



MARITIME SECTOR: KEY DRIVER OF ECONOMIC GROWTH AND SUSTAINABLE DEVELOPMENT IN NIGERIA

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Abstract:

Nigeria's Maritime sector is a neglected gold mine. It is capable of becoming a key engine of economic growth and sustainable development, if enhance strategies are implemented for optimum efficiency. Nigeria's maritime sector performance for 2019, like the global maritime business in the evidently points to the negative. However, factors that led the local maritime downward are different from factors that negatively affected global maritime sector. This paper will assess the technologies advancement; automation and digitalisation of Nigeria maritime sector to ensure it attain global best practices recommended by International Maritime Organisation (IMO) and United Nations Conference on Trade and Development (UNCTAD). Currently, technological advancement is bringing its transformative advantages to the maritime ports and shipping space. In the industry known for complex issues, large scale, and a need for firm reliability, digital technologies that create new opportunities for better optimization, automation, and profitability. The study will also analyse maritime performance indicators which includes performance measurement, direct shipping connectivity, port improved management and environmental factor. Performance indicators are systematic tools that determine nature and critical issues that confront shipping industry and ports, help evaluate the possible impact of another policy decision. The challenges, prospects and sustainability of maritime sector in Nigeria over the years will be properly reviewed. The maritime future poses numerous challenges, but also erupt numerous opportunities. Global trade is expanding, Ports and shipping as its workhorse are undergoing transformation and facing massive challenges in maintaining competitiveness. Theories, analyses supporting statistical data, and related information from other relevant institutions and agencies, served as the framework of the study. The result of the study is expected to contribute in economic growth and sustainable development of the maritime sector.

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1. Introduction

Global maritime trade reduced its pace in 2018, with volumes increasing at 2.7 percent in 2018 down from 4.1 percent in 2017. The drop was broad-based, and its shake heavily all maritime cargo segments. United Nations Conference of Trade and Development (UNCTAD, 2019) is projecting 2.6 per cent growth in 2019 and an annual average growth rate 3.4 percent for the period 2019 – 2024. But the outlook seems challenging given the increasingly uncertainty regarding trade policy and wide-ranging down side risks clouding the horizon. International trade risks that intensified in 2018 which contributed to the slowdown in maritime trade growth include the decision of the United Kingdom of Great Britain and Northern Ireland to leave the European Union (“Brexit”); and the economic transition in China; geopolitical turmoil; and supply-side disruptions, such as those occurring in the oil sector. Country-peculiar developments, including recession in some emerging economies; weak production in industrial sectors across many regions, as lowdown in China and weaker import demand in both developed and developing countries, also hindered growth. A transition to the new improved understanding among major stakeholders, credible planning, better and forward-looking-policies that can effectively resolves the trade dispute among the big players, and take account of different nature of developing countries a group and their varied local conditions and needs.

According to a Brick Stone Africa research (2019), “*maritime industry includes all enterprises engaged in the business of designing, constructing, manufacturing, acquiring, operating, supplying, repairing and/or maintaining vessels or component parts thereof: of managing and/or operating shipping lines, stevedoring and customs brokerage services, shipyards, dry docks, marine railways, marine repair shops, shipping and freight forwarding services and similar enterprises*”. To make it very clear, the industry encompasses all the maritime related business activities which takes place within the country’s maritime environment. These include off shore economic activities such as fishing salvage, towage, under water resources and on-shore economic activities such as Port-activities maritime transport (shipping), ship construction, repairs and maintenance activities.

Nigeria being a nation that is known for its reliance on imported good, maritime sector has capacity to boast a country’s economic growth and development, if adequately harnessed. Maritime is regarded as prospect sector that if adequately harnessed, could ultimately improve Nigeria’s economic growth and sustainable development. Nigeria being an oil producing and exporting state, as well as consumer state, it has large market for foreign commodities, owing to its population rate. With the above point, maritime sector holds the key to nation’s growth and development. As Nigeria is experiencing

economic crisis, experts and economists have continued to develop different models or formula, monetary and fiscal policies that could help to resuscitate the nation's economy, but the bedrock of these policies appears to not fully harnessed.

With potential to generate about 8 trillion yearly, the maritime industry holds key role to unlocking our economy considering that Nigeria is a consuming nation and majority of our consumptions are imported. Indeed, statistic from of National Bureau of statistics (NBS) showed that the nation's import rose by 38.1 percent, while export also rose by 63.3 per cent in the second quarter of 2016. Notwithstanding these figures, the shipping firms and terminal operators are groaning under low cargo handling. These further established the need to urgently, unlock the potential in the maritime sector, while policies and programmes that have numerous ways and capacity to boost the nation's economy must be implemented.

2. Main Objective

The main objective of this study is to evaluate maritime sector as key driver of Nigeria's economic growth and sustainable development.

2.1 Specific Objectives

- a. To assess the impact of technological advancement in Nigeria maritime sector
- b. To analyse the performance indicators of Nigeria maritime sector
- c. To examine challenges, prospects and sustainable development in the sector.

3. Literature Review

3.1 Major Maritime Industry Key Players

The following sectors plays vital/key role in maritime industry in Nigeria:

- 1) The Nigerian Administration and Safety Agency (NIMASA),
- 2) Nigeria Ports Authority (NPA),
- 3) Nigerian Ship Owners Association (NSA),
- 4) The Nigerian Shippers Council (NSC)
- 5) National inland waterways Authority (NIWA),
- 6) Ministry of Trade and Transportation,
- 7) Allied supports e.g. Nigeria Custom Services (NCS) etc.,
- 8) Operators, Finance Institutions and Private Investors.

