CHALLENGES OF SUPPLY CHAIN MANAGEMENT IN THE OIL & GAS PRODUCTION IN NIGERIA (SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA).

BY

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ABSTRACT

A cursory look at the Nigerian Economy, one will be left with no choice other than to say that its economy is largely dependent on its oil/ gas sector, making the sector one to research on, thus finding out the Challenges of Supply Chain Management and its effect on oil/ gas production is of the essence as this will provide a clue to proffering solution to the regular shortages of oil supply in the country and regular long queue at gas stations.

In other to achieve this objective, this study focused on Nigeria's downstream petroleum supply chain and elaborates in details on the challenges that surround the oil and gas sector using Shell Petroleum Plc located at Niger Delta Nigeria and in this process, employees in the supply and distribution department were investigated using self-administered questionnaires where 30 questionnaires were distributed and 27 retrieved. In examining the data, (SPSS) known as the Statistical Package for Social Sciences was employed, results were presented in simple percentage and frequency tables, three hypothesis tests were also carried out to find out whether or not relationships exist between variables. This study also examines the effect of the pandemic on the stock market in the oil and gas industry. The coronavirus has critically changed the world, and this has greatly impacted numerous businesses/industries and the oil industry was not exempted. The discussion and analyzing of findings chapter was broken into two sections where we emphasized on the different dimensions of the supply chain and gave detailed explanation and findings of all our hypotheses in chapter Six (6) (6.2 up until 6.2.3).

However, results gotten proved beyond a reasonable doubt that relationship exist between the variables. In this view, the study suggests that the issue of Supply chain Management should not be taken for granted and that firms to be outsourced by Shell must be thoroughly investigated to determine their past performance.

Keywords: Supply Chain Management, Productivity, Supply Chain Activities.

Submission of Thesis and Dissertation

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LIST OF ABBREVIATIONS

SPDC: Shell Petroleum Development Company

SCM: Supply Chain Management

NNPC: Nigeria National Petroleum Corporation

OPEC: Organization of the Petroleum Exporting Countries

BP: British Petroleum

TEPNG: Total Exploration & Production Nigeria Limited

SNEPCO: Shell Nigeria Exploration and Production Company

SCI: Supply Chain Integration

SCC: Subcontractor Challenges

LC: Logistic Challenges

PR: Productivity

LNG: liquefied natural gas

SMEs: Small and Medium Scale Enterprises

O & G: Oil and Gas

RFID: Radio Frequency Identification

CHAPTER ONE

1.0 Introduction

This chapter gives an overview of the research study, summarizing plans and goals of the research study, also knowing the significance of the study.

1.1. Background of the research study

The issue of the challenges of supply chain management and its effect/ impact on a firm's existence cannot be less emphasized, as firms need its products to get to its customers before it can be said to be complete with the aim of maximizing profit. It is in line with Kampstra *et al*. (2006), he proposed that supply chain management [SCM] has helped significantly in the furtherance from coordination & purchasing experienced from the 1960s to 1990s to a broader & incorporated accentuation on value creation in the world. Leading industries perceive the excellence of supply chain as not just a source of cost reduction but as an opportunity to building a greater advantage over competitors with the ability to improve operation & reduce expense.

Bolumole (2000) views that the management of the supply chain offers a coordinated philosophy for the management of the firm's purchasing & distribution procedures on the foundation of the marketing perspective. The general goal of SCM [supply chain management] is to add to the enhancement of the profitability of the firm. Supply chain management is the blueprint, management, and constant development of an established set of processes for purchasing and distribution of goods and services (Chima, 2007). According to the Global Supply Chain Forum, SCM is a mix of important processes in business from customers via suppliers that make these products available (Chan & Qi, 2003). "Most challenges that arise in SCM is as a result of vulnerability or a collapse in facilitating certain activities" (Turban *et al.*2004). According to Cooper and Ellram, (1993), SCM is the ability to control the general flow at which distribution takes place, from the supplier (the distributor) to its end-user (the customer). The main aim of SCM is to provide efficient service to clients at the lowest cost possible to maximize profit (Chima, 2007). SCM is now a crucial tool for sustaining an upper hand for every established firm & industry (Magretta, 1998).

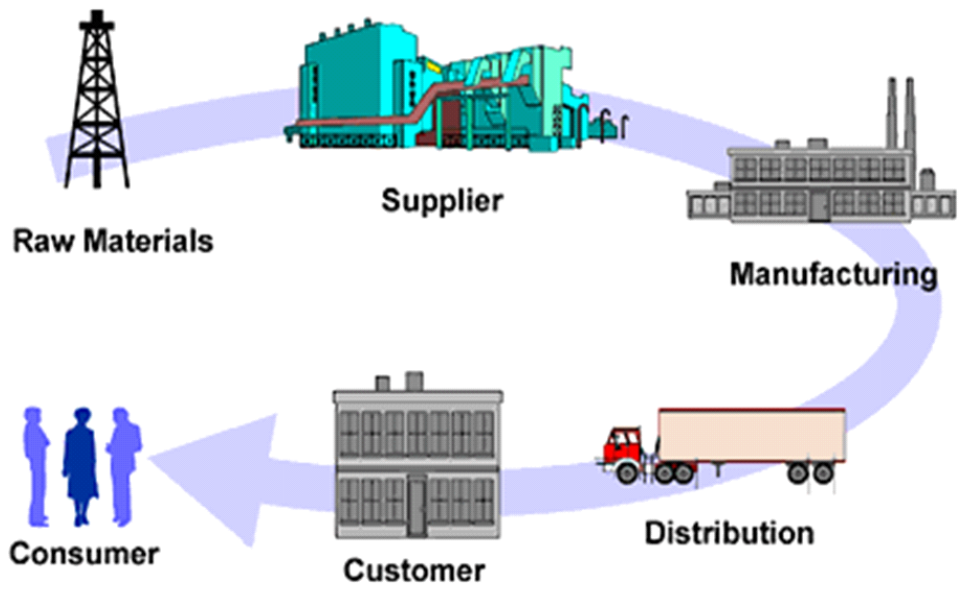


Fig 1: View of Supply Chain. Source: (http://organizations.weber.edu [Accessed 24/11/2019].

The figure above exemplifies the inventory control process and production planning that incorporates the manufacture of goods by corporations and the boundaries connected with the supply chain process. The production planning reveals the explanation of the formation and administration of the production method that includes the recording of raw materials and securing, material handling design and control (Beamon, 1998).

Additionally, supply chain management (SCM) can be described as the configuration, management, and uninterrupted improvement of a sequentially structured set of operations that involves the purchasing and distribution of materials to enhance productivity. The purpose of SCM is to deliver maximum customer service/assistant at the least possible cost, having it in mind that a customer is anybody who consumes the output of a process.

In a supply chain, a firm will network to its suppliers/contractor's upstream and its distributors/wholesaler's downstream to best serve its customers. Usually, information, materials, capital, technology, labor, financial assets, and other resources flow through the supply chain. Given That the objective of the corporation is to maximize profits, the company must increase benefits and lessen costs along the supply chain (Christopher et al 2007).

The company must evaluate the benefits against the costs of each judgement/decision it makes along its supply chain to ensure that the company's target/purpose of profit maximization is achieved without

neglecting customer's satisfaction. Supply chain management is hence an extension/continuation of the focus on client service. Nowadays, there are new opportunities for organizing events across a supply chain even in such convoluted operations as oil and gas, because of improving information systems and communication technologies.

Combining the management of operations with other roles/functions of the operation permits the involvement of all functions in the SCM decisions. Historically, the ownership of supply chain of a company has always been highly concentrated. Typically, it is common to separately handle high-tech operations from low tech operations and labor-intensive operations from capital-intensive operations. It is also common to manage by considering scale economies (Christopher et al 2007). Thus, it is common to distinct operations that generate standardized goods and services in significant quantities from those that manufacture a great collection of personalized products in lesser quantities.

There have been worries recently and many people have suggested that the O&G manufacturing sector could have entered an age of increasingly limited capital. However, resources are not the explanation for supply constraints, given the huge potential still available including, currently identified & booked reserves, more potential discoveries, expanding scope for recovery from existing fields with new technology, and the new frontier of vast oil sands and oil shale reserves that are in the money at today's prices.

1.1.1. Introduction of the Case Company (SPDC)

The operations of SPDC (Shell) are both onshore and offshore and its activities in Nigeria are coordinated as a joint venture consisting of various firms and NNPC (Nigeria National Petroleum Corporation) & shell owned companies. Shell is the head of all petroleum firms in Nigeria. It produces about 39% of the nation's oil. Its activities are mainly in the Niger Delta & offshore regions where it carries operations in the oil mining lease area of about 31,000 square kilometers. "SPDC has employees of over 4,500 and has over 6,000 kilometers of pipelines with 8 gas plant & 87 flow stations".

1.1.2. Background Overview of Nigeria's Oil and Gas production.

Nigeria is the largest oil producer in the whole of Africa. The supply chain of the O&G manufacturing industry comprises of upstream, midstream, and downstream sectors (Aminu & Olawore, 2014; NNPC, 2016). The upstream is the maritime company that deal with the manufacture of crude oil. The midstream deals with storage and refining of petroleum goods while the downstream includes activities like

dissemination, transfer of oil produced goods from the plants to retail outlets (NNPC, 2016; Osuala, 2013). It has been estimated that crude oil in Nigeria would decline to about 7.93% (2018-2025). The up and downstream sector of the industry is the factor that drives the market. The oil and gas production over the past couple of years has been hampered in Nigeria due to attacks on oil infrastructure by militants. The majority of the country's natural given gas production was re-injected to boost better crude oil recovery.

"With the rate of unemployment, a change in climate arose as a result of greenhouse emission from flare-outs, the time has come to generate new ways to utilize and take advantage of the gas reserves of the country and to convert it to improving the nation" (Odumugbo, 2010) ."Also, with 6-LNG trains delivering at Bonny, the country is set to be the 3rd highest LNG exporter after Indonesia & Qatar" (Economides and Wood, 2009).

1.2. Statement of the problem

Few authors have proposed that "the force towards successful supply chain during recent times has added to the supply chains turning out to be increasingly powerless to distraction and exposed to impediments" (Christopher and Lee, 2004; McGillivray, 2000; Engardio, 2001). This paper sought to discover the answer to the question, "what are the challenges of the supply chain in oil and gas production in the Niger Delta region?"

SCM is a complex issue in most industry of which the oil and gas are not left out and this is because it plays a unique part in the industry. Although the reason for its uniqueness in the O&G industry is because of its very lengthy link as it requires many parties/groups starting from its exploration of oil and gas to the end-user (customer). Also, it involves the use of very expensive machinery, equipment, and specialized logistic, and majority of the equipment needs unique maintenance and operations by skilled workers.

Aside from the above, the industry is also affected by political factors as majority O&G industry organizations are regulated by the local government and this is where the militancy disruption and coronavirus spread in the community comes in. It is in view of this that this study seeks to find out how Shell is fairing in the face of these challenges.

1.3. Research Aims and Objectives

1.3.1. Research Aim

The intention of this paper is to analyze the predicament associated with the supply chain management of oil and gas production in the Niger Delta region of Nigeria using the Shell Petroleum Development Company of Nigeria as a case.

1.3.2. Specific Objectives

The intentions of this research paper include:

- To analyze the process of the supply chain in the oil and gas production sector based on literature.
- To evaluate the already current gaps in the supply chain of the operations of oil and gas.
- To highlight lessons & information gotten from literature which would assist in investigating the activities/operations of Supply Chain in Shell Petroleum Development Company of Nigeria.
- To utilize Questionnaires in examining the obstacles of supply chain encountered by Shell & create more efficiency/effectiveness in the supply chain of oil and gas production.

