [Accessed 16 February 2012].

Eweje, G., 2006. *Environmental costs and responsibilities resulting from oil exploitation in developing countries: The case of the Niger Delta of Nigeria, Journal of Business Ethics.* [Online]
Available at: http://link.springer.com/article/10.1007/s10551-006-906 [Accessed 8 January 2020].

Ezenyilimba, E., Maduagwu, N. E. & Eze, J. O., 2018. Disaster Management in a Volatile Ecowas Region: Nigeria Perspective.. *International Journal of Academic Research in Economics and Management Sciences,* 7(3), pp. 30 - 46.

Faehnle, M. & Tyrväinen, L., 2013. A framework for evaluating and designing collaborative planning. *Land Use Policy,* Volume 34, pp. 332-341.

Fakoyejo, O., 2020. *Pipeline Explosion: Over 45,000 incidents recorded in 18 years - NNPC.* [Online] Available at: https://nairametrics.com/2020/01/21/pipeline-explosion-over-45000-incidents-recorded-in-18-years-nnpc/

FEMA, 2007. *Principles of Emergency Management Supplement.* [Online] Available at: https://irp.fas.org/agency/dhs/fema/principles.pdf [Accessed 12 January 2021].

FEMA, 2011. A Whole Community Approach to Emergency Management: Principles, Themes, and Pathways for Action FDOC 104-008-1 / December 2011. Accessed on 10/08/2023 from https://www.fema.gov/sites/default/files/2020-07/whole_community_dec2011__2.pdf

Freeman, R., 1984. *Strategic Management: A stakeholder approach..* MA.: Pitman Publishing Company.

Freeman, R., 2010. *Strategic management: A stakeholder approach..* s.l.:Cambridge University Press..

Friedman, A. & Miles, S., 2006. *Stakeholders: Theory and practice..* s.l.:Oxford University Press on Demand. 292 .

Frynas, J., 2000. *Oil in Nigeria: Conflict and litigation between oil companies and village communities. ,* s.l.: LIT Verlag Münster..

Giesen, G., 2002. *Creating collaboration: A process that works..* Colorado, United States.: Greg Giesen & Associates..

Gimba, D., 2007. *War against human trafficking: The journey so far in S.E Arase & I.P.O. Iwuofor (eds.), Policing Nigeria in the 21st Century.,* Ibadan: Spectrum Books Limited.

Godschalk, D., 2003. Urban hazard mitigation: Creating resilient cities.. *Natural Hazards Review,* 4(3), pp. 136-143.

Goodman, L. & Dion, P., 2001. The Determinants of Commitment in the Distributor–Manufacturer Relationship.. *Industrial Marketing Management.,* 30(DOI:10.1016/S0019-8501(99)00092-9.), pp. 287-300.

Granville, F., Mehta, A., Pike, S. 2016. Destinations, disasters and public relations: Stakeholder engagement in multi-phase disaster management. Journal of Hospitality and Tourism Management; Vol. 28, pp. 73–9. doi: 10.1016/j.jhtm.2016.02.001.

Groves, P., Kayyali, B., Knott, D. & Van Kuiken, S., 2013. *The 'Big Data' revolution in Healthcare.* New York (NY): McKinsey Global Institute.

Haddow, G. & Bullock, J., 2003. *International disaster management, in Haddow G.D. & Bullock J.A (eds) Introduction of Emergency Management.* New York: Random House, Inc..

Hermansson, H., 2015. Disaster management collaboration in Turkey: Assessing progress and challenges of hybrid network governance.. *Public Administration. ,* 94(DOI:10.1111/padm.12203.).

Hewett, K. & Bearden, W. O., 2001. Dependence, Trust, and Relational Behavior on the Part of Foreign Subsidiary Marketing Operations: Implications for Managing Global Marketing Operations. *Journal of Marketing,* 65(4), pp. 51-66.

Hillman, A. J. & Keim, G. D., 2001. Shareholder value, stakeholder management, and social issues: what's the bottom line?. *Strateg Manag J.,* 22(2), p. 125–39..

Himmelman, A., 2001. On coalitions and the trans-formation of power relations: Collaborative betterment and collaborative empowerment.. *American Journal of Community Psychology,* 29(2).

Hooper, R., Fitzsimmons, R. & Grant, N., 2002. *The role of deformation in controlling depositional patterns in the south-central Niger Delta, West Africa.* [Online] Available at: http://www.sciencedirect.com/science/article/pii/S0191814101001225 [Accessed 9 April 2016].

Ibem, E. O., 2011. Challenges of Disaster Vulnerability Reduction in Lagos Megacity Area, Nigeria. *Disaster Prevention and Management,* 20(1), pp. 27-40.

Ibidapo-Obe, O., 2014. *Enhancing Research Collaboration between the Academia, Government and Industry.* Ife, Nigeria, s.n.

Ibitoye, V., 2012. *Positioning NEMA for better Disaster Management.* [Online] Available at: http://www.dailyindependentnig.com [Accessed 9 July 2013].

Idemudia, U., 2010. Rethinking the role of corporate social responsibility in the Nigerian oil conflict: The limits of CSR.. *Journal of International Development,* 22(7), pp. 833-845.

Idemudia, U. & Ite, U., 2006. Corporate–community relations inNigeria's oil industry: challenges and imperatives.. *Corporate Social Responsibility and Environmental Management,* 13(4), pp. 194-206.

ICRC, 2020. Code of Conduct for the International Red Cross and Red Crescent. Accessed on 10/08/2023 from https://www.icrc.org/en/doc/resources/documents/publication/p1067.htm

IFRC, 2020. Code of Conduct for the Movement and NGOs in Disaster Relief. Accessed on 10/08/2023 from https://www.ifrc.org/our-promise/do-good/code-conduct-movement-ngos

Imoobe, T. & Iroro, T., 2009. *Ecological restoration of oil spill sites in the Niger Delta, Nigeria.* [Online] Available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.536.859&rep=rep1&type=pdf [Accessed 9 April 2016].

Incardona, J. P., 2010. Collier TK, Scholz NK. Oil spills and fish health: exposing the heart of the matter.. *J. Expo Sci Environ Epidemiol..*

Innes, J., 2004. Consensus building; clarifications for critics. *Planning Theory,* Volume 3, pp. 5-20.

Isaacs, D., 2003. *(2003) 'Will Nigeria learn pipeline fire lessons?' BBC News. 25 June..* [Online] Available at: http://news.bbc.co.uk/ [Accessed 12 January 2007].

Islam, A., Khan, A. M., Obaidullah, A. M. & Alam, M. S., 2011. Effect of Entrepreneur and Firm Characteristics on the Business Success of Small and Medium Enterprises (SMEs) in Bangladesh. *International Journal of Business and Management,* 6(3), pp. 289-299.

Iwayemi, A. & Fowowe, B., 2011. Impact of oil price shocks on selected macroeconomic variables in Nigeria.. *Energy Policy,* 39(2), pp. 603-612.

Iwueke, E. L. et al., 2019. Entrepreneurship: Characteristics, Practices and Impacts on Nigeria Economy in Relation to Geosciences. *IIARD International Journal of Economics and Business Management,* 5(1), pp. 48-63.

Izuchukwu, O., 2011. Analysis of the contribution of agricultural sector on the Nigerian economic development.. *World review of business research,* 1(1), pp. 191-200.

Jega, A., 2012. *The Electoral Process and Security Sector Synergy.* Abuja, A Paper Delivered by Professor Attahiru M. Jega, OFR, Hon. Chairman, Independent National Electoral Commission, to EIMC 6 Participants of Institute for Security Studies (ISS).

Johnson, S. R. J. &. T. Y., 2004. Institutional causes, macroeconomic symptoms: Volatility, crises and growth. Journal of Monetary Economics, 50,. *10.1016/S0304-3932(02)00208-8,* p. 49–123. .

Johnson, S. R. J. &. T. Y., 2004. Institutional causes, macroeconomic symptoms: Volatility, crises and growth. Journal of Monetary Economics, 50,. *10.1016/S0304-3932(02)00208-8,* p. 49–123. .

Kabanda, G., 2008. Collaborative Opportunities For Icts Development In A Challenged African Environment. *Journal of Technology Management and Innovation; 3(3),* pp. 91-99.