3.2 Technological advancement and digitalization in maritime industry

The United Nations Conference on Trade and Development (UNCTAD,2019) estimates that between 2008 and 2023, the world; sea-borne trade will grow at a Compounded Annual Growth (CAG) rate of 3.8% led by containerized shipments and followed by dry bulk commodities. New technologies like internet of things (IOT), Digitization, Robotics, Automation, Block Chain and Artificial Intelligence (AI) can boost world economy

growth and development if it is appropriately applied. These will help optimize existing processes, create new business opportunities and transform supply chain and the geography of trade. Notwithstanding the potential opportunities and benefits offered by these technologies, they also entail risks and potential cost to maritime actors in developing countries. It is thus necessary to establish a level playing field. Digitalization can significantly benefit port and shipping services if it is fully and properly applied. According to UNCTAD, 2019, *“research points that maritime transport, with a fleet of 95, 402 ships carries about 80 per cent of global trade volumes. Practically all the data behind any maritime trade transaction and transport operation are being digitalized. The Internet of things, coupled with an increasing availability of data, will allow for an exponential growth of automated processes. The combination of enhanced digital and physical connectivity will help carriers, sea ports and intermodal transport providers integrate their processes with the shippers’ own globalized supply chains, providing a better visibility of shipments at any giving time”*.

3.3 Maritime Technology Terms and Applications

- 1) **Artificial Intelligence (AI):** (Lloyd’s Academy, 2019) *“Intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans”*, such as problem-solving. It is anticipated that usage of this application in shipping will lead to reduced staffing and maintenance, better navigation and increased safety by minimizing human error.
- 2) **Independent/ Autonomous Vessel:** This is act of using robotic technologies to navigate vessel. It is unmanned by human. International Maritime Organization (IMO) defined four various stages of autonomy, thus:
 - a) First Stage: Vessel with automated processes, but on-board seafarers operate this and are ready to take control.
 - b) Second Stage: Remotely controlled vessel with seafarers on board.
 - c) Third Stage: Remotely controlled vessel with no crew on board
 - d) Fourth Stage: Fully autonomous vessel. Autonomous ships market expected to have double digits’ growth in 2030, that is from \$6.1bn in 2018 to \$13.8bn by 2030. IMO is now collaborating with MASS (Maritime Autonomous Surface Ships) sector to see how to look into the proposal and also regulate according to these levels.
- 3) **Big data:** This is a process of handling diverse, complex and cargo sets of data, which can be structured and analysed to increase understanding of trends and patterns, predict behavior and ultimately deliver business results.
- 4) **Block Chain:** It’s simply a ledger of digital records (blocks) stored in a public database (chain), which is leading the way to a safer and more transport maritime environment by reducing errors and better preventing fraud.
- 5) **BOT** (Shortened form of the word “robot”) This refers to a programme that runs automatically and in a repetitive way or is commanded to behave in a certain manner following input.

- 6) **Digitalization:** Using digital advancements to enhance or transform the way a business operates and the services they provide, which relies on strategic innovation and the availability and quality of data. The future of the maritime industry must be digitally informed and as such digital cultures within maritime organization will lead to fundamental shifts.

Note: Digitalization is sometimes referred to as digitization, which is the process of taking analog information and translating it to information that can be read by a computer:

- A. **Internet of Things (IOT):** The System of device that are interconnected through sensors would not normally be expected to have internet access, for example a light bulb or thermostat. They use the internet to collect data communicate and share data with each other in real time. Computers or smart phones are not considered part of IOT. Connected ships are already helping with the design and operation of the ships and can make the industry more competitive by improving communication between off and onshore, driving route and fuel consumption optimization and cutting costs. However, the unreliability of internet access in unfavourable weather conditions and cyber security concerns are making some players reluctant to implementing IOT-based solutions.
- B. **Smart Shipping:** The implement of smart technology to improve the overall ship management performance and operations across the entire supply chain. Cooperation between maritime professionals and the benefits brought by these technologies can lead to a more efficient and safer sector.
- C. **Cyber Security:** The inter-connectedness of systems has led to easier access of data and bigger risk of being compromised. Maritime sector is expected to fully indulge in this action to protect themselves, such as improving passwords and changing these regularly, providing cyber training and performing regular IT checks.
- D. **Drone:** Its unmanned ariel systems or vehicles controlled remotely, which are being used by maritime sectors to gather information surveillance, but also to load, offload and deliver goods. This is expected to significantly reduce shipping costs in the future.

There is no gain saying that technological advancement and digitalization is elevating the maritime industry beyond its traditional limits, and it provides many new opportunities that enhances productivity efficiency, sustainability of shipping and logistics. Nigeria depends heavily on foreign goods which are mostly imported via seaports, if maritime industry is fully harnessed, the sector will dramatically improve our economy as an oil producing and exporting country, as well as consumer nation. It has been established that cargo in Nigeria ports spend unnecessary long time before it is moved to its various destinations, showing huge concerns and bottleneck to the successful integration of the Nigerian and sub-Saharan economies in worldwide trade networks. Most of the bottlenecks within Nigeria ports are caused by not imbibing in modern technological advancement and digitization in country's various ports. The idea of adopting of smart ports can reform the mode of operation in country's Ports. (Festus

