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Master of Science in Integrated Supply Chain Management

By

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ABSTRACT
Oil is the mainstay of the economy in many countries where it is found. Its distribution to consumers, alongside its derivatives, requires the optimization of cost and the tight coordination of companies involved in the process. This becomes imperative for such companies to sustain business continuity, gain competitive advantage and maximize their profitability. Against this background, this study investigates the cost optimization and transportation strategies in the distribution of petroleum products in Nigeria using Mobil Oil Corporation, Nigeria as a case study. Using available literature and other documentary evidences, the study includes a qualitative review of Mobil Oil’s strategies in the distribution of petroleum products in Nigeria and how these strategies impacted on cost, profitability and operational efficiency of the company. Findings from the study show that the company operates a multi-modal distribution system and an integrated business model strategy. These models have resulted in low distribution cost over time and steady rise in the company’s annual profit before tax. It is recommended that the firm implement a long term plan for the sustenance of the company’s profits after the full deregulation of the oil industry in Nigeria and strategic business alliance to maximize its distribution channels and logistics.
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I. Introduction

It is essential to realize that the oil industry has become important in the world economy today. Its role in the development of national economies as the engine on which most industries and households run globally cannot be over emphasized (Soliani, 2016; Jha, 2016). As globalization takes place, the role of oil becomes important in terms of world trade and transportation as the usage of oil sees an increase. Oil is still considered the a very important source of energy for many industries with machinery and motor driven machines using the commodity on a large scale in spite the availability of other alternate sources. In addition to that, transportation based industries and agriculture also use larger amount of oil in their operations (Sen and Sen, 2016) as it is considered as portable, safe, easy to handle and energy density is provided by oil (National Master, 2009)

Industrialization across the world is also driving the consumption pattern of oil as industries and companies tend to use it more and more. In terms of consumption, the US is the largest consumer of oil while China is seen as the second largest user of oil. China is fast reaching the consumption levels of the US and would be able to surpass it in a few decades as well (Hussain, Assavapokee & Khumawala, 2006). It is also seen that as China’s robust economy moves fast in line with developing countries’ growth, the consumption is bound to move in step with it (Holschler, Bachan and Stimpson, 2008). Despite its being criticized on the basis of its non-renewability and finite supply, oil as an energy source has become so important that dependency on it has become so great that growth without oil is becoming unimaginable.
Statement of Problem

In Nigeria today, oil accounts for 95 percent of its energy. Competition exists between suppliers of petroleum products within the oil industry and this has led to the provision of incentive programs for continuous improvement in the transportation of petroleum products.

Major oil companies usually setup their refineries close to their depots, where the depots become a distribution center to the customers. The decision of setting up a depot is based on the location of the customers in order to minimize travel time and associated costs in supplying the petroleum products to the customers. This is one of the major strategies of facility location and is normally forecasted by the sales and marketing departments. The company then will consider its capability and capacity to fulfill the customer requirement.

The problem affecting the globalized distribution of petroleum products is that competition in trucking, railroads and pipelines companies still exists within the industry. According to Horner, J. A, President of Shell Pipeline Corporation, in his paper “Economics of Energy Transportation-Petroleum and Petroleum Products transmission” states that transportation petroleum and petroleum products are both competitive and complementary. In fact, pipelines compete with barges and tankers; tankers compete with barges, and so on. At the same time these competitors complement each other. This is such that a single unit of petroleum energy, to achieve its most economical delivery, may be handled by as many as four separate transportation media from the wellhead to the consumer’s tank. The final destination points may be as diverse as service stations, home heating tanks, public utilities, railroad fueling yards, ships' bunker tanks, and the nation's.

As the competition becomes fierce, companies must find a way to differentiate their operations in order to sustain their competitive advantage and profitability. This advantage is
gained by instilling different abilities and capabilities within the organization which provides better services and goods to the customer in the long run. This means that in the last few years, the supply chain management has become the key recognizant by the companies to attain profitability. Companies with good logistics and an efficient supply chain management will allow a company to first acquire and then improve their competitive advantage (Christopher, 2011). As the company gains a competitive advantage, they now focus on either their cost or their valued advantage to optimize over time. By using effective supply chain management strategies, companies are able to satisfy the consumers by being cost effective. The cost effectiveness can be the integration of supplier-buyer cooperation. Therefore, cost optimization and strategic transportation of petroleum product is one potential strategy for transporting petroleum product from depot to consumers that minimizes cost and maximize profit.

**Purpose of the study**

In relation to the problem statement, the paper will focus on the options which can be used in the supply chain optimization by considering previous research that has been written in this field. The literature, which has shown common characteristics and solutions, will be applied to optimize the supply chain. The paper will then look at the haulage of petroleum products industry in Nigeria by making it the center of analysis. Cost reduction in transporting petroleum product, and improving customer services at the optimized cost. We will consider the secondary distribution of petroleum products using Mobil Oil Producing Company as a case study thereby determining the best cost optimization medium of transportation. The research paper will showcase what
method of distributions are in place by Mobil Oil corporation depending on the location, time of carriage and delivery of the products to their customer with optimal cost effectiveness.