Kadafa, A., 2012. Oil Exploration and Spillage in the Niger Delta of Nigeria. *Civil and Environmental Research,* 2(2), p. 2222–2863.

Kareko, J. & Siegel, P., 2003. *Planning for Marine Protected Areas. In: Francis, J. et al. (eds.) Training for the Sustainable Management of Marine Protected Areas: a Training Manual for MPA Managers. ,* s.l.: CZMC/UDSM, WIOMSA, The World Bank.

Kareko, J. & Siegel, P., 2003. *Planning for Marine Protected Areas. Module 2. 39-84. ,* s.l.: In: Francis, J. et al. (eds.) Training for the Sustainable Management of Marine Protected Areas: A Training Manual for MPA Managers. CZMC/UDSM, WIOMSA, the World Bank.

Kasper-Fuehrer, E. C. & Ashkanasy, N. M., 2001. Communicating trustworthiness and building trust in inter-organizational virtual organizations. 27, 235–. *Journal of Management,* 27(DOI:10.1177/014920630102700302.), pp. 235-254.

Kettl, D., 2006. Managing boundaries in American administration: the collaboration imperative, 66 (2006). *Public Administration Review,* Volume 66, p. 10–19.

Kiefer, J. & Montjoy, R. S., 2006. Incrementalism before the storm: network performance for the evacuation of New Orleans. *Public Administration Review,* Volume 66, p. 122–130.

Kishawy, H. & Gabbar, H., 2010. Review of Pipeline Integrity Management Practices. I. *nternational Journal of Pressure Vessel and Process Piping,* Volume 87, pp. 378-380. .

Kvale, S. & Brinkmann, S., 2009. *Inter Views: Learning the Craft of Qualitative ResearchInterviewing.* Los Angeles, CA: Sage, .

Lawal, T. & Oluwatoyin, A., 2011. National development in Nigeria: Issues, Challenges Prospects.. *Journal of Public Administration and Policy Research. Vol. 3 (9), pp.,* 3(9), pp. 237-241.

Lawrence, A., 2006. 'No personal motive?'Volunteers, biodiversity, and the false dichotomies of participation.. *Ethics Place and Environment,* 9(3), pp. 279-298.

Levin, A., 2019. *FINTECH Africa. NIBSS is Nigeria's Most Impactful Fintech Company.* [Online] Available at: https://www.financialtechnologyafrica.com/2019/06/12/nibss-is-nigerias-most-impactful-fintech-company-andrew-levin/
[Accessed 12 July 2022].

Lindsay, J. R., 1993. Exploring the interface of urban planning and disaster management: establishing the connection between the fields..

Liu, J., Dong, C., An, S., Mai, Q., 2022. Dynamic Evolution Analysis of the Emergency Collaboration Network for Compound Disasters: A Case Study Involving a Public Health Emergency and an Accident Disaster during COVID-19. Healthcare (Basel). 10(3), 500. doi: 10.3390/healthcare10030500. PMID: 35326978; PMCID: PMC8950046.

Lockwood, M., 2010. Good governance for terrestrial protected areas: A framework, principles and performance outcomes. *Journal of Environmental Management,,* 91(3), pp. 754-766.

Lugard, S. B., 2014. Stakeholder Approach to Corporate Social Responsibility: Recipe for Sustainable Peace in the Niger Delta Region? Afe Babalola University: Journal of Sustainable Development Law and Policy; 4(1), pp. 154 - 173

Marshall, C. & Rossman, G., 2016. *Designing Qualitative Research.* 6th Edition ed. Thousand Oaks, CA: Sage Publications.

Mbumega, A. & Cyril, O. A., n.d. Inter-Agency Cooperation: An Approach to Conflict Management andSecurity Provisioning in Nigeria.

McGuire, M. & Silvia, C., 2010. The effect of problem severity, managerial and organizational capacity, and agency structure on intergovernmental collaboration: evidence from local emergency management. *Public Administration Review,* 70(2), p. 279–288.

MindTools, 2023. What Is Stakeholder Management? - Planning Your Stakeholder Communications. Accessed on 10/08/2023 from https://www.mindtools.com/at2o1co/what-is-stakeholder-management

Minoja, M., 2012. Stakeholder management theory, firm strategy, and ambidexterity.. *Journal of Bus Ethics,* 109(1), pp. 67-82.

MNJTF, 2022. *MNJTF. About the Force.* [Online] Available at: https://mnjtffmm.org/about/ [Accessed 16 July 2022].

Modgil, S., Singh, R.K., Foropon, C., 2022. Quality management in humanitarian operations and disaster relief management: a review and future research directions. Ann Oper Res.; Vol. 319, pp. 1045–1098. https://doi.org/10.1007/s10479-020-03695-5

Moe, T., Gehbauer, G., Sentz, S. & Mueller, M., 2007. Balanced scorecard for natural hazard management projects.. *Disaster Prevention and Management.,* 16(5), pp. 785-806..

Moe, T. L. & Pathranarakul, P., 2006. An integrated approach to natural disaster management: public project management and its critical success factors.. *Disaster Prevention and Management,* 15(3), p. 396–413.

Mojtahedi, S. M. & Oo, B. L., 2014. Stakeholders' approaches to disaster risk reduction in built environment.. *Disaster Prevention and Management,* Volume 23, p. 356–369.

Mojtahedi, S. M. & Oo, B. L., 2014. Stakeholders' Approaches to Disaster Risk Reduction in Built Environment.. *Disaster Prevention and Management,* Volume 23, p. 356–369.

Moore, S., Eng, E. & Daniel, M., 2003. International NGOs and the Role of Network Centrality in Humanitarian Aid Operations: A Case Study of Coordination during the 2000 Mozambique Floods. *Disasters,* 27(4), p. 305–318.

Moorman, C., Zaltman, G. & Deshpande, R., 1992. Relationships Between Providers and Users of Marketing Research. *Journal of Marketing Research,* Volume 29, pp. 314-329..

Morgan, R. a. H. S., 1994. The Commitment-Trust Theory of Relationship Marketing. *Journal of Marketing ,* Volume 58, pp. 20-38.

Moynihan, D. P., 2008. Learning under Uncertainty: Networks in Crisis Management. *Public Administration Review,* 68(2), pp. 350-365.

Mustapha-Koiki, A. R., 2019. *Journalism and Risk: The Impact of Boko Haram Attacks on News Content and Journalists' Patterns of News Gathering and Reporting in Nigeria (2011-2012). (Doctoral Thesis,University of Canterbury, Christchurch, New Zealand).,* Christchurch: New Zealand.

NDDC, 2006. *Niger Delta Regional Development Masterplan,* s.l.: 48–99.

NDMF, 2010. *National Emergency Management Agency (NEMA). National Disaster Management Framework (NDMF)..* [Online] Available at: http://www.preventionweb.net/files/21708_nigherianationaldisastermanagementf.pdf [Accessed 14 January 2012].

NDMG, 2010. National Disaster Management Guidelines (NDMG): Role of NGOs in Disaster Management. A publication of the National Disaster Management Authority, Government of India, ISBN: 978-93-80440-10-1, September 2010, New Delhi.

NEMA Handbook, 2010. *National Emergency Management Agency: DRR Profile.* [Online] Available at: https://nema.gov.ng/documentations/National%20Disaster%20Response%20Plan.pdf [Accessed 8 January 2022].

NEPA, 2007. *Collaboration in NEPA, A Handbook for NEPA Practitioners. Executive Office of the President, United States of America.,* USA: Results of research and consultations by the Council on Environmental Quality (CEQ).

Ngunan, T., 2013. Multi-Agency Approaches to Conflict Management in Nigeria. *Journal of the Society for Peace Studies and Practice,* 1(2), pp. 36-48.

Nguyen, D., Fumihiko, I. & Kanako, I., 2017. Public-private collaboration for disaster risk management: A case study of hotels in Matsushima, Japan.. *Tourism Management,* Volume 61, pp. 129-140..

Nigerian Tribune, 18th October 2013. *Inter-Agency Collaboration and Security Challenges.,* Nigeria: The Nigerian Tribune.

Njoku, A., 2016. *Oil Pipelines Vandalism And Its Effects On The Socio-Economic Development ,* s.l.: s.n.