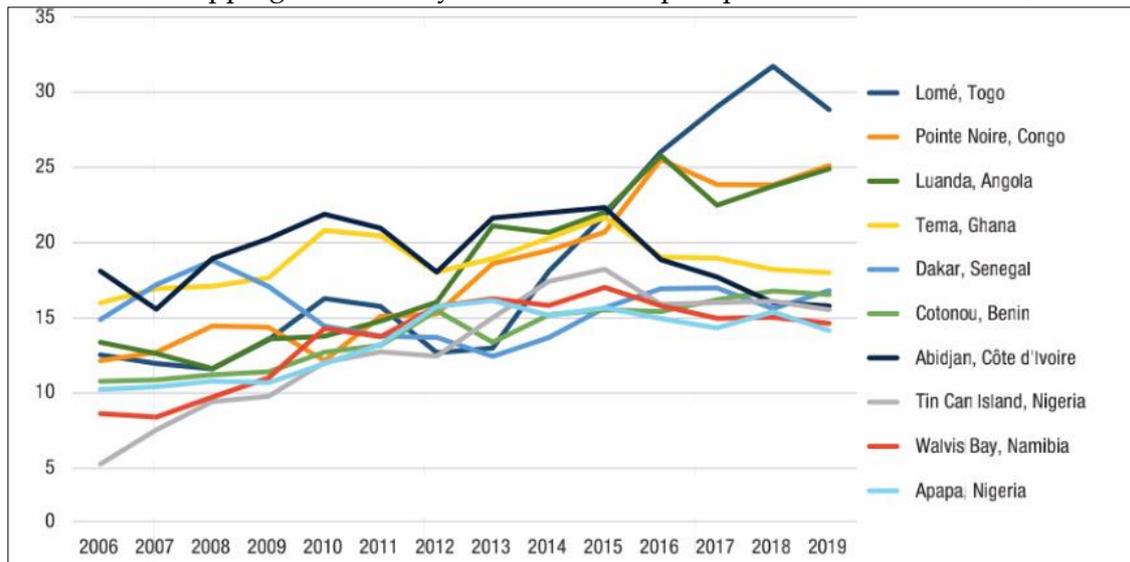
Okolie, 2020) *“There is urgent need for our policy makers to start working on strategies which will put in place accessible and reliable technologies that will increase the provision of ship/shore interface maritime intermodal interface, provision of modern facilities for berthing, faster anchoring ships, faster support services for cargoes, passenger’s ships and base for industrial development centered around the activities of the port freight and movement of goods”*. The implantation of modern technologies in maritime sector will speedily enhance or boost revenue of the sector which will create a huge impact that will help grow the industry. It makes works easy, reliable, efficient, effective and better port operating system is assured

3.4 Maritime Performance Indicators

This paper looks at various performance indicators associated with maritime sector. The motive is providing brief analytical tools to guide the policy making in the critical issues of maritime business through a set of key performance indicators that are relevant to the sustainable development of the maritime sector.

- 1) **Maritime Performance Measurement:** (UNTAD, 2019) *“Performance indicators are important analytical tools that can facilitate and understanding of the nature and scale of issues facing the shipping industry and ports and help assess the potential impact of alternative policy options”*. The impactful indicators such as cost-effectiveness, efficiency, profitability, productivity, access, social inclusiveness, connectivity and environmental sustainability are highly regarded for maritime business and its users, governments and policymakers. Country’s data generation are important to help establish the nature and level of maritime activity and underlying trends in order to understand, state, interpret the results and implications for policy makers, especially in developing countries. Maritime transport is seriously gaining more interest and attention in the indicators that support performance monitoring, reporting, measurements, and assessment.
- 2) **Liner Shipping Connectivity:** The global container shipping network determines the country’s position in maritime business. This means that its connectivity is a significant determinant of accessibility to world trade, trade costs and competitiveness. UNCTAD in 2004 developed the line shipping connectivity index (UNCTAD 2017), which aims to capture a country’s level of integration into the existing global liner shipping network by measuring liner shipping connectivity. The liner shipping connectivity index can be considered a proxy for the accessibility to world trade. The higher the level, the easier it is for a country to access the global maritime freight transport system, including in terms of capacity, transport options and frequency, and thus effectively participate to international trade.

Figure 1: Linear shipping connectivity index for the top 10 ports in Western Africa, 2006 – 2019



Source: UNCTAD (2019).

“In Western Africa, Lome, Togo has emerged as the leading hub port. It is followed by Pointe Noire, Congo and Luanda, Angola. Spurred by modernization reforms and benefitting from the congestion at the port of Lagos, Nigeria, Lome Port has been rapidly expanding in recent years”. (UNCTAD, 2019)

Another factor influencing the good performance of leading ports in the region is that they managed to attract direct services from China, boosting their indices given the additional services the larger vessel deployed on these routes (Wolde Woldearegay et. al, 2016).

Abidjan, Cote d’Ivoire, which was still ranked number one in the region 2016, slipped to seventh position in 2019. Lagos dropped from the ranking of the 10 most connected ports of the region in 2006 to sixteenth position in 2019, while two other Nigerian ports (Tin Can Island and Apapa) joined the ranking. Within the African has relatively low connectivity, as its geographical position does not link it to any major North-South or East-West shipping routes.

3) **Ports Improved Management:** Port performance is a key indicator of trade cost that determines connectivity and trade cost (Micco et al., 2003; UNCTAD 2017). (UNCTAD 2019) “Every hour of ship time saved in a port helps ports, carriers and shippers save money on port infrastructure investments, capital expenditures on ships and inventory holding costs of merchandise goods”. UNCTAD has provide data analysis on the time ships spend in ports during port calls. A good number of important differences can be discovered between countries and vessel types.