**Significance and Implications of the Study**

The supply chain that has been managed at Mobil Oil Corporation and its philosophy of continuous improvement has led to development of its supply chain over the years. The company has been able to develop its market position over years and have invested in the supply chain management in the company. The company focused on initiatives to make the supply chain as effective and efficient as possible. Mobil Oil has significantly carried out extensive consolidation and dispatches of tanker shipments of heavy petroleum products (lubricants) in batch of packaged (gallon/quartz-sized) and bulk (tankers) from their ten (10) lubricant plants nationwide.

Due to the issues faced by the company on which delivery system to use, these research questions that have been developed for this paper are: (i) What options does the oil delivery industry have when it must apply and optimize its supply chain amidst operations constraints? ii) What are the solutions that have been used by Mobil Oil Corporation to optimize the supply chain management for its own benefit and competitive advantage? An understanding of this will enable an assessment of the sustainability of such solutions over time and how they have been adapted to current trends in the industry.
Theoretical Framework

The theoretical framework which has been used for this paper will build a basic structure for this study and will begin by giving a basic overview of supply chain management. The optimization and competitive advantage provided by the supply chain management will be seen and its importance to the transportation of petroleum product which would be detailed first. After the analysis is narrowed down, the characteristics of the oil supply chain would be seen to show how they are different from supply chain of other industries. Once the differences are given, the uniqueness of optimization in the supply chain management of the petroleum products would be studied. The concept of optimization would be given by seeing the core optimization areas which should be seen in the supply chain and see how they are being implemented and applied. Once this framework has been established, the options available for optimization to the company would be seen in terms of the techniques and areas they are applied in (Johnson & Christensen, 2000). The methodology to this research would be to conduct empirical studies based on qualitative research and secondary and primary data using interviews would be carried out. Key personnel would be interviewed from Mobil Oil Corporation and information of supply chain optimization would be detailed. Theories and results from the research would be examined and compared. Conclusions would thereafter be made regarding the research carried out (Kothari, 2004).

Research Methodology

The limitations which have been faced while in this research will be characterized as the time constraint that must be encountered. Further, the study is focusing on only one company engaged in the product delivery industry in Nigeria. The petroleum product delivery industry has
a great significance and this thesis will look at the supply chain in the haulage of petroleum products. The time constraint will mean that the research at hand may not be very extensive, but only a limited set of solutions will be seen. These solutions would show how cost optimization and customer based focus is given by the supply chain. The paper will give greater attention to downstream based methods in the supply chain which will allow the research to capture the flexible features of the supply chain. The upstream is far less flexible and has less potential to be changed and optimized. The upstream has been researched on and studied while the downstream link is studied in much more detail. The time limitation that has been placed also means that only Mobil Oil Corporation has been studied due to its success in the Nigeria region. Further research will be in place to detailed research in multiple companies to see how they optimized their supply chain.

To further discuss this research, a qualitative methodology has been chosen which is considered collection of data which cannot be quantified and collects qualitative data to define a research studied (Wiid & Diggines, 2010). Qualitative research can be gather to analyze the data collected, and investigate the ideas and findings of other research as a literature review. Once the literature review is discussed, a case study is developed on Mobil Oil Corporation which can give an extensive rationale to the study (Gerring, 2007). The case study can grasp the complexity of one single company as it will be carried out in this research.
II. Literature Review

Cost Optimization and the Supply Chain

In producing and distributing goods and services, costs are incurred. As profit-making is a key feature that characterizes businesses, one common strategy companies employ to keep the profit margin continually wide and stay in business is cost optimization. Cost optimization involves cost reduction and minimization, and the maximization of the business values accruable from unavoidable expenditures (Jha, 2016; Yan, 2015; Sitek and Wikarek, 2012). In other words, cost optimization is the process of getting the best value or return on every operation related investment. The supply chain offers several windows for cost optimization because of its wide scope in the operations of an enterprise.

The scope of the supply chain, according to Norouzi (2013) includes every activity that exists from the raw material stage to when the final products are delivered to the customer. These include demand and supply planning, sourcing, producing, fabricating, assembly, testing, packaging, ordering, warehousing, transporting, distributing, delivery to customer, returning raw materials and receiving returns of finished goods and information flow (Norouzi, 2013). The supply chain also includes all logistical activities of a business enterprise, especially distribution logistics. In essence, at every stage of the supply chain, costs are involved. Being able to determine the costs at each stage of the supply chain therefore provides the avenue for controlling and optimizing such costs. The aim of supply chain management (SCM) is to increase sales, reduce costs and take full advantage of business assets by improving interaction and communication between all the actors forming the supply chain (Sitek and Wikarek, 2012).