NNPC, 2011. *2011 Draft Annual Statistical Bulletin.* [Online] Available at: http:www.eia.gove/countries/cab.cfm?fips=Ni [Accessed 7 April 2013].

NNPC, 2016. *DEVELOPMENT OF Nigeria's oil industry..* [Online] Available at: http://nnpcgroup.com/NNPCBusiness/BusinessInformation/OilGasinNigeria/Developmentofthe Industry.aspx [Accessed 20 January 2020].

Nolte, S. & Boenigk, S., 2012. Cross-sectoral Coordination of Disaster Relief. *Bucknell Digital Commons,* Volume Bucknell University, pp. 1-34.

Noran, O., 2014. Collaborative Disaster Management: An Interdisciplinary Approach.. *Computers in Industry. ,* 65(DOI: 10.1016/j.compind.2014.04.003.), pp. 1032-1040.

NPC, 2006. *Nigerian Population Commission, Report of National Census of 2006..* [Online] Available at: https://nigeria.opendataforafrica.org/ifpbxbd/state-population-2006 [Accessed 10 January 2022].

Ntukekpo, D. S., 1996. *Spillage: Bane of Petroleum,* s.l.: Ultimate Water Technology and Environment..

Nwachukwu, C., 2006. *Nigeria loses N29.4 billion per day to rebel attacks,* s.l.: The Punch, Vol. 4.

Nwachukwu, C., 2006. Nigeria loses N29.4 billion per day to rebel attacks.. *The Punch,,* p. Vol. 4. .

Nwaka, G. I., 2005. The urban informal sector in Nigeria: towards economic development, environmental health and social harmony. *Global Urban Development Magazine,* 1(1), pp. 1-11.

Nwilo, P. C. & Badejo, O. T., 2005. *Oil spill problems and management in the Niger Delta. Paper presented at International Oil Spill Conference, May 2005..* Miami, Florida, USA, s.n.

Nwokeji, G. U., 2007. *The Nigerian National Petroleum Corporation and the Development of the Nigerian Oil and Gas Industry: History, Strategies and Current Directions..* Japan, Prepared in

Conjunction with an Energy Study by the James A. Baker III Institute for Public Policy and Japan Petroleum Energy Center.

O'Brien, H. & Toms, E., 2008. What is user engagement? A conceptual framework for defining user engagement with technology. *Journal of the American Society for Information Science and Technology,* 59(6), pp. 938-955.

OCHA, 2018. *ReliefWeb.* [Online] Available at: https://reliefweb.int/report/nigeria/dg-nema-moves-enhance-collaboration-between-nigerian-military-and-agency [Accessed 06 June 2021].

Ogen, O., 2007. The Agricultural Sector and Nigeria's Development: Comparative Perspectives from the Brazilian Agro-Industrial Economy, 1960-1995.. *Nebula,* 4(1), pp. 184-194.

Ogundiya, S. & Amzat, J., 2008. Nigeria and the Threat of Terrorism: Myth of Reality. *Journal of Sustainable Development in Africa,* 10(2), pp. 1-25.

Oil and Gas Journal, 2000. *Nigerian Pipeline Explosions Kills 250.* [Online] Available at: "Nigerian Pipeline Explosions Kills 250." Accessed January 14, 2012 <http://www.ogj.com/articles/2000/07/nigerian-pipeline-explosion-kills-250.html>. [Accessed 14 January 2012].

Okafor, A. & Olaniyan, A., 2017. Legal and institutional framework for Promoting oil pipeline security in Nigeria.. *Afe Babalola University: Journal of Sustainable Development, Law & Policy ,* 8(2), p. 210 – 224.

Okoli, A., 2013. The political ecology of the Niger Delta crisis and the prospects lasting peace in the post-amnesty period. *Global Journal of Human Social Science,* 13(3), pp. 38-46.

Okoli, A., 2013. The political ecology of the Niger Delta crisis and the prospects lasting peace in the Post-Amnesty Period. *Global Journal of Human Social Science,* 3(3), p. 230.

Okoli, A. & Orinya, S., 2013. Oil Pipeline Vandalism and Nigeria's National Security. *Global Journal of Human Social Science,* 13(5), pp. 68-75.

Okoli, A. & Orinya, S., 2013. Oil Pipeline Vandalism and Nigeria's National Security.. *Global Journal of Human Social Science,* 13(5), pp. 68-75..

Okonkwo, T. & Etemire, U., 2017. "Oil Injustice" in Nigeria's Niger Delta Region: A Call for Responsive Governance. *Journal of Environmental Protection,* 8(1).

Okorie, A., 2005. Nigerian Oil: The Role of Multinational Oil Companies in the Development of Niger Delta, Nigeria. In Term Paper Quarter. *E 297c.,* Volume E 297c, p. 45 – 49.

Oladipo, E., 1993. Comprehensive Approach to Drought and Desertification in Northern Nigeria. *Natural Hazards,* 8(3), pp. 235-261.

Olaniyan, A., 2015. The multi-agency response approach to the management of oil spill incidents: legal framework for effective implementation in Nigeria. *Journal of Sustainable Development Law and Policy (The),* 6(1), pp. 109-128.

Olaoluwa, O., 2020. *Nigerian banks want fintech collaborations for specific needs.* [Online] Available at: https://inclusiontimes.com/nigerian-banks-want-fintech-collaborations-for-specific-needs/ [Accessed 12 July 2022].

Olson, M., 2008. *The rise and decline of nations: Economic growth, stagflation, and social rigidities..* s.l.:Yale University Press..

Omeje, K., 2005. Oil conflict in Nigeria: contending issues and perspectives of the local Niger Delta people. *New Political Economy,* 10(3), p. 321–334.

Omodanisi, E., E. A. & Salami, A., 2014. A multi-perspective view of the effects of a pipeline explosion in Nigeria. *International Journal of Disaster Risk Reduction,* Volume 7, p. 68–77.

Onoja, N., 2013. *Nigeria loses $11bn to oil theft, vandalism-NEITI. The Vanguard.* [Online] Available at: http://www.vanguardngr.com/2013/07/nigeria-loses-11bn-tooil-   theft-vandalismneiti/ [Accessed 13 November 2019].

Onuoha, F., 2007. Poverty, pipeline vandalism and explosion and Human Security: Integrating disaster management into poverty reduction in Nigeria. *African security Review,* 16(2), pp. 32-46.

Onuoha, F., 2007. Poverty, Pipeline Vandalism and Explosion and Human Security: Integrating Disaster Management into Poverty Reduction in Nigeria. *African security Review,* 16(2), pp. 32-46.

Onuoha, F., 2009. Why the poor pay with their lives: Oil pipeline vandalisation, fires and human Security in Nigeria. *Disaster,* 33(3), pp. 369-389.

Onuoha, F. C., 2008. Vandals or victims? Poverty, risk perception and vulnerability of women to oil pipeline disasters in Nigeria. *Gender and Behaviour,* 6(2), pp. 41-52.

OPEC, 2012. *Nigeria facts and figures, Annual Statistical Bulletin 2022.* [Online] Available at: https://www.opec.org/opec_web/en/about_us/167.htm [Accessed 8 January 2022].

Oriola, T., 2016. *Criminal Resistance?: The Politics of Kidnapping Oil Workers. ,* s.l.: Routledge..

Orji, F. M., 2018. *Management of environmental issues in the Nigerian oil-producing region: A framework for stakeholders' collaboration. Doctoral thesis, University of Central Lancashire.,* s.l.: s.n.

Oshwofasa, B. & Anuta, D., 2012. Environmental Degredation and Oil Industry Activities in the Niger-Delta Region.. *African Journal of Scientific Research,* 9(1).

Osland, A., 2015. Building hazard resilience through collaboration; the role of technical partnerships in areas with hazardous liquid and natural gas transmission pipelines. *Environmental Planning,* Volume 47, p. 1063 – 1080..

Oyefusi, A., 2013. Micro-Econometric Analyses of Some Welfare Effects of Oil-Availability in the Niger Delta Region of Nigeria.. *Journal of Sustainable Development,* 6(12), p. 61.

Parfomak, P. W., 2017. *Pipeline Safety and Security: Federal Programs, Congressional Research Service Reports, 59.* [Online] Available at: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1033&context=crsdocs [Accessed 13 September 2017].