These tables shows that countries with more ports calls tend to have shorter turnaround times as well. Ports with shorter turnaround times are more attractive to shippers and the carriers. More so, if ships are larger, other things being equal turnaround

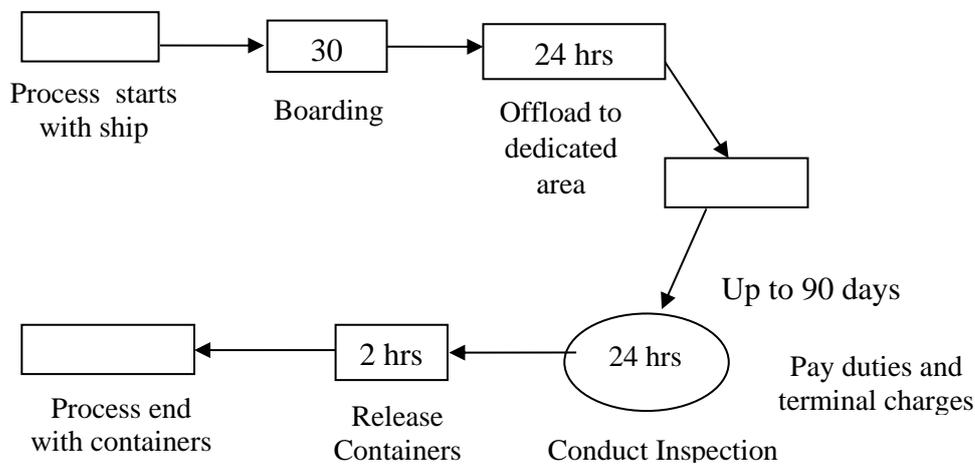
time should be longer, as there will be more cargo to be loaded and unloaded. At the same time, ports that can accommodate larger ships will usually also be more modern and efficient.

Table 1: Ten highest and lowest-ranking economies:
 Median time spent in port by liquid bulk 2018

Economy	Ranking, from fastest to slowest	Median time in port (days)	Average size of vessels (gross tons)	Size of largest vessel (gross tons)	Average age of vessels (years)	Total number of part calls in 2018
Peru	1	0.11	24356	83580	14	2521
Switzerland	2	0.23	1669	5000	25	394
Japan	3	0.31	7913	166093	12	44382
Gibraltar	4	0.35	5060	59315	14	1252
Germany	5	0.36	4428	13239	18	14394
Cyprus	6	0.39	9010	30641	18	909
Faroe Islands	7	0.45	4587	170004	12	125
Iceland	8	0.48	6696	165125	14	242
Netherlands	9	0.49	9440	42826	15	41843
Panama	10	0.49	13730	30965	21	2713
Madagascar	142	2.49	13467	85362	6	131
Reunion	143	2.54	26535	53076	8	33
Senegal	144	2.79	25289	29658	11	265
Yemen	145	2.87	12437	26218	19	284
Congo	146	2.93	20770	172146	11	36
Somali	147	2.94	5259	157831	23	56
Iraq	148	3.13	71414	64705	13	1380
Nigeria	149	3.15	20250	64705	16	1507
United Republic of Tanzania	150	3.84	20385	64705	18	236
Kenya	151	4.03	36933		11	198
World		0.94	15543	234006	13	494120

Source: UNCTAD (2019).

2.5 Current Cargo Clearing Cycle in Nigeria



Sources: Maritime Ports Reform in Nigeria Feedback from the OPS 2018

Many factors are noted that causes significant delay in clearing of goods in Nigeria Ports. They include offloading of goods to the dedicated areas, duties payment and charges inspection conducts and Release of containers. NIMASA and NPA need to synchronize strategies and embrace digitalization in the issues of physical inspection, payment of duties, terminal charges and clearing of goods. However, there is improvement in minimizing human interface by concerned agencies, but it is not enough, introduction of more technologies to facilitate faster exercise in cargo clearing cycle is essential. Most times, terminal operators are constrained for space and inadequate equipment for easy inspection and stocking of containers. Although, sometimes-terminal operator might compromise and overlook the standard regulations for their selfish purposes. There is complexity in the procedures and process of clearing goods in Nigeria, thereby causing unnecessary delays. There is need for Nigeria custom service, Federal Operation Unit (FOU). Nigeria Port Authority and Nigeria Maritime Administration and Safety Agency (NIMASA) to come together to reorganize their mode of operation to help ease of doing business at the Ports.

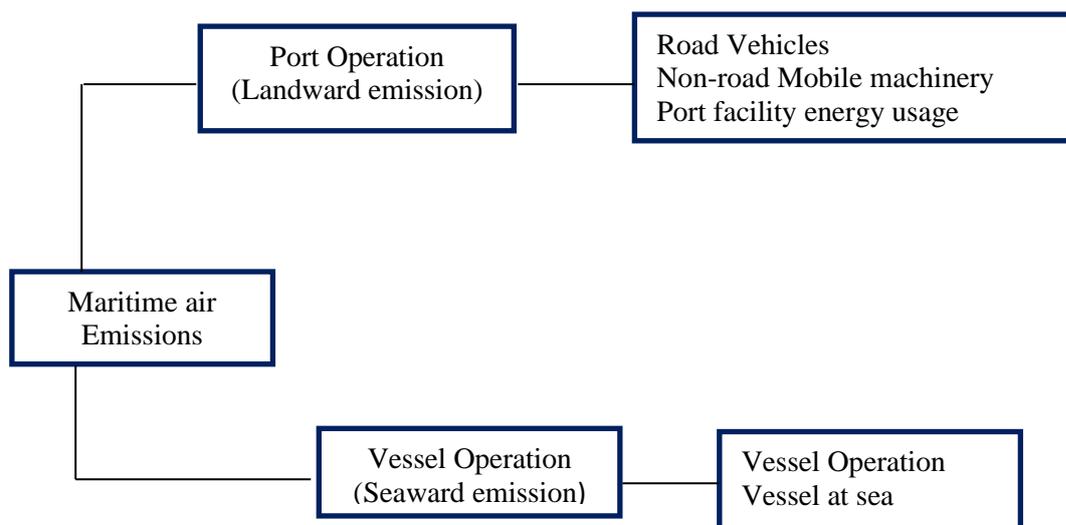
2.5.1 Environmental Factors

According to United Kingdom Maritime 2015 Document (Navigating the Future 2019), *“As the global economy and the blue economy within it continues to grow, goods and people are moving around the world in greater volumes than ever before and the scale of environmental impacts from transport is increasing. Under international and domestic agreements other transport and economic sectors are moving quickly to reduce their environmental and climate impacts”*. Maritime Agenda 2015 (The future of Germany as a maritime industry hub, 2017). *“Maritime Industry must strike the balance between the conflicting demands of economic necessities and environmental protection requirements. Both interests must be reconciled for shipping to be as efficient and sustainable as possible”*.