Supply chain is a concept that has seen its definition and scope modified over the years while still retaining its basic elements. Jones and Riley (1985), for instance, see supply chain
management as the total flow of assets from the supplier to the customer. New and Payne (1995) defined supply chain as a chain that links the manufacturing and supply processes from the raw material stage to the stage of delivering the final goods and services to the consumer. Mentzer et al. (2001) describe the supply chain as a set of three or more organizations directly linked by one or more of the upstream and downstream flows of products, services, finances, and information from a source to a customer. According to Ching (2001), it is the distribution logistics that has the responsibility of distributing the finished products while exhibiting an appropriate level of service and customer satisfaction.

According to Jain et al (2009), a supply chain is a dynamic process and involves the constant flow of information, materials, and funds across multiple functional areas both within and between chain members. It refers to the integration of corporate business processes from end users to the suppliers by providing information, goods, and services that add value for the customers (Grant et al, 2006). It is also a series of interconnected activities which are concerned with planning, coordinating and controlling materials, parts and finished products from supplier to customer (Lourenco, 2001). More recently, the concept has been defined as a collection of various types of companies working together to improve the flow of products, information and finance (Sitek and Wikarek, 2012). The Council of Supply Chain Management Professionals (CSCMP) describes it as encompassing activities for the transportation and efficient and effective storage of goods, services and related information from point of origin to point of consumption in order to meet customer needs (CSCMP, 2013).
Distribution Logistics and the Oil Industry

Effective supply chain management is a strategic tool for enhancing an organization's productivity and profitability. Its effectiveness is measured in terms of profit to the organization and value to the customer. Against this background, Norouzi (2013) appraised the performance of the distribution logistics in the Iranian oil industry and proposed a performance matrix for assessing its effectiveness. The study (Norouzi, 2013) employed a review of literature to develop the performance appraisal model which combines both Analytical Hierarchy Process (AHP) and Balance Score card (BSC) models. To develop the model, a questionnaire was designed and distributed among industry experts, validated and assigned weights based on a pairwise comparison of the expert opinions. Subsequently, the data were quantified and analyzed to arrive at a composite model for performance measurement. The study underscores the importance of measuring the effectiveness of the supply chain in the distribution and transportation of petroleum products.

Bahaidar (2013) found out that constrained infrastructure is one of the factors affecting the distribution of oil and petroleum products in Kenya. Using a descriptive research design and a target population involving all the employees in the oil companies in Kenya, the research data was collected using a questionnaire and analyzed using descriptive and inferential statistics. The study was conducted on the premise that the main challenge facing the oil industry is not the availability of oil resources, but putting these reserves into production and delivering the final products to consumers at the minimum cost possible (Bahaidar, 2013), a process that requires a solid supply chain management program (Chima, 2007). The study findings revealed that the management information systems, storage facilities, and transport infrastructure of the oil companies were adequate to provide the necessary impetus for the companies' supply chain to function effectively.
thereby meeting its aims of cost optimization, profit maximization and value added service to the customer. The study (Bahaidar, 2013) also established that the long-term strategic alliances the companies had with other suppliers had positive effects on the storage and transportation of oil products in Kenya.

One mode of distributing petroleum products is the use of pipeline. Pipeline transportation of petroleum products is common and most prevalent because, among other things, it eliminates the risks of surface transportation. Anikwe (2012) investigated the significance of this mode of product distribution on the marketing of petroleum products in Nigeria. Among other objectives, the study sought to determine the effects of the use of pipeline transport mode on the availability of petroleum products in South East, Nigeria and identify the major challenges confronting pipeline transportation of petroleum products (Anikwe, 2012). Using a cross sectional survey design method and a random sample of 217 petroleum depots employees, a combination of parametric and non-parametric statistical techniques were employed to test the hypotheses of the study. The study found out that pipeline transportation mode has a positive significant effect on the availability of petroleum products in southeast Nigeria by increasing the people’s access to oil. Small pipeline diameter and pipeline vandalism were also found to be the major challenges confronting petroleum products transportation. In essence, just as the choice of strategies matter for effectiveness in the supply of petroleum products, the mode of distribution also matters.

Manzano (2005) investigated the supply chain practices in the downstream sector of the oil industry. Based on literature reviews and interactions with industry experts, he noted that the distribution part of the petroleum supply chain comprises the transport of finished fuels from the door of the refinery to consumers. The author also found that the sale of the products either in bulk or in small quantities in gas stations were done using pipeline, tanker, truck, rail or barge as the
major modes of transportation. The supply chain structure in the downstream industry at the global level has the following actors as identified in the study; suppliers of crude oil, refiners, and consumers, who may be small like car owners or wholesale consumers like power stations using heavy oil and petrochemicals plants receiving feedstock. These actors are involved in the supply chain activities of oil supply and trading, manufacturing, distribution, as well as sales and marketing.

Soliani (2016) equally reviewed the distribution logistics in the Brazilian oil industry. The study revealed that by lowering the barriers for entry into the petroleum industry in the country via the introduction of new set of rules for the distribution of petroleum products, the adoption of innovative supply chain strategies became imperative for companies to remain competitive and be able to maximize their profits and minimize their costs of distribution. The distribution logistics is seen as key in ensuring that petroleum products reach the final consumers at a lower cost. In Nigeria, the downstream petroleum industry is partly deregulated and this has implications for entry into the business and for the distribution of petroleum products among the industry operators.