1.4. Rationale of the study

“The O&G industry proposes a solid model for the implementation of supply chain management (SCM) practices” (Banjoko). Viewing the obstacles of the supply chain in the production of O&G , are these obstacles inherent in the industry? Or are they related to volatility? Issues of the supply chain are embedded in the companies themselves.

Hence the drive of this study is to analyze & identify the method & pattern of the supply chain in the oil and gas production sector, its obstacles, and have a view into Shell (SPDC) and the obstacle in which its supply chain encounters. Afterward, an appraisal would be conducted with a view to recommending approaches to lessening it.

1.5. Significance of the Research study

This research paper has significance to individuals with an interest in identifying obstacles faced in the supply chain of O&G production (Niger Delta, Nigeria). It is also of value to oil and gas marketers & their key players, enabling them with data on how to mitigate the obstacles.

Furthermore, it is expected that this study could add to already current literature in disputes influencing supply chain management in the oil and gas businesses. The discoveries & suggestions of this paper would be of importance to managers.

1.6. Scope of the Study

This study is on the challenges of supply chain management faced by oil/ gas firms in their production capacity, but emphasis will be on the O&G manufacturing industry in Delta State and the Shell Petroleum Development Company of Nigeria will be used as a case study. The survey research method with the aid of questionnaires which is a primary source of data collection will be adopted. Shell Petroleum Development Company of Nigeria located in Delta State Nigeria, with a reasonable number of employees from which the sample size will be drawn.

Dissertation Structure

This thesis is constructed into seven chapters and they are as follows.

Chapter One: Introduction – A broad overview of the topic which also examines the logic for embarking on the research.

Chapter Two: Literature Review – A Systematic Analysis of the literature about Supply Chain in O&G production, leading to analysis of the challenges faced by SPDC in oil production in Niger Delta Nigeria, also not ruling out the effect of the pandemic to the industry and identification of the likely ways of extenuating the difficulties in the supply chain.

Chapter Three: Research Question and Hypotheses – This section highlighted the research question guiding this paper which produced both our dependent and independent variables as well as our hypotheses.

Chapter Four: Research Methodology – Chapter four explains the methodology employed in this study, motives for implementing the approach and data collection methods.

Chapter Five: Data Presentation, Analysis and Interpretation - Analysis of the results of questionnaire responses, brief discussion of the results and possible ways and steps to be taken by Nigerian government and SPDC to mitigate the problem facing supply chain in oil and gas production in Niger Delta.

Chapter Six: Discussions and Findings – In this chapter, we explored our literature and findings gotten from our respondents which can be seen in the tests of hypotheses in 5.3. There is a well detailed explanation of the findings where we aligned our findings with emphasis and views of scholars and authors.

Chapter Seven: Conclusions drawn from the study, advised recommendations that could be embraced by Nigerian government and SPDC to alleviate and tackle the disputes being faced in the supply chain of O&G production and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

2.1.1. The Oil Industry

The petroleum corporations similarly known as the oil and gas firms have established an important piece of the economy globally for the most recent decade of which results in petroleum or crude oil becoming the main fuel source. Nigeria is the leading/biggest manufacturer and exporters of crude oil in Africa (BP 2015). Above 60% of the nation's national budgetary revenue, 15% of GDP and 95% of foreign exchange revenues have been impacted by the oil and gas (O&G) production through crude oil exports (NBS 2012). For many years, the level of raids/incidents on oil transportation pipelines, violent rallies/protests, attacks/strikes on oil installations and kidnapping of oil operatives/staff, with insecurity in the province have been a major concern across the globe (Omofonmwan and Odia 2009). It was projected that the Nigerian Federal government lost in excess of 170 billion Naira within 2000 and 2010 as a result of such controversies/conflicts (Anifowose et al. 2012).

The Nigerian Federal government has established different natural laws and made an attempt to control the actions/operations of the O&G sector so as to decrease the negative repercussions of their activities/actions (Idemudia 2010). Furthermore, the oil and gas (O&G) sector has likewise taken on means to mitigate the undesirable/negative environmental externalities and socio-economic challenges related to O&G activities, including the compensation payments made to affected persons and communities, and identifying corporate responsibilities (Idemudia 2014). In spite of these endeavors that have been mutually made by both the Federal Government of Nigeria and the O&G sector, the Niger Delta region continues to be exposed to O&G related environmental threats/dangers and economic hardship related to the activities of the O&G sector in this region.

Crude oil and natural gas are known as raw resources for the petroleum industry. ka et al. (2006) briefly spoke on the production process. Crude oil production can be gotten from deep underground or in offshore areas and used to produce petrochemicals & oil derivatives. When accessed, it goes through a distillation process and various parts of it are manufactured (Hussain et al., 2006). Fuel, naphtha, and kerosene are samples gotten from crude oil & these are moved to the refineries/factories as a feedstock following the cracking process where new products can be extracted/obtained for the petrochemical industry such as

aromatics & olefins. Also, with propylene, benzene, ethylene, toluene, butadiene, and xylenes, petrochemical plants can manufacture products like soaps, synthetic fibers, furniture, paints & many others (Hussain et al., 2006). It was also revealed that economic trends worldwide and petroleum industries have turned out to be inseparable and have had a great influence on each other in recent times.

Anderson (2003) highlighted two unstable factors that cause the oil market to be highly volatile, they include “frequent price fluctuation and the frequent political changes”. These factors keep instigating major changes in the demand and supply that have a visible effect on the supply chain and its management. Ribas et al. (2011) add that the volatility can be due to unanticipated circumstances such as broken-down equipment or natural disaster. The high level of instability of the oil & gas market raises the need to adopt a unique management of supply chain in the oil industry (Ribas et al., 2011).

Outsourcing is extremely crucial in the supply chain. The O&G supply chain is unique from other industries. Firstly, there is a long chain of distribution as it requires many parties from the exploration of O&G to the ultimate customer (Varma et al., 2008). Secondly is the involvement of high-priced machinery and specialized logistic services. The machinery/equipment requires maintenance by competent personnel. Thirdly, the O&G industry is regulated largely by the government. As such, the industry is influenced by political factors (Ngoasong, 2014). Lastly, refinery plants are located near to coast to make it easy to be accessed by the crude oil tanker (International Energy Agency, 2012).

O&G industry is subjected to a high degree of risks which need certain reduction and processes to avert accidents (Varma et al., 2008; Mearns and Yule, 2009). When managing the supply chain, all factors are to be considered ensuring operations are secure for individuals, equipment, and the environment. The upstream and downstream sector & the numerous business events within the sectors need a deep understanding of the industry to ensure effective supply chain management.

2.2. Conceptual framework

2.2.1. Definition of Supply Chain Management (SCM)

What is Supply Chain Management? “It is the progression of connected events which are related to controlling, coordination and planning of raw substances & completed manufactured goods from dealer [suppliers] to client" (Lourenco, 2001). “Supply chain in the oil and gas sector is seen as complicated especially in cases of linkage between upstream suppliers, downstream distributors, information capital and flow through the chain” (Banjoko, n.d).

2.2.1.1. Concept of Supply Chain Management

The research in this field started in the early 1980s (Bourne, 2000), and this was distinct from previous studies in which early research on performance management concentrated mainly on monetary aspects & factors (Neely, Gregory, and Platts, 1995). This traditional approach to performance has received much criticism as being only suitable for short-term success (Bourne, 2000). Likewise, Parker (2000) argues that as compared to other firms, the reliance on financial metrics does not reflect the true strength of a product.

The author went further to state that the system does not involve intangible variables such as reliability of product or service, and that metric are lagging as it tracks past events. In other words, Bititci (1997) claimed that organizations that only consider the financial measures are likely to fall short in improvement and development. The increase in the research of supply chain performance has been caused by the desire on the researcher's part to get a wholistic organizational performance (Gunasekaran and Kobu, 2007).

Drawing from the above, traditional measurements such as activity-based costing is losing its relevance because of the current trend of outsourcing by organizations (Gunasekaran and Kobu, 2007). Despite the development of research on the supply chain performance, much remains to be discovered as managing supply chain performance isn't a straightforward process (Overton, 2014). In other words, performance management of supply chain is complex and influences many factors like the industrial sector (Taticchi et al., 2013), organizational strategies (Peng and Wee, 2010).

In addition, some external factors such as market situation, political factors, and an increase in globalization play an important role in supply chain performance (Gunasekaran, 2004). This shows that under all business situations, there is no constant scale, but measures should always be dynamic as to adapt to a specific situation" (Abubakar et al., 2016)**.**

2.2.1.2. Sub-Contractor Problems

Most industries now rely on the third-party suppliers to provide the product and services. The O&G industry are not exempted. O&G organizations normally subcontract part of their roles to subsectors to lessen their operating cost, to overcome the limitation of expertise and pass on some of the supply chain risks to another party (Ernst and Young 2014) In fact, research suggest that around 40% of oil and gas practices are outsourced to complete the project (Yusuf et al., 2014; Pillai et al. 2010).

Shell relies on contractors to execute operational activities. Shell would strive to meet up its monthly targets for the extraction of oil in Nigeria without these contractors (Amunwa & Minio, 2011). “Some of these contractors are the likes of Schlumberger, Halliburton, Daewoo, US-based Willbros, and Saipem” (Amunwa & Minio, 2011). These are Shell subsidiaries & sub-companies that complete various operations in the supply chain. A major concern & issue is the chances of each subsidiary performing based on its profit which introduces complications in the supply chain (Banjoko, n.d). This also leaves some customers unsatisfied.

According to (Amunwa & Minio, 2011), Shell staff claimed that contractors cause clashes intentionally with nearby communities (Amunwa & Minio, 2011). Just like in February 2009, Saipem which is a division of Eni placed a pipeline across Taylor Creek which hindered the waterway & put the lives of local women at risk in Ogboloma. The ladies blocked the production site for days constrained Saipem to leave and a key Shell project was kept on hold (Amunwa &Minio, 2011).

2.2.3. Supply Chain Disruption in Nigeria Oil and Gas Sector

Supply Chain Management has been increasingly complex for more than a decade now as executives concentrate on solving challenges arising from globalization, developments in information technology, diversified procurement, outsourcing, and the lean and green demand in the supply chain. Although the performance impact of these projects has received tremendous interest and commendation for research, they also tend to increase supply chain propensity to disruption (Christopher and Lee, 2004).

A key disruption in the supply chain of any commodity can have a substantial dwindling effect on profit, production level, shareholder value, company reputation and relationship with customers, and may even lead to the termination and closure of a company (Afiqah, Musa, Suraya, and Norhidayah, 2014). The impact of main disruption in the O&G industry could ripple through all sectors of the financial system/economy that is dependent on oil for fuel energy & may have a devastating/dreadful outcome on national income.

Every company face disruption tendency in their supply chain, though the enormity of effect could be shocking/alarming for smaller firms than larger ones. Smaller firms have the tendency not to recover shortly from the tensions & pressures of supply chain because they lack the internal and adaptive capability, flexibility and redundancy (Simba, Niemann, Kotzé, & Agigi, 2017) to stay resilience (Azadi Jafarian, Saen, & Mkirhedayatian, 2015) and counter the risk of supply chain as they unfold/reveal. Most

small size supply chains tend to break down during major disruptions and many of them hardly recuperate afterward.

For few firms, it could take extra two years or more to revert to pre-disruption performance level. A case in point was the fire disaster in 2013 that crippled the entire operation of Sunflag Textile Manufacturing Company in Lagos, Nigeria for close to three years. As Hendricks & Singhal (2005) rightly noted that irrespective of the origin of the disruption, the nature of the company, or when the disruption happens, it will cause a grave devastating effect on the economy of the firm, shareholder value, profitability performance and stock price volatility (Hendricks & Singhal 2005).

