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MODERATING EFFECT OF TECHNOLOGY ADOPTION ON PORT LOGISTICS AND BLUE ECONOMY PERFORMANCE OF MARITIME INDUSTRY IN NIGERIA

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ABSTRACT

The study examined the moderating effect of technology adoption on port logistics and blue economy performance of maritime industry in Nigeria. The predictor variable's (port logistics') dimensions included: port administration, port operations, procurement, warehousing, and intermodal transport. The criterion variable (blue economy performance) was measured with shipping trade, food production, energy production and job/employment creation. Technology adoption was used as the moderating variable. The theories that underpinned the study included: stakeholders' theory, Planed Behaviour Theory, Resource Dependence Theory, Resources, Field Guide to Strategy Concepts: and Blue Economy Model. Cross-sectional survey research design was used for the study. Primary and secondary sources of data were used as the main data collection methods. Primary data for this study were collected through structured questionnaire. The population of the study consisted of all the seven (6) ports in Nigeria. The study used descriptive and inferential statistical tools to analyse the data. Specifically, multiple regression analiysis of ordinary least square estimation was used to test the hypotheses with the aid of SPSS 25.0. Process regression model was used to test the moderating variable effect. The reliability of the research instrument was validated with Cronbach Alpha threshold at 0 .70. The study revealed that seaports improve route planning and collision avoidance as well as have seamless coordination between vessels, ports, and logistics providers. Also, seaports have better coordination among stakeholders, including shipping lines, port authorities, and logistics

providers. The study revealed that seaports significantly reduce labour costs and minimize human error and that they have service operators to carry out maintenance in a way that reduces unexpected breakdowns and prolongs the lifespan of assets, thereby lowering maintenance and repair costs. The study concluded that: Port administration, port operation and Intermodal transport have positive and significant effect on shipping trade, while procurement, and warehousing have insignificant effect on shipping trade. Port administration, port operation, procurement, warehousing and intermodal transport have insignificant effect on food production. Port administration, port operation, procurement and warehousing have insignificant effect on energy production, while intermodal transport has positive and significant effect on energy production. Port administration, port operation, procurement, warehousing and intermodal transport have insignificant effect on job/employment creation. Technology adoption has significant effects on port logistics and blue economy performance in the maritime industry in Nigeria. This study, therefore, recommended that: Governments, ports and maritime industry stakeholders should promote intermodal transport links - rail, inland waterways, efficient road networks to distribute cargo quickly with hubs / dry ports to reduce congestion and distribute jobs more broadly. They should also, encourage the development of bonded warehouses, cold chain storage, value-added services and encourage logistics parks near ports to cluster warehousing and distribution, resulting in more jobs.

KEYWORDS: Moderating Effect, Technology Adoption, Port Administration, Port Operations, Procurement, Warehousing, Intermodal Transport, Port Logistics, Blue Economy Performance, Maritime Industry

INTRODUCTION

Blue economy is a sector in the global economy that has captured attention in the recent time. It is an economy based on resources sourced from the entire marine environment for economic growth, sustainability and for improvement of livelihood. Although it is a new sector born out of economy diversification as resources ashore can no more suffix considering the world growing population and demand for food and other necessities (Yang, 2019).

Blue economy in most developed countries in Europe and America has reached its potentials, yet in developing countries especially in Asia and Africa it is yet evolving. Nigeria is one of the maritime countries in the world, yet, the development rating of Nigeria maritime industry

or blue economy which is new to our system stand at the beginning point. This can be viewed in connection to technology, facility, safety and insecurity, communication and general operation. These technologies help in enhancing blue economy operation and thereby propelling performance. The advancement in technology help to trigger both blue economy performance and port logistics operation. According to Sinay (2023), the blue economy talks about the sustainable use of ocean resources for economic growth, improved livelihoods and jobs creation, while preserving the health of marine and coastal ecosystem, it embodies various economic sectors, like fisheries, aquaculture, tourism, marine renewable energy, marine transportation and coastal infrastructure development etc. From Sinay's (2023) definition, it becomes entirely visible that blue economy cannot perform effectively in absent of transportation propelled by logistics and port which is key among all the coastal facilities. This means that logistics and port (port logistics) perform a veritable and indispensable role in the performance of blue economy everywhere in the world and in the maritime industry ultimately (Chase, 2016) opined that the inefficient logistics alter trading performance because it generates costs affecting local economic development. High logistics cost occurs as a result of high transaction costs at container ports which may be orchestrates either by lack of facility, equilibrium, capacity or lake of skilled and qualified manpower or most importantly weak intermodal connectivity.

In the past decades, the whole world businesses environment has been very dynamically affected by the new wave of globalization which have triggered international trade and businesses between countries and hastened the growth of multinational operations. Globalized businesses have brought about the belief that globally dispersed operations need to be coordinated and organized in the most efficient and effective way by enhancing port logistics to achieve blue economy performance. In this regards, proper administration of the world-wide linked activities of port and logistics that is maritime port logistics orientation is one of the most significant consideration of international blue economy development and performance. Port logistics embodies the entire activities involved in the logistic flow (ie, all the relevant activities of the flow of goods from the origin to the destination, including transportation, warehousing, purchasing, distribution and other relevant port activities etc). in two or more nations across the globe (Olowu & Adeyemo, 2020).

Blue economy performance requires a lot of adequate information, qualified manpower, facilities/equipment, for planning the procurement, warehousing intermodal transportation,

port administration and operation yet lack of these affects significant decision making for planning and achievement of blue economy performance in Nigeria. The challenges of integrated decision on port sustainability activities which influences blue economy performance also affects the inputs of port logistics in Nigeria.

There is a developing unanