



Effect of International Seaborne Trade on Productivity of Ports in Nigeria

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ABSTRACT

This study examined the effect of international seaborne trade on productivity of port in Nigeria. The predictor variable (international seaborne trade) had its dimensions as oil export, non-oil export, oil import and non-oil import. The criterion variable (productivity of port) was measured with port productivity. The theories that underpinned the study included: Comparative advantage theory and theory of international trade, ex-post facto research design was used for the study. Secondary sources of data were used as the main data collection method. Relevant data for this study were collected from the annual reports and accounts of Nigerian Ports Authority, National Bureau of Statistics and Central Bank of Nigeria Annual Statistical Bulletins (1981 – 2022). The population of the study consisted of all the 6 ports in Nigeria. The study used descriptive and inferential statistical tools to analyse the data. Specifically, multiple regression analysis of ordinary least square estimation was used to test the hypotheses with the aid of SPSS 26.0. The reliability of the research instrument was validated on the basis of the secondary data sources. The study revealed that there are opportunities to develop and use oil and non-oil export channels for international seaborne trade through ports. The study revealed that ports provide avenues for the use of oil and non-oil imports to smoothen international seaborne trade that leads to effective seaport performance. The study found that non-oil export and non-oil imports offer veritable opportunities to optimize international seaborne trade efficiency in ports by helping to convert resources, build traffic intensity in trade and engage customers and stakeholders to utilize ports for their international business transactions. The study revealed that ports recognize that oil export, non-oil export, oil import and non-oil import provide the government and business community variety of options to engage in seaborne trade of intensive nature. The study concluded that: Oil export has insignificant effect on productivity of ports in Nigeria ($t = 1.592$). Non-oil export has negative and insignificant effect on productivity of ports in Nigeria ($t = -1.040$); oil import has insignificant effect on productivity ($t = 0.948$); non-oil import has insignificant effect on productivity ($t = 0.775$). This study, therefore, recommended that Nigerian ports should prioritize and utilize the full capacity available in seaborne trade and channel oil exports and non-oil exports towards increasing and optimizing the productivity of ports in Nigeria.

Keywords: International Seaborne Trade, Oil Export, Non-Export, Oil Import, Non-Oil Import, Productivity of Ports

INTRODUCTION

Nigeria's seaborne trade remains the focal point of West African traffic. For instance, the cargo throughputs to and from Nigeria account for more than 70 percent of the total volume of cargo generated by the entire West Africa sub-region of Africa (Monday *et al.*, 2021). Without Nigeria as a foremost market international seaborne trading activities in West Africa region would be much affected due to her major export commodities such as crude oil cocoa palm kernel rubber and coffee among others. (Odiegwu, 2019) With their highly developed infrastructures modern equipment and efficiencies professional cargo handlings and freight managements the ports have great potential to exploit their strategic position for serving both the rapidly developing national economy and the wider international community (Somuyiwa & Ogundele, 2015).

Nigeria and Nigeria's investments in seaborne trade shipping have advanced retrogressively since the end of the eighties. Nigerian government's ships then which were over twenty-six were all sold to settle accumulated debts. Private sector investment in the industry was also very low from the Nigerian side (Lloyd & Odiegwu, 2019). The intrinsic assumption from this could be that Nigeria lacks the shipping demand output to support investment in seaborne trading (Odiegwu & Enyioko, 2022a).

It is possible that seaborne trade related factors negatively influencing the performance of Nigerian ports can be overcome or significantly reduced by the application of available logistic tools and functions. To achieve the proposed elimination or reduction at the level of negative influences imposed by the limiting factors empirical evidence and information are needed on which of the numerous factors constitute a significant factor and major clog in the wheel of operational progress efficiency and flow of seaborne trade in Nigeria through the seaports. Expert inputs from oil and non-oil exports/imports as major stakeholders and consumers of port services become very important in identifying the factors that inhibit the choice of ports for import and export hence there is the need to ascertain how international seaborne trade affects vessel turnaround time of ports in Nigeria.

Since the goal of each port operator is to maximize port efficiency productivity cost-effectiveness of cargo handling and delivery of consignments via the ports time savings improvement of supply chain safety and security related to the port service quality improvement utility and customer satisfaction; exporters and importers remain the most important port users as far as international seaborne trade is concerned and this leads to the determination of the significant and critical ways in which international seaborne trade affect productivity of ports in Nigeria.

Seaborne oil trade is the exchange of petroleum resources (crude oil and refined oil resources) from and to supply and demand countries and its carriage and/or transportation by sea using ocean going tankers vessels (Monday *et al.*, 2021). It is composed of seaborne oil export and import trade and covers all kinds of petroleum energy resources whether crude oil or refined petroleum resources. Nigeria's seaborne oil trade comprises seaborne refined petroleum products import trade and crude oil export trade via the Nigeria seaports and the oil export terminals respectively; both categories of marine terminals being administered by the Nigeria Ports Authority (NPA) (Olusegun, 2020).

In addition, the issues relevant to the analysis of demand for any seaborne trade of the oil export/import suffer from a number of handling challenges which affect the free flow of international trade from the source to destination. This raises an all-embracing need to determine the moderating effect of foreign exchange rate on international seaborne trade and performance of ports in Nigeria. The demand for international seaborne trade has necessitated the curiosity to measure its influence on the productivity of ports in Nigeria. This research investigated the effect of international seaborne trade on productivity of ports in Nigeria. Accordingly, the following hypotheses were formulated and investigated: Ho₁: Oil exports have no significant effect on productivity of ports in Nigeria. Ho₂: Non-oil exports have no significant effect on productivity of ports in Nigeria. Ho₃: Oil imports have no significant effect on productivity of ports in Nigeria. Ho₄: Non-oil imports have no significant effect on productivity of ports in Nigeria.

LITERATURE REVIEW

Theoretical Framework

This study examines the effect of international seaborne trade on **productivity** of ports in Nigeria. In this section the theoretical framework **that** underpinned the study has been explored. Theories such as: Comparative advantage theory and theory of international trade have been x-rayed in this section.

Comparative Advantage Theory

This theory was propounded David Ricardo in 1817 because he was dissatisfied with the looseness in Smith's theory (Evans, 2011). According to Ricardo's theory of comparative advantage even if a nation has an absolute cost disadvantage in the production of both goods there still exists a basis for mutually beneficial trade. The less efficient nation should specialize in the production and exportation of the good in which it is relatively less inefficient (where its absolute disadvantage is least) while the more efficient nation should specialize in the production and exportation of the good in which it is relatively more efficient (where its absolute advantage is greatest). This theory proved to be better than Smith's absolute advantage theory because it is possible for a nation not to have an absolute advantage in anything, but it is not possible for one nation to have a comparative advantage in everything and the other nation to have a comparative advantage in nothing. That is because comparative advantage depends on relative costs (Rodrigue & Notteboom, 2020).

A consensus has subsequently emerged that the classical and neoclassical theories could be used to address the issue of economic development utilizing the technique of comparative statics. Itsuro (2003) has stressed that the traditional trade theories confer both static gains (direct benefits) and dynamic gains (also called indirect benefits) on trading countries.

The comparative advantage theory in the principles of economics means the ability of a country to produce a particular commodity at a lower opportunity cost than another country. The concept further means the ability to produce a product most efficiently given all the other products that could be produced in the same market. Alderton (2008) opines that this theory can be contrasted with absolute advantage which means the ability of a country to produce a particular good at a lower absolute cost than another. The theory describes the manner in which trade can create value for both parties even when one can produce all commodities with fewer resources than the other (Jose & Tongzon, 2007). The net benefits of such an outcome are called gains from trade. Initial research on comparative advantage theory was first described by Robert Torrens in 1815 in an essay on the Corn Laws. He concluded it was England's advantage to trade with Poland in return for grain even though it might be possible to produce that grain more cheaply in England than Poland (Haberler, 1988). In this context static gains refer to the increase in income which arises from greater efficiency in allocating resources along a fixed and given production possibilities frontier while the —dynamic benefits of trade refer to the cumulative increases in income that arise from outward shifts of the production possibilities frontier brought about by a trade-induced movement along the original frontier. These dynamic benefits have been dubbed the - growth effects of trade.

Theory of International Trade

In the early 1900s a theory of international trade was developed by two Swedish economists Eli Heckscher and Bertil Ohlin. This theory has subsequently become known as the Heckscher–Ohlin model (H–O model) (Sanyal & Jones, 1982). The results of the H–O model are that the pattern of international trade is determined by differences in factor endowments. It predicts that countries will export those goods that [make](#) intensive use of locally abundant factors and will import goods that make intensive use of factors that are locally scarce (Sanyal & Jones, 1982). The Heckscher–Ohlin model makes the following core assumptions (Ohlin, 1933): Labor and capital flow freely between sectors equalising factor prices across sectors within a country. The amount of labor and capital in two countries differ (difference in endowments). Technology is the same among countries (a long-term assumption), and tastes are the same upon countries. According to Harbeler (1988) there are four vital points regarding the - dynamic benefits of international trade

on participating less developed countries (LDCs): First trade provides material means (capital goods machinery and raw and semi-finished materials) indispensable for economic development. Secondly and even more important trade is the means and vehicle for the dissemination of technological knowledge the transmission of ideas for the importation of know-how skills managerial talents and entrepreneurship. Thirdly trade is also the vehicle for the international movement of capital especially from the developed to the underdeveloped countries. Fourthly free international trade is the best anti-monopoly policy and the best guarantee for the maintenance of a healthy degree of free competition (Haberler, 1988).

International trade theory provides explanations for the pattern of international trade and the distribution of the gains from trade. The theory convinces most economists of the benefits of liberal trade. But many non-economists oppose liberal trade. Opponents include some who may have encountered trade theory but nevertheless fall prey to fallacious reasoning. This paper attempts to convey why trade theory is so persuasive to economists and also to deal with why many non-economists are not persuaded.