The vulnerability of some supply chain has been because of a major one-time occurrence occurring from terrorism, natural hazards, and political instability. An example is the US in September 11, 2001, the explosion of oil pipeline perpetrated by militant & insurgent groups in Nigeria Niger Delta, the 'union strike in 2016 by oil workers, major fire disaster engulfing oil tankers, the west-coast port strike in 2002, tank farms and gas depots, the 2003 northeast blackout, and other acts of nature.

Nonetheless, several other disruptions to the supply chain, especially in the downstream petroleum industry in Nigeria could be attributed to inadequate internal processes management as well as external supply chain networks in the petroleum sector (Akanle, O., Adebayo & Adetayo, 2014). The petroleum supply chain could be regarded in the context of this study/analysis as a virtual network of O&G service dependent firms, technology, individuals, activities, information/knowledge, and financial resources involved in creating value through upstream and downstream linkages by making petroleum products and related services accessible to the last-mile consumer in a cost-effective manner.

The supply chain for the petroleum industry is highly inflexible and complex when compared to other industries. Inflexibility stems from the production capacity of crude oil suppliers, long lead times for transportation, and modes of transport limitations (Hussain, et al., 2006). The difficulty of the petroleum supply chain exists due to the various infrastructures and global/worldwide outsourcing organizations functioning in the industry (Kazemi, Szmerekovsky, 2015). Morton, (2003) notes that the factors of inflexibility and complexity make matching demand and supply of petroleum products an uphill task thereby growing the risk of disruptions. The supply chain cycle for petroleum begins with the extraction of crude oil and ends with the distribution of refined petroleum products to consumers. Due to its nature, any disruption in the chain can undermine the cycle, causing delay and interruption in the entire supply network of petroleum products (Paul, Sarker, & Essam,2017). By disruption, we mean the

accidental/unexpected and discrete events that substantially impair the output & operations of any member of the supply chain network for an unplanned period of time (Snyder et al, 2014), and carry serious negative consequences to the system (Tang and Musa 2011).

Nigeria is the number one oil producer in Africa and the supply chain for the petroleum industry comprises of the upstream sector, midstream, and downstream industries (Aminu & Olawore, 2014; NNPC, 2016). The upstream sector comprises mainly of maritime firms charged with crude oil exploration, extraction, and manufacturing. Midstream supply chain companies are answerable for the refining/processing and storage of petroleum products in tank farms and depots. The operations of downstream supply chain's entail the marketing, distribution, and transport of refined petroleum products from the refineries or import jetties to retail outlets/market to be distributed to the customers (NNPC, 2016; Osuala, 2013). This study focuses on the downstream supply chain of petroleum in Nigeria. There is a complex web of petroleum service providers and logistics companies in the downstream supply chain echelon which relies on physical infrastructures and information network to execute their functions (Fernandes et al. 2013).

The complexity indicates that each activity center and partners in supply chain within the entire downstream oil service chain is a possible disruptive force that needs to be carefully defined, controlled, and moderated. According to Simba et al, (2017) drivers are the origins from which threats to supply chain occur. A recent Amor & Ghorbel report (2018) discloses that Nigeria tops the lists of countries outsourcing the production of their oil and supply process, thus enhancing their exposure to disruption risks. Internal processes, external environmental factors, and certain petroleum supply chain components are increasing disruption (Olsen, Haugland, Karlsen, & Husoy, 2005). Environmental disasters, political and global financial crises are examples of supply chain disruption from external environmental factors. Internal operations, the capabilities of the firm, information quality, and visibility of the supply chain process are possible sources of pressure from the petroleum supply chain (Williams, Ponder & Autry, 2009). Operational risk refers to the disturbances caused by issues within a firm's organizational boundaries affecting its ability to manufacture and distribute goods/services (Samvedi et al., 2013).

Supply chain drivers include globalization, long lead-times, low product shelf life, increased outsourcing, and the increasing demand for agile, lean and green supply chain management (Thun & Hoenig 2011). Knowledge of these drivers will serve as support for managers in determining the level of their risk in the supply chain. Executives are tasked to concoct strategies or implement policies that can successfully alleviate supply chain disruptions, either by decreasing the likelihood of occurrence, or by restricting its

impact on the supply process, or by eliminating the risks altogether. The literature abounds with a broad approach to reducing supply chain disturbances. Tang (2006) argued that mitigation strategies should implement either long-term or short-term planning, generating techniques for mitigation and contingency plans. Inalegwu & Raul, (2014) suggests: increase efficiency, inventory, responsiveness, versatility, aggregating demand, and retaining numerous/several and diversified supplier base. Tomlin (2006) site samples of mitigation strategies that include contingent sourcing, orders acceleration, supply rerouting, and lateral and vertical emergency transshipments. Sheffi (2005) and Simona, (2016) propose dual sourcing, increased product, quantity/volume, versatility in routing and distribution, and visibility and management of information.

In Singhal, Agarwal & Mittal (2011), getting a robust supply base not only allows a company to cope with daily demand-supply volatility, but also helps create organizational resilience when significant disruptions occur. Lee &Tang (1996) supports in-house manufacturing of such goods when faced with possible supply delays when outsourcing for certain products. Nsikan, Ekeins, Tarela, & Affiah (2018) reported that assuring predictability through proper quantification, building confidence/trust in supplier cooperation, and investment in the visibility or transparency of the supply chain reduces the risk of disruptions. Inalegwu & Raul, (2014) proposes that investment in information technology especially radio frequency identification tags (RFID) is known to decrease the probability of disruptions by raising inventory visibility, tracking transit shipments and tracking inventory and orders throughout the entire oil supply chain network (Nsikan, John and Tommy,2014). Access to real-time and transparent data reduces the bullwhip effect and offers the exact demand and supply information required to minimize the differences in demand and supply for the commodity. The prominent but regrettable feature of the Nigerian petroleum industry is frequent shortages of petroleum product. Nigeria has experienced frequent disruptions in the supply of petroleum products over the years. This cripples business operation, resulting in revenue loss and underdevelopment as most companies depend on petroleum products for survival (Aminu and Olawore, 2014). Practical evidence may indicate the existence of certain mechanisms to reduce disruptions in the supply chain for the Nigeria petroleum industry. Yet, considering the persistent shortages of refined petroleum products, product adulteration, and the related socio-economic effects, the efficacy of these measures remains doubtful. There is remarkable research interest in the disruptions of supply chain process in the O&G industry.

Nevertheless, the recurrent occurrence of scarcity of petroleum products in Nigeria is an indicator of insufficient insight into the internal drivers of instability of the petroleum supply chain and its mitigation strategies.

2.0 Supply-Chain Link in the Oil and Gas Industry

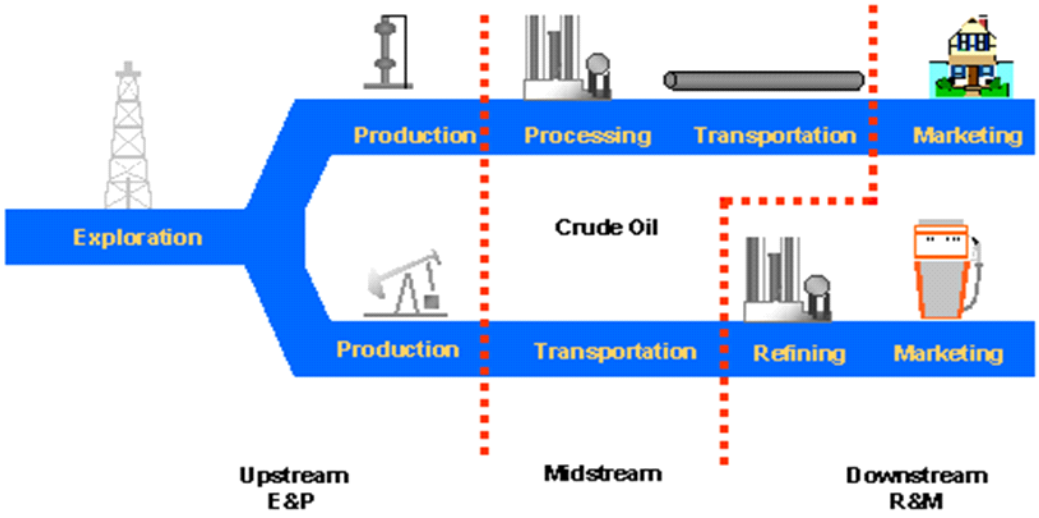


Figure 2: Supply-chain link in the Oil and Gas industry. Source: https://pt.slideshare.net/RavinGandhi/reliance-petroleum-ltd/13 [Accessed on 24/11/2019].

The Figure above is a regular oil and gas supply chain interface.

This chain is not only a "chain of firms but a group of businesses and connections" (Lambert, 2006).

This illustration above shows key supply firms and resources that run via the supply chain. For instance, “the exploration as seen above includes geophysical, seismic & geological operations, and the production events comprise of drilling, production, and reservoir” (Chima, 2007). The retail trade of processed goods such as oil, fuel, etc. is known as marketing. “Each phase of the link can be a unique corporation or a division of an organized company”. The greater part of the work and events are recurring in the exploration and production phase. This shows that in the oil & gas supply chain interface, the events in the exploration phase develop values through recognition possibilities & seismic evaluation.

There are not many oil firms that are able to figure out how to develop a culture of output/production, competence, satisfaction/fulfillment; Schlumberger is one of them (Khan, n.d.). Schlumberger is known as the driving technology supplier around the globe. Schlumberger makes the provision of the most

extensive scope of goods/services from exploration through production. The belief of the firm is that the supply chain is tied with sourcing for the accurate materials and ensuring it gets to the right individual at the appropriate time (Schlumberger worldwide site).

A start of the oil & gas supply chain is the coarse petroleum producer, after which, the oil advances to the purifier, the distributor, the retailers & finally to the gas siphon where customers get the product. "The leading producers of oil in the world are Russia, Iran, Saudi Arabia, Mexico, the United States, China, United Arab Emirates, Norway, Canada, Kuwait, Venezuela, Iran, Brazil, Kazakhstan and Nigeria" (Nathan, 2008). The Organization of the Petroleum Exporting Countries (OPEC) has control over the main crude oil supplies of the world. It is important to note that a high amount of economic returns can be achieved distinctly with well-organized worldwide oil supply chain management (Nathan, 2008).

2.2.4. Effect of the Pandemic on stock market in the Oil and Gas Industry.

The pandemic dominated global headlines since Jan/Feb 2020. China had to shut down plants due to the virus, coupled with a drastic reduction in global tourism and travel, have compelled the demand of oil to fresh lows, triggering the Organization of Petroleum Exporting Countries (OPEC) to take extreme actions to lessen the negative influence on the oil-exporting countries (Ben Winck, 2020). One of the largest oil-producing nations (Saudi Arabia), said to boost/increase production notwithstanding coronavirus and as a result, it led to a 30% plunge in oil prices. The price war started by Saudi Arabia wiped billions of pounds off the market value of the industry's leading corporations after oil markets documented one of the greatest price collapses in history. The shock caused British Petroleum (BP) & the UK oil giants Royal Dutch Shell to suffer a loss of over £32bn from their shared market value within minutes of the London Stock Exchange opening.

The shares of (British Petroleum) BP plunged by 27% while Shell lost a fifth of its market value, after the global benchmark, the price of oil logged its greatest collapse since the Gulf war that took place in 1991. By mid-morning, the worth/value of Shell's London-listed shares plummeted by over 13% to about £13 per share, essentially wiping £16.8bn off the firm, which now has a worth of £108bn. As a result of the outbreak of the virus in China, oil corporations face an unpredictable year, which has erased the forecast of oil growth for the year and may trigger the demand of oil to contract. Shell and the US oil giant ExxonMobil are believed to be the most unprotected/exposed to the market crash as they have high break-even oil prices. Exxon needs about $74/barrel of oil price to contain its costs while Shell requires $65/ barrel to break even (Jillian Ambrose, 2020).