The world is clamouring for going green and environment friendly atmosphere for healthy living and doing business. There is absolute need for reduction of greenhouse gas emission in order to achieve the climate protection goals. International maritime organization (IMO) has new level requirements in maritime industry to reduce global pollution, for example *“establishment of control areas for ship emission such as Sulphur and nitrogen oxide and for discharges from ships, or the recent decision by the IMO Environmental Committee to lower the minimum Sulphur levels of ship fuel from 3.5percent to 0.5 percent from the year 2020. These measures will significantly reduce the environmentally harmful and unhealthy Sulphur oxide emissions caused by shipping activities”* (Maritime Agenda 2025, 2017).

The two major sources of maritime air quality and GHG emission are:

- 1) Port operation (ground emission)
- 2) Vessel emission (Sea emission)



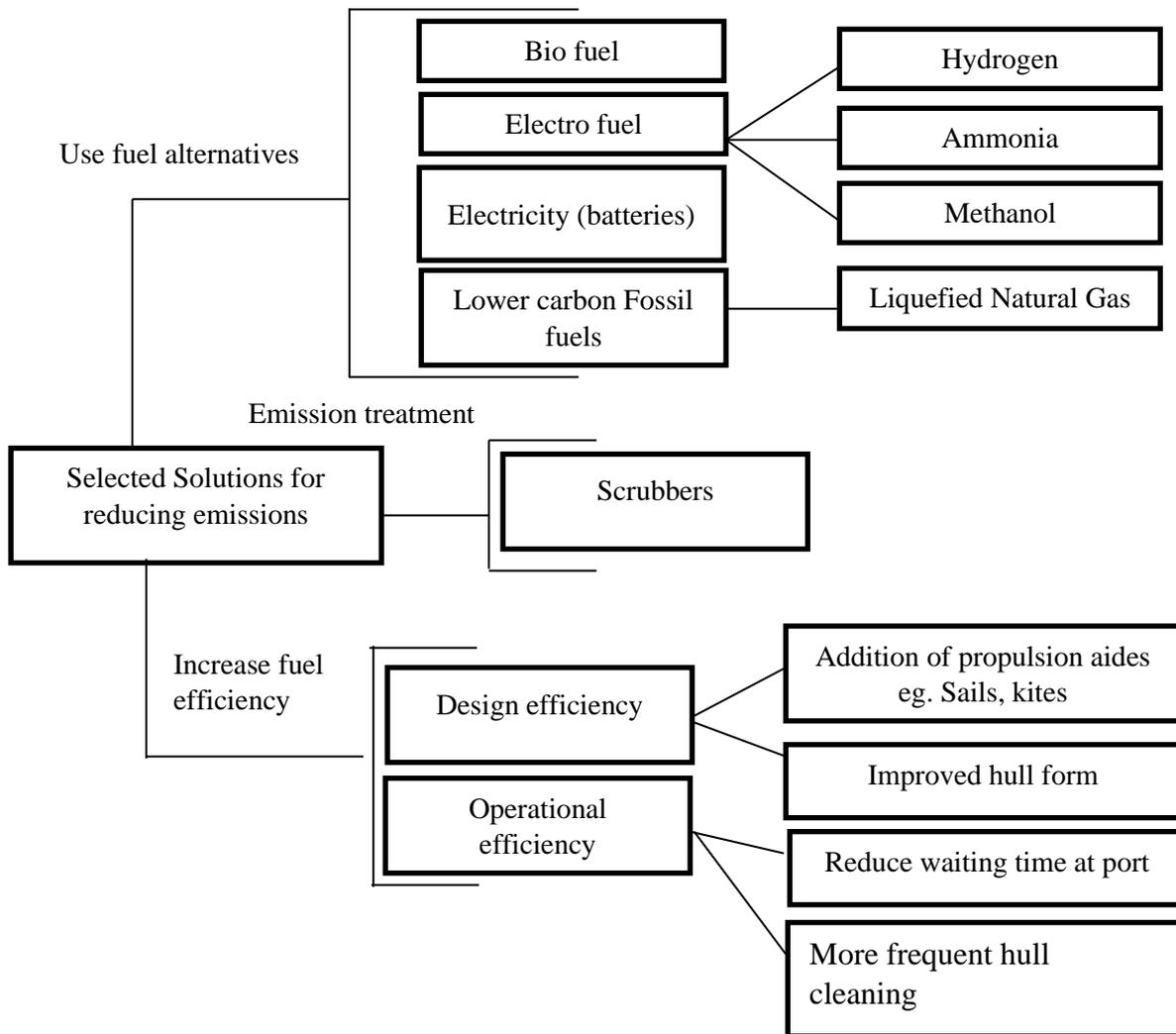
Source: (UK) Maritime 2050, Navigating the future

2.6 Strategies to Reduce Maritime Pollution

Institutions, Agencies, government, private sectors etc. are making frantic effort to reduce air pollution in maritime sector, which have been shown to cause important environmental degradation and human health challenges. (Carbett and Fischbeck,2002) *“A number of emission control technologies and operational strategies are in use or currently being evaluated, especially for pollutants such as Oxide of Nitrogen (NOx) and Particulate matter (PM). These emissions controls have been categorized as either pre-combustion in-engine, or post-combustion controls”.*

According to Maritime 2050 Agenda by UK, these three (3) solutions can reduce emission and they are as follows:

- 1) Treating emission at exhaust (for example, NOx emissions can be reduced significantly by using selective catalytic reduction systems)
- 2) Improving fuel efficiency (whether through improved vessel design or better operations of vessel once constructed).
- 3) Substituting existing fuels with less polluting alternatives.