Ideally international trade leads to an increase in income in the level of investment and in the state of technical knowledge in the country. The increase in investment and improvements in innovations and technological progress then lead to increased productivity and competitiveness and trigger a further increase in trade and in income. This positive feedback continues and brings about a —virtuous circle of increased trade rising income and economic development. Nevertheless, experience has shown that successful crude oil shipment performance requires a broadly supportive policy environment including macroeconomic stability public investment in infrastructure and human capital and policies that provide adequate incentives for investment in the crude oil shipment sector.

Above all these policies should be consistent transparent and steadily maintained over a long period of time. Ajayi and Araoye (2019) argued that a general perspective of the theory of international trade is interchange of goods capital and services across international territories. Munim and Schramm (2018) wrote that in many international markets it reveals an ample share of gross domestic product (GDP). While international trade has been present throughout much of history its economic social and political significance has been increasing in recent centuries. [Tong and Wei \(2014\)](#) opine that industrialization advanced transportation globalization multinational corporations and outsourcing are all having major impact on the international trade system. They argued further that rising foreign trade is critical to the continuance of globalization. International trade is a major source of economic revenue for any nation that is considered a world power. Without foreign trade countries would be restricted to the goods and services produced within their own borders (Martin, 1992).

This study adopted the theory of international trade because it provides a valuable insight into the nature of the link between international seaborne trade and cargo throughputs of ports. It is of a demand-driven link whereby oil and non-oil shipment growth stimulates seaborne trade that add up to the growth productivity and effective development of the ports. The theory of international trade allows for effective and efficient participation in crude oil and non-oil shipment, and it permits economies of scale not open to small - protected economies. By introducing greater market competition oil and non-oil shipment encourages a more efficient utilization of resources and greater growth/efficiency in cargo throughputs vessel turnaround time and productivity of ports.

Conceptual Framework

This study evaluated the effect of international seaborne trade on productivity of ports in Nigeria. In carrying out the study four dimensions of international seaborne trade (independent variable or predictor variable) namely oil exports, non-oil exports, oil imports and non-oil imports were examined. These dimensions were adopted in line with the works of Proshare (2020); Olusegun (2020); Okwedy (2020) and Onyeabor (2018). Also, cargo throughputs of ports in Nigeria shall serve as the key dependent or criterion variable under which the measures such as cargo throughputs vessel turnaround time and port productivity would be appraised.

The study adopted part of the classification of cargo throughputs of ports in Nigeria espoused by Agbo *et al.* (2018); Kingsland (2020); Ajayi and Araoye (2019) and Ahmed (2019) in maritime transportation evaluation involving port performance indicators. The imperative of the usage of these elements to measure cargo throughputs of ports in Nigeria has become obvious as could be seen from the conceptual framework of the Study- “the effect of international seaborne trade and productivity of ports in Nigeria” (see figure 1):

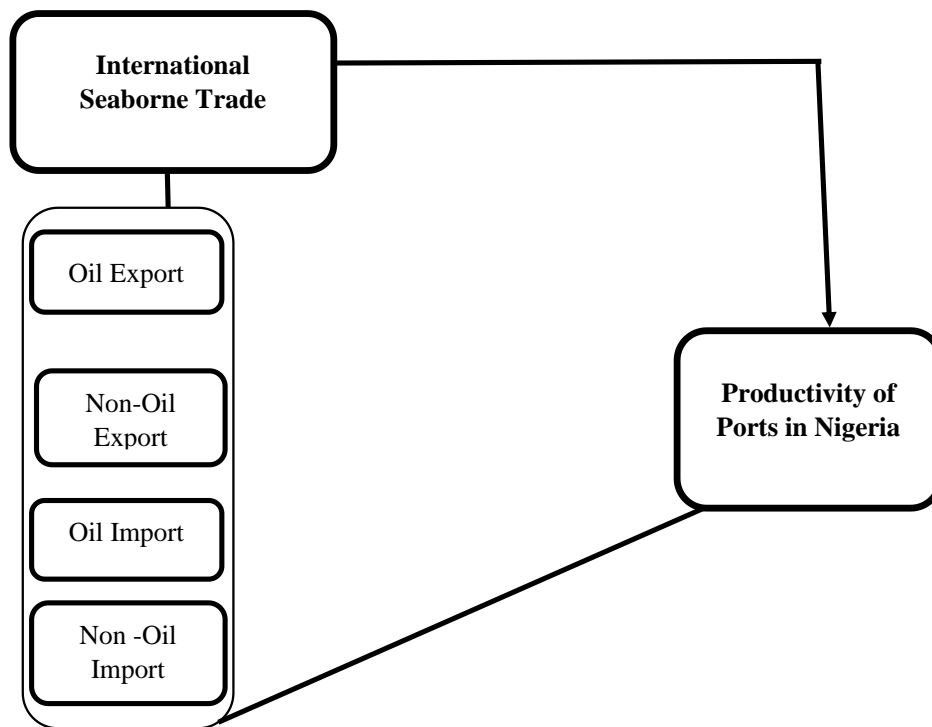


Figure 1: Conceptual Framework of the Effect of International Seaborne Trade on Productivity of Ports in Nigeria

Sources: Olusegun (2020); Okwedy (2020); Monday *et al.* (2021); Desk Research (2023).

This section has been used to review the literature relevant to the study. To achieve the literature review objective the study critically examined the theoretical foundation of the study such as absolute advantage theory neoclassical theory of external trade comparative advantage theory and theory of international trade. Also, the literature review has captured concepts like- international seaborne trade oil exports non-oil exports oil imports non-oil imports port performance cargo throughputs vessel turnaround time port productivity foreign exchange rate empirical studies on the area of the study as well as the summary of the literature review with evidence of gaps in literature.

International Seaborne Trade

International seaborne trade is the one transacted by persons, companies, agencies or governments through the sea. Stopford (2009) defines seaborne trade as the movement of merchandise by vessels between the port of origin where merchandise is received from the exporter at the port of origin to the port of destination where merchandise is claimed by the importer. Seaborne trade connects countries Markets Business and people allowing them to buy and sell goods all over the World. Seaborne Cargoes comprise commodities of different types and sizes. They can be grouped into six main categories: Energy trade Agriculture trade Metal industry trade Forest product Manufactured commodities (Emi, 2016). The history of the World is a history of exploration and trade by Sea. As a result of this Seaborne trade was established Coal from

Iyoha and Okim (2017) see seaborne oil trade as the exchange of petroleum resources (crude oil and refined oil resources) from and to supply and demand countries and its carriage and/or transportation by sea using ocean going tankers vessels. It is composed of seaborne oil export and import trade and covers all kinds of petroleum energy resources whether crude oil or refined petroleum resources. Nigeria's seaborne oil trade comprises seaborne refined petroleum products import trade and crude oil export trade via the Nigeria seaports and the oil export terminals respectively; both categories of marine terminals being administered by the Nigeria Ports Authority (NPA). Oil is a major source of energy in the global economy and a major ocean-based energy resource found in large quantities onshore and offshore in Nigeria. Thus, its exploration drilling and subsequent transportation to market centers refineries and depots are mostly sea-based activities involving the use of vessels of various kinds and forms ranging from Exploration vessels and tanker vessels; to drilling Floating Production Storage and Offloading Systems (FPSO'S) (Yom, 2015). Apart from the use of pipelines in the long-distance transportation of fossil energy resources shipping by use of vessels offers the best alternative for long distance carriage of oil trade globally.

Nigeria has a long and proud maritime heritage which has played an integral role in the development of Western Africa by the provision of an efficient and cost effective seaborne into Western and Central Africa and beyond (Yakubu & Akanegbu, 2018). Nigeria's location and population make it a country of diverse economic capabilities with large investment opportunities as its seaborne trade. Thus, this advantage opposition enables her easy access for

other ports of the sub-region are being transhipped from Nigerian major seaports. The country has a coastline of over 750km and eight major ports excluding oil terminals with a cargo handling capacity of 35million tones per annum (Balogun, 2016).

Onuorah (2018) notes that Nigeria is the largest oil and gas producer in Africa with the history of oil exploration in Nigeria dating back to 1907 when Nigerian Bitumen Corporation conducted exploratory work in the country during the early period of the first World War. Following the country's breakthrough into the oil and gas ocean energy market in the mid 1950's it has developed a viable oil and gas sector adjudged to be among the best in the world. At present about 5284 wells have been drilled mostly in the Niger Delta region of Nigeria (Odiegwu & Enyioko 2022b).

Both Ndikom (2006) and Oluwaleye (2014) viewed seaborne as a mode of transport that has continued to represent the cheapest and most efficient means of moving very large volume of import and export trade goods in the Nigerian international trade. In Nigeria the seaborne sector has been responsible for facilitating over 90 percent of trading prospects. Nigeria accounts for over 60 percent of total seaborne traffic in volume and value in the West African sub- region with a GDP accounting for over 60 percent of total GDP of 16 countries that make up the Economic Community of West African States (ECOWAS). The success or otherwise of the Nigeria seaborne trading sector therefore has a reverberating impact on the sub-region (Onuorah, 2018).

Badejo and Solaja (2017) describe exporting as the process of earning profits by selling products or services in foreign markets. He further gave the concepts of exportation; he said "exportation must be based on the principles of local sufficiency". This connotes that a country that will engage in any export trade mission should therefore as the case must be has such a product in large quantities and it must be easily available in reasonable sufficiency. As a resource-rich country Nigeria's economic performance has been unfortunately driven by only the oil and gas sector to the extent that even progress recorded towards genuine economic development prior to the discovering of oil in commercial quantity has been virtually eroded.

The Covid-19 pandemic initially resulted in a decline in global maritime trade in 2020 but trade substantially bounced back in 2021 in part due to deferred demand and large stimulus packages.