**Oil Industry and Nigeria’s Economy**

Oil is the mainstay of the Nigerian economy today. Since oil was discovered in large quantity in the country in the early 1956, the contribution of other non-oil economic activities to national income has been dwindling and marginal. The oil sector accounts for about 80% of all government revenue, 90-95% of export revenues, and over 90% of foreign exchange earnings. From being a paltry 2.7% of government revenue in 1960, the share of oil revenue as a proportion of total government revenue has not gone below 70% since 1975. It was as high as 96% in 1990
(National Bureau of Statistics, 2011). The literature is also replete with evidence to buttress the prominence of Nigeria as one of the major oil producers globally.

Nigeria is estimated to have a proven oil reserve of over 37.2 billion barrels and a proven natural gas reserve of over 180 trillion cubic feet (United States Energy Information Administration, 2012). Nigeria produces over 2.53 million barrels of crude oil per day and 1 trillion cubic feet of dry gas, out of which it exports over 2.3 million barrels of crude oil and 17.97 million metric tons of liquefied natural gas per day (Azoro, 2016). On the domestic front, the petroleum industry generates over 90% of the country’s foreign exchange earnings, and provides various forms of employment to the country’s population. The industry and earnings from same have also greatly influenced Nigeria’s international relations and politics (Ehinomen and Adeleke, 2012).

Using the gross domestic product (GDP), per capita income (PCI) and inflation (INF) as independent variables and oil revenue as the dependent variable for a regression analysis, Ogbonna and Ebimobowei (2012) investigated the effects of petroleum income on the Nigerian economy for the period for a 10-year period spanning 2000 to 2009. Oil revenue in the study included petroleum profit tax, royalties, fees from operating licenses and prospecting licenses. The results of the analyses show that oil revenue had a positive and significant relationship with gross domestic product and per capita income. Oil revenue was also found to have a positive relationship with inflation, although the relationship was not statistically significant. Based on these findings, this study concludes that petroleum income has positively and significantly impacted the Nigerian economy when measured by GDP and PCI for the period 2000 to 2009. The findings thus buttressed the general opinion that income from oil has been beneficial to the country’s economy at both macro and micro levels.
Case Studies on Nigeria

While a substantial number of studies have been carried out globally on supply chain, distribution logistics, transport and cost optimization in the oil industry, the number of such studies that used case studies from Nigeria is limited. The scope of the works also differs. For example, Obasanjo (2013) focused on the mode of transportation of petroleum products while Obasanjo et al (2014) investigated the problems associated with road transport haulage. Pipeline transportation problem was the focus of Anikwe (2012). Other areas investigated include supply chain integration in the oil industry (Amue and Ozuru, 2014), national participation, local contents and liberalization (Azoro, 2016; Ehinomen and Adeleke, 2012), petroleum and economy (Ogbonna and Ebimobowei, 2012), and optimal scheduling (Eke and Enibe, 2007).

For Obasanjo (2013), issues of time, safety, cost, reliability, speed and capabilities define an effective and efficient transport system. On that premise, the study compared the cost, time constraints, and the pattern of flow transporting petroleum products by three different modes of transport from the Kaduna refinery in Nigeria to some selected locations in northern Nigeria. Using a combination of primary and secondary sources, data obtained were analyzed using both inferential and descriptive statistics. The result showed that Kano recorded the highest quantity of tankers in-flow for the delivery of petroleum products, the major constraints faced by tanker drivers conveying petroleum products to the selected locations is delay at police and military check points and mechanical problems. The study also showed that the adoption of pipeline transport has the potential to save up to 95 percent of the haulage costs while rail transport could save up to 40 percent. The findings from Obasanjo et al (2014) were a further extension of Obasanjo (2013).
Amue and Ozuru (2014) in their paper developed and tested a conceptual model of supply chain integration and operational performance. In developing the model, a number of hypotheses were tested. Two of the hypotheses were that there was a significant and positive relationship between integrating online information throughout the supply chain network and operational success, and that there was a significant relationship between knowledge integration across the supply chain network and operational performance. The results, however, suggested otherwise with respect to the first hypothesis as the impact of information integration on operational performance was insignificant. The results showed a lack of information sharing on stock levels of different products, forecasting, and campaign information. The second hypothesis was, however, accepted as knowledge integration had the greatest impact on operational performance.