Park, E. S., and Yoon, D. K., 2022. The value of NGOs in disaster management and governance in South Korea and Japan, International Journal of Disaster Risk Reduction, Volume 69, 2022, https://doi.org/10.1016/j.ijdrr.2021.102739

Pearce, L., 2003. Disaster management and community planning, and public participation: how to achieve sustainable hazard mitigation. *Natural Hazards,* Volume 28, p. 211 – 228.

Peterson, R., 2000. *Constructing effective questionnaires (Vol. 1),* Thousand Oaks, CA: Sage Publications.

Petroleum Products and Distribution Act, 1975. *Petroleum Products and Distribution (Anti-Sabotage) Act of 1975,* s.l.: Laws of the Federation of Nigeria 2004, p. 12..

Phil-Eze, P. & Okoro, I., 2009. *Sustainable biodiversity conservation in the Niger Delta: a practical approach to conservation site selection.* [Online] Available at: http://link.springer.com/article/10.1007/s10531-008-9451-z [Accessed 9 April 2016].

Phillips, R., 2003. *Stakeholder theory and organizational ethics ,* s.l.: Berrett-Koehler Publishers. .

Premium Times, 2021. *Nigeria's Presidential Task Force on COVID-19 gets new role.* [Online] Available at: April 6, 2021 https://www.premiumtimesng.com/news/headlines/453562-just-in-nigerias-presidential-task-force-on-covid-19-gets-new-role.html [Accessed 6 April 2021].

Premium Times, 30th December 2019. [Online] Available at: https://www.premiumtimesng.com/regional/ssouth-east/370383-how-to-secure-oil-pipelines-against-vandals-abia-community.html [Accessed 8 July 2022].

Prizzia, R., 2008. *The Role of Coordination in Disaster Management,* s.l.: DOI:10.1201/9781420058635.ch5.

Rajan, S. R., 2002. Disaster, development and governance: reflections on the 'Lessons of Bhopal. *Environ Values,* p. 369–394.

Rashid, A. S., 2011. Management of Farmer-herdsmen Conflicts in North-Central Nigeria: Implications for Collaboration between Agricultural Extension Service and other Stakeholders. *Journal of international agricultural and extension education,* 18(1), pp. 60-72.

Reed, M. G. & Bruyneel, S., 2010. 2010. "Rescaling environmental governance, rethinking the state: A three-dimensional review.". *Progress in human geography ,* 34(5), pp. 646-653.

Reed, M. et al., 2009. Who's in and why? A typology of stakeholder analysis methods for natural resource management.. *Journal of environmental management,* 90(5), pp. 1933-1949.

Reuters, May 15, 2008. *Timeline: Deadly Nigerian Pipeline Disasters.* [Online] Available at: https://www.reuters.com/article/us-nigeria-pipeline-disasters-idUSL1566948020080515

Robinson, J., Torvik, R. & Verdier, T., 2006. Political foundations of the resource curse.. *Journal of Development Economics, ,* 79(2), pp. 447-468.

Roloff, J., 2008. Learning from Multi-Stakeholder Networks: Issue-Focussed Stakeholder Management. *Journal of Business Ethics,* 82(1), pp. 233-250.

Rosenbaum, D., 2002. Evaluating Multi-Agency Anti-Crime Partnerships: Theory, Design and Measurement Issues. .*University of Illinois at Chicago, Crime Prevention Studies,* Volume 14, pp. 171-225.

Ross, M., 2003. *Nigeria's oil sector and the poor. Position Paper for DFID-Nigeria,.* Los Angeles, s.n.

Ross, M., 2012. *The oil curse: how petroleum wealth shapes the development of nations..* s.l.:Princeton University Press..

Rouhi, N., Gorji, H. A., Maleki, M., 2019. Nongovernmental organizations coordination models in natural hazards: A systematic review. Journal of Educ Health Promot.; 8(44). doi: 10.4103/jehp.jehp_201_18. PMID: 30993137; PMCID: PMC6432838.

Saeed, A. & Narimah, K., 2019. *Role of stakeholders in mitigating disaster prevalence: Theoretical Perspective..* s.l., https://doi.org/10.1051/matecconf/2019..

Sani, M., 2012. *Nigeria: NEMA Develops National Contingency Plan on Disaster Management.* [Online]
Available at: http://allafrica.com/stories/2012061804 09.htm1 [Accessed 14 June 2013].

Sanusi, A., Josiah, C. & Isa, H., 2016. The Environmental Impact of Pipeline Vandalism – A Challenge to Biodiversity in Portharcourt Area of Rivers State, Nigeria. *International Journal of Advances in Chemical Engineering & Biological Sciences (IJACEBS),* 3(1), pp. 142-146.

Sapat, A., Esnard, A. M. & Kolpakov, A., 2019. Understanding Collaboration in Disaster Assistance Networks: Organizational Homophily or Resource Dependency?. *American Review of Public Administration ,* 49(8), p. 957– 972.

Schraagen, J. M. C. & Van de Ven, J. G. M., 2008. Improving decision making in crisis response through critical thinking support.. *Journal of cognitive engineering and decision making ,* 2(4), pp. 311-327.

Scott, L., 2022. Collaboration and Community. . Pp 1 – 16. visit. *A Report Prepared for the Pew Partnership for Civic Change*, 01 February, pp. 1-16.

Shah, I. et al., 2022. Inter-agency collaboration and disaster management: A case study of the 2005 earthquake disaster in Pakistan. *Jàmbá - Journal of Disaster Risk Studies,* 14(1), pp. 1-11.

Shell Global, 2022. *Process safety at Shell | Shell Global..* [Online] Available at: https://www.shell.com/sustainability/safety/process-safety.html [Accessed 22 June 2022].

Shittu, 2014. *Mapping Oil Spill Human Health Risk in Rivers State, Niger Delta.* [Online] Available at: http://eprints.nottingham.ac.uk/14115/1/Shittu_PhD_Thesis_%282014%29.pdf [Accessed 8 January 2020].

Sitas, N. et al., 2016. Fostering collaboration for knowledge and action in disaster management in South Africa.. *Current Opinion in Environmental Sustainability.,* Volume 19, pp. 94-102.

Sola, A. & Joachim, A., 2016. Development of the non-oil sector in Nigeria: challenges & lessons for less developed countries.. *Covenant Journal of Business and Social Sciences,* 5(1).

Spence, D. B., 2011. Corporate Social Responsibility in the Oil and Gas Industry: The Importance of Reputational Risk, Chi.-Kent L. Rev.; 86 (59). Available at: https://scholarship.kentlaw.iit.edu/cklawreview/vol86/iss1/4

StateHouse, 2020. *About the PTF. Seal of the President, Federal Republic of Nigeria..* [Online] Available at: https://statehouse.gov.ng/covid19/objectives/ [Accessed 12 July 2022].

Sumaina, K., 2019. *Thisday Online.* [Online] Available at: https://www.thisdaylive.com/index.php/2019/04/30/nema-stakeholders-to-review-contingency-plan-against-natural-disasters/ [Accessed 06 June 2021].

Sunny, O., 2013. *Insurgency: Taming Inter-Agency Rivalry,* s.l.: Sunday Trust, 29th September 2013.

Taber, K., 2018. The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. *Research in Science Education ,* 48(1), pp. 1-24.

TechCabal, 2020. *Nigerian banks want fintech collaborations, but for specific and unique needs.* [Online]
Available at: https://headlines.ng/nigerian-banks-want-fintech-collaborations-but-for-specific-and-unique-needs/ [Accessed 12 July 2022].

The Punch Newspaper, 2019. *Oil communities demands N5b from Chevron.. Published on.* [Online] Available at: https://punchng.com/explosion-oil-community-demands-n5bn-from-chevron/ [Accessed 1 August 2019].

Thisday Live, 2022. *PM NEMA, NITDA to Collaborate on Disaster Risk Mitigation – THISDAYLIVE,* s.l.: Thisday Newspaper.

Tierney, K. J., Lindell, M. K. & Perry, R. W., 2001. *Facing the Unexpected: Disaster Preparedness and Response in the United States..* New York, NY.: Joseph Henry Press: .