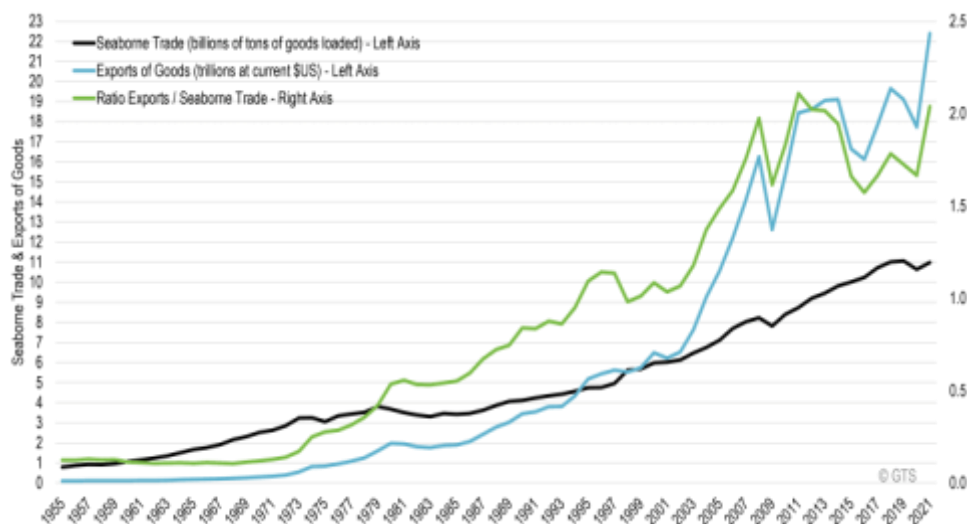


Figure 2: International Seaborne Trade During COVID And Thereafter

Source: UNCTAD (2022) Seaborne Trade and Export of Goods

In 2020 because of the fallout from the COVID-19 pandemic international seaborne trade contracted by nearly four per cent but in 2021 there was a rebound as the global economy started to recover and continued consumer spending along with an easing in pandemic-related restrictions (Clarksons Research, 2022).

Oil Export

At international frontier oil is traded physically or by customization and by commoditization. Customizable oil trade is divided into a) spot oil market and b) forward oil market. The term "spot oil market" generally refers to a short-term oil transaction where oil physically changes hands very soon after the seller receives payment (Umoru & Eborieme, 2013). On the other hand, forward oil markets refer to contracts where buyers and sellers agree up-front on a price for a commodity that will be delivered at some point in the future. Customizable oil trade (spot and forward oil market) entails one-on-one transactions between two companies or a company and a country or between two countries (Caliskan & Ozturkoglu, 2018). In customization oil produce can be exchanged for money or for another commodity or for debt settlement many countries including OPEC members sell more at spot oil market "price" (Caliskan & Ozturkoglu, 2018).

Commoditization of oil trade means the exchange of oil produce in commodity exchange market like other commodities/stocks such as gold, silver and currency. Oil exchange floor is where oil suppliers and buyers meet to trade various blends of oil via options futures and physical delivery of crude oil and other oil products. In commoditization of oil trade oil is traded with options and futures contract (Nze *et al.*, 2020). Oil options and futures contract are standardized exchange-traded contracts in which the contract buyer agrees to take delivery from the seller a specific quantity of oil at a predetermined price on a future delivery date. The difference between futures and forward oil markets can be confusing at times. In 2020 [Nigeria](#) exported \$613M

in [Refined Petroleum](#) making it the 56th largest exporter of [Refined Petroleum](#) in the world. At the same year [Refined Petroleum](#) was the 5th most exported product in [Nigeria](#).

The primary difference is that a futures contract is a highly standardized oil commodity sold through a commodity/financial exchange rather than a highly customizable contract bought and sold through one-on-one transactions. OPEC members sell more on customizable oil market rather than commoditized oil market whereas the reverse holds for non-OPEC members. Oil futures and forward markets protect and “hedge” against rising or falling prices resulting from all forms of turmoil that causes global oil price volatility (Park & Suh, 2019).

Nigeria’s exports in the second quarter of 2022 were dominated by crude oil accounting for 80 per cent of total export revenue despite the huge oil theft recorded in recent times (Odiegwu & Enyioko 2022b). Data sourced from the National Bureau of Statistics latest report on Merchandise Trade showed that crude oil exports valued at N5.9bn accounted for 80 per cent of total exports undertaken by Nigeria in the period under review (NBS & CBN, 2022).

Non-Oil Export

Non-oil exports simply expressed are items other than crude oil (petroleum products) that are sold in the foreign exchange market only to generate cash. Farm products exports construction and manufacturing exports solid mineral exports and place in the international appear to be the four primary parts of Nigeria's non-exports industry. Agricultural commodities goods produced solid minerals entertainment and vacation services and other non-oil export commodities are limitless (Onuorah 2018).

Exports are one of the oldest forms of economic transfer and occur on a large scale between nations that have fewer restrictions on international trade such as tariffs or subsidy. According to Osidipe *et al.* (2018) the term export derives from the goods and services out of the port of a country. The seller of such goods and services is referred to as an exporter whereas the overseas based buyer is referred to as an importer. Exports also include the distribution of information that can be sent in the form of an e-mail fax or can be shared during a telephone conversation (Umoru & Eborieme, 2013). Thus, in economics an export refers to any good or commodity transported from one country to another in a legitimate fashion typically for use in trade. Many countries engage in export trade. The Federal government of Nigeria started to diversify the Nation's economy as a result of the foregoing. In the meantime, despite the aforementioned problems the non-oil industry has potential for growth as shown in Table 1 below:

Table 1: Sub-sector of the Non-Oil Sector and their Range of Business Activities

S/N	Sub-Sector	Description of Activities
1	Agriculture	Cultivation harvesting handling processing storage distribution of various crops(cocoa oil palm sesame seeds groundnut maize) Rearing processing and distribution of livestock fishery and domesticated animals
2	Manufacturing	There are ten (10) sub-sectors of manufacturing sector: Production packaging distribution lines marketing export line etc.
3	Environmental services	Cleaning of offices and homes urban waste collection and recycling street cleaning energy generation from waste etc.
4	Building and Construction	Metal works supplies of building materials block and roofing works plumbing and electrical finishing (tiling paintings decorations gardening etc.)
5.	Health services	Hospitals pharmaceutical industries Pharmacies drug supplies and accessory services
6.	Mineral Activities	Exploration mining processing marketing mineral testing and transportation
7.	Power	Power generation and distribution meter reading production and supply of electrical accessories installations maintenance renewable energy investments such as solar hydro and wind
8.	Telecommunication services	Telecommunication engineering services installations telephone wholesale and retail services marketing services.
9.	Financial sector	Banking insurance installation maintenance marketing services transportation etc.

Source: Researcher’s Compilation Based on Webometrics (2023).

This represents the largest telecommunications market in Africa according to Nwaogbe *et al.* (2020). In addition, this industry has helped to create jobs by employing 300000 people each year. Meanwhile the tourism industry has a revenue and manpower generation capability of more than N1 trillion and it now generates roughly N150 billion per year. The four (4) primary sectors that are involved in exporting are described in the preceding paragraphs for a better grasp of the subject matter:

Oil Import

Crude oil is a major driver of businesses manufacturing transportation of goods and services and maritime trade at the national regional and global level. The pursuit of higher growth rate implies the need for adequate supply of crude oil and its constituent products such as gasoline liquefied petroleum gas (LPG) kerosene among others for the domestic industrial agricultural and transport sectors of any economy (Onyeabor .2018).

The huge oil import bill continues to be a drain on the foreign reserve and BOP of the economy. The direct and indirect effects on other sectors of the economy cannot be overemphasized. The International Monetary Fund's (IMF) forecast shows that Nigeria's current status as an oil exporting country the end to or downsizing of the thirst for crude oil importation is not in sight at least in the medium term. It is estimated that Nigeria would continue crude oil imports in excess of US\$31 billion per annum between 2012 and 2018 (Ibiyemi, 2019). In 2020 [Nigeria](#) imported \$7.75B in [Refined Petroleum](#) becoming the 17th largest importer of [Refined Petroleum](#) in the world. At the same year refined petroleum was the 1st most imported product in Nigeria. Nigeria imports Refined Petroleum primarily from Netherlands (\$3.02B).

[Belgium](#) (\$1.45B) [Norway](#) (\$659M) [India](#) (\$415M) and [United Kingdom](#) (\$392M). The fastest growing import markets in [Refined Petroleum](#) for [Nigeria](#) between 2019 and 2020 were [Belgium](#) (\$859M) [Italy](#) (\$265M) and [Norway](#) (\$102M) (UNCTAD 2022).

The shortage of refining capacity at existing oil refineries is the main driver of Nigeria's fuel crisis which hampers the socio-economic development of the country. It places a high subsidy burden on the government and has long made Nigeria dependent on imported petroleum products (Olusegun, 2020).

Nigeria's total import for petroleum products is about \$28 billion per annum. Nigeria is the largest producer of crude in Africa and third in the world. Nigeria is the only member country of the Organization of Petroleum Exporting Countries (OPEC) that imports 90 to 95 per cent of refined petroleum product (Okwedy, 2020).

Nigeria Imports of Oil revealed 2615454.321 NGN mn in 2017. This records an increase from the previous number of 2384412.462 NGN mn for 2016. Nigeria Imports: Oil Sector data is updated yearly averaging 4237.350 NGN mn from Dec 1960 to 2017 with 58 observations. The data reached an all-time high of 3064255.925 NGN mn in 2012 and a record low of 22.042 NGN mn in 1966. Nigeria Imports: Oil Sector data remains active status in CEIC and is reported by Central Bank of Nigeria (Ndikom *et al.*, 2017). Data show that the contribution from consumer goods fell from 40% to 27% between 2018-2020 and the proximate determinants of this outcome can be identified. A key factor is the import substitution industrialization pursued with vigour since the late 2000s (Okwedy 2020). This strategy which equated industrialization with development relied mainly on imported. The cost of importing petroleum products of all kinds into Nigeria has soared to over \$28 billion on an annual basis Blackgold Energy Authorities an oil and gas consulting and advisory firm has revealed (Ajayi, 2010).

In 2015 the demand for oil was on a higher side to the tone of 98m barrels each day and a projection of 118m barrels daily in 2030. It has also been noticed that the increase in oil prices raises foreign exchange rate within a nation. It is of great opinion that variations in the prices of crude oil are motivated by alterations in the demand for oil. After the period of Breton woods variations in oil prices had strongly influenced changes in exchange rate either to positive (appreciation) or negative (Depreciation) which in Nigerian context has steadily moved on the negative (depreciation). In an oil exporting economy appreciation in real exchange rate exists with the increase in the price of oil and exchange rate depreciates with the decrease in the prices of oil while in importing nation the reverse becomes obvious (Ajayi & Araoye, 2019).

Nigeria is an oil producing country and the largest oil producer in Africa with 6th position in OPEC membership. One of the current setbacks in the growth of Nigeria economy is manifested through the inability of the government to make the oil product available for domestic consumption due to inefficient refining process within the country. This inefficiency was due to the challenges that emanated from some refineries like Warri and Port Harcourt refineries which do not operate at installed capacity causing the economy to rely on importation of oil product. The importation is piloted by private investors and sometimes disguised government investors. According to Yakubu and Akanegbu (2018)

The supply side effect of oil in Nigeria assumes a developmental and significant increase in macroeconomic variables of the economy hence bringing reduction in poverty level and unemployment and increase in the general standard of living. Despite the huge amount that the government asserted that they expended on oil the country has depended more on the importation of petroleum oil thereby pushing the country into demand side of the economy which influenced the depreciation of the Nigerian currency (Yakubu & Akanegbu, 2018).

Non-Oil Import

Non-oil exports are all those commodities excluding crude oil (petroleum products) which are sold in the international market for revenue generation. Nigeria's non-oil exports sector is structured into four broad constituents which are agricultural exports manufactured exports solid mineral exports and services exports (Egbetunde & Obamuyi, 2018). Thus, non-oil export products are unlimited as they include crops manufacturing goods solid minerals entertainment and tourism services etc. (Duru *et al.* 2020). This explains non-oil exports in the context of this study. The word "import" is derived from the word "port" since goods are often shipped via boat to foreign countries. Import is therefore derived from the conceptual meaning as transportation of products and services from one state into the port of another country. The buyer of such goods and services is referred to as an "importer" while the overseas-based seller is referred to as an "exporter" (Idemobi, 2018). Thus an import refers to any good or service brought in from one country to another country in a legitimate fashion typically for use in trade. It is a good that is brought in from another country for sale (Ngige, 2018).

Imported products or services are provided to domestic consumers by foreign producers. An import in the receiving country is considered export in the sending state. A country has demand for an import when domestic quantity demanded exceeds domestic quantity supplied or when the price of the good (or service) on the world market is less than the price on the domestic markets (Yusuf *et al.*, 2019).

Duru *et al.* (2020) defined the non-oil sector of the Nigerian economy as the whole of the economy less oil and gas sub-sector. It covers agriculture industry solid minerals and the services sub-sector including transport communication and distributive trade financial services insurance government etc. This definition is sufficient for the purpose of this study.

Yakubu and Akanegbu (2018) also categorized Nigeria's non-oil trade into four broad constituents namely: agricultural exports; manufactured exports; solid mineral exports; and services exports. These activities have great potentials. Thus, non-oil exports/imports comprise crops and products such as cotton cassava cocoa cashew nuts; solid minerals and chemicals; manufactured goods such as textile tyre machineries; and manpower entertainment and tourism to mention but a few. It is made up of every other thing exported or imported except petroleum products. In other words, non-oil trade in Nigeria comprises of all such products that do not have any affiliation with crude oil or petroleum products this also defines non-oil trade in the context of this study.

Idemobi (2018) defined the non-oil trade of the Nigerian economy as the whole of the economy less the Oil and Gas sub-sector. It covers agriculture industry solid minerals and the services sub-sector including transport communication distributive trade financial services insurance government and others. This definition is also sufficient for the purpose of this study. On the other hand, the concept of economic growth like other economic concepts has different definitions by different authors. However according to Oluwaleye (2014) non-oil sector growth is the process whereby the real per capita income of a country increases over a long period of time, and it is measured by the increase in the amount of goods and services produced in a country.

The benefits stemming from non-oil sector growth are wide-ranging (Gicheru, 2020). Oladimeji and Muhammad (2017) sees non-oil sector growth as the process of augmenting the productive forces or expanding productive capacity which is accomplished through effective mobilization assemblage and management of human material and financial resources. According to Nwamuo (2019) non-oil growth implies an increase in the net national product in a given period. It is defined as a steady process by which the productive capacity of the economy is increased over time to bring about rising levels of national output and income. This study adopts the concept of non-oil growth by Kehinde (2017) which is justified based on key elements in the definition which suit the Nigerian economic situation namely: through effective mobilization assemblage and management of human material and financial resources to expand her productive capacity.

Port Productivity

Productivity is the quantitative relationship between output and input productivity is a measure of output to some index of input use. Arithmetically productivity is nothing more than the arithmetic ratio between the amount produced and the amount of any resources used during production (Oyewole, 2020). This conception of productivity goes to imply that it can indeed be perceived as the output per unit input or the efficiency with which resources are utilized. Labour which is the most used among the factors of production may be taken as the dock labour input in port operation or the total size of personnel (unskilled semiskilled skilled and managerial staff) engaged in port services (Zeb-Obipi, 2014).

Port productivity as defined by Lee *et al.* (2018) is the number of containers moves per port call divided by the total hours from when vessels arrive at port limits to the point of departure from the berth." "Port productivity can be defined differently between terminal operators and customers there is a general consensus that productivity can be greatly improved with the help of certain tools and initiatives such as carrier-terminal collaboration which can be a win-win situation for ports and shipping lines if joint-planning is implemented as a way of optimising cargo flows from end-to end.

Productivity is comprised of two divisions: total factor productivity (TFP) and partial productivity. Esmer (2008) sees total factor Productivity as multifactor productivity which is required where a broad total collection of outputs and inputs are required. Production theory is the basis for analyzing output level changes and the rate of output depends on these factors; the rate at which inputs (technology) are utilized the amount and types of input resources injected and the level of technology or kind of production process that is employed. Euchu *et al.* (2016) describe productivity as a key to determining the optimal combination of input that should be used to manufacture a given product. Feng (2010) further explain the variations in total factor productivity by differences in productivity efficiency the scale of production and the level of technology.

Also, Idemobi (2018) identifies two major approaches of total factor productivity measurement as the growth accounting i.e. Index number and the econometric approach. According to them the growth accounting approach to TFP measurement is a method for calculating the contribution of various factors to economic growth with the aid of marginal productivity theory – growth accounting decomposes the growth of output into – growth of labour land and capital; education; technical knowledge and other miscellaneous sources while the econometric approach to TFP measurement is the calculation of specified production function with the intention to creating the direct connection of productivity growth to important parameters of either of the functions. Its econometric implementation provides parameters estimates of the production technology in the process of measuring productivity advancement (Nyema, 2014; Odiegwu, 2019).

Productivity refers to metrics and measures of output from production processes per unit of input. Labour productivity for example is typically measured as a ratio of output per labour-hour input (Okeudo, 2013). Productivity may be conceived as a metrics of the technical or engineering efficiency of production. As such quantitative metrics of input and sometimes output is emphasized. Productivity is distinct from metrics of allocative efficiency which take into account both the value of what is produced, and the cost of inputs used and also distinct from metrics of profitability which address the difference between the revenues obtained from output and the expense associated with consumption of inputs (Okeudo, 2013; Okwedy, 2020; Yakubu & Akanegbu, 2018).

Zeb-Obipi (2014) characterizes productivity as the measure of how well resources are well utilized to accomplish a set of results. Everything about productivity is nothing but the ability to convert organizational sources to utility effectively and efficiently to the benefit of the organization as well as being able to achieve organizational results in line with organizational ethic.

Production is a process of combining various immaterial and material inputs of production so as to produce tools for consumption. The methods of combining the inputs of production in the process of making output are called technology (Okeudo 2013). Technology can be depicted mathematically by the production function which describes the function between input and output. The production function depicts production performance and

productivity is the metrics for it. Measures may be applied for example different technology to improve productivity and to raise production output (Yohanna *et al.* 2019).

In productivity measurement the main indicator of improved productivity becomes a decreasing ratio of input to output at the constant or improved quality this is also buttressed by Olusegun (2020) who asserts that measuring the productivity of different groups of operatives requires different ratios which are indicative of output/input relationship by citing an example of the productivity of assembly line work which could be measured as output units per man-hour or the value of good produced per cost of labour on an assembly line. The main problem of productivity is clustering and the solution is the reduction of the size of the clustering considering the kind of choice to be implemented between applying parametric and non-parametric productivity measurement. Oluwaleye (2014) opined that productivity is a very essential tool for rapid economic growth. He further discussed the two important sectors in Nigeria which could have up heaved the economic growth of the nation which he mentioned transportation especially port as one of the sub-sectors which has the potentials to aid these sectors and links them with international trade. Furthermore, he opined that there should be a cordial relationship between productivity economic growth and development. Productivity can also be described as the process by which varieties of inputs are applied for the processing of a system to obtain the desired or required outputs at another end. Indeed, productivity is more of a result of a complex social process involving science research analysis training technology management production plant trade union and labour among other inter-related influences (Onyeabor, 2018).