Reports indicate that there is a persistent scarcity of petroleum products in many parts of Nigeria as well as an inequitable distribution of the products. Against this premise, and the establishment of three refineries in the country, Eke and Enibe (2007) sought to determine an efficient and equitable distribution of three blends of petroleum product. They employed a linear programming model with 20 constraints and 51 variables. The optimal solution was obtained for each of the product in a hypothetical target year and the result was compared with the result of optimal solution obtained during an uncertainty period. The study reveals that any variation in supply, demand and transportation cost changes the optimal solution. Strategic transportation that optimizes cost thus matters in the distribution of petroleum products in Nigeria. How one of the oil companies involved in the downstream sector of the Nigerian petroleum industry, Mobil, carries out this task to gain advantage over competition and increase its profit margin is the preoccupation of this seminar.
III DISCUSSION

Introduction

This chapter centers on the distributional operation of petroleum products by Mobil Oil Nigeria and how this is optimized for efficiency and to gain a competitive advantage over other oil marketers in the Nigerian downstream sector. Most of the details contained in this chapter were retrieved and synthesized from various publications (online and hard copies) of Mobil Oil Nigeria, Mobil Producing Nigeria Unlimited, and the parent company, Exxon Mobil Corporation, as well as from the Lagos Office of Mobil Oil Nigeria. Other than where relevant citations are made, the facts and figures in this chapter are therefore Mobil’s and are hereby acknowledged as such.

Mobil Oil in Nigeria

Mobil Oil Nigeria (MON) Plc dates back to 1907 when Socony Vacuum Oil Company began marketing operations in Nigeria through the sale of Sunflower kerosene. Mobil Oil Nigeria plc was incorporated as a Private Limited Liability Company in 1951. It became a public limited liability company in 1978 and its share capital is listed on the Nigerian Stock Exchange. Exxon Mobil Corporation holds 60% of the issued share capital while other investors hold the remaining 40%. Exxon Mobil Corporation (ExxonMobil) is an international petroleum and petrochemical company with a presence in some 200 countries and territories. Most of ExxonMobil’s projects in Nigeria are located offshore in shallow and deepwater. The company’s largest facility is QIT which processes crude (Qua Iboe) produced from several offshore fields in the Bight of Biafra, and the Erha/Erha North deepwater project. Qua Iboe is Nigeria’s largest exported crude blend with an average production around 400,000 bbl/d.
Exxon Mobil’s affiliate companies have worked in Nigeria for over 100 years through Esso Exploration and Production Nigeria Limited (EEPNL), Esso Exploration & Production Nigeria (Offshore East) Limited, Mobil Producing Nigeria Unlimited and Mobil Oil Nigeria Plc (MON). Mobil Oil Nigeria was formed principally for the marketing of petroleum products. The petroleum products the company sells include Premium Motor Spirit (PMS), Diesel, Aviation fuel, kerosene and lubricants. Petrol, Diesel, Kerosene and lubricants are mainly sold through the company’s service stations while Aviation fuel is sold through the aviation domestic and international terminals at the Murtala Mohammed Airport, Lagos, Nigeria. Mobil oil Nigeria is one of the six major petroleum products marketers in Nigeria. It currently has over 200 retail outlets across Nigeria and owns three plants in Apapa, Lagos, Nigeria for the manufacturing of lubricants, petroleum jelly and insecticides. The Company distributes its products through this network of outlets and distributors, as well as through direct sales to end-users. Fuel products are supplied from the company’s terminal at Apapa Lagos, PPMC depots and third-party terminals. Considering the large expanse of the Nigerian market, this distributional strategy is optimal as further discussed in the next section.

Figure 1: A Typical Mobil Oil Retail Outlet
Transportation of Petroleum Products

Mobil Oil Nigeria employs a multi-modal petroleum products transportation system. The modes used by the company are pipelines, marine, tankers and trucks. The modes are complementary and are based on the market segment in which the company operates. They are also deployed to address the peculiarities of the company’s market and clients across Nigeria. The marine mode of product transportation is largely used in ferrying products from the crude oil processing facilities located offshore. The pipeline and tankers / trucks modes are used for the supply of petroleum products to the over 200 service outlets and individual consumers.

Pipeline transportation of petroleum products involves the application of pressure to move the fluid to the desired destinations through a network of pipelines laid across the Nigerian landscape. The pressure is generated by the installation of pumps along the pipeline. The Mobil lube oil depot at Apapa, Lagos, receives its product through the pipeline from the jetty, and also delivers most of the product to service station through the pipeline. The development of a network of pipelines for the transportation of petroleum products requires a large capital outlay. Most of the costs are related to two main components; pipeline system and compressor stations. The cost of pipeline is determined by the length and diameter of the pipeline while the cost of a compressor station depends on the operating power of the compressor. The latter is dependent on both suction and discharge pressure. Mobil Oil recognizes these dynamics and therefore focuses on obtaining a proper balance between pipeline cost and compressor cost to optimize the pipeline transportation of petroleum products. Essentially, the company operates a cost effective design of gas pipeline and its operation to ensure that the cost of pipeline transportation is low enough to provide adequate profit from the financial investment.
Pipelines in Nigeria are constantly under the threats of vandalism, as such, the transportation of petroleum products across the country is largely truck-based. The costs of truck transportation increase with distance covered, thereby making the supply and distribution of petroleum products through this mode more expensive than using the other modes. Furthermore, the logistics of truck transport for high volume and long distance shipments are enormous. For instance, if each truck holds 200 barrels and can travel 500 miles per day, it would take a fleet of 3000 trucks, with one truck arriving and unloading every other minute, to meet the capacity of 1,000 mile pipeline supplying 150,000-barrel per day. However, despite generally being small in terms of both volume per shipment and distance, truck movements are essential to both the completeness and the competitiveness of the overall oil distribution system to retail outlets.