Tillotson, P., Slade, R., Staffell, S., Halttunen, K., 2023. Deactivating climate activism? The seven strategies oil and gas majors use to counter rising shareholder action, Energy Research & Social Science; Vol. 103, 103190, ISSN 2214-6296, https://doi.org/10.1016/j.erss.2023.103190.

U.S. Department of the Interior , 2022. *Emergency Response to Oil Spills and Hazardous Material Release / U.S. Department of the Interior.* [Online] Available at: https://www.doi.gov/oepc/preparedness-and-response-oil-spills-and-hazardous-substance-releases [Accessed 25 June 2022].

U.S. EIA, 2019. *Nigeria Energy Outlook.* [Online] Available at: https://www.iea.org/articles/nigeria-energy-outlook [Accessed 8 January 2020].

Udofia, O. & Joel, O., 2012. Pipeline vandalism in Nigeria: Recommended best practice of checking the menace.. *Society of Petroleum Engineers Journal. ,* Issue DOI: 10.2118/162980-MS..

Umar, M. & Wilson, M., 2021. Supply Chain Resilience: Unleashing the Power of Collaboration in Disaster Management. *Sustainability,* 13(10573), pp. 1-20.

UNDP, 1992. *Disaster Management.* [Online] Available at: https://www.physio-pedia.com/Disaster_Management [Accessed 8 January 2022].

UNDP, 2006. *Beyond scarcity: Power, poverty and the global water crisis.,* s.l.: United Nation's Development Programme Report (UNDP).

UNEP, 1999. *National Emergency Management Agency (Establishment, etc.) Decree 1999 (No. 12 of 1999).* [Online] Available at: https://leap.unep.org/countries/ng/national-legislation/national-emergency-management-agency-establishment-etc-decree [Accessed 8 January 2020].

UNISDR, 2009. *UNISDR terminology on disaster risk reduction.* [Online] Available at: https://www.undrr.org/publication/2009-unisdr-terminology-disaster-risk-reduction [Accessed 8 January 2022].

US Department of Homeland Security, 2010. *US Department of Homeland Security, Transportation Security Administration, Pipeline Security and Incident Recovery Protocol Plan March 2010 . ,* United States: As directed by the Implementing Recommendations of the 9/11 Commission Act of 2007.

Usman, M., 2014. Corruption in Nigeria: A Challenge to Sustainable Development in the Fourth Republic.. *European Scientific Journal,* Volume 19, pp. 118-137.

van Niekerk, D., 2010. *A framework for multi-sphere disaster risk reduction: The case of South Africa. ,* Saarbrücken.: Lambert Academic Publishing.

Vanguard, 11th January 2012. *"Federal Government Approves New Operational Status for JTF.,* s.l.: s.n.

Vanguard, 2022. *Nigeria signs MoU with Equatorial Guinea to develop, supply natural gas.* [Online] Available at: https://www.vanguardngr.com/2022/03/nigeria-signs-mou-with-equatorial-guinea-to-develop-supply-natural-gas/ [Accessed 8 July 2022].

Vidal, 2011. *Kenya explosion exposes lethal lines that tempt the desperate poor,* s.l.: The Guardian, Monday, September 12.

Vogwell, D., 2003. Stakeholder management. Paper presented at PMI® Global Congress 2003—EMEA, The Hague, South Holland, The Netherlands. Newtown Square, PA: Project Management Institute.

Watts, M., 2004. Resource curse? Governmentality, oil and power in the Niger Delta, Nigeria.. *Geopolitics,* 9(1), pp. 50-80.

Weiss, J., 1987. Pathways to Cooperation among Public Agencies. *Journal of Policy Analysis and Management,* 7(1), pp. 94-117.

Wilkinson, S., L., M. J. & Seville, E., 2006. Barriers to Post Disaster Reconstruction, Wellington..

Willems, T. & Van Doreen, W., 2012. Coming to terms with accountability: combining multiple forums and function. *Public Management Review,* 14(7), pp. 1011-1036.

Willems, T. & VanDooren, W., 2012. Coming to Terms with Accountability.. *Public Management Review,* 14(DOI:10.1080/14719037.2012.662446.), pp. 1-26.

Wunder, S., 2005. *Oil wealth and the fate of the forest: a comparative study of eight tropical countries. ,* London, United Kingdom: : Taylor and Francis e-Library; (432p.)..

Wurthmann, G., 2006. *Working Paper 84-Ways of Using the African Oil Boom for Sustainable Development,,* s.l.: s.n.

Yin, R. K., 2018. *Case Study Research Design and Methods.* 6th Ed. ed. Thousand Oaks, CA: Sage Publishing..

Zabbey, N., Sam, K. & Trinitas, O. A., 2017. *Remediation of contaminated lands in the Niger Delta, Nigeria: Prospects and challenges.* [Online] Available at: https://doi.org/10.1016/j.scitotenv.2017.02.075. [Accessed 8 January 2020].

THE ROLE OF STAKEHOLDERS' COLLABORATION IN MITIGATING LOSSES DURING OIL PIPELINE DISASTERS IN NIGERIA

Introduction

Dear Sir or Madam,

I am in the process of undertaking research examining the possible causes of oil pipeline disasters in Nigeria, and how multi-stakeholder collaboration might help to mitigate future resurgence. I would very much value your insights and your knowledge from experience.

This research is entirely for academic purposes and all responses shall remain discreet, with none of the results attributable to individuals.

Instruction: PLEASE TICK AND FILL Appropriately. * Required

SECTION A: Assessment of Cases of Oil Pipeline Disasters

1. Are you from the Niger Delta Region of Nigeria? (A) Yes [   ] (B) No [   ]

2. Are you aware of pipeline disasters?* (A) Yes [   ] (B) No [   ]

3. Have you personally experienced any loss of life or property as a result of oil pipeline disaster?*

(A) Yes [   ] (B) No [   ]

4. How many cases of oil pipeline disaster have you experienced?*

(A) 0 [   ] (B) 1 [   ] (C) 2 [   ] (D) 3 [   ] (E) Above 3 [   ]

SECTION B: Impact of Oil Pipeline Disaster

5. How were you affected personally by oil pipeline disaster(s)?*

(A) Loss of Life [   ] (B) Loss of Property [   ] (C) Loss of Job [   ] (D) All of the above [   ]   (E) Others [   ]

6. If others, please specify...

7. How has it affected your immediate environment? *…………………………………………

SECTION C: Causes of Pipeline disaster

8. Which firm/institution do you work for?* ………………………………….

9. Are you a disaster management expert?* (A) Yes [   ] (B) No [   ]

10. Does your firm/institution partake in oil pipeline disaster management?* (A) Yes [   ] (B) No [   ]

11. In your experience, what are the most prevalent causes of pipeline disaster? Select all that apply.....*

Operational Error ◯   Mechanical Failures ◯   Vandalism ◯   Inadequate Maintenance ◯   Inadequate Surveillance ◯   Environmental Factors ◯

Ecological Factors ◯   Lack of Collaboration amongst Stakeholders ◯   Others. ◯

12. If other, please specify....

13. Who/What gets affected most in the aftermath of oil pipeline disaster? Select all that applies*

People ◯   Environment ◯   Wildlife ◯   Vegetation ◯   Government Property ◯   Oil Companies Water bodies ◯   Other ◯

14. If other, please specify…………...

SECTION D: Relevant stakeholders

15. Which stakeholders do you consider relevant in oil pipeline disaster management? Select all that apply*

Government Agencies ◯   Non-Governmental Organizations (NGOs) ◯

Security Agencies ◯   Health Agencies ◯   Local and International Donors ◯

Media ◯   Academia ◯   Community and Citizen ◯   Regional Cooperation ◯

SECTION E: Emergency preparedness rating*

To what extent do you agree with the following statements?

S/N	Emergency preparedness rating	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't Know
1	There are robust emergency preparedness measures in place to respond to cases of oil pipeline disaster.						
2	In previous oil pipeline disasters, the response of stakeholders has been swift.						
3	Maintenance checks are conducted regularly on oil pipeline systems.						
4	Worn out / Overdue pipes are replaced on regular basis.						
5	There is sufficient security to protect oil pipelines from vandalism.						
6	Oil spill response equipment are readily available on site>						

SECTION F: Aftermath of Oil Pipeline Disaster*

To what extent do you agree with the following statements?