2.7 The Challenges, Prospects and Sustainable Development of Maritime Sector

Maritime transport is the main stay of world trade and a key engine piloting globalization and competitiveness. UNCTAD, 2019 estimates that around 80% of global trade by volume and over 70% by value is transported by sea.

2.7.1 Major Challenges Facing the Maritime Sector in Nigeria

- 1) **Safety and Security:** Piracy and sea crimes, including vessel hijack and crew abducting were reported on increase in 2019, around the Gulf of Guinea (GOG) and escalating to Nigeria waters. International Maritime Bureau (IMB) stated that Nigeria are among the volatile countries in maritime insecurity especially Lagos, the attack on Neve constellation in which 19 crews were abducted raised a lot dust globally and its very big minus for Nigeria's image and integrity. Nevertheless, there are several reports of cargo theft on board, vessels on water and at the ports, which occurred more rampant in 2019 than ever before, according Nigeria's maritime records reports, 2019. In order to be curb incessant crime on Nigeria

waters, the country has successfully enacted the suppression of piracy and other maritime offences Act (SUPMOA) 2019. The Act gives effect to the United Nations Convention on the Law of Sea (UNCLOS) 1982, the convention for the elimination of unlawful Acts against the Safety of Maritime Navigation (SUA) 1988 and its Protocols. We believe that these Acts will strengthen our security networks to combat piracy and other related crimes for smooth operation of maritime businesses in Nigeria.

- 2) **Paucity of Funds:** Maritime is a massive industry that requires huge capital and intensive financing which will definitely attract more private sectors in the industry. This lack of funding has brought about inefficiency and ineffectiveness in the management and performances of maritime industry services. In addition, the issue cabotage vessel financially to indigenous operators has not been fully resolved. The indigenous operators are still struggling to survive in the sector and urgently needed government absolute help to thrive and consolidate.
- 3) **Inefficiencies, Dishonesty and Sharp Practices:** A notable number of importers and exporters are not trustworthy in their operation as they can falsify records, changes documents and under-declare their cargos. The sector is associated with operational inefficiencies, non-transparent, unpredictable and sharp practices in the activities of the sector.
- 4) **Loss of Revenue:** In 2017/18, Nigeria Ports Authority carried research, which unveiled that, the country losses about \$7 billion annually in revenue due to inefficiencies and weak infrastructure of Nigeria seaports. However, Brickstone Africa Research, 2019 stated that, *“Our research reveals that Nigeria is currently losing N15B or \$101M annually and even more disturbing is that Nigerian ownership accounts for less than 8% percent which is far less percentage contemplated in extent legislative enactments”*.
- 5) **Traffic Gridlock and Poor Traffic Control Method:** The roads that have access to ports should be in an admirable state for easy movement. Apapa Ports and other ports in the country have bad road networks and urgent attention are required to improve the networks. Lack of proper traffic control is an additional pressure to the traffic congestion
- 6) **Digitalization:** Nigeria maritime sector should think ahead and focused on being competitive and lead way to achieve their objectives, which can be done via digitalization. This does not prevent them from investing in human, institutional and technological capacities in order to enable traders and service providers to engage in new business opportunities.
- 7) **Human Resource Training and Neglect of Maritime Institutes:** Maritime sector are going digitalized; ships and port are becoming more and more efficient and computerized. There are innovations, technologies and machines, maritime operators need incessant trainings to get abreast to the latest technologies which will strengthen them to compete globally. Nevertheless, the Maritime Institutes, especially Institutes of Maritime Studies, University of Nigeria buildings are

completely abandoned for years now. Most of facilities used in running the programmes are makeshifts, and there are need for Nigeria Maritime Administration and Safety Agency (NIMASA) develop the Institutes nationwide as a baseline for training, human empowerment, capacity building and sustainable development.

2.7.2 Prospects of Nigeria Maritime Sector

A. Blue Economy

The concept of blue economy has taken a global focus and Nigeria, being richly endowed in ocean resources can attain economic prosperity and wealth creation for its citizenry if the right and proper investments are mobilized to optimize these resources and opportunities. Blue economy has long been explored by western countries to develop/improve their economies. concrete steps to harness the abundant resources of African oceans and seas are yet to receive adequate attention from African leaders (Dakuku Peterside, 2019) states that *"Time has come for all hands to be on deck and support Government at all levels in taping into the blue economy and developing it to such a level that it can contribute for more than is being projected"* Rt, Hon. Femi Gbajabiamila, Speaker House of Representative states that *"The National Assembly would also work with the executive arm in putting in place the necessary legal framework for the blue economy to engender and protect the Nigerian marine environment and development of the ocean economy."* The concept of blue economy deals with the totality of all economic activity associated with the oceans, seas, harbours and coastal zones etc. These concept includes aquaculture, biomedicine, boats and ship building, ship repairs, defense and security, amongst others all geared towards wealth and job creation for economic growth and sustainable development.