In Nigeria, refined petroleum products are transported from the refineries through a network of pipelines, coastal vessels, road trucks and rail wagons to the 21 regional storage/distribution depots, spread across the country. It is from these depots that the marketing companies obtain their supplies. Though the distribution of petroleum products by road transport is characterized by various constraints, roads by far handle the largest freight transport share of petroleum products in Nigeria. About 80% of freight movements are done on the road and there has been a steady growth in the number of heavy goods vehicles. There are an average of about 5,000 tankers involved in wet cargo haulage, to move about 150 million liters of fuel and 2,500 trailers in dry cargoes plying Nigerian roads daily. However, bad roads, poor road networks and also various hindrances such as delays at police, military, state revenue agency and customs check points obstructs an effective and efficient logistics.

In view of these challenges, the company may look at potentially changing its mode of distribution in the near future. This will largely be by intensifying efforts to rehabilitate the network
of pipelines, and make provision for remotely securing the pipelines from vandalism using latest technologies. This will ensure that the problems of transporting petroleum products by road are circumvented and a trade-off can be achieved in the losses associated with road transportation and the cost of rehabilitating and securing the pipelines. Mobil is one of the six major oil marketers in Nigeria and it gets its products from the refineries of the Nigerian National Petroleum Corporation (NNPC) for further processing and distribution to the final consumers through its retail outlets. This process flow is illustrated in the figure below.

Figure 1: The physical flow of petroleum products in Nigeria (Anyadiegwu, 2015)
Mobil Operational Strategies

According to the Exxon Mobil blueprint, by the year 2040, demand for transportation fuel is expected to increase by almost 30 percent when compared with the present. This increase will be driven by commercial transportation, primarily in developing countries. The resulting fuel mix will continue to shift from gasoline to diesel. In fact, global transportation demand for diesel is expected to increase by about 45 percent over the period, with more than half of the growth in Asia Pacific. At the same time, worldwide gasoline demand is expected to be essentially flat, as declining demand from fuel economy improvements in developed countries is offset by growth in developing nations. Stricter emissions standards will lower demand for high-sulfur fuel oil as the marine sector shifts to cleaner fuels over the coming decade. Natural gas is likely to grow in use as a transportation fuel, particularly for heavy-duty vehicles and marine vessels, due to its low emissions and cost-competitiveness relative to liquid fuels in many parts of the world.

Lubricant demand is also expected to grow on increased economic activity, particularly in Asia Pacific. Within the high-value synthetic lubricants sector, where ExxonMobil has a leading market position, demand is expected to significantly outpace industry growth. Growth in global demand, stimulated by lower commodity prices, resulted in higher industry refinery utilization and margins in 2015, particularly in Europe and Asia Pacific. Refineries in North America continue to benefit from cost-competitive feed-stock and energy supplies, allowing them to meet domestic product needs and economically export to markets throughout the Atlantic Basin. Over the next five years, the addition of new refining capacity is expected to outpace demand growth. This suggests that rather than struggle to meet market demands like their competitors, Mobil is focusing on increasing the supply of petroleum products to ensure an increase in consumers’ choices. Prioritizing consumer options and increasing product availability amidst potential shrinkage in
global oil supply based on growing market demands presents a very good opportunity for Mobil to increase its market share, profitability and maintain its competitive edge in the downstream oil sector.

Regardless of the industry environment, the company’s integrated business model, world-class assets, and feedstock flexibility position it to be a leader in return on capital employed across the business cycle. The company’s integrated business model comprises distribution and supply of petroleum products in the company’s business locations across the world with emphasis on cost optimization and efficiency. It is also a part of the general operations strategies of the company.

The strategies are to:

- Maintain best-in-class operations
- Lead industry in efficiency and effectiveness
- Provide quality, valued products and services to our customers
- Capitalize on integration across ExxonMobil businesses
- Maintain capital discipline

**Integrated Business Model and Cost Optimization**

Exxon Mobil’s integrated business model allows the company to maximize value across the supply chain. In the fuels business, integrated business teams combine expertise in manufacturing, supply chain, technology, logistics, marketing, and sales to optimize the production and placement of fuel products such as gasoline, diesel, and aviation and marine fuels. In 2016, the company continued to expand its brand presence with store count exceeding 20,000 globally while at the same time reducing the number of company-owned sites in select markets through sales to independent, branded wholesalers who specialize in operating retail sites and
convenience stores. This business model change resulted into a lower operational risk and reduced operating and capital expenses.