In studying production functions Omoke *et al.* (2018) opine that there are two important relations between inputs and outputs which are crucial. One is the relation between input and variation in all inputs taken together. This is known as the return to scale characteristics of a production system. Return to scale plays an important role in managerial decisions. They affect the optimal size of a firm and its production facilities. They also affect the nature of competition and thus are important in determining the profitability of an investment. It also signals the relationship between the quantity of an individual input (or factor of production) employed and the level of output produced. Munim and Schramm (2018) define the purposes of studies of productivity for improvement purposes based on the following types of analysis such as trend analysis horizontal analysis vertical analysis and budgetary analysis.

Furthermore they defined trend analysis as the studying of productivity changes for the firm over a while horizontal analysis as the studying of productivity in comparison with other firms of the same size and engaged in a similar business vertical analysis as the studying of productivity in comparison with other industries and other firms of different sizes in the same industry and budgetary analysis as setting up a norm for productivity for a future period as budget based on studies as above and planning strategies to achieve it. The efficiency of the use of resources or productivity performance is of key interest thus high productivity in transportation industry agriculture and other service sectors are necessary for the rapid economic growth of any nation (Lei & Bachmann, 2020).

Productivity can be referred to as a matrix of the technical or engineering efficiency of production. As such quantitative metrics of input and sometimes output is emphasized. Productivity is distinct from metrics of allocative efficiency which take into account both the value of what is produced, and the cost of input used and also distinct from metric of profitability which addresses the difference between the revenues obtained from the output and the reference associated with consumption (Lam *et al.* 2017; Ibe & Onwuegbuchunam 2012; Farahane & Heshmati, 2020). The activity of converting input resources into service(s)/product(s) can be identified with production and consumption. Thus, production is a process of combining immaterial and material inputs of production to produce tools for consumption. The methods of combining the inputs of production in the process of making outputs are called technology. Technology can be depicted mathematically by the production which describes the function between inputs and outputs. The production function depicts production performance and productivity as the metric for it. Measures may be applied with for example different technology to improve productivity and to raise production outputs. With the help of production function it is possible to describe the mechanisms of economic growth (Iyoha & Okim 2017). The process of productivity measurement is complex as Emi (2016) says because of the interrelationship of the different elements that make up a terminal and they have different impacts on each other.

Container handling productivity as Kehinde (2017) posits is directly proportionate to the transfer functions of a container terminal the number and movement rate of berth cranes the use of yard equipment berth and yard occupancy number of vehicles at the entrance into the terminal the productivity of workers employed at the operational areas of the terminal which he opined for frequent check-up and adjustment. There may be differences in the case of other types of cargo terminal such as dry cargo terminal liquid cargo terminal etc. Ndikom *et al.* (2017) further describe port productivity as a measure of the efficiency of port or terminal operations and consider the amounts of resources usually necessary to perform a specific task in a given period. They stated that the level of efficiency indicates how quickly containers are handled and how quickly vessels are served and turn around at port. Considering the port (terminal) operation efficiency level carriers view ships time at ports as an expensive activity thus the speed of container handling and consequent vessel turnaround time is a crucial issue in terms of competitiveness for port authorities and port operators (NPA 2019). Okwedy (2020) examined the growth of Lagos Port Complex and Tin Can Island Port as the major development in Apapa Lagos state and Nigeria in general. The report described the effectiveness of a seaport as a function of the speed and ease by which cargo passes through the port. The study mentioned throughput as one of the measurements of the operational effectiveness of the port. This can be in terms of port performance index (PPI) berth performance index (BPI) or cargo performance index (CPI). The time of waiting at berth or port premises can also be used to measure the operational effectiveness of the port. The effectiveness of the port will contribute in no small measure to the economic prosperity of its location and the nation. Thus, apart from the benefits derivable from the port as a viable economic base through the value chain its effectiveness is important to optimize the advantages.

Furthermore Onyeabor (2018) is of the view that exporter/importer assess the port's performance through one indicator of interest which is the dwell time of cargo in port measured in terms of the number of days that a ton of cargo remains in port. A high dwell time is generally an indication that all is not well with the port. It does not identify areas where improvements may be sought since unlike ship time in port it does not have a breakdown according to the various procedures that have to be gone through before cargo can be shipped or delivered (e.g. customs clearance waiting for instructions waiting for

the ship waiting for transport etc.). The importance of dwell time also obviously varies with the nature of the cargo. Hence substantial productivity improvement is generally needed to enable ports to meet the strict service requirement of their customers and to obtain competitive advantages (Joseph & Chukwuedozie, 2019). Global terminal operators must strive to increase productivity at the ports considering the current market condition where time is essential thus the introduction of much larger vessels will create a big gap in supply and demand (Kang & Kim 2017). She supported the use of ship arrival and departure from the berth as the base for measuring port productivity and argued that increase in productivity at the port and improvement on vessel turnaround time is not solely dependent on automation of cargo handling although it helps to reduce the labour cost to an extent but have not enabled vessel operator to acquire the expected results from the ports. Hence, he opined that labour crane numbers infrastructure capital management policies and government agencies' involvements should be considered other than automation. Iyoha and Okim (2017) maintain that ports have evaluated their performance by comparing their actual and optimum throughputs (measured in tonnage or number of containers handled). They concluded that if a port's actual throughput approached (departs from) its optimum throughput over time its performance would improve (deteriorated) over time.

Kehinde (2017) defines effectiveness as to how well the port utilizes its available resources or concerned with how well the port provides throughput service to its users i.e. carriers (ocean and inland) and shippers thus classified economic operating objectives of a port as either efficiency or effectiveness objectives in which port efficiency operating objectives include the technical efficiency objective of maximizing throughput in the employment of a given level of resources (exhibited by the port's economic production function) and the cost efficiency objective of minimizing cost in the provision of a given level of throughput (exhibited by the port's economic cost function). For a port to be effective it must be efficient i.e. it must be cost efficient which in turn requires that it must be technically efficient. For example, if a port has the effective operating objective of maximizing profits and is cost inefficient it can obtain greater profits for the same level of throughput service by reducing its costs to become cost efficient. A port can be cost efficient without being effective implies that a port may attract revenue/throughput when it has a reduced or subsidized cost even when it is not effective (Joseph & Chukwuedozie, 2019).

Empirical Review

Effect of International Seaborne Trade on Productivity of Ports

While looking at the effect of international seaborne trade on productivity of ports from a country's perspective then it is more specific. In this thesis Nigeria is picked as the case country. In terms of Nigeria international seaborne trade and productivity of ports go hand in hand. However, it is essential to quantify the effect of them. While reviewing literature related to Nigeria numerous studies that looked at the connection between trade and productivity of ports emphasized the significance of maritime trade for global trade wealth and productivity of ports. For instance, Saeed *et al.* (2021) argued that the trade in service industries has a substantial impact on Jordanian Productivity of ports while the trade in goods insignificantly affects productivity of ports in Jordan. Also, the international seaborne trade increased in services more than goods trade and how it plays a vital role in developing states. The researcher used the Fully Modified Ordinary Least Squares (FMOLS) method based on Solow model growth which takes into account data indigeneity and serial correlation by applying this method to data of trade in goods and services in Nigeria during the period from 1980 and 2014.

Moreover Hjazeeen *et al.* (2021) highlighted that the ability of states to compete with other economic states is on their ability to use knowledge education and innovation which are the main indications of economic development. Moreover, the mobile phone and internet users controlling corruption FDI and political stability also have a significant positive impact on a state's productivity of ports while government expenditure on patents education and trade openness have a negative impact on state economic development. The main issues facing the economy today are lack of information and scarcity and researchers applied three models to address this element namely the regression model the fixed-effects model and the random-effects model on panel data of twenty developing countries within the period between 1996 and 2020. Their main findings are that the statistical analyses revealed that the fixed-effects model is the best and also that the estimates of the suggested model variables do not reject economic theory assumptions or practical realities. Furthermore, the findings revealed that 93 percent of the changes in economic development in the developing nations under research are related to a reliance on the knowledge sector.

Azam and Feng (2022) stressed that both public expenditure and tax revenue have a significant positive impact on productivity of ports in the short run because the government uses the tax revenue as a finance resource for government expenses. The researcher applied the (VAR) model Vector Auto regression and the Vector Error Correction Model (VECM) Granger causality test Impulse Response Function and Variance Decomposition to the annual data of the Australian economy including the Government expenditure tax revenue and Productivity of ports rate during the period from 1970 and 2019. The main findings are that the taxes represent a limitation and heavy burden on populations in the long run as they minimize the purchasing power, and it has a negative impact on productivity of ports in Australia. Furthermore, more reliance on the government for tax revenue in their expenditure will lead to tax evasion and inefficiency procedures.

Osidipe *et al.* (2018) analysed trade liberalization and selected manufacturing sectoral groups in Nigeria employing the gravity model a large country sample and a long time series to estimate the impacts of successive FTAs and WTO admission on Nigeria's exports and imports. The authors discovered that multilateral or preferential trade liberalization has no statically relevant influence on exports and imports. However, the JUSFTA was an exception because it significantly increased Nigeria's exports to the US.

Egbetunde and Obamuyi (2018) studied foreign trade and economic growth: A study of Nigeria and India Linear trend line estimations were used to compare actual trade levels to predicted trade levels based on pre-JUSFTA data. It was discovered that bilateral commerce between Nigeria and the United States grew following the implementation of the JUSFTA in 2017 indicating a substantial association between bilateral trade volume and free trade agreement implementation.