B. Proper Review and Absolute Implementation of Cobatage Act

Cobatage law is known to be a framework of transformation, but there is a great need to properly review and regulated it for the benefit of Nigerian operators and enhance economic growth and development. According to (NIMASA, 2019) Cabotage Act 2003, which is describe by maritime stakeholder as protectionist laws is undergoing serious reviewing the National Assembly with motive reviving the act to enhance its implementation. This act is regarded as significant pillar for indigenous capacity for the sustainable development of the Nigeria maritime industry. (Dakuku Peterside 2019) former Director General NIMASA, states that *"The spirit of the cabotage Act is not to generate revenue in terms of waivers but to build the requisite capacity for indigenous players which will in the long run generate wealth and create employment for Nigerians teaming population"*. The coastal and inland Shipping Act 2003 is principally a protective law that safeguards local shipping interests in the carriages of locally generated cargo. The law allows the local or indigenous operators to participate in locally generated cargo and restrict foreign shipping companies in the grassroots cargo business (Ndikom, 2010). Nevertheless, there should be fully implementation of Cabotage Vessel Financing Assistance Fund (CVFF), established to give financial assistance to local operators in ship acquisition and other

maritime businesses. With full execution of cabotage act and CVFF, Nigerians will take control of maritime activities and can compete globally in maritime business.

2.8 Development and Reformation of Deep Seas Ports and Multi-Model Transportation

Nigeria will have multiple opportunities and benefits if government develops deep-sea ports via dredging of the waterways for future bigger vessels to berth. Nigeria seaports are not big enough for large vessels to load or discharge good. (NIMASA, 2019) said that some deep-sea project is already on going at Ibom deep sea in Akwa Ibom State, the Lekki deep-sea port and Badagry deep seaport in Lagos State. Multimodal transportation system can help to link waterways with the roads, the air and the rail, which is seamless. This concept will facilitate the trade and commerce, internal generation for the government, good finance and enhancement of economic activities associated with the sector.

2.9 Technological Advancement

Technological advancement, environmental issues and geopolitical challengers will test the resilience of the Nigerian maritime sector over the coming decade. One way Nigeria maritime industry can survive global competition and adjust to the new era is by embracing automation. (World finance, 2020) *“Autonomous cargo ships have long been touted as the next big thing, combining cost-efficiency with green credentials. Two Norwegian companies, Yara International and Kongsberg Maritime expect to launch the world's first autonomous, zero-emission container vessel this year, i.e. 2020, but many in the industry are skeptical”*. Although the technology of driverless vehicle tends to encounter a series of legal and ethical questions, from liability to insurance costs. The industry's presence across multiple jurisdictions adds extra complexity. Philip Damas, Head of Drewry Supply Chain Advisors, the logistics arm of UK maritime research consultancy Drewry Group said *“The question is whether governments, regulators and insurers around the world will be willing accept and coordinate such a dramatic switch in a worldwide industry like global maritime transport”*.

According to Stuart Neil, communications Director of the International Chamber of Shipping, *“the technology is not currently advanced enough to have a significant impact on the industry. If we look at the automotive industry, driverless technology took yet to impact the job market. We see no reason as to why autonomous technology for shipping will be markedly different”*. There is significant doubt about the current impact of driverless technology globally, but Nigeria maritime should position themselves globally in order to be relevant and competitive in technological advancement and sustainable development.

The shipping and Ports industries are cautiously embracing relevant technologies arising from digitalization (Mckrsey et al., 2017) *“More and more carriers and freight forwards alike are taking measures to digitalize internal processes, develop integrated information technology infrastructures and other real-time transparency on shipments. Other technologies of*

relevance to seaborne trade include artificial intelligence, internet of things, robotics, automations and block chain”.

Growth and development in Nigeria waterborne trade and activity will create significant new opportunities for the Nigeria maritime industry, with its expertise in delivering high “value added” sophisticated and innovative products and services. Connection with all other transport modes, will be seamless. Smart vessels will communicate with smart ports to limit congestion, waiting time and thus costs and will adapt their sailing speed to match harbour shots automatically.

2.10 Public–Private Partnership in Policy Formation and Implementation

Nigeria maritime sector has experienced serious efforts by various stakeholders (federal government in collaboration with private sector and development partners) to reposition for efficiency and global best practices. For past decades, public- private Partnership have been used as an alternative to public financing of major infrastructure projects. PPP is being describe as a contractual framework or structure in which public and private entities come together to deliver a project or service that is traditionally provided by the government or the public sector. They include: service agreements or outsourcing, joint ventures, concession etc. According to the New Maritime world 2016, the main benefits of PPP in maritime sector are as follows:

- a) PPP address the issue of lack of financing from the public sector,
- b) Performance gains associated with the involvement of private enterprise,
- c) The competitive of the sector is related to its level of integration to the supply.

The involvement of a private corporation as an infrastructure project financial partner can ensure an increased level of integration of site base on elements that are more directly related to competitiveness.

Other benefits of PPP are to facilitate trade, generation of revenue, government greater access to capital market, increase trade investment, encourage new methods and industrial relations, optimal business management and promotion of more competition among operators, service delivery through improved skills, technological advancement and innovation, unlocking access to capital and cost efficiencies, maintaining safe and secure operations and freeing government funding for other sectors the national economy etc.

NIMASA have had credible business relationship with port of Antwerp in Belgium in improved operation of the port and personnel training. This collaboration will open opportunities for training and better understanding on how smart ports are being operated.

2.11 Sustainable Development in Maritime Sector

International shipping cruise on oceans, therefore it is the responsibility of IMO to establish measures to improve the safety and security of international shipping and to avert environmental degradation in maritime industry. The primary objectives of IMO can be summarized as follows: safe, secure and efficient shipping on clean ocean.

Subsequently, maritime sector is expected to deliver safe, secure, efficient and reliable transportation of goods across the world, while reducing pollution, reducing energy efficiency and ensuring resources conservation. To achieve these in maritime sector, all the key actors in maritime sector should be recognized and taken into account when handling specific actions. IMO being a specialized agency of United Nations has a unique role to play in ensuring that 2030 agenda for sustainable development goals (SDGs) is achieved. (IMO, 2019) *“with more than 60 years’ expertise and experience, IMO is already contributing to sustainable development. Shipping is an essential component of sustainable growth, as it is the most environmentally sound mode of transport, having the lowest carbon footprint per unit of cargo transported. Through IMO, member states, civil society and the maritime industry are already working together to strengthen ongoing effort toward sustainable development goals”*.