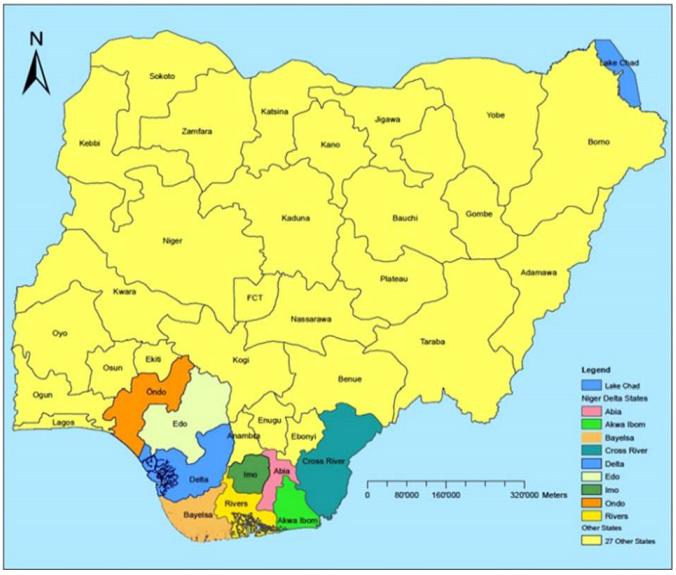
In April 2020, the US oil price per barrel dropped drastically low that traders paid customers to take the asset off their hands. This problem arose because of a lack of storage capacity and traders realizing that the collapse in demand would lead to them receiving and storing their assets. The COVID-19 pandemic has compelled significant sections of the economy to freeze, such that we require less oil than normal due to lowered transportation and production.

There was an oil turn around on last week's setback in June 2020, having a slow but progressive growth since plunging into negative in April 2020. There was a rise in the U.S crude where it was at its highest level since March 6, 2020. Oil traders such as Vitol/Trafigura group & exporter Saudi Aramco emphasized the strength of demand recovery in present days and prices for some of the oil products around the globe are roaring higher. There was 91 cent rises on West Texas Intermediate for July which settled at $39.75/barrel on the New York Mercantile Exchange and there was a gain of 68 cents on Brent for August settlement which settled at $42.19/barrel. OPEC also help stimulate the recovery in oil price by making deals with Russia and other allies to limit production. Prince Abdulaziz Salam (Crowned Prince of Saudi Arabia) mentioned that OPEC was on the right path to re-balance the oil market worldwide and it would be a critical phase for OPEC to ensure & demonstrate that nations around the globe are obeying/sticking to the cuts.

2.2.5. Economic contribution of Shell to Nigeria

"Shell operates a joint venture between Nigerian National Petroleum Corporation (NNPC), Total Exploration and Production Nigeria Limited (TEPNG) & Nigerian Agip Oil Company Limited (NAOC)". In the oil making market, with the aid of joint partners, Shell has been able to deliver over 1million barrels daily on an average (shell.com.ng).

- 4,000/30,000: estimated direct and indirect jobs created by SPDC and SNEPCO in Nigeria(shell.com.ng).
- 42 billion dollars in revenue to government from SPDC between 2008 to 2012.
- 5.2 billion dollars of the share of taxes & royalty compensated to the Nigerian government in 2012



(SPDC 3.4 billion dollars, SNEPCO 1.8 billion dollars).

Fig 3: Oil Producing States in Niger Delta Region shown on map. Source: (http://pubs.sciepub.com/env/1/4/2/ [Accessed 28/11/2019].

Most of the oil generating states are found in the Niger Delta; Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, and Rivers (Oviasuyi & Uwadiae, 2010). The provinces are also blessed naturally with reasonable deposits of gas reserves & hydrocarbon. Crude oil resources provide the government with 20 million dollars daily (Oviasuyi & Uwadiae, 2010).

2.2.5.1. Supply chain challenges of shell in Niger delta Nigeria.

Over the years, the militant obstruction has caused Shell to experience low production output and increased capital spending (Banjoko, n.d). Some obstacles Shell encountered includes vandalization of pipelines, absence of technology infrastructure, sub-contractor issues, and increase demand from community host. Some of these issues will be highlighted below.

Pipeline Vandalization

Fig 4: A blazing pipeline owned by SPDC. Source: (wn.com 2008) [Accessed 28/11/2019].

The militants use certain crimes such as kidnapping, piracy, and oil bunkering to finance their activities. The amount of oil stolen cannot be accurately ascertained, researchers have proposed it to be as excessive as 5-10% of the total production in Nigeria (Malina, n.d.). MEND stated that "explosion engineers sponsored by severely equipped fighters damaged two of Shell's pipelines" (Purefoy, 2008). The company had to close production in order "to control the volume of crude that will spill out to the environment,".

Also, there was an attack on the pipeline of shell in Rivers State using heavy weapons and riffles which occurred on December 19, 2009 (Malina, n.d.). This is one of the severe issues affecting the production of oil in the Niger Delta region. This issue has hindered Shell from meeting up to the required production output and did not want to expose its staff to dangers caused by the militant group in the Niger Delta region. Several pipelines have been destroyed & the kidnapping of numerous oil staff with the demand of huge sums as settlement for their release by the militant group has caused a draw-back in the production line of these oil and gas companies operating in the region.

Additional literature examined that "When a pipeline is affected and manufacturing gets shut down, you realize the cost of oil increases because there are no slacks in the system," said Jim LeCamp.). SPDC [Shell] has not ceased to look for the most suitable plan to protect its facilities. Despite these, the hazard of crude oil embezzlement and damage continues.

2.2.5.2. Relatively High Demand from Host Community

Over the years, the unsettling nature in the Niger Delta that has been caused by disagreement & tribal wrangles over incomes of oil has generated corporate social obligation from Shell (Coble, 2007). The underdeveloped states of the communities that are rich in oil have issues such as bad roads, poor network coverage, lack of portable drinking water, the poor state of medical centers, and many others. This has affected the companies that carry out operations in these communities even though it is the responsibility of the government to make provision of all these amenities in place, the residents of these communities have accused the oil companies and the government of underdevelopment of their communities. They are furious on the profit these companies and the government make from their lands yet they (the community) have not benefited significantly from the returns. (Murdock, 2012) states that most of the people in these communities live under $1 per day ($1 is equivalent to 450 Naira as of June 2020) (Abokifx.com). This has caused the youth in such communities to resolve into violence by attacking the infrastructures and facilities of these oil companies, shutting down offices, kidnapping staff to get shares or compensation (Coble, 2007). The Niger Delta communities have been faced with the negative effects such as no portable drinking water resulting from the activities of the oil companies' operations in this region and the lack of basic needs such as electricity, good road network, employment as a result of government neglections. (Ile &Akukwe, 2001).

2.3. THEORETICAL FRAMEWORK

The rate of oil supply (amount of oil & gas available) can be explained using one of the following theories which are Dutch disease, volatility effect of natural resource abundance/dependence (caballero, 2000), or rent-seeking effect. For this study, the rent-seeking effect theory will be adopted as this has a way to impacting either positively or negatively on supply chain management in the oil & gas industry.

Rent-seeking is of the opinion that resource dependence, especially in the oil & gas industry, usually leads to development cycle leading to all participant be it private or public, domestic & foreign have an overwhelming concern to seek partnership or alliance that have the natural resources so as to have its own share of the resource.

The issue with rent-seeking theory sometimes is attached to incentives, these incentives often disrupt production activities, affect the entire economy negatively, hindering its growth (GDP). In a dynamic

system, this may produce voracity effects as found in the words of Tornell (Tornel, 1999). Flowing from the above, it can be said that in as much as this theory (rent-seeking) is good, it could lead to future disruption of production activities as seen in the Niger Delta region that has today led to increase in the rate of militancy activities such as Kidnapping of expatriates, vandalization of pipeline, clashes between communities, firm & communities (Shell and its host community) owing to the fact that incentives might not get to certain individuals while their resources are being tapped by the firm.

CONCLUSION

Flowing from the review of the literature of others authors, it can be said that different authors have come up with different perspectives as regards the subject matter Supply Chain management and Productivity, but none has endeavored to carry study with the same subject matter and using Shell Nigeria as a case study and this has set as setback thus limiting their findings to their area of concentration. In this view, the study seeks to broaden the scope of the subject matter using Shell Nigeria as a case study with the aim of adding to knowledge on this same subject matter (Supply Chain Management and Productivity).

CHAPTER THREE

RESEARCH QUESTIONS AND HYPOTHESES

3.0. Research question:

The key question this research seeks to resolve can be seen below:

- What are the disputes/obstacles faced with the supply chain in oil and gas production in the Niger Delta region?

The Niger Delta region has massive oil and gas reserves and ranks the sixth-largest crude oil exporter in the world. But despite the enormous resources that are bound in the region, the region still lacks efficiency in the supply chain of its oil thereby facing certain major obstacles that have caused major loss of profits for major oil companies and the oil industries at large.

The key research question would be broken down into two (2) sub-questions and this will be briefly explained below, they are as follows:

1. What are the logistical challenges affecting the supply chain in the oil and gas sector with respect to the current pandemic (Coronavirus) faced by the global economy?

This question seeks to discover the obstacles in transportation in the supply chain of oil industries. The oil and petrochemical industries are international. The long-distance between both supply chain partners & slow modes of transportation not only induces high transportation costs and in-transit inventory but also relatively high costs of carrying inventory in terms of safety stocks at the location of the final consumer. Qualified respondents working at Shell Petroleum (Supply & Distribution Department) would be in the best position to provide data on this question.

2. What are the major issues that result in the subcontractor's inefficiency thereby leading to a loss for oil and gas industries?

This question seeks to uncover the causes of the subcontractor's inadequacies which as a result, had a great impact on the petrochemical industry. There are numerous problems surrounding sub-contractors such as inadequate planning, poor management of contractor's schedules, clashes with locals in the community as briefly explained in the literature review in chapter 2 (2.0.). Problems with these sub-contractors can be reduced by implementing a careful selection process that considers not only cost but environmental aspects to avoid clashes with locals.

3.1. Research Hypothesis

The following research hypothesis test will be carried out

3.1.1. Hypothesis one

H_0: There is no significant relationship between supply chain management and oil/ gas production in Nigeria

H_1: There is a significant relationship between supply chain management and oil/ gas production in Nigeria

3.1.2. Rational for hypothesis one

Past studies have shown that interest of supply chain management has been a major concern for researchers (e.g. Christopher et al 2007) but none of this researchers carried out their study using Shell Petroleum Development Company of Nigeria, thus making their study relevant to their area of interest but it will interest us to know that findings of such scholars can only be applicable to their areas of interest thus leaving out Shell Petroleum which is the emphasis of this study. Findings gotten from this study will be translated in latter chapters which will serve as recommendations and analysis to solving the challenges of supply chain management in the oil/ gas industry first in Shell, subsequently Nigeria as a whole.