The study shows that when there is a depreciation of the domestic exchange rate the contribution of seaborne trade to port productivity declines. This result goes against the traditional exchange rate and exports notion. It is widely expected that the depreciation of exchange rates would improve export performance. The result is consistent with Yohanna *et al.* (2019) who found that devaluation-based adjustment policies may not achieve the desired effects of nominal exchange rate changes (devaluation) on the balance of trade. In other words the exchange rate cannot be used solely in managing external balances. Furthermore, a UNCTAD (2019) study found that the “benefits of depreciation on exports may have evaporated”. The argument is based on the apparent lack of a correlation between exports and US dollar exchange rates for emerging markets since 2013. The dummy variable (D) is significant and this reinforces the result that port performance has a positive relationship with trade. Port performance is a critical factor that can shape countries’ trade competitiveness. Every hour of port time saved by ships translates into savings in port infrastructure expenditure for ports ship capital costs for carriers and inventory holding outlays for shippers (Proshare, 2020). This will then contribute positively to trade.

In the short run the results show that the speed of adjustment parameter (-0.586) is negative and significant which implies that 59% of the last year’s disequilibrium is corrected this year. The fact that the coefficient of the error correction (-0.586) is negative confirms the existence of the long-run relationship between port performance and the regressors that were used in this study. The short-run results were almost similar to the results that were obtained in the long-run analysis. However, in the short run there is an improvement in the explanatory power of some of the indicators. This may suggest that the impact of the explanatory variables is much bigger in the short run than in the long run. However INF was seen to be having an insignificant relationship with trade performance. This may suggest that port productivity does not affect trade performance in the short run (Monday *et al.* 2021).

UNCTAD. (2019) shows that when African countries trade with themselves they exchange more manufactured and processed goods have more knowledge transfer and create more value. Trade is the key to long-term sustainable economic growth and development in sub-Saharan Africa (Shaw 2018). Osidipe *et al.* (2018) found that both imports and exports have the potential to positively impact economic growth in African countries.

This is explained by the fact that Africans trade the least with each other than all the other continents (Shaw 2018; UNCTAD, 2022). Furthermore a large share of regional trade in Africa is informal i.e. not recorded in official data (Bensassi *et al.* 2019; World Bank, 2020). Based on these empirical studies this thesis hypothesizes that: Ho₁: Oil exports have no significant effect on productivity of ports in Nigeria; Ho₂: Non-oil exports have no significant effect on productivity of ports in Nigeria; Ho₃: Oil imports have no significant effect on productivity of ports in Nigeria and Ho₄: Non-oil imports have no significant effect on productivity of ports in Nigeria.

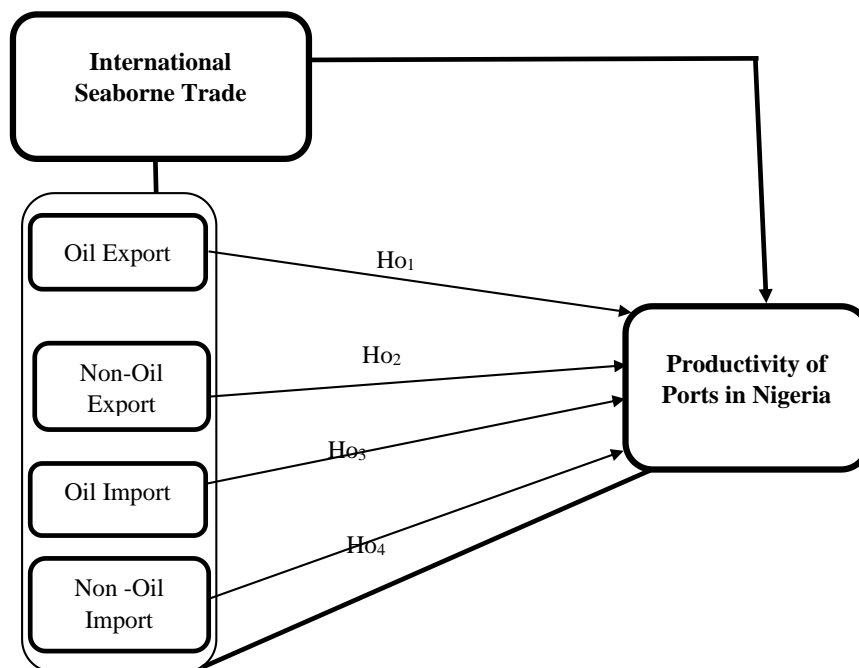


Figure 2: Operationalized Framework of the Effect of International Seaborne Trade on Productivity of Ports in Nigeria

Sources: Olusegun (2020); Okwedy (2020); Monday *et al.* (2021); Desk Research (2023).

METHODOLOGY

Research Design

Research design is the blueprint that guides the researcher in acquiring and generating necessary data for the study; so, this study adopted the ex-post facto research design which requires the usage of historical data to forecast future trends employing regression techniques. The study area was on Nigerian

ports and six ports in Nigeria. Therefore, the population of the study was six (6) ports. The study was narrowed down to the effect of international seaborne trade and cargo throughputs of ports in Nigeria (1981-2022). Secondary sources of data were used as the main data collection sources in which accuracy, availability, adequacy, authority, scope, suitability and sources of data were considered for relevance (Kiabel, 2020). So, the relevant data for this study were collected from the annual reports and accounts of Nigerian Ports Authority, National Bureau of Statistics and Central Bank of Nigeria Annual Statistical Bulletins of the various years in question from their official website. The data collected were from the period of 1981 – 2022.

In this study percentages ratios frequency distribution scaling ranking and other statistical tools were used to analyse and achieve research objectives. Also, regression analysis was used to test the hypotheses formulated in the study. Inferential statistic of **Ordinary Least Squares (OLS) regression** was used to determine the effect of the independent quantitative variables on the dependent variables. All these analyses were computed through the use of statistical package for social sciences (SPSS) IBM SPSS Statistics 26 version.

Model Specification

$$Y_1 = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + e \text{ -----(1) \{for testing H}_1 \text{ H}_2 \text{ H}_3 \text{ H}_4\}$$

$$PP = f(\text{OE NOE OI NOI})$$

Where;

PP = Port Productivity

OE = Oil Exports

NOE = Non-Oil Exports

OI= Oil Imports

NOI = Non-Oil Imports

Statistical Model Specification

This study used cargo throughputs, vessel turnaround time and port productivity to measure the dependent (criterion) variable (port performance) while oil exports, non-oil exports, oil imports and non-oil imports were used as the dimensions or predictor variables of the independent variable (international seaborne trade). The model has therefore been specified thus: $Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + e$; Y = Port Productivity; X_1 = Oil Exports; X_2 = Non-Oil Exports; X_3 = Oil Imports; X_4 = Non-Oil Imports.

b_0 = The parameter which represents the intercept b_1 b_2 b_3 b_4 b_3 b_4 = the regression parameters were used in determining the significance of the effect of each of the independent variables x_1 x_2 x_3 x_4 on the dependent variables Y. e = Random disturbance term. These include the variables which (although not specified) in this model may also affect international seaborne trade and productivity of ports. They include government policies political instability corruption environmental marketing problems etc. The effects of international seaborne trade on the dependent variables were measured in interval and ratio scaling. The coefficient of determination (R^2) was used to measure the rate at which the independent variable was explained by dependent variables. The a priori expectations for the coefficients are as follows: $\beta_0 > 0$; $\beta_1 > 0$; $\beta_2 > 0$; $\beta_3 > 0$; $\beta_4 > 0$.

RESULTS AND DISCUSSION

Regression Diagnostic Tests

Several underlying diagnostic tests were conducted prior to the estimation to ensure that the basic regression analysis assumptions are not violated. The tests included normality test using the Condition Index, Eigenvalue, Tolerance, for Collinearity diagnostics variance inflation factor (VIF) for collinearity statistics, Durbin Watson test for autocorrelation.

As shown in the results presented in Table 2, with a combination of the entire variables in the 42 observations for the model of study, the condition index of 1.000 shows that there is a perfect multicollinearity of data as the predictor variables are regressed against the dependent variables. Also, the eigenvalue of the dependent variables revealed a value of 4.250 for cargo throughputs, vessel turnaround time and port productivity respectively. While the eigenvalues of the predictor variables are 0.581 for oil export; 0.094 for non-oil export, 0.042 for oil import and 0.033 for non-oil import showing that the model displayed harmonic and normality outcomes. The data in Table 4.1 also, revealed multicollinearity with the help of the variance inflation factor (VIF) which measures the severity of multicollinearity in regression analysis. The VIF values of the predictor variables revealed that oil export is 6.883; non-oil export is 11.999; oil import is 11.673 and non-oil import is 11.194. As the observed VIF values are close to the benchmark of 12, this is an indication of an absence of multicollinearity among the variables, thus there is likely no issue of unstable parameter estimates in the regression line as VIF is a statistical concept that indicates the increase in the variance of a regression coefficient. The Durbin Watson (DW) statistics of 0.539 for cargo throughputs – modal 1; 1.024 for vessel turnaround time – modal 2; 0.170 for port productivity – modal 3; indicate that there is no problem of serial correlation or autocorrelation in the regression models.

Table 2: Multi-Collinearity Diagnostics Analysis of International Seaborne Trade and Port Productivity in Nigeria

Model		Collinearity Diagnostics			Collinearity Statistics	
		Eigenvalue	Condition Index	Tolerance	VIF	Durbin Watson
1	Cargo Throughputs	4.250	1.000			0.539
2	Vessel Turnaround Time	4.250	1.000			1.024
3	Port Productivity	4.250	1.000			0.170
	Oil Export	0.581	0.584	0.145	6.883	
	Non-Oil Export	0.094	6.093	0.083	11.999	
	Oil Import	0.042	2.909	0.086	11.673	
	Non-Oil Import	0.033	0.908	0.089	11.194	

Source: Secondary Data, 2023, and IBM SPSS Statistics 26 Window Output

Descriptive Statistics of the Dimensions of International Seaborne Trade and Port Productivity

Table 3 shows the descriptive statistical results of the dimensions of international seaborne trade and port productivity. Table 3 shows that port productivity has the mean and standard deviation scores of 7.002 ± 7.156 ; oil export has the mean and standard deviation scores of $5584251.079 \pm 6139876.173$. The data further revealed that non-oil export has the mean and standard deviation scores of $481091.168 \pm 776963.339$; oil import has the mean and standard deviation scores of $1158004.294 \pm 1605302.797$ and non-oil import has the mean and standard deviation scores of $3706771.183 \pm 5038165.338$.