S/N	Aftermath of Oil Pipeline	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't Know
1	Areas where oil pipeline disasters occurred are often deserted.						
2	Areas where oil pipeline disasters occurred are often cleaned up.						
3	Victims of oil pipeline disaster are compensated financially.						
4	Investigations were usually carried out to identify the cause(s) of the disaster?						
5	Lessons were learnt						

SECTION G: Collaboration as a tool for disaster management

16. Has your firm/institution ever responded to incidences of oil pipeline disaster?

(A) Yes [   ] (B) No [   ]

17. Are there any interagency collaborations between your firm/institution and other stakeholders? (A) Yes [   ] (B) No [   ]

18. Does your firm/institution consider collaboration with other stakeholders as a disaster management technique? (A) Yes [   ] (B) No [   ]

19. Which stakeholder(s) does your firm/institution collaborate with on disaster management? …………………………………………………………………………………

20. What are the main channels of communication between your firm/institution and other stakeholders? Telephone calls [   ] Designated social media platform [   ] Email Messaging communication [   ] Other [   ]

21. If other, please specify…………...

SECTION H: Assessment of current level of interagency collaboration

To what extent do you agree with the following statements?

S/N	Assessment of current level of interagency collaboration	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't Know
1	My firm/institution has clear policy and practice for collaboration with other agencies.						
2	The current level of collaboration between my firm/institution with other agencies has been effective in responses to cases of disaster management.						
3	In my experience, collaboration between stakeholders has been an effective tool in disaster management.						

APPENDIX 2

RGU RESEARCH ETHICS AND GUIDELINES

Ethical conduct depends on:

1. Consideration of the impact of the research, including;

   i.   The potential implications of research for subjects and participants

   ii. The potential implications of research for non-participants, and

   iii. The uses to which research can be put

2. Guidance covering the treatment of participants, including;

   i.   informed consent

   ii. confidentiality and anonymity, and

   iii. special consideration of vulnerable respondents

3. Academic considerations. Researchers are enjoined to;

   i.   Maintain research of high quality

   ii. Display competence

   iii. Act responsibly towards others in their field, and

   iv. Advance their discipline

4. Guidance concerning research relationships. These include;

   i.   The responsibilities of the researcher to the body commissioning the research,

   ii. Responsibilities to the university,

   iii. Commitments to fellow researchers, and

   iv. Integrity in dealing with subjects, participants and stakeholders.

INTERVIEW SCHEDULE

"Assessment of Multi-Stakeholders Collaboration Efforts During and After Oil Pipeline Disaster in Nigeria"

The research study objectives are:

1. To assess the human and ecological effects of pipeline disasters in the Niger Delta Region.

2. To examine the level of awareness about pipeline disaster amongst different stakeholders and find out if there are existing collaborations between the different stakeholders on risk mitigation.

3. To develop a framework that proffers collaboration of stakeholders as a disaster mitigation technique and determine the type of collaboration and the channel for communication amongst the stakeholders before, during and after occurrences.

All information collected during the study period will be kept strictly confidential until such time as you sign a release waiver. No publications or reports from this project will include identifying information on any participant without your signed permission, and after your review of the materials.

Interview Questions

1. Are you from the Niger Delta Region of Nigeria?

2. Have you experienced any case of pipeline disaster or heard about it before?

3. If yes, what were the human and ecological effects?

4. Have you ever been involved in preventing or managing such disasters?

5. What are your efforts?

6. Do you collaborate with any other stakeholder to discuss ways of preventing such occurrences? If yes, who?

7. Who do you consider relevant in the prevention, management and risk reduction of pipeline disasters and what should be their role?

8. Do you think collaboration of stakeholders can help reduce and manage these occurrences?

9. What type of collaboration do you suggest?

10. What is the best channel of communication amongst stakeholders before, during and after these occurrences?

11. What are the possible effects of multi stakeholders' collaboration on managing and mitigating pipeline disasters?

APPENDIX 4

REQUEST TO CONDUCT RESEARCH SURVEY

The Scott Sutherland School of Architecture and Built Environment, Robert Gordon University
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Date: 31st December, 2021

THE DIRECTOR GENERAL,
NATIONAL EMERGENCY MANAGEMENT AGENCY (NEMA),
ABUJA,
NIGERIA.

Dear Sir,

REQUEST TO CONDUCT RESEARCH SURVEY

I am writing to seek your permission for an interview with the agency's experts on Management of Oil Pipeline Disasters in Nigeria with particular reference to the Niger Delta Region. Any date from now to 15th January, 2022 will be appreciated for the interview.

The above data collection is part of on-going PhD at Robert Gordon University, UK on the topic "Assessment of Multi-Stakeholders Collaboration Efforts During and After Oil Pipeline Disaster in Nigeria" to develop a framework that proffers collaboration of stakeholders as a disaster mitigation technique and determine the type of collaboration and the channel for communication amongst the stakeholders before, during and after occurrences.

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

Many thanks in anticipation.

Kind regards

FRANCIS I. Johnson
+2348068491528

Do you Collaborate With other Stakeholders?	Roles of Stakeholders	Your Efforts
"……..Occasionally, yes. We collaborate with security agencies, fire service, NGOs and health agencies. Though such collaborations always exist during disaster occurrence." RP/NEMA/01 *"…….Collaborate with Community Leaders and residents as well as government agencies, though mostly at discussion levels."RP/MNOC/01*	*"……..Government agencies are very relevant in the prevention, management and risk reduction of pipeline disasters. These agencies should be charged with the responsibility of early warning signals and prompt response to disaster cases."RP/NEMA/01* *"…….Government and government agencies are key stakeholders in this regards as they coordinate the activities of all other stakeholders towards achieving the desired goal. Security agencies should provide security and strict surveillance to detect oil leaks and prevent the activities of vandals and miscreants. The health agencies and other emergency services like fire service should provide immediate response during the occurrence of disasters. The community residents should serve as partners in securing pipelines as well as aid during search and rescue missions. NGOs should partner in sensitization activities and assist in providing relief materials to victims of oil pipeline disasters. RP/FMHDSD/01*	*"……I have been involved in the assessment of the level of destruction of the environment as a result of these disasters and drawing up plans for clean-up exercises." RP/FMHDSD/01* *"……Oversee the national oil spill contingency plan. We monitor oil spill drill exercises and carry out inspection and investigation visits. My agency is also tasked with clean-up of spilled sites to remediate the environment as much as possible with the aid of a baseline environmental sensitivity index map (ESI)"RP/NOSDRA/01*
"…….we relate majorly with our host communities as well as government representatives from time to time. No concrete collaboration exist between us and other stakeholders."RP/MNOC/02	*"……..Government agencies charged with the responsibility of handling oil spills and oil disasters, security agents should also be involved. Health agencies are also very important in the risk reduction. The multi-national oil companies should be more involved in the prevention of oil pipeline disasters. The media should organize sensitization in conjunction with NEMA to discourage people involved in oil bunkering."RP/NNPC/01*	Shell Plc. Website: *"………..Large spills of crude oil, oil products and chemicals associated with our operations can harm the environment, and result in major clean-up costs, fines and other damages. We have requirements and procedures designed to prevent spills. We design, operate and maintain our facilities with the intention*

of avoiding spills. To further reduce the risk of spills, Shell has routine programmes to reduce failures and maintain the reliability of facilities and pipelines.

For oil spills, we have created a global response network that enables us to deal more effectively with oil spills, supplementing local response capability. We routinely perform large-scale exercises with local regulatory and response organisations to practice, and improve, our response capability.