Mobil’s integration of the chemical and lubes operations has allowed it to reduce costs by sharing services and capitalizing on operational synergies. For example, at each of integrated sites, there is a shared site management and support services structure, which reduces overhead and administrative costs. The company also leverages common utilities and infrastructure to reduce energy and maintenance expenses. In addition, the average capacity of its refineries is more than 70-percent larger than industry average. This ensures that the worldwide cash operating cost of its portfolio of refineries is approximately 15% below the industry average. Functional excellence enables effective execution of the specific tasks of refining, logistics, and marketing, while cross-functional excellence ensures collaboration and coordination across the value chain to maximize profitability. For example, integrated business teams are pursuing profitable volume growth and upgrading sales to the highest-value channels by optimizing each step of the supply chain, from crude oil acquisition to finished product delivery.

Cost and Performance Trend

Using the above strategies, Mobil Oil was able to record some improvements in its performance. Globally, the company delivered earnings of $6.6 billion with a 28.2% return on average capital employed and achieved record sales of its flagship lubricant brand, Mobil 1. In the Nigerian market, with its multi-modal transportation and distribution of petroleum products as well as other cost optimization strategies embedded in the company’s integrated business model, Mobil Oil’s profits grew by more than 70% between 2015 and 2016 with a marginal 19% increase in the selling and distribution expense.
Between the years 2009 and 2016, as shown in Table 1, the cost profile of Mobil Oil Nigeria with respect to the selling and distribution (SDC) of petroleum products oscillated between N3.1 billion and N6.5 billion. During the same period, the company’s profit before tax (PBT) ranged from N4.0 billion to N12.0 billion. The cost profile also shows that there is an annual increase in the selling and distribution cost of the company but this was kept to an average of 15% during the period. In other words, while the company recognizes the need to incur selling and distribution expenses, it strived to keep this cost at a barest minimum with an expectation of bigger returns on the cost as reflected in the annual PBT trend. Both the cost and PBT trends are illustrated in Figure 2.

<table>
<thead>
<tr>
<th>Year</th>
<th>PBT (N '000)</th>
<th>SDC (N '000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>4,066,153</td>
<td>3,156,731</td>
</tr>
<tr>
<td>2010</td>
<td>5,721,728</td>
<td>3,690,417</td>
</tr>
<tr>
<td>2011</td>
<td>5,999,414</td>
<td>4,096,322</td>
</tr>
<tr>
<td>2012</td>
<td>4,076,549</td>
<td>4,490,961</td>
</tr>
<tr>
<td>2013</td>
<td>5,123,002</td>
<td>4,621,179</td>
</tr>
<tr>
<td>2014</td>
<td>8,446,137</td>
<td>5,226,522</td>
</tr>
<tr>
<td>2015</td>
<td>6,906,322</td>
<td>5,517,566</td>
</tr>
<tr>
<td>2016</td>
<td>12,019,892</td>
<td>6,586,717</td>
</tr>
</tbody>
</table>

While the year-on-year increase in the selling and distribution cost (SDC) was highest at 19% between 2015 and 2016, the annual increase in profit before taxation (PBT) dipped between 2011 and 2012 with a negative growth of 33%. The company’s Managing Director attributed this to the partial deregulation of the downstream petroleum sector in Nigeria and the attendant delays in the reimbursement of subsidies on fuel imports by the government. The trend was reversed in 2013. PBT further increased by 65% over the 2013 figures in 2014. The PBT in 2015 also
witnessed a negative growth as it declined to N6.9 billion from N8.4 billion in the preceding year.

The profit before tax of N12.0 billion in the 2016 financial year is the highest year on year growth in Mobil Oil’s profitability during the period reviewed. To further sustain this growth trend, Mobil will focus on keeping a lid on the distribution cost profile and optimize the capacity of the distribution channels to ensure that the company’s array of products are available at its over 200 outlets at a stable cost. Over time, this will become a small fraction of the operational expenses that would barely affect earnings and the company’s profit margin.

Figure 2: Mobil Oil Nigeria SDC and PBT Trends (2009 – 2016)
IV. SUMMARY AND CONCLUSION

Summary

This research examined the cost optimization and strategic transportation of petroleum products in Mobil Oil Corporation, Nigeria. The study becomes important for two main reasons. One is the importance of oil to the national economy of Nigeria. Oil accounts for 95% of the country’s energy and is the largest contributor of government revenue in the country. It accounts for about 80% of all government revenue, 90-95% of export revenues, and over 90% of foreign exchange earnings. The oil and gas industry also accounts for between 10% and 15% of the country’s GDP. The supply and distribution of oil across the country therefore matters. This is more so as the oil supply and distribution market has several operators that must find a way to differentiate their operations in order to sustain their competitive advantage and profitability. It thus becomes imperative to study how Mobil Oil, one of the major players in the industry, is able to optimize its costs and strategically sustain its profitability in the face of fierce competition. The study adopted a qualitative research approach and a review of related literature on the case study.