Table 3: Descriptive Statistics of the Predictor Variables and the Measure –

Port Productivity		Mean	Standard Deviation
Options			
1	Port Productivity	7.002	7.156
2	Oil Export	5584251.079	8245263.260
3	Non-oil Export	481091.168	905951.212
4	Oil Import	1158004.294	1963826.353
5	Non-Oil Import	3706771.183	6206359.869

Source: Secondary Data, 2023, and IBM SPSS Statistics 26 Window Output

Statistical Test of Hypotheses and their Interpretations (Multivariate Analysis)

The study has sought in chapter one to determine the extent to which international seaborne trade affects the performance of ports in Nigeria. As a result, five research questions and fourteen hypotheses were raised to that effect. The next stage of the study analysis tested the outcomes on the examined dimensions and measures of the variables in terms their effects. Therefore, this section tested and interpreted the hypotheses formulated in this study.

Effect of International seaborne trade on Productivity of Ports in Nigeria

This subsection was used to critically examine the effect of international seaborne trade on productivity of ports in Nigeria. To achieve this, the following hypotheses were formulated:

H₀₁: Oil export has no significant effect on productivity of ports in Nigeria.

H₀₂: Non-oil export has no significant effect on productivity of ports in Nigeria.

H₀₃: Oil import has no significant effect on productivity of ports in Nigeria.

H₀₄: Non-oil import has no significant effect on productivity of ports in Nigeria.

Table 4 shows the inferential statistical test results of the effects of international seaborne trade on productivity of ports in Nigeria as a measure of performance of ports. The result of the hypothesis 9 tested, shows positive and insignificant effect of oil export on productivity of ports in Nigeria with t-value outcome of $1.592 @ p0.120 > 0.05$, meaning that a positive and insignificant effect exist between oil export and productivity of ports in Nigeria, indicating that the null hypothesis 1 (H₀₁) has been accepted and alternate hypothesis 1 (H₁₁) rejected hence – “oil export has no significant effect on productivity of ports in Nigeria”. The result of hypothesis 2 (H₂) revealed that non-oil export has negative and insignificant effect on productivity of ports in Nigeria with t-value outcome of $-1.040 @ p0.305 > 0.05$. By this result the null hypothesis 2 (H₀₂) has been accepted and alternate hypothesis 2 (H₁₂) rejected hence – “non-oil export has negative and insignificant effect on productivity of ports in Nigeria”. With respect to hypothesis 11 (H₀₃), the result in Table 3 revealed that oil import has positive and insignificant effect on productivity of ports in Nigeria with t-value outcome of $0.948 @ p0.349 > 0.05$, therefore, the null hypothesis 3 (H₀₃) has been accepted and alternate hypothesis 3 (H₁₃) rejected hence – “oil import has positive and insignificant effect on productivity of ports in Nigeria”. For the effect of non-oil import on productivity of ports in Nigeria which is hypothesis 4 (H₄), the result of the

hypothesis 4 (H_4) tested, shows positive and insignificant effect of non-oil import on productivity of ports in Nigeria with t- value outcome of 0.775 @ $p0.443 > 0.05$, denoting that a positive effect which is not significant exist between non-oil import and productivity of ports in Nigeria, therefore, the alternate hypothesis 4 (H_{i4}) has been rejected and null hypothesis 4 (H_{04}) accepted hence – “non-oil import has no significant effect on productivity of ports in Nigeria of ports in Nigeria”.

Table 4: Test Results of International seaborne trade (IST) and Productivity of Ports in Nigeria (PP)

International seaborne trade (Independent Variables)	Unstandardized Coefficients		Standardized Coefficients	t - value	Significant/Probability Value	Decision
	B	Std. Error	Beta			
(Constant)	6.022	0.238		25.269	0.000	
Oil Export	1.148	0.000	0.471	1.592	0.120	Insignificant
Non-Oil Export	-7.820	0.000	-0.406	-1.040	0.305	Negatively Insignificant
Oil Import	3.402	0.000	0.365	0.948	0.349	Insignificant
Non-oil Import	8.686	0.000	0.293	0.775	0.443	Insignificant

Source: Secondary Data, 2023, and IBM SPSS Statistics 26 Window Output (Appendix I)

a. Dependent Variable: Productivity of ports in Nigeria

b. Predictors: (Constant), Non-oil import, Oil import, Oil export, Non-oil export

$$Y_3 = b_0 + b_9x_9 + b_{10}x_{10} + b_{11}x_{11} + b_{12}x_{12} + e \text{ -----(3) \{for testing H}_9, H_{10}, H_{11}, H_{12}\}$$

$$Y_3 \text{ (Productivity of ports in Nigeria)} = 6.022 + 1.148OE - 7.820NOE + 3.402OI + 8.686NOI + e$$

$$t = (1.592) \quad (-1.040) \quad (0.948) \quad (0.775)$$

From the inferential results, it can be stated as follows:

1. Oil export as a dimension of international seaborne trade has a positive and insignificant effect on productivity of ports in Nigeria as a measure of performance of ports. This simply means that oil export as a channel for international seaborne trade insignificantly affects productivity of ports in Nigeria.
2. Non-oil export as a dimension of international seaborne trade has a negative and insignificant effect on productivity of ports in Nigeria as a measure of performance of ports. This also means that non-oil export contributes less to the productivity of ports in Nigeria.
3. Oil import as a dimension of international seaborne trade has a positive and insignificant effect on productivity of ports in Nigeria as a measure of performance of ports. The outcome here is indicative of the fact that oil import insignificantly affects productivity of ports in Nigeria as a measure of performance of ports.
4. Non-oil import as a dimension of international seaborne trade has a positive but insignificant effect on productivity of ports in Nigeria which is a measure of performance of ports. This simply means that non-oil import positively and insignificantly influences productivity of ports in Nigeria.

Table 5 has revealed in summary the rejection and acceptance of the hypotheses as follows: H_{01} : Oil export has no significant effect on productivity of ports in Nigeria; H_{02} : Non-oil export has no significant effect on productivity of ports in Nigeria; H_{03} : Oil import has no significant effect on productivity of ports in Nigeria; H_{04} : Non-oil import has no significant effect on productivity of ports in Nigeria.

Table 5: Summary of the Results on Test of the Research Hypotheses

Research Hypotheses	t-value	Significant/Probability Value	Result	Decision
H_{01} : Oil export has no significant effect on productivity of ports in Nigeria	1.592	0.120	Positive and Significant effect	Accept
H_{02} : Non-oil export has no significant effect on productivity of ports in Nigeria	-1.040	0.305	Negative and Insignificant effect	Accept
H_{03} : Oil import has no significant effect on productivity of ports in Nigeria	0.948	0.349	Positive and Insignificant	Accept
H_{04} : Non-oil import has no significant effect on productivity of ports in Nigeria	0.775	0.443	Positive and Insignificant effect	Accept

Source: Research Data 2023, and IBM SPSS Statistics 26 Window Output

DISCUSSION

Effect of International Seaborne Trade on Productivity of Ports in Nigeria.

The result, with regard to the effect of international seaborne trade on productivity of ports, points to the fact that, oil export, non-oil exports, oil imports and non-oil imports provide prospects for encouraging port productivity in Nigeria. A critical evaluation of the finding reveals that with reference to all the four variables oil export has no significant effect on productivity of ports in Nigeria ($t = 1.592$); non-oil export has negative effect on productivity of ports in Nigeria ($t = -1.040$); oil import has no significant effect on productivity of ports in Nigeria ($t = 0.948$); non-oil import has no significant effect on productivity of ports in Nigeria ($t = 0.775$).

The implication of this result is that non-oil exports and non-oil import are not major determinants of economic growth in Nigeria. This result is not far fetched in that the non-oil sector is still at its low ebb of development in Nigeria. Conversely, this result deviated from the works of Egbetunde and Obamuyi (2018) and Duru *et al.* (2020) in that they found that international seaborne trade exerted positive and significant effect on economic growth. This study supports the findings of Zoramawa *et al.* (2020) but deviated from the findings of Abdulrahman (2021); Zayone *et al.* (2020) and Nelson *et al.* (2020). Productivity of ports in Nigeria which is the means by which a company creates value and encourages relationship with its customer base has been used in this study as one of the measures of performance of ports.

This study has revealed positive indications which are significant between oil import and performance of ports (cargo throughputs, vessel turnaround time and productivity). Corroborating on this Adesola *et al.* (2018) contend that oil import plays important role in international seaborne trade as it significantly affects global business outputs even in ports. Adesola *et al.* (2018) conclude that oil exports and oil import are channels that encourage international seaborne trade as being shipped by seaports globally.

This is because it only contributed minimally to the performance of ports in Nigeria. More so, the above findings though support the assumption of the export led hypotheses which hold that the overall growth/performance of countries/organisations can be generated not only by increasing the amounts of labour and capital within the economy, but also by expanding exports. Ahmed (2019) added that, outside lack of port infrastructure, there are other challenges such as the suffocating high interest rate and banks' unwillingness to lend to the maritime sector that hinder international seaborne trade in Nigeria. In the same vein, Ajayi and Araoye (2019) revealed that this sub-sector even as of 2014 when the economy exhibited growing symptoms of recession, only 6.45% of Nigeria's exports consisted of manufactured commodities. All these challenges contributed to the reason why the sub-sector is still at its lowest ebb.