"…….my efforts include but not limited to coordinating search and rescue, coordination of emergency response services, provision of relief materials and providing shelter for displaced persons."RP/NEMA/01

"…….Yes, we do, especially when such disasters occur. We usually collaborate with NEMA during such occurrences. We recommend a better collaboration framework or pattern with other agencies as well as NGOs and also the community residents so that we can move past this ugly incidence."RP/NNPC/01

"…….We only join efforts with some stakeholders when these disasters have occurred."RP/CRL/01
"…….Not really. We only respond when our attention is called."RP/HS/01

"……….the government been at the helm of affairs have the number one responsibility. They need to get their acts together. Having created a number of agencies to handle such cases, they should equip these agencies to deliver on their mandate. Among them include NEMA who coordinates all activities relating to disasters in Nigeria. Health agencies, security agencies and we, the community should be involved also.RP/CRL/01

"………..I first and foremost recognize the role of the community in the prevention and mitigation of these disasters. The National Emergency Management Agency needs to do more in this regards as they are at the centre of any form of disaster in Nigeria. National Oil Spill Detection and response Agency is also very relevant as well as the Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development of Nigeria. Also very relevant are the health agencies

"…….I was involved in granting first-aid attention to some of the victims of the resulting fire as a result of the oil pipeline explosion."RP/HS/01

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*"……No"*RP/SA/01

*"……..Yes, we work hand in hand with NOSDRA."*RP/FMHDSD/01

"……….Other sister agencies in the Federal Ministry of Environment." RP/NOSDRA/01

*and NGOs."*RP/SA/01

*"………Government agencies charged with the responsibility of handling oil spills and oil disasters, security agents should also be involved. Health agencies are also very important in the risk reduction. The multi-national oil companies as well as NNPC should be more involved in the prevention of oil pipeline disasters. The media should organize sensitization in conjunction with NEMA to discourage people involved in oil bunkering."*RP/CRS/01

*"……….All government agencies saddled with this responsibilities as well as the multi-national oil companies and the community where these pipelines pass through."*RP/NOSDRA/01

*"……..we the oil companies together with all government agencies as well as the local communities and security agencies all have a role to play in this all important struggle."*RP/MNOC/01

*"……..the host communities where pipeline traverse are very important in the prevention of pipeline disasters. When they are partners in progress, they serve as security for these pipelines. Other relevant stakeholders previously outlined include government at all levels, government agencies charged with specific responsibilities in the oil and gas sector, security agencies, health agencies and NGOs."*RP/MNOC/02

"………everyone is relevant as far as disasters in Nigeria is concerned. However, in light of the topic been discussed, I consider the community residents as relevant stakeholders in the effective management of these disasters. I also consider government

agencies who serve as
representatives of the government in
this case. The oil companies are also
very relevant in this regards as well
as security agencies."RP/HS/01

APPENDIX 6

CAUSES OF OIL PIPELINE DISASTERS

Cronbach's Alpha

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.658	.638	9

Source: IBM SPSS Analysis Software

A total of 9 items were tested as a group. These items include the causes of oil pipeline disaster responses obtained from the survey. A value of 0.658 was obtained as the Cronbach's Alpha value. This is acceptable, especially when the number of items tested are not up to 10.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Operational Error	.386	300	.000	.625	300	.000
Mechanical Failures	.386	300	.000	.625	300	.000
Vandalism	.525	300	.000	.373	300	.000
Inadequate Maintenance	.358	300	.000	.635	300	.000
Inadequate Surveillance	.393	300	.000	.622	300	.000
Environmental Factors	.471	300	.000	.533	300	.000
Ecological Factors	.469	300	.000	.536	300	.000
Others	.533	300	.000	.090	300	.000
Lack of Collaboration amongst Stakeholders	.520	300	.000	.395	300	.000

a. Lilliefors Significance Correction
Source: IBM SPSS Analysis Software

The Shapiro-Wilk test is insignificant at the levels tested (less than 0.05). This illustrates a non-parametric distribution model for causes of oil pipeline disasters.

Pearson Correlation between Factors that Causes Pipeline Disasters

		Operational Error	Mechanical Failures	Vandalism	Inadequate Maintenance	Inadequate Surveillance	Environmental Factors	Ecological Factors	Others	Lack of Collaboration amongst Stakeholders
Operational Error	Pearson Correlation	1	.368**	.094	.287**	.517**	.407**	.195**	.079	.163**
	Sig. (2-tailed)		.000	.103	.000	.000	.000	.001	.170	.005
Mechanical Failures	Pearson Correlation	.368**	1	-.011	.151**	.268**	.234**	.321**	.079	.023
	Sig. (2-tailed)	.000		.846	.009	.000	.000	.000	.170	.697
Vandalism	Pearson Correlation	.094	-.011	1	.049	.127*	.133*	-.009	.042	-.017
	Sig. (2-tailed)	.103	.846		.402	.028	.021	.879	.466	.770
Inadequate Maintenance	Pearson Correlation	.287**	.151**	.049	1	.477**	.124*	.131*	.124*	-.075
	Sig. (2-tailed)	.000	.009	.402		.000	.032	.023	.031	.192
Inadequate Surveillance	Pearson Correlation	.517**	.268**	.127*	.477**	1	.140*	.180**	.142*	.093
	Sig. (2-tailed)	.000	.000	.028	.000		.016	.002	.014	.108
Environmental Factors	Pearson Correlation	.407**	.234**	.133*	.124*	.140*	1	.324**	.205**	.104
	Sig. (2-tailed)	.000	.000	.021	.032	.016		.000	.000	.073
Ecological Factors	Pearson Correlation	.195**	.321**	-.009	.131*	.180**	.324**	1	.203**	.175**
	Sig. (2-tailed)	.001	.000	.879	.023	.002	.000		.000	.002
Others	Pearson Correlation	.079	.079	.042	.124*	.142*	.205**	.203**	1	.045
	Sig. (2-tailed)	.170	.170	.466	.031	.014	.000	.000		.438
Lack of Collaboration amongst Stakeholders	Pearson Correlation	.163**	.023	-.017	-.075	.093	.104	.175**	.045	1
	Sig. (2-tailed)	.005	.697	.770	.192	.108	.073	.002	.438	
	N	300	300	300	300	300	300	300	300	300

HUMAN AND ECOLOGICAL IMPACTS OF PIPELINE DISASTERS

Pearson Correlations

		How has it affected your immediate environment	How were you affected personally by oil pipeline disaster(s)?
How has it affected your immediate environment	Pearson Correlation	1	-.174**
	Sig. (2-tailed)		.003
	N	300	300
How were you affected personally by oil pipeline disaster(s)?	Pearson Correlation	-.174**	1
	Sig. (2-tailed)	.003	
	N	300	300

**. Correlation is significant at the 0.01 level (2-tailed).
Source: IBM SPSS Analysis Software

The Table shows the correlation for factors of human and ecological impacts of pipeline disasters. There exist a negative correlation between personal or human effects and the environmental effects. This correlation is however not significant at 0.05 level of significance.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
How has it affected your immediate environment	.132	300	.000	.927	300	.000
How were you affected personally by oil pipeline disaster(s)?	.351	300	.000	.779	300	.000

a. Lilliefors Significance Correction
Source: IBM SPSS Analysis Software

The Table shows the test of normality for the distribution. The Shapiro-Wilk test is insignificant at the levels tested. This illustrates a non-parametric distribution model for both environmental effects as well as human effects of oil pipeline disasters.

Correlations between Factors of Emergency Preparedness

		There are robust emergency preparedness measures in place to respond to cases of oil pipeline disaster	In previous oil pipeline disasters, the response of stakeholders has been swift	Maintenance checks are conducted regularly on oil pipeline systems	Worn out / Overdue pipes are replaced on regular basis	There is sufficient security to protect oil pipelines from vandalism	Oil spill response equipment are readily available on site
There are robust emergency preparedness measures in place to respond to cases of oil pipeline disaster	Correlation Coefficient	1.000	.435**	.501**	.348**	.344**	.416**
	Sig. (2-tailed)	.	.000	.000	.000	.000	.000
	N	300	300	300	300	300	300
In previous oil pipeline disasters, the response of stakeholders has been swift	Correlation Coefficient	.435**	1.000	.260**	.365**	.145*	.341**
	Sig. (2-tailed)	.000	.	.000	.000	.012	.000
	N	300	300	300	300	300	300
Maintenance checks are conducted regularly on oil pipeline systems	Correlation Coefficient	.501**	.260**	1.000	.466**	.322**	.344**
	Sig. (2-tailed)	.000	.000	.	.000	.000	.000
Worn out / Overdue pipes are replaced on regular basis	Correlation Coefficient	.348**	.365**	.466**	1.000	.267**	.498**
	Sig. (2-tailed)	.000	.000	.000	.	.000	.000
There is sufficient security to protect oil pipelines from vandalism	Correlation Coefficient	.344**	.145*	.322**	.267**	1.000	.388**
	Sig. (2-tailed)	.000	.012	.000	.000	.	.000
Oil spill response equipment are readily available on site	Correlation Coefficient	.416**	.341**	.344**	.498**	.388**	1.000
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).
Source: IBM SPSS Analysis Software

Analysis of Variance

		Sum of Squares	Df	Mean Square	F	Sig.
Mean.Emergency_Preparedness	Between Groups	10.343	14	.739	1.815	.036
	Within Groups	116.014	285	.407		
	Total	126.357	299			
Mean.Aftermath	Between Groups	30.972	14	2.212	5.942	.000
	Within Groups	106.102	285	.372		
	Total	137.073	299			

Source: IBM SPSS Analysis Software

The Table shows the analysis of variance between emergency preparedness rating factors and aftermath of pipeline disaster factors. From the table, a value of 0.036 was obtained for mean emergency preparedness between groups and 0.000 for mean aftermath between groups. These values are less than 0.05, signifying that the variance are not significant at this level.