From the findings, Mobil Oil’s engagement in the downstream sector of the petroleum industry in Nigeria entails gas treatment, crude oil and gas conversion into refined and petrol chemical product, and transportation and distribution of the refined products. Mobil is one of the six major marketers of petroleum products in the Nigerian market and it sources its crude oil from the refineries of the Nigerian National Petroleum Corporation (NNPC) for onward processing at its facilities offshore and lube plants in Lagos. The company’s largest facility is QIT which processes crude (Qua Iboe) produced from several offshore fields in the Bight of Biafra, and the Erha/Erha North deepwater project. Qua Iboe is Nigeria’s largest exported crude blend with an average production around 400,000 bbl/d.
The petroleum products the company sells include Premium Motor Spirit (PMS), Diesel, Aviation fuel, kerosene and lubricants. Petrol, Diesel, Kerosene and lubricants are mainly sold through the company’s service stations while Aviation fuel is sold through the aviation domestic and international terminals at the Murtala Mohammed Airport, Lagos, Nigeria. It currently has over 200 retail outlets across Nigeria and owns three plants in Apapa, Lagos, Nigeria for the manufacturing of lubricants, petroleum jelly and insecticides. The Company distributes its products through this network of outlets and distributors, as well as through direct sales to end-users. Fuel products are supplied from the company’s terminal at Apapa Lagos, PPMC depots and third-party terminals.

Mobil Oil employs a multi-modal transportation system for the supply and distribution of its products. The modes are pipelines, marine and trucks/tankers. The modes are complementary and are based on the market segment in which the company operates. They are also deployed to address the peculiarities of the company’s market and clients across Nigeria. The marine mode of product transportation is largely used in ferrying products from the crude oil processing facilities located offshore. The pipeline and tankers / trucks modes are used for the supply of petroleum products to the over 200 service outlets and individual consumers. To optimize costs along the supply and distribution chain, Mobil Oil employs an integrated business model. The model allows the company to maximize value across the supply chain. The integrated business teams combine expertise in manufacturing, supply chain, technology, logistics, marketing, and sales to optimize the production and placement of fuel products such as gasoline, diesel, and aviation and marine fuels.

The integrated business model is operated in a way that operations in different areas of the company’s several products (chemicals and lubes for instance) are synergized. This results in
shared management, services, utilities and infrastructure thus lowering operational risk as well as reducing operating and capital expenses. Functional excellence in the business model enables effective execution of the specific tasks of refining, logistics, and marketing, while cross-functional excellence ensures collaboration and coordination across the value chain to maximize profitability. The company’s financial results attest to the effectiveness of this model. Globally, the company delivered earnings of $6.6 billion with a 28.2% return on average capital employed. In the Nigerian market, Mobil Oil’s profits grew by more than 70% between 2015 and 2016 with a marginal 19% increase in the selling and distribution expense. For the period 2009 and 2016, the company kept the year-on-year increase in selling and distribution costs at an average of 15%.

To sustain this growth trend in profitability, it is essential for Mobil to align with the local government’s economic policies. For instance, at the inception of the current government in 2015, one critical fulcrum on which the government intended to ride on is the deregulation of the oil industry. Not only does the government want to deregulate the industry, it equally has a plan to reevaluate its sources of revenue to downplay the contribution of oil. What this portends is that government’s involvement in and protection of the oil industry will ebb gradually until it is totally withdrawn for free market operations. With this, issues of delays in the reimbursement of subsidies on fuel imports by the government will no longer be there and Mobil will have to leverage on its extensive international network and affiliations to optimize the importation of crude oil for local refining. At the moment, no oil marketer is involved in importation of crude for itself. Rather, this activity is carried out by the Nigerian National Petroleum Corporation from whom the major oil marketers like Mobil obtain their products. The overall impact of this on Mobil’s profitability is that the company will have a full grip of its petroleum business from end to end without external dependencies. This will also ensure that the company’s cost profile is within its full control.
It is also important for Mobil to focus on increasing its local contents and partnerships in the implementation of its integrated business model in its Nigerian operations. This follows from the diversity of the Nigerian market based on regional competitive advantage and geography. Nigeria has a land mass that is over 9,000 km² and a business population in the North whose main preoccupation is haulage and truck transportation of agricultural produce and livestock. The southern part of the country is more urbanized and has more industries and automobiles. While gasoline and diesel will sell more in the South, the demand for diesel and lubes will be higher in the North. The logistics of distributing these products from the processing plants in Lagos, Southern Nigeria to the North is enormous with negative impacts on gross earnings. Entering into strategic business alliance with distribution companies in the Northern part of the country to handle the supply of petroleum products in that part of the market will lower the costs of supplying products from Lagos using its own resources and infrastructure without eroding the brand equity and market share.

**Conclusion**

Mobil is one of the most profitable companies in the downstream petroleum industry globally and in Nigeria because, among other things, its strategy of integrating its businesses ensures cost optimization. This results in higher returns on operational investment thereby giving the company a competitive advantage in its line of business while staying consistently profitable. The effective utilization of the company’s assets and resources through the integrated business model offers comprehensive optimization tools that gives the company quality returns on capital
employed throughout the business cycle, especially in the supply and distribution of petroleum products.
REFERENCES