3.2. Hypothesis two

H_0: There is no significant relationship between logistic challenge and oil/ gas production in Nigeria

H_1: There is a significant relationship between logistic challenge and oil/ gas production in Nigeria

3.2.1. Rational for hypothesis two

Logistics is another major concern that is worrisome in every business organization that deals with the movement of goods and services but how well has it been investigated is the major concern of this study. When there is a logistics challenge, production is incomplete. However, this study confirms that there is a challenge that is needed to be examined for effectiveness/efficiency and this is the essence of this hypothesis two

3.3. Hypothesis three

H_0: There is no significant relationship between subcontractors' challenge and oil/ gas production in Nigeria

H_1: There is a significant relationship between subcontractors' challenge and oil/ gas production in Nigeria

3.3.1. Rational for hypothesis three

Giving out jobs to other firms or individuals (sub-contractors) is another major concern of this study. Therefore, an adept knowledge of the subcontractor and its effect/ impact on oil/ gas production inquiry is needed. This study deems it fit to carry out an empirical study with the aim to know whether a relationship exists between the variables.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1. Methodology Research

A research methodology is a process of analyzing & examining. It resolves issues thereby increasing knowledge. The aim of research includes assessing difficulties, evaluation of existing knowledge, developing new ways of doing things (Collins and Hussey, (2003). This paper reviews the methods of research, methodologies & model that would be used, the description of vital notions in research & corporate collection of data and locating other related data and material for the research.

4.2. Project Philosophy

For this paper, an inductive approach was used, which entails collation of ideas from various individuals on a topic and examining results gotten. The research paper was studied from a realistic viewpoint which led to knowing risks and obstacles involved with the supply chain in oil & gas production in Nigeria and the extent on which they attempted to achieve lasting solutions to it.

4.3. Research Design

The widely used approaches in research include quantitative, although other research methods still exist. Research has been conceived to utilize other methods that would assist in achieving the goals of the study. Consist of systematic review and case study methodologies.

4.3.1. Systematic Literature Review Methodology – This deal with the rational re-evaluation of literature, to assess the obstacles, opportunities & potential resolutions to the issue of supply chain oil & gas. A thorough analysis of the data gathered from the systematic review will be taken and correlated with Shell's O&G production in the Niger Delta region of Nigeria context.

4.3.2. Case Study –A phenomenological research methodology was used in this case study. A case study comprises the usage of descriptive, illustrative, experimental, and informative approaches to define active/efficient supply chain activities & using theories as a way of understanding the process of supply chain management & obstacle faced. For this research work, the Shell Petroleum Development Company of Nigeria will be used as a case.

4.3.3. Qualitative Research

This is an analytical research technique used to build a much-improved knowledge of details & opinions (Creswell, 2009). There are various approaches that can be used in this qualitative research such as the feminist perspective, participative inquiry & grounded theory (Neville, 2005). For this research paper, the participatory inquiry was adopted & used because it creates room for support & participation of colleagues at the office of inquiry (case study). An advantage of using the approach is the capability to make use of a small section for the study which enables the researcher to discover detailed vivid data in the form of individual views & insight.

4.3.4. Quantitative Research

This research is prone to discovering the quantity & appraisal of several events, also providing a reasonable explanation for the research paper (Wisker, 2008). There are various forms of surveys that are involved with quantitative research, they include online surveys, mobile interviews, and methodical observations among others (Neville, 2005). Nevertheless, in this research study, a mixed-methods research technique would be applied and the part of the quantitative research method that would be used is the on-line survey. Mixed method research is the use of both qualitative & quantitative approach (Creswell & Plano Clark, 2007). This method provides quality & helps validate the study because it offers the use of both qualitative & quantitative (Creswell, 2009).

4.4. STUDY POPULATION

The population of the study comprised of both male and female employees of Shell Petroleum Development Company of Nigeria Delta State with an emphasis on the Supply and Logistics Department with a total staff strength of 70.

4.5. SAMPLING UNIT

This research would concentrate on male as well as female employees of the Shell Petroleum Development Company of Nigeria Delta State.

4.6. SAMPLING FRAME

The sample frame for this study is the Nigeria Oil/ Gas industry, but for this study, the sampling frame will focus on employees of the Shell Petroleum Development Company of Nigeria Delta State due to the largeness of the sector and its proximity. Shell Petroleum Delta State was chosen because of the largest

concentration of oil and gas companies are in the Niger Delta region. This ensures the representativeness of the entire country.

4.7. SAMPLING TECHNIQUES

The research technique that will be employed in this study will be simple random sampling. This is because every employee of the Shell Petroleum Development Company of Nigeria, Delta State has an equal chance of being picked without been biased.

4.8. SAMPLE DETERMINATION

In determining the sample size of the study, the Taro Yamane error margin at 10% will be adopted to get a smaller figure from the population size which is too large and second proximity to employees who hardly stays in the office due to coronavirus outbreak.

The sample size was gotten through the Taro Yamane Formula: $n = \frac{N}{1+Nb^2}$

Where n = desired sample size

N = population size

b = maximum acceptance margin of error for the study

The sample size would be chosen as follows:

SAMPLE ERROR

Where:

N = Study population

n = Sample size

b^2= Error margin

Therefore:

Therefore: $n = \frac{70}{1+70(0.10)^2}$

$$= \frac{70}{1+70(0.01)}$$

$$= \frac{70}{1.7}$$

$$= 41$$

N.B: From the above, the sample size for the study is 41. However, due to the coronavirus outbreak which has caused the lockdown of businesses and has warranted stay at home and stay safe for employees making it difficult to access them. As a result, 30 from the sample of 41 were considered and questionnaires administered to. It is also to be noted that these sets of sample participants were also chosen because they were all oil and gas supply chain operators in Shell's downstream petroleum.

4.9. Data Collection Technique

Data for this study was collected through digitized questionnaires that were created using google form as a platform to gather data/information. This medium/technique was used because of the current pandemic (COVID 19). These forms were sent to employees in the department with the assistance of a third party who works with the firm. It gave the researcher an avenue to elicit a wide variety of responses, introduce to the respondent's new parts of questionnaires, provide background for interpreting results and give that researcher a chance to get a close contact with staffs of Shell O&G.

4.10. Research Instrument

This is the tool that is used to generate data from respondents. The questions were divided into two sections A and B, section 'A' represent the demography of the respondents while sections 'B' will be the composition of the questions. It also contained questions relating to the topic of this research to seek the respondent's view and how they would react and respond to the topic and to also test the hypothesis. Also, a Five Point Likert Scale was adopted to increase response rate and response quality along with reducing respondents' "frustration level" Sachdev, S. B., & Verma, H. V. (2004). It ranges from 'strongly agree' to 'strongly disagree' and has been most recommended by researchers.

4.11. Pilot Study

An initial survey was carried out before the main study. This initial survey included 15 employees of the Department of Supply and Logistics, Shell Petroleum Development Company of Nigeria, Delta State. Out of the 15 questions distributed, 13 questions were retrieved.

4.11.1. Validity of the research instrument

For the validity purpose of the research instrument, the researcher gave a copy of a well-structured questionnaire to her supervisor for correction and thereafter Content Validity Index.

4.11.2. Reliability of the research instrument

The study's reliability will be dependent on the results of the pilot study, this will determine the reliability/dependability of the research method.

4.12. Data Analysis

The methods employed to examine the data is the Regression Analysis to uncover facts about the Supply Chain Management Challenges in Nigeria's Oil/ Gas Production which will in-turn be used to accept or reject the different hypothesis. For the research objective and research question, information gotten and converted into data will be analyzed using a simple percentage and frequency table to get respondents perceptions about the subject matter.

4.13. Limitations

Due to the recent pandemic caused, this study administered its questionnaires to the available employees at Shell Nigeria Plc. Furthermore, this study's findings were limited to the oil and gas sector in Nigeria, particularly Shell Nigeria Plc.

4.14. Research Ethics

This paper complied with the ethics of the university & this was indicated in the moral review questionnaires as information shared to the employees is kept confidential.

CONCLUSION

This research paper reveals that the key challenge is pipeline vandalization which is caused by militant. This report identifies the forces behind the increase of these militant groups, some of which are poverty, unemployment & many others. It is now vital for government & SPDC top management to step up and mitigate these obstacles, the government needs to provide adequate security, fight corruption, try every possible way to stop militants in Niger Delta.

CHAPTER FIVE

DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

5.0. INTRODUCTION

This chapter introduces and addresses the study of the data obtained from the survey (questionnaires). The data generated were analyzed using frequency, percentage, and simple regression. The data analysis and findings below are designed to provide answers to the above-mentioned research questions. The findings obtained from the research form the basis from which the thesis draws conclusion. The chapter was addressed as follows: Demographics presentation of respondents, examination/analysis of the research questions, hypothesis testing, and discussion of findings.

Table 5.1: Questionnaires distributions.

Number of questionnaires distributed	30
Number of questionnaires retrieved	27
Number of questionnaires not retrieved	3

Source: Survey 2020

The table above shows that of the total copies of questionnaires distributed, 30 representing 100%, 27(90%) which is very much valid was successfully retrieved and used for this study but 3(10%) were not retrieved. As a result of this, we would work with the 27 questionnaires which would be equal to 100%.

5.1. DATA PRESENTATION.

Data will be presented in frequency and percentage tables as this will aid the study in converting respondents' responses into data.

Table 5.2 Demographic information of respondents

Socio-demographic	***Frequency (%)***	***Percent (%)***
Gender:		
Male	20	74
Female	7	26
Total	27	100

Marital Status:		
Single	8	30
Married	15	56
Divorced	2	7
Widowed	2	7
Total	27	100
Age group:		
18-25 years	5	19
26-35 years	9	33
36-45 and above years	7	26
46 and above	6	22
Total	27	100
Years in Firm:		
0- 5years	5	19
6 – 10years	6	22
11 and above	16	59
Total	27	100

Source: Survey 2020

As contained above, 74% of the respondents are male while 26% are females and this showed that both males and females were considered and are represented in the study. As regards marital status 30% are single, 56% are married, 7% are divorcee while 7% are widowed. For age range, 19% are between the age of 18-25 years old, 33% are between 26 – 35 years old, 26% are between 36 – 45 while 22% are 46 and above years. Finally, for the number of years spent in the firm 19% have worked between 0 - 5years, while 22% have also worked for 6 years to 10 years and 59% of the respondents have worked above 11 years.

5.2. Presentation of Independent Variable Data, Analysis, and Interpretation

Table 5.3: Research question on Supply Chain Management

	SD	D	U	A	SA
The company do not have adequate storage facility, and this has served as a set-back for the firm.	12 (44%)	8 (30%)	0	3 (11%)	4 (15%)
Poor inventory visibility has created setbacks for the company.	7 (26%)	6 (22%)	2 (7%)	6 (22%)	6 (22%)
Insufficient skill of personnel to handle supply chain management issues.	12 (44%)	11 (41%)	1 (4%)	1 (4%)	2 (7%)
Inadequate investment in supply chain management technology.	4 (15%)	3 (11%)	1 (4%)	10 (37%)	9 (33%)
Recent corona virus outbreak has served as a setback in carrying out supply chain management activities thereby affecting company's revenue.	3 (11%)	4 (15%)	0	7 (26%)	13 (48%)

Source: Survey 2020

From the table above (5.3), we can see that a considerable percentage of respondents believed that Shell has a good storage facility but about 26% still believes that the firm does not have an adequate storage facility. As a result, it can be said that more storage facilities must be considered if Shell wants to do better in terms of meeting customers' needs.

As regard inventory management of the firm, 48% of respondents agree that there is no poor inventory with Shell, and this basically means that Shell's inventory facility is top-notch. While 44% disagrees on the issue of inventory visibility and this depicts that Shell needs to work more & find effective ways to improve its inventory.

For insufficient skill, most of the respondents agree that they have enough skilled personnel. From the response above, a larger number of respondents in Shell believes that their staff strength is good enough.

For question regarding having inadequate investment in supply chain management technology, the table above shows that Shell still needs to work on its investment pattern as this will help them build momentum and increase productivity and lastly, the recent coronavirus outbreak has been a major problem, majority of the respondents are of the opinion that indeed coronavirus outbreak has created more trouble than good thus affecting their revenue negatively.