AFTERMATH OF OIL PIPELINE DISASTERS

Correlation Between Factors

		Areas where oil pipeline disasters occurred are often deserted	Areas where oil pipeline disasters occurred are often cleaned up	Victims of oil pipeline disaster are compensated financially	Investigations were usually carried out to identify the cause(s) of the disaster	Lessons were learnt
Areas where oil pipeline disasters occurred are often deserted	Correlation Coefficient	1.000	.246**	-.039	.153**	.141*
	Sig. (2-tailed)	.	.000	.499	.008	.014
Areas where oil pipeline disasters occurred are often cleaned up	Correlation Coefficient	.246**	1.000	.197**	.558**	.161**
	Sig. (2-tailed)	.000	.	.001	.000	.005
Victims of oil pipeline disaster are compensated financially	Correlation Coefficient	-.039	.197**	1.000	.207**	.051
	Sig. (2-tailed)	.499	.001	.	.000	.381
Investigations were usually carried out to identify the cause(s) of the disaster	Correlation Coefficient	.153**	.558**	.207**	1.000	.323**
	Sig. (2-tailed)	.008	.000	.000	.	.000
Lessons were learnt	Correlation Coefficient	.141*	.161**	.051	.323**	1.000
	Sig. (2-tailed)	.014	.005	.381	.000	.
	N	300	300	300	300	300

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: IBM SPSS Analysis Software

The Table indicated a positive correlation between the factors relating to aftermath of oil pipeline disasters. The level of correlation between these factors are statistically significant 0.05 level of significance.

CURRENT LEVEL OF COLLABORATION

Correlations Between Factors

		My firm/institution has clear policy and practice for collaboration with other agencies	The current level of collaboration between my firm/institution with other agencies has been effective in responses to cases of disaster management	In my experience, collaboration between stakeholders has been an effective tool in disaster management
My firm/institution has clear policy and practice for collaboration with other agencies	Pearson Correlation	1	.696**	-.016
	Sig. (2-tailed)		.000	.777
	N	300	300	300
The current level of collaboration between my firm/institution with other agencies has been effective in responses to cases of disaster management	Pearson Correlation	.696**	1	.136*
	Sig. (2-tailed)	.000		.018
	N	300	300	300
In my experience, collaboration between stakeholders has been an effective tool in disaster management	Pearson Correlation	-.016	.136*	1
	Sig. (2-tailed)	.777	.018	
	N	300	300	300

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: IBM SPSS Analysis Software

There exist positive correlations between these factors as observed from the Table except for the correlation between firms/institutions having clear policy and practice for collaboration and collaboration been an effective tool in disaster management. Also, at 0.05 level of significance, only the current level of collaboration been effective is statistically significant in comparison with collaboration been an effective tool in disaster management. The rest items are not statistically significant at 0.05 level of significance.

Reliability Test for the Likert Scale Questions

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.745	.761	14

Source: IBM SPSS Analysis Software

The Table shows the Cronbach's alpha reliability test for all the likert scale items tested during the survey. These includes the emergency preparedness rating, aftermath of oil pipeline disaster as well as current level of collaboration amongst stakeholders. A value of 0.745 was obtained. This is quite satisfactory, indicating that the data obtained are reliable.

RELEVANT STAKEHOLDERS IN OIL PIPELINE DISASTER MANAGEMENT

Cronbach's Alpha Reliability Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.704	.722	9

Source: IBM SPSS Analysis Software

For the 9 item tested, a reliability of 0.704 was obtained. This shows a good reliability of the data obtained.

Correlation amongst the Relevant Stakeholders in Oil Pipeline Disaster Management

			Government Agencies	Non Governmental Organizations (NGOs)	Security Agencies	Health Agencies	Local and International Donors	Media	Academia	Community and Citizen	Regional Cooperation
Spearman's rho	Government Agencies	Correlation Coefficient	1.000	-.030	.339**	.115*	.150**	.150**	.094	.168**	.165**
		Sig. (2-tailed)	.	.609	.000	.047	.009	.009	.106	.003	.004
		N	300	300	300	300	300	300	300	300	300
	Non Governmental Organizations (NGOs)	Correlation Coefficient	-.030	1.000	.108	.271**	.337**	.238**	.164**	.086	-.050
		Sig. (2-tailed)	.609	.	.062	.000	.000	.000	.004	.137	.386
		N	300	300	300	300	300	300	300	300	300
	Security Agencies	Correlation Coefficient	.339**	.108	1.000	.488**	.140*	.372**	.329**	.545**	.255**
		Sig. (2-tailed)	.000	.062	.	.000	.015	.000	.000	.000	.000
		N	300	300	300	300	300	300	300	300	300
	Health Agencies	Correlation Coefficient	.115*	.271**	.488**	1.000	.160**	.475**	.421**	.249**	-.123*
		Sig. (2-tailed)	.047	.000	.000	.	.006	.000	.000	.000	.033
		N	300	300	300	300	300	300	300	300	300
	Local and International Donors	Correlation Coefficient	.150**	.337**	.140*	.160**	1.000	.240**	.331**	.179**	.416**
		Sig. (2-tailed)	.009	.000	.015	.006	.	.000	.000	.002	.000
		N	300	300	300	300	300	300	300	300	300
	Media	Correlation Coefficient	.150**	.238**	.372**	.475**	.240**	1.000	.530**	.242**	.032
		Sig. (2-tailed)	.009	.000	.000	.000	.000	.	.000	.000	.581
		N	300	300	300	300	300	300	300	300	300
	Academia	Correlation Coefficient	.094	.164**	.329**	.421**	.331**	.530**	1.000	.177**	.021
		Sig. (2-tailed)	.106	.004	.000	.000	.000	.000	.	.002	.717
		N	300	300	300	300	300	300	300	300	300
	Community and Citizen	Correlation Coefficient	.168**	.086	.545**	.249**	.179**	.242**	.177**	1.000	.276**
		Sig. (2-tailed)	.003	.137	.000	.000	.002	.000	.002	.	.000
		N	300	300	300	300	300	300	300	300	300
	Regional Cooperation	Correlation Coefficient	.165**	-.050	.255**	-.123*	.416**	.032	.021	.276**	1.000
		Sig. (2-tailed)	.004	.386	.000	.033	.000	.581	.717	.000	.
		N	300	300	300	300	300	300	300	300	300

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: IBM SPSS Analysis Software

The Table shows to a large extent, positive correlation values between the relevant stakeholders in oil pipeline disaster management. Also, at a significance level of 0.05, no statistical significance was observed.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Government Agencies	.541	300	.000	.224	300	.000
Non Governmental Organizations (NGOs)	.391	300	.000	.623	300	.000
Security Agencies	.531	300	.000	.335	300	.000
Health Agencies	.468	300	.000	.538	300	.000
Local and International Donors	.443	300	.000	.575	300	.000
Media	.416	300	.000	.604	300	.000
Academia	.360	300	.000	.635	300	.000
Community and Citizen	.528	300	.000	.355	300	.000
Regional Cooperation	.344	300	.000	.636	300	.000

a. Lilliefors Significance Correction
Source: IBM SPSS Analysis Software

The significance level using the Shapiro-Wilk and Kolmogorov-Smirnov test were less than 0.05 indicating a non-parametric distribution.