In like manner, Foyeku (2019) submitted that, Nigeria as a country has suffered from a grave neglect of the non-oil sector owing to overdependence on oil. This has eventually made the country monolithic unlike the historical experiences of Britain, US, Germany, Japan, Russia and of late, emerging economies from Asia, notably China, India, Singapore, Taiwan, Thailand South Korea, Malaysia Brazil and even of recent, Ghana. In Nigeria like most developing countries, poor access to production funds has been blamed for the near absence of growth/performance of the non-oil sector. To revalidate the above claims submitted our empirical findings of agrees with the claims of Idemobi (2018); Inah and Elijah (2018); Iwuoha and Awoke (2019). The implication of this result is that international seaborne trade is a major determinant of port performance in Nigeria.

Conclusion

International seaborne trade is a pivotal avenue for the movement of merchandise by vessels between the port of origin where merchandise is received from the exporter at the port of origin to the port of destination where merchandise is claimed by the importer. It has the ability to impact on the productivity of ports in Nigeria and other businesses when conducted effectively and efficiently within the realms of best international trade practices. Based on the findings of the study, the following conclusions have been made:

1. Oil export has positive and insignificant effect on productivity of ports in Nigeria (t-value = 1.592@ p0.120>0.05).
2. Non-oil export has negative and insignificant effect on productivity of ports in Nigeria (t-value = -1.040@ p0.305>0.05)
3. Oil import has positive and insignificant effect on productivity of ports in Nigeria (t-value = 0.948 0.349)
4. Non-oil import has positive and insignificant effect on productivity of ports in Nigeria (t-value = 0.775@ p0.443>0.05).

Recommendations

Based on the findings and conclusions of this study, the following recommendations were made:

1. Government/port authorities should improve other sectors of Nigerian economy by producing and exporting manufactured products to reduce excessive load and dependence on oil sector and encourage port productivity
2. To sustain the cargo throughput of the seaports and consequently port productivity, Government must ensure that the current trend of increment in seaborne oil trade is maintained by ensuring that bottlenecks and impediments such as security challenges that limit the oil production outputs of the production companies are proactively determined and handled.

3. Seaborne trade promotion measures should be encouraged by the government at all levels of development (for example, matured, emerging or growing economies) and structure of the economy (for example, service economy, industrially or agriculturally based economies) to enhance port productivity.
4. Nigerian ports should prioritize and utilize the full capacity available in seaborne trade and channel oil exports and non-oil exports towards increasing and optimizing the productivity of ports in Nigeria
- 5 Nigerian ports should rationalize the tendency of supporting non-oil import by putting up conducive environment that validates the activities of international seaborne trade to increase the productivity of seaports in Nigeria.

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Appendices

Year	Oil Export	Non-Oil Export	Oil Import	Non-Oil Import	Cargo Throughput	Vessel Turn around Time	Port Productivity	Fixed Exchange Rate	Floating Exchange Rate
1981	10680.5	342.8	119.8	12719.8	10999525	6.34	5.88	0.61	0.65
1982	8003.2	203.2	225.5	10545	14405246	6.71	6.24	0.67	0.68
1983	7201.2	301.3	171.6	8732.1	18114772	7.31	6.92	0.72	0.75
1984	8840.6	247.4	282.4	6895.9	20075237	6.31	5.95	0.77	0.77
1985	11223.7	497.1	51.8	7010.8	17957195	7.01	6.67	0.89	0.9
1986	8368.5	552.1	913.9	5069.7	23642716	7.91	6.64	2.02	2.2
1987	28208.6	2152	3170.1	14691.6	22611229	11.34	7.35	4.02	4.51
1988	28435.4	2757.4	3803.1	17642.6	18741209	7.89	5.72	4.54	4.59
1989	55016.8	2954.4	4671.6	26188.6	14651102	6.44	5	7.39	7.72
1990	106626.5	3259.6	6073.1	39644.8	16401679	7.4	4.8	7.39	7.55
1991	116858.1	4677.3	7772.2	81716	12274579	5.31	4.26	8.04	8.5
1992	201383.9	4227.8	19561.5	123589.7	11537590	3.75	3.39	9.91	10
1993	213778.8	4991.3	41136.1	124493.3	11175346	4.59	3.58	17.3	18
1994	200710.2	5349	42349.6	120439.2	13376187	6.55	4.6	22.33	24
1995	927565.3	23096.1	155825.9	599301.8	16169157	7.23	6.2	21.89	23
1996	1286216	23327.5	162178.7	400447.9	17840901	7.35	7.29	21.89	22

1997	1212499	29163.3	166902.5	678814.1	18902426	6.98	7.44	21.89	22
1998	717786.5	34070.2	175854.2	661564.5	18637002	7.79	6.98	21.89	23
1999	1169477	19492.9	211661.8	650853.9	13861848	7.37	6.73	21.89	23
2000	1920900	24822.9	220817.7	764204.7	13273053	7.74	7.89	85.98	97
2001	1839945	28008.6	237106.8	1121074	15475301	8.57	6.75	99	108
2002	1649446	94731.85	361710	1150985	16582805	10.92	7.92	109	115
2003	2993110	94776.44	398922.3	1681313	19325718	8.93	6.67	114	121
2004	4489472	113309.4	318114.7	1668931	22232936	8.67	8.55	127	132
2005	7140579	105955.9	797298.9	2003557	28932880	7.99	7.81	132	140
2006	7191086	133595	710683	2397836	35940692	7.44	7.76	128.5	134
2007	8110500	199257.9	768226.8	3143726	57473350	8.73	6.39	120	131
2008	9861834	525859.2	1315532	3922664	64372749	7.52	7.55	115.5	120
2009	8105455	500864.6	1068745	4047715	65775509	8.59	6.94	145	147
2010	11300522	710953.8	1757140	5857516	76744727	7.81	6.77	148.21	150
2011	14323155	913511.3	3043597	7191578	83461697	8.73	8.29	151.05	155
2012	14259991	879335.2	3064256	6020199	77092625	7.93	8.74	155.09	159
2013	14131843	1130171	2429376	6378727	78281634	8.74	8.81	153	165
2014	12006965	955061.8	2215166	7582383	84951927	7.88	7.24	170	170
2015	8184481	660678.3	1725225	8588564	77387638	8.11	6.99	199	215
2016	8178818	656794	2384412	6446528	70365036	8.33	8.97	300	365
2017	12913241	1074902	2615454	7464238	71535636	8.44	7.69	360	380
2018	17281953	1425374	3686178	8884003	73175127	8.21	8.64	419	550
2019	16703434	3207100	3534790	16152184	79814647	11.77	8.37	0.61	0.65
2020	11058152	1555441	2717010	17802182	84951927	9.52	8.75	0.67	0.68
2021	16737340	2466831	6087845	15171960	77387638	8.44	9.12	0.72	0.75
2022	17837443	2586832	6175848	16651963	78281634	10.49	9.86	0.77	0.77

Sources: Central Bank of Nigeria Statistical Bulletin 1981-2022, Nigeria Ports Authority Annual Bulletin 1981-2022, and National Bureau of Statistics 1981-2022.

Descriptive Statistics ^a

	Mean ^b	Root Mean Square	N
Port Productivity	7.0026	7.15670	42
Oil Export	5584251.0793	8245263.26006	42
Non-oil Export	481091.1683	905951.21270	42
Oil Import	1158004.2943	1963826.35307	42
Non-Oil Import	3706771.1838	6206359.86935	42

a. Coefficients have been calculated through the origin.

b. The observed mean is printed

Collinearity Diagnostics ^a

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	Oil Export	Non-Oil Export	Oil Import	Non-oil Import
1	1	4.250	1.000	.01	.00	.00	.00	.00
	2	.581	2.705	.71	.00	.01	.00	.00
	3	.094	6.730	.15	.41	.14	.05	.11
	4	.042	10.116	.12	.37	.07	.63	.39
	5	.033	11.307	.00	.22	.79	.31	.50

a. Dependent Variable: Port Productivity

Model Summary ^{c, d}

Model	R	R Square ^b	Adjusted Square	R Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.796 ^a	.634	.595	4.55360	.634	16.436	4	38	.000	.170

a. Predictors: Non-Oil Import, Oil Export, Non-Oil Export, Oil Import

b. For regression through the origin (the no-intercept model), R Square measures the proportion of the variability in the dependent variable about the origin explained by regression. This CANNOT be compared to R Square for models which include an intercept.

c. Dependent Variable: Port Productivity

d. Linear Regression through the Origin

ANOVA ^{a, b}

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1363.228	4	340.807	16.436	.000 ^c
	Residual	787.942	38	20.735		
	Total	2151.170 ^d	42			

a. Dependent Variable: Port Productivity

b. Linear Regression through the Origin

c. Predictors: Nonoil Import, Oil Export, Non-oil Export, Oil Import

d. This total sum of squares is not corrected for the constant because the constant is zero for regression through the origin.

Coefficients ^a

Model		Unstandardized Coefficients		Standardized Coefficients		Sig.	Collinearity Statistics	
		B	Std. Error	Beta	t		Tolerance	VIF
1	(Constant)	6.022	.238		25.269	.000		
	Oil Export	1.148E-7	.000	.471	1.592	.120	.145	6.883
	Non-Oil Export	-7.820E-7	.000	-.406	-1.040	.305	.083	11.999
	Oil Import	3.402E-7	.000	.365	.948	.349	.086	11.673
	Non-oil Import	8.686E-8	.000	.293	.775	.443	.089	11.194

a. Dependent Variable: Port Productivity

Coefficients ^{a, b}

Model		Unstandardized Coefficients		Standardized Coefficients		Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta	t		Lower Bound	Upper Bound
1	Oil Export	8.861E-7	.000	1.021	3.219	.003	.000	.000
	Nonoil Export	-4.979E-6	.000	-.630	-1.610	.116	.000	.000
	Oil Import	-6.295E-7	.000	-.173	-.418	.678	.000	.000
	Non-oil Import	6.027E-7	.000	.523	1.298	.202	.000	.000

a. Dependent Variable: Port Productivity

b. Linear Regression through the Origin