What the above findings depict is that, for there to be effective production and rendering of service, there must be effective supply chain management laid down principle/ pattern just the way it is attainable in Shell. However, this result in the findings coincides with that of Gunasekaran and Kobu, (2007) who is of the opinion that traditional measurements such as activity-based costing is losing its relevance because of the current trend of outsourcing by organizations and that Overton, (2014) who believes that regardless of the development of research on the performance of supply chain, there is still much to be discovered as the management of supply chain performance is not an easy process. In other words, management of supply chain efficiency is dynamic and affect several factors such as the industrial sector (Taticchi et al., 2013), organizational strategies (Peng and Wee, 2010).

Furthermore, these findings also Rent-seeking theory as adopted by this study which is of the opinion that resource dependence, especially in the oil & gas industry, usually leads to development cycle leading to all participant be it private or public, domestic & foreign (supply chain management) have an overwhelming concern to seek partnership or alliance that have the natural resources so as to have its own share of the resource.

Table 5.4: Research question on Logistics Challenge.

	SD	**D**	**U**	**A**	**SA**
Fear of expatriate to work effectively due to militant kidnap.	3 (11%)	5 (19%)	1 (4%)	4 (14%)	14 (52%)
There has been inadequate transport infrastructure put in place to carry out company activities.	19 (70%)	2 (7%)	1 (4%)	2 (7%)	3 (11%)

The recent pandemic outbreak (Covid 19) has affected the transportation and distributions of finished products.	2 (7%)	2 (7%)	0	16 (59%)	7 (26%)

Source: Survey 2020

Tables 5.4 looked at the role played by logistics challenge on production in Shell, the result showed that logistics should not be taken for granted by firms that seek to have a competitive edge when compared to their competitors in the sense that questions were raised and the response gotten from respondents all points to logistics being key and outsourcing of it is vital.

For fear of expatriate as seen in table 5.4, it shows that a higher percentage agrees to being afraid because of kidnap. This depicts that relationship still exists between the kidnapping of expatriate and production of oil, when expatriates fear going to the field to perform their duty, it will in turn have a negative effect on production.

The question of transportation is another vital matter of concern. Although Shell is not faced with the issue of transportation inadequacy as said by the respondents, it still must do all it can to remain at that and also ensure that it outsources its transportation matter to more than one firm as this is one sure way to avoid been disappointed.

Finally, regarding the pandemic outbreak (COVID-19) affecting transportation and distribution of Shell oil/ gas production has played a negative big role in the production of oil and this resulted in some of its employees being asked to work from home.

Table 5.5: Research question on Subcontractor Challenge.

	SD	**D**	**U**	**A**	**SA**
There has been delays and cancelled projects that has affected the company because of inefficiency of subcontractors.	14 (52%)	8 (30%)	0	2 (7%)	3 (11%)
There has been halt on projects because of clash between Locals in Niger Delta Community and Subcontractors.	6 (22%)	5 (19%)	1 (4%)	8 (29%)	7 (26%)

The company has only one way of sourcing for supplier's base.	17 (63%)	10 (37%)	0	0	0
Too much dependence on suppliers from abroad.	11 (41%)	9 (33%)	0	3 (11%)	4 (15%)

Source: Survey 2020

From the result gotten in tables 5.5, one can say with certainty that subcontractors are very important in businesses, especially in the oil and gas sector. Big firms such as Shell can hardly carry out its activities all alone. It is ideal that firms look towards employing the idea of subcontractors as this is one way to reduces cost and achieve effectiveness. Most respondents disagree to the idea of subcontractors being the reason for canceled projects while regarding the clash between locals and subcontractors, the table 5.5 also shows that issues of locals need to be treated with urgency or else the production capacity of Shell will be negatively affected the more.

For Shell having only one way of sourcing for supplies, respondents disagree with this and this implies that the Shell supplier base is rich enough but there can still be room for improvement which will also lead to a better productivity level for the firm.

Lastly, Shell does not depend solely on suppliers from abroad, they also have local partners that see to the supplies of their needs. There was a lot of disagreement on this. By implication, local content/suppliers are viewed as part of Shell's ingredients for production. Although few respondents are also of the opinion that there has been a high level of dependency on supplies abroad.

Findings from the above have proven that firms such as Shell cannot achieve maximum productivity level without subcontracting some of its activities as seen in the table above. This however also corroborates with that of Ernst and Young (2014) who believe that most businesses rely now on the third-party providers to provide product and services and the O&G business is not exempt. They postulate that the O&G organizations outsources sections of their roles normally to contractors to decrease their operating cost, to conquer the limitations of expertise and to pass some of the supply chain risks to another party.

In fact, Yusuf et al., (2014 and Pillai et al. (2010) research indicated that around 40% of oil and gas practices are outsourced to achieve their plan/project and Amunwa & Minio, (2011) also agrees with this result that Shell relies on contractors in order to execute operational activities. Shell would strive to meet

up its monthly targets for the extraction of oil in Nigeria without these contractors. The rent-seeking theory adopted also agrees with this finding which stipulates that issue with rent-seeking theory sometimes is attached to incentives, these incentives often disrupt production activities, affect the entire economy negatively, hindering its growth (GDP). In a dynamic system, this may produce voracity effects as found in the words of Tornell (Tornel, 1999). Thus, the vandalization of pipeline and disruption of Shell activities in the Niger Delta will continue if its people are not well taking off. However, this study result has shown that Shell production/ disruption level is low, and thus stakeholders been treated well.

5.2.1. Presentation of Dependent Variable Data, Analysis, and Interpretation

Table 5.6: Research question on Productivity level.

	SD	**D**	**U**	**A**	**SA**
Customers complain of delay in supplies always	10 (37%)	10 (37%)	0	5 (19%)	2 (7%)
There has been increase in the level of customers satisfaction recently	6 (22%)	5 (18%)	1 (4%)	8 (30%)	7 (26%)
Return on scale of your firm is encouraging because of effective supply of its product	3 (11%)	6 (22%)	0	9 (33%)	9 (33%)
The technical efficiency of your firm has improved, leading to increased production output	3 (11%)	6 (22%)	0	11 (41%)	7 (26%)

Source: Survey 2020

As regards the production level of Shell as seen above, it can be said that most of the respondents believe that their production level is fair. However, caution should be taken to avoid a negative trend in its supply chain management which could have a corresponding negative impact on production. Also, the majority of the respondents believe that customers do not complain as regards supply delays. For increase in customer satisfaction, most of the respondents believe that customers are fine but a close look at the table also tells that many respondents have a contrary opinion. Regarding return on scale, there was also need for attention as it was a divided house, thus there is need for urgent restructuring of activities so as to

reduce the negative impact of supply chain challenge and finally for technical efficiency, majority of the respondents deems that the firm is effective & productive.

5.3. Test of Hypotheses

5.3.1. Restatement of Hypothesis one

H_0: There is no significant relationship between supply chain management and oil/ gas production in Nigeria.

H_1: There is a significant relationship between supply chain management and oil/ gas production in Nigeria.

Table 5.7: Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.906(a)	.820	.816	.40823

a Predictors: (Constant), SCM(Q1)

Table 5.8: ANOVA(b)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	36.501	1	36.501	219.026	.000(a)
	Residual	7.999	25	.167		
	Total	44.500	26			

a Predictors: (Constant), SCM(Q1)

b Dependent Variable: PR(Q1)

Table 5.9: Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	.517	.249		2.077	.043
	SCM(Q1)	.837	.057	.906	14.800	.000

a Dependent Variable: PR(Q1)

Table 5.10: Regression result for hypothesis one (Summary of above tables)

Model 1	Df	Correlation (r) Co-efficient	Co-efficient (R2) Determine	Sig Level	t-cal	t-tab	F-cal	Remark
Y=a+bx+e	26	0.906	0.820	0.000	14.800	1.984	219.026	Sig

Source: Researcher's Survey, 2020

$Y = a + bx + e$ ($PR = a_0 + a_1SCM + e$)

Where y (PR) = dependent variable (PRODUCTIVITY)

a = intercept

bx (a_1SCM) = Partial slope coefficient of SUPPLY CHAIN MANAGEMENT

e = Stochastic error term which represent other independent variables not included in the model

Interpretation

R = correlation that exists between two or more variables, from the above result, it can be said that correlative relationship exists between the two variables tested as the R value is high given a 90.6%. What

this depicts is that SUPPLY CHAIN MANAGEMENT correlate at 90.6% with PRODUCTIVITY. Also, R2 = coefficient of determination of the two variables. This shows the percentage of the total variation of the dependent variable explained by the independent variable. This will show that there is a significant relationship between supply chain management and oil/ gas production in Nigeria. According to our analysis, R2 = 0.820 (82.0%), which is high implies that the variation in PR is explained by changes in the rate of SCM. The remaining 18% variation is explained by stochastic error term (e) meaning that 18% of changes in SCM are explained by factors that are not explained in the model. Finally, with the F value of 219.026 and P value of 0.000 at 0.05 significant level, the regression ANOVA indicates that the regression variables have a significant effect on the response variable. This is also confirmed by t-calculated of 14.800 which is greater than t-tabulated of 1.984. Furthermore, a detailed explanation of the analysis of the findings/hypotheses which has also been linked with literature has been elaborated more in the discussion of the findings section that can be seen in chapter 6 (6.2).

5.3.2. Restatement of Hypothesis two

H_0: There is no significant relationship between logistic challenge and oil/ gas production in Nigeria

H_1: There is a significant relationship between logistic challenge and oil/ gas production in Nigeria

Table 5.11: Table Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.919(a)	.845	.842	.29040

a Predictors: (Constant), LC (Q3)

Table 5.12: ANOVA(b)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	22.032	1	22.032	261.249	.000(a)
	Residual	4.048	25	.084		

	Total	26.080	26			

a Predictors: (Constant), LC (Q3)

b Dependent Variable: PR(Q2)

Table 5.13: Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	1.328	.187		7.094	.000
	LC (Q3)	.720	.045	.919	16.163	.000

a Dependent Variable: PR (Q2)

Table 5.14: Regression result for hypothesis two (Summary of the above questions)

Model 2	Df	Correlation (r) Co-efficient	Co-efficient (R2) Determine	Sig Level	t-cal	t-tab	F-cal	Remark
Y=a+bx+e	26	0.919	0.845	0.000	16.163	1.984	261.249	Sig

Source: Researcher's Survey, 2020

$Y = a + bx + e$ ($PR = a_0 + a_1LC + e$)

Where y (PR) = dependent variable (PRODUCTIVITY)

a = intercept

bx (a_1LC) = Partial slope coefficient of LOGISTIC CHALLENGE

e = Stochastic error term which represent other independent variables not included in the model

Interpretation

R = correlation that exists between two or more variables, from the above result, it can be said that correlative relationship exists between the two variables tested as the R value is high given a 91.9%. What this depicts is that LOGISTIC CHALLENGE correlates at 91.9% with PRODUCTIVITY. Also, R2 = coefficient of determination of the two variables. This shows the percentage of the total variation of the dependent variable explained by the independent variable. This will show that there is a significant relationship between the logistic challenge and oil/ gas production in Nigeria. According to our analysis, R2 = 0.845 (84.5%), which is high implies that the variation in PR is explained by changes in the rate of LC. The remaining 15.5% variation is explained by stochastic error term (e) meaning that 15.5% of changes in FSR are explained by factors that are not explained in the model. Finally, with the F value of 261.249 and P value of 0.000 at 0.05 significant level, the regression ANOVA indicates that the regression variables have a significant effect on the response variable. This is also confirmed by t-calculated of 16.163 which is greater than t-tabulated of 1.984.