The latest regulation by IMO which started January, 2020 which states that fuel oil for ships will be reduced from 3.50% - 0.50%, this policy is expected to bring significant benefits for human health and the environment. (UNTAD, 2019) *“Enforcement, compliance with and monitoring of the new Sulphur limit is the responsibility of state port to the international convention for the prevention of pollution from ships (MARPOL), 1973, as modified by the protocol of 1978 (MARPOL 73/78), annex VI”*. It is noted that ships discovered not to comply with the regulations, may be detained by authorities concerned and adequate sanctions will be imposed. Sustainable maritime development must promote standardization and rigorous enforcement, which will ensure level playing field and safety guarantee.

More so, advancement of maritime sector requires training education and capacity building of maritime operators and professionals for the system including Engineers, Lawyers, Port personnel, Ship managers and Senior policy administrators. The quality of education and training of maritime operators will determine performances, efficiencies and effectiveness of the sector. Regular training of maritime professionals, seafarers and other personnel will expose them to new challenges and immediate solutions for global best practices. Sustainable maritime system requires modern technology to keep operational efficiency of ships and ports at the highest level. (IMO, 2019) *“Continuing technological advances call for increase of sharing of knowledge, experience and know-how in order to maximize the benefits of innovation and new technology for shipping safety and environmental stewardship and thus for the cost-effectiveness of the sector”*. NIMASA is expected to partner with international organizations, non-governmental organizations (NGOs), technical innovators like ship builders, engine makers, Research institutes and other relevant Agencies to embrace new technology and maximize sector all round performance.

2.12 Pillar for Sustainable maritime development

Safety culture and environmental stewardship	Maritime security and anti-piracy actions
Energy efficiency	Maritime traffic management
New Technology and Innovation	Maritime infrastructure development
Maritime education and training	Global standard at IMO

Source: International Maritime Organization (IMO). 2019.

3. Methodology

This study performed by reviewing maritime sector, the key driver for economic growth and sustainable development in Nigeria.

The researcher sourced and analysed results based on empirical reports derived from available literatures, works by other authors and scholars such as published journals, UNCTAD, IMO, NIMASA publications and other relevant materials

Essential literatures review approach (method) were adopted as an empirical evidence on maritime sector, as the key driver for economic growth and sustainable development.

4. Results and Findings

As the world is clamouring going green and sustainable development, NIMASA has align with IMO in strategic thinking about Sustainable development and needed much cooperation from stakeholders for economic transformation and realization of SDGs.

- This research unveiled that NIMASA is still struggling to get international standard and there are no genuine performance standards or targets with regards to timelines and outputs for processes handled by each target such as timeline for process volume/number of import/export transactions processed within given period and causes inefficiency, loss of revenue, sharp practices and unnecessary delay at the ports.
- NIMASA has not full embraced technological advancement which is the lever economic growth and sustainable development. The modern automation such scanning, sealing and tracking(SST), E-commerce, Nigeria Single Window(NSW) etc. are yet to be adopted.
- Nevertheless, there are absolute insecurity in Nigeria territorial waters and Gulf of Guinea. The high incidence of piracy sustains high shipping cost on Nigeria waters with the cost ultimately transferred to ports users and final consumers.

There is absolute neglect in NIMASA research institutes and human resources trainings in order to attain recommended IMO standard and practices.

5. Conclusion

Nigeria economy is in crisis now, overdependence on oil and gas industry is constantly dwindling, and only way forward is diversification to boost the economy. The maritime sector indisputably is an impeccable sector with unexploited resources and good potentials capable to lift the economy. It amazes us that government has not given much attention required in the sector. Federal government of Nigeria should look into maritime sector as a main source of generating revenue and job creation. The sector has many challenges such as inadequate finance or paucity of funds, non-compliant to modern technologies, inadequate synergy among operating agencies, conflict in directives, poor

ports management, insecurity issues, inefficiencies and sharp practices, loss of revenues, port congestion and neglect to established Institutes and human resource development.

However, there are numerous emerging opportunities and prospects in maritime sector and they include; harnessing of blue economy, full implementation of coastal and inland cabotage Act, 2003, development and reformation deep sea, technological advancement, public-private partnership (PPP) and research development of the sector.

5.1 Recommendations

The following recommendations were suggested:

- 1) For optimal ships and ports management, government and other stakeholders should collaborate in identifying and enable key levers for improving ships and ports productivities, profitability and operational efficiencies. In order to achieve these, government should ensure that policy, legal and regulatory frameworks are supportive and flexible.
- 2) Nigeria government in collaboration with shipping industry, ports managers, private sector and other stakeholders should get abreast with new maritime technologies for existing and newly emerging maritime markets, to specifically support market-based developments promoting sustainable solutions for economic use of the sea and ports.
- 3) Supportive coordination, cooperation and consolidation of maritime security among states, regions, organizations and industry, in order to implement IMO maritime security standard, with a multi-agency method to address vulnerabilities of ships and ports.
- 4) There is need to strengthen the development of maritime education and trainings with intent to attain international standard for future challenges, including innovation and evolution technology.

Conflict of Interest Statement

The authors declare no conflicts of interests.

About the Author

Ikenna Amuka has broad experience in both academics and non-academics fields. He holds B.Sc (Economics); M.Sc (Development Studies); and MBA (Business Management). His wealth of knowledge and experience earned him a position as Research Fellow, and Lecturer in the Institute of Maritime Studies, University of Nigeria, Nsukka, Nigeria.

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