5.3.3. Restatement of Hypothesis three

H_0: There is no significant relationship between subcontractors' challenge and oil/ gas production in Nigeria

H_1: There is a significant relationship between subcontractors' challenge and oil/ gas production in Nigeria

Table 5.15: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.910(a)	.829	.825	.62084

a Predictors: (Constant), SCC (Q3)

Table 5.16: ANOVA(b)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	89.499	1	89.499	232.201	.000(a)

	Residual	18.501	25	.385		
	Total	108.000	26			

a Predictors: (Constant), SCC (Q3)

b Dependent Variable: PR (Q4)

Table 5.17: Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	-.948	.324		-2.927	.005
	SCC (Q3)	1.136	.075	.910	15.238	.000

a Dependent Variable: PR (Q4)

Table 5.18: Regression result for hypothesis three (Summary of the above table)

Model 3	Df	Correlation ® Co-efficient	Co-efficient (R2) Determine	Sig Level	t-cal	t-tab	F-cal	Remark
Y=a+bx+e	26	0.910	0.829	0.000	15.238	1.984	232.201	Sig

Source: Researcher's Survey, 2020

$Y = a + bx + e$ ($PR = a_0 + a_1SCC + e$)

Where y (PR) = dependent variable (PRODUCTIVITY)

a = intercept

bx (a_1SCC) = Partial slope coefficient of SUBCONTRACTOR CHALLENGE

e = Stochastic error term which represent other independent variables not included in the model

Interpretation

R = correlation that exists between two or more variables, from the above result, it can be said that correlative relationship exists between the two variables tested as the R value is high given a 91%. What this depicts is that SCC correlates at 91% with PR Also, R2 = coefficient of determination of the two variables. This shows the percentage of the total variation of the dependent variable explained by the independent variable. This will show that there is a significant relationship between subcontractors' challenge and oil/ gas production in Nigeria. According to our analysis, R2 = 0.829 (82.9%), which is high implies that the variation in PR is explained by changes in the rate of SCC. The remaining 16.1% variation is explained by stochastic error term (e) meaning that 16.1% of changes in SCC are explained by factors that are not explained in the model. Finally, with the F value of 232.201 and P value of 0.000 at 0.05 significant level, the regression ANOVA indicates that the regression variables have a significant effect on the response variable. This is also confirmed by t-calculated of 15.238 which is greater than t-tabulated of 1.984.

5.4. Limitation

Adding to the limitations of the third chapter of this dissertation, the findings of the study might not be applicable to other sectors.

CHAPTER SIX

DISCUSSION AND ANALYSIS OF FINDINGS

This chapter will be divided into two sections, we will explore more on our literature and the findings we got from our analysis in chapter 5. The first section would elaborate on the management of the supply chain as a whole and looking at different dimensions of the supply chain and how effective logistics and workforce globalization enhance the supply chain. This section has been divided into themes that include Supply Chain Management Internationally in 2020, Recent Issues of Supply Chain Management, Supply Chain going green, Supply Chain Integration (SCI), Increase in Workforce Globalization, Circular Supply Chain, Elastic logistics.

6.0 Supply Chain Management Internationally in 2020 & Beyond

The ongoing pandemic (COVID 19) flare-up has and is still influencing the supply chain as well as disrupting manufacturing operations around the globe. The effect of Covid-19 on supply chains globally has compelled numerous companies to throttle down or shut assembly & manufacturing plants in the U.S. and Europe temporarily. The most vulnerable businesses are those which are solely or depend heavily on factories/manufacturing plants in China for parts and materials. The activity surrounding the Chinese manufacturing plants has plunged over the past months and is believed to stay miserable for the coming months (Pierre Haren and David Simchi-Levi, 2020). The initial interference to corporations from COVID-19 came in China (of which after that, was Italy), altering the infrastructure & networks of supply chains across many countries (globally). An economic pointer that the virus took a worldwide economic toll and not just a toll on China, is the plunging prices in oil and gas markets around the globe. The prices for liquefied natural gas (LNG) were before now on a decline from rising supplies and mild winter weather, but presently, has hit rock bottom levels, with a few U.S. manufacturers willing and eager to pay prospective consumers to take on their excess natural gas. Oil also slumped as it became obvious that disruptions to worldwide shipping and trade could go beyond China (Amy M. Jaffe, 2020).

6.1. Recent Issues of Supply Chain Management

There is no doubt in saying that supply chain management is indeed the lifeblood of most businesses around the world as it stands today. From our findings so far, keeping all supply chain components running as smoothly as possible is a major concern for most businesses locally and Shell inclusive, as this will

ensure that firms are on time in their service delivery with regards to this. This study will be coming up with some predictions of supply chain management for 2020 and beyond. Some of which includes: Supply Chain are going green; There will be more Supply Chain Integration; Increase in workforce globalization and challenges; Circular Supply Chain will be the future trend of Supply Chain; There will be an increase of elastic logistics as a result of the supply chain; Robotic automation of Supply Chain will be adopted etc.

6.1.1. Supply Chain are going green

Greening the supply chain has now grown to be a substantial concern/topic in the management of supply chain and this entails overseeing a series of dimensions involving procurement, the management of manufacturing materials, circulation, marketing, and reverse logistics (Younis *et al.*, 2016). Given the times we live in, the social and environmental influence of the supply chain is becoming as crucial as its effective management. Predictably, numerous corporations are taking measures to lessen carbon emissions in supply and logistic chains in the firm, with an additional benefit of it influencing the bottom line.

In the United State, for example, climate change advocacy groups and consumers' growing effort are becoming more environmentally responsible and this has pushed supply chain to become less harmful to the environment as electricity and transportation has contributed hugely to greenhouse gas emissions and this has made green logistics to gain more grounds among companies today. Although green logistics is just one of the many supply chain trends affecting warehousing today as the system helps to prevent excessive wastage of resource as its uses timer and gauge to monitor the usage of electricity, heat, and gas. Looking at the above findings, one is left with no choice other than to say that for Shell to continue to gain relevance in the eyes of its competitors and Nigeria as a whole, it must take its logistics issue serious as this will enable the firm to be more effective while reducing the cost of doing things and increasing profit. It was admitted by Echoing Pagell, Timmons that the approach of business to sustainability is often powered by the cost savings it can attain/achieve. During this age and period of environmental awareness, Timmons is aware of the importance for corporations to put their focus on the greater/bigger picture when the topic of sustainability in the supply chain is addressed (Danielle Barron, 2019).

6.1.2. Supply Chain Integration (SCI)

The scope of supply chain integration is not restricted but it has a wide scope from supplier integration to customer integration that also encompasses the central concept of internal integration (Flynn et al., 2010;

Zhao et al., 2010). Integration of the supply chain aims to ensure eddiciency and accuracy in a company's general operations and to streamline manufactured goods, data/information, and cash flow from suppliers to end users (Sammuel and Kashif, 2013).

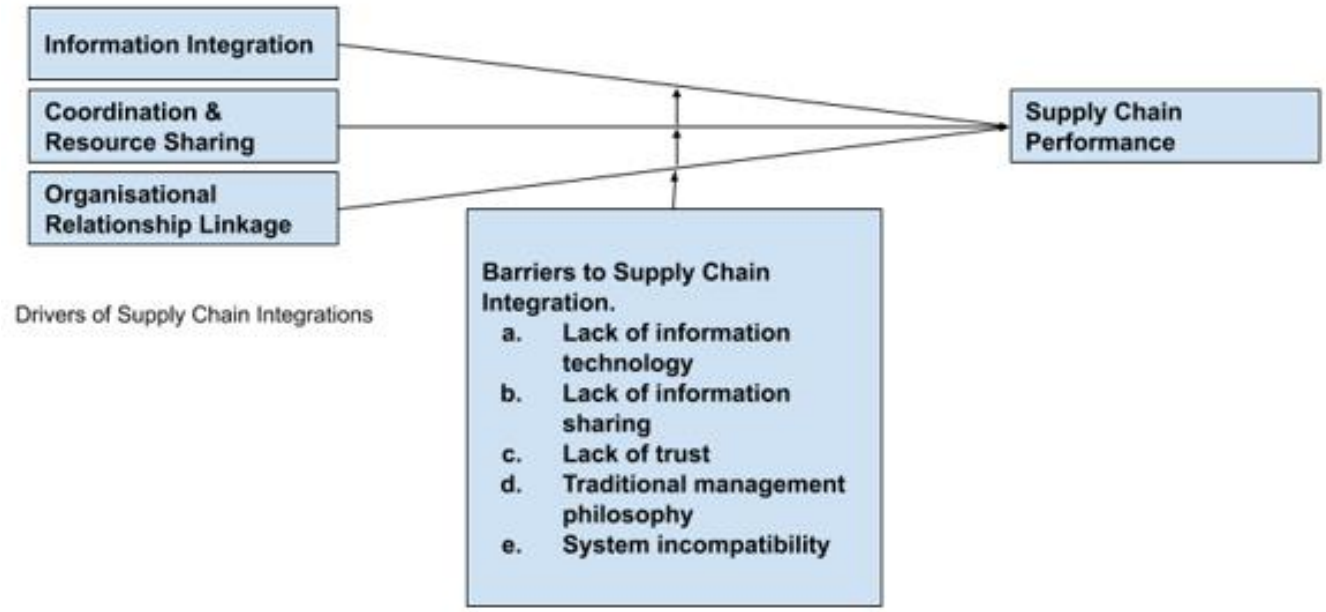


Fig 5: Impact of Supply Chain Integration on Performance. Source: (https://researchleap.com/levels-barriers-to-supply-chain-integration-a-conceptual-model-of-supply-chain-performance/ Accessed 12/06/2020

Supply chain collaborators join hands collectively in long term goals and merge resources (assets, knowledge, and capabilities) to provide competitive advantage and exceptional performance (Cadden et al., 2015).

Findings have also shown that there will be more integration of supply chain management in the coming years and we will see more components being added into the supply chain. This is because companies globally will be looking forward to partner and build integrations with third parties, as it has been proven that third party partnership is one way to reduce cost while improving customer satisfaction. Thus, there is no doubt in saying that Shell Nigeria which is the case of our research will strive more to making more partners in its logistics matters as this will enable the firm to meets its supply needs of its customers satisfactorily at best cost reduction rate and thereby increasing its profit-making.

6.1.3. Increase in Workforce Globalization and Challenges.

This study also is of the opinion that companies should expect major changes in the labor component of the supply chain and there is no doubt in saying that one of such is the globalization of the workforce. Findings have shown that 80% of a firm such as Amazon will have a multi-country operation from 2021 and above after the end of the Pandemic and this factor will lead to needing more knowledgeable workers (those capable of handling complex processes like analytics, procurement processing and provision of services) influencing the demand for workforce globalization. Shell can thus take advantage of seeking workforce across Nigeria and partnering with the workforce in countries such as Ghana, Cameroon, and those that are without oil as this will enable them to increase their customer base and increase profit while becoming more relevant globally. This is relevant because no firm exists where all its workers have all the knowledge needed, and this will make firms such as Shell hire workers from outside/abroad.

6.1.4. Circular Supply Chain will be the future trend of Supply Chain

A circular supply chain is one that retains resources in use for as long as possible. One that mitigates waste at every point/stage, from the design to delivery/distribution & beyond. It is also said to be creative and mindful of the broader/bigger picture. 70% of leaders in the supply chain have the intension to invest in the circular economy in 18 months' time. Agreeing to a Gartner survey of 1,374 function leaders amongst businesses including healthcare, logistics, and retail. Companies are pressurized to mitigate the volume of waste they are generating. Corporations are capitalizing in technology to attain circularity across optimized delivery (46%), customer engagement (45%), production and remanufacturing (43%), and planning (43%), corresponding to this survey. It is forecasted that circular economies that are power-driven by waste-free processes and recycling or reuse of spent produce, could be substituted for traditional linear economies within the decade (Morgan Forde., 2020).

Outsourcing is one sure way to see to it that wastage is curtailed, the reason is that linear supply chain will no doubt be replaced with the circular supply chain as this will see to it that firms refurbish discarded products for resale as this will help deal with the rising cost of raw materials and their volatile availability. This method will help cut down costs, past the initial cost of putting a new process in place. With the adoption of a circular supply chain, companies such as Shell can spend less on raw materials, leading to a reduction in the risk of price volatility. The circular supply chain helps create less waste and reduces the firm overall impact on the environment.

6.1.5. There will be increase of elastic logistics because of supply chain.

This study has found out that, it is not enough for supply chain to have a lean process but rather its need to be flexible and responsive to market fluctuation as well and this is why more businesses are adopting a flexible approach to logistics as elastics logistics allow the supply chain of a firm to easily expand or shrink as the case may be and depending on the present market demand with the aid of technologies such as artificial intelligence that allows the supply chain to adjust when the need arises. In view of this, Shell Nigeria can adopt this kind of adjustability method to better handle potential issues such as overstocking and unoptimized space in vessels, thus making Shell Nigeria enjoy greater stability and remain competitive despite market fluctuation.

6.2. Discussion of Findings in Test of Hypotheses Result

This is the second section of this chapter as explained in the abstract and the introduction of this chapter. Here, we will give a detailed explanation and findings of all our hypotheses that have been critically analyzed & examined in chapter four (5) starting from table (5.3.1 up until 5.3.3).

6.2.1. Hypothesis one

First, there is a significant relationship between supply chain management and oil/ gas production in Nigeria. This is as a result that the majority of the respondents agree to the fact that challenge in the supply chain of Shell Petroleum will lead to disruption in the production of its products, which eventually will have a negative effect on customer satisfaction which is the end result of the supply chain. A close look at tables 5.3 in chapter five, will enable one to say that factors such as adequate storage facility, inventory visibility, skilled employees to manage the affairs of supply chain, inadequate investment in supply chain, and recent coronavirus outbreak which are seen as challenges of supply chain all affect negatively in production of oil/ gas as a majority of the respondents strongly agree/agrees to this fact. Thus, firms that seek an increase in its production must see to it that the mentioned factors be considered and put in place.

Referencing from our interpretation in hypothesis one which can be seen in chapter 5 (5.3.1), the findings of the study coincide with that of Christopher et al (2007) who is of the opinion that in a supply chain, a company will link to its suppliers upstream and to its distributors downstream in order to serve its customers.

Usually, materials, information, capital, labor, technology, financial assets, and other resources flow through the supply chain. Since the goal of the firm is to maximize profits, the firm must maximize benefits and minimize costs along the supply chain.

6.2.2. Hypothesis two

Hypothesis two result also shows that there is a significant relationship between logistic challenge and oil/ gas production in Nigeria. This is also seen in the results in chapter five on table 5.4, showed that 69% of the respondents believed that the issue of fear of expatriate been kidnapped by militant has been seen as one of the major challenges of logistics and this goes a long way to affecting the production capacity of Shell negatively. However, transport infrastructure is not seen as a logistic challenge to Shell and this may be due to Shell having successfully outsourced this part to indigenes of Niger Delta because about 77% of the respondents supported this fact and finally, the recent coronavirus outbreak has caused a major setback for production, this is believed to be as a result of the transport drivers and other persons involved, being careful of contracting the virus.

Looking back at the interpretation of our hypotheses two in (5.3.2), the result gotten showed that it is in line with that of Ernst and Young (2014) who believe that most industries now rely on the third-party suppliers to supply the product and services. There are no exceptions in the O&G industry. Oil and gas organizations normally outsource part of their functions to subsectors to reduce their operation cost, overcome the limitation of expertise as well as to pass some of the supply chain risks to another party and that of Yusuf et al., (2014); Pillai et al. (2010) who believes that research suggested that around 40% of oil and gas activities are subcontracted to accomplish the project leading to increase productivity level.

6.2.3. Hypothesis three

Finally, the hypothesis three result showed that there is a significant relationship between subcontractor's challenge and oil/ gas production in Nigeria. this is owing to the fact that the subcontractor issue is not left out, as the majority of them strongly disagree and disagree with a percentage of 81%, that there has been delay and cancellation of projects due to inefficiency of subcontractors and this goes in line with table 5.5, where most of the respondents strongly agree that transportation is not an issue. Although, majority of the respondents are also of the opinion that there has been a rising issue of clashes between subcontractors and local with 55% agreement which is greater but this is often time tackled and helped as the company has more than one-way sourcing with a 100% compliance to this. However, the initial fear

of over-dependence of suppliers from abroad was cleared as most of the respondents believed that this is not true.

The result gotten which was explained in the interpretation section of our hypotheses 3 in (5.3.3) also showed and coincide with that of Sheffi., et al 2005 who suggests dual sourcing, increased product, volume, routing, and versatility of distribution as well as visibility and management of information. In the submission of Singhal, Agarwal & Mittal's (2011), having a robust supply base not only enables a firm to cope with daily demand-supply variances but also helps create organizational resilience when significant disruption occurs. Lee &Tang (1996) supports in-house manufacturing of such goods when faced with possible supply delays when outsourcing certain products. Nsikan, Ekeins, Tarela, & Affiah (2018) reported that ensuring forecast accuracy through proper quantification, building trust in supplier collaboration, and investing in visibility or accountability in the supply chain reduces the probability of disruptions.

The (3) three hypotheses have now been tested and our findings have now been concluded. We will now move forward to our summary/conclusion chapter.

CHAPTER SEVEN

SUMMARY, RECOMMENDATION AND CONCLUSION

7.0. INTRODUCTION

This chapter focuses on the summary of the study, conclusion, recommendation, contribution to knowledge, the implication of study, and suggestion for further study.

7.1. SUMMARY OF THE STUDY

The intent of this thesis was to investigate & analyze the predicament related with the supply chain management of O&G production in Niger Delta region of Nigeria using Shell Petroleum Development Company of Nigeria as a case. In attaining this extensive objective, other specific objectives were formulated which also led to the need to formulate the research question, hypothesis all curled from the statement of the problem. The study went further to review articles, and this gives rise to the conceptual framework and theoretical framework which form the second chapter.

Chapter three which is research methodology focused on the research design that was adopted and it was indicated there that descriptive survey research design was adopted. The population of the study was based on the employee's strength of Shell Petroleum, which was about 70, a figure gotten from the firm's Human Resource Department. The sample size was arrived at using Yaro Yamane method and adoption of regression with the aid of statistical package for social sciences (SPSS) which gave a total number of 41 but due to proximity, the study focused on 30 employees of Supply and distribution department. Also, in chapter three, a pilot study was carried out and the result got showed that the questionnaire distributed was not ambiguous, and its questions where simple to understand. Finally, in chapter four, respondents' responses were presented in simple percentage and frequency tables, and the hypothesis test was carried out using regression with the aid of Statistical Package for Social Sciences (SPSS).

7.2. CONCLUSION

In conclusion, this study can say that there is a significant relationship between supply chain management and oil/ gas production in Nigeria**; t**here is a significant relationship between logistic challenge and oil/ gas production in Nigeria; there is a significant relationship between subcontractors challenge and oil/ gas production in Nigeria. In view of this, firms like Shell that seeks to keep an edge over its competitors and ensure that its supply chain management department is well taken care of, by investing effectively in it as this has proven to increase the productivity level and in turn will affect profit-making.

7.3. RECOMMENDATION

Owing to the above summary of the study and conclusion, the following recommendations are proffered: Since it has been found out that a significant relationship between supply chain management and oil/ gas production in Nigeria**, a** real investment plan must be considered for the supply chain management department as this is one department that deals with the outside world of every firm. This is because it takes the firm's product from the firm to the customers or consumers.

Also, the result has shown that **t**here is a significant relationship between logistic challenge and oil/ gas production in Nigeria; Thus, firms such as Shell Petroleum that seeks to have a competitive edge over its competitors must see to it that they do not take logistic issue for granted because any disruption in the distribution of materials/ product will negatively affect the revenue of the firm.

Lastly, it was also observed that there is a significant relationship between subcontractor's challenge and oil/ gas production in Nigeria. Thus, outsourcing has been found out to be a mainstay of firms that seeks to carry out a stress-free activity with a minimal cost implication. It is therefore advised that firms should not work with only one subcontractor but rather with various subcontractors as this will enable them to minimize cost and be effective in carrying out their activities effectively.

7.4. SUGGESTION FOR FURTHER STUDY

Referencing from our limitations in the fourth and fifth chapter, it is therefore suggested that other researchers can broaden the scope of this study by looking at the Challenges of Supply Chain Management on productivity level in Nigeria considering the Banking Sector or Small and Medium Scale Enterprises (SMEs) and not Shell Petroleum Development Company of Nigeria as a case study this time.

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APPENDIXES

CHALLENGES OF SUPPLY CHAIN MANAGEMENT IN THE OIL & GAS PRODUCTION IN NIGERIA (SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA).

Dear Respondents,

This questionnaire will take only 5min of your time. The purpose of this questionnaire is to gather information on the opinion of the supply and distribution staffs of **Shell Petroleum Development Company of Nigeria** concerning the subject matter: **CHALLENGES OF SUPPLY CHAIN MANAGEMENT IN THE OIL & GAS PRODUCTION IN NIGERIA** in partial fulfillment of the requirement for award of Masters of Science (MSc) Degree in International Business at National College of Ireland.

Kindly respond to each statement as it agrees with you. Your honest response will be highly appreciated, as every information supplied by you will be held confidential.

Thank You,

Yours Faithfully,

Stephanie Ijeomah.

QUESTIONNAIRE

SECTION A – DEMOGRAPHIC ANALYSIS OF DATA

Instruction: Please tick or fill in the correct information as appropriate.

1. Gender: Male { } Female { }
2. Age: 18-25 { } 26-35 { } 36-45 { } 46 and ABOVE { }
3. Marital Status: Single { } Married { } Divorced { } Widowed { }
4. Years of service at present work: <10 { } 11-15 { } 16-20 { } 21 and above { }

SECTION B

Instruction: Tick the appropriate response in the column that best represents your opinion in each statement SD = Strongly Disagree'; 'D=Disagree'; 'U=Undecided'; 'A=Agree'; and 'SA=Strongly Agree

S/N	Supply Chain Management	SD	D	U	A	SA
1	The company do not have adequate storage facility, and this has served as a set-back for the firm.					
2	Poor inventory visibility has created setbacks for the company.					
3	Insufficient skill of personnel to handle supply chain management issues.					
4	Inadequate investment in supply chain management technology.					
5	Recent corona virus outbreak has served as a setback in carrying out supply chain management activities thereby affecting company's revenue.					
S/N	**Logistics Challenges**	**SD**	**D**	**U**	**A**	**SA**
6	Fear of expatriate to work effectively due to militant kidnap.					
7	There has been inadequate transport infrastructure that has been put in place to carry out company activities.					

8	The recent pandemic outbreak (Covid 19) has affected the transportation and distributions of finished products.					
S/N	**Subcontractors Challenges**	**SD**	**D**	**U**	**A**	**SA**
9	There has been delays and cancelled projects that has affected the company as a result of inefficiency of subcontractors.					
10	There has been halt on projects as a result of clash between Locals in Niger Delta Community and Subcontractors.					
11	The company has only one way of sourcing for supplier's base.					
12	Too much dependence on suppliers from abroad.					
S/N	**Productivity Level**	**SD**	**D**	**U**	**A**	**SA**
13	Customers complain of delay in supplies always.					
14	There has been increase in the level of customers satisfaction recently.					
15	Return on scale of your firm is encouraging as a result of effective supply of its product.					
16	The technical efficiency of your firm has improved, leading to increased production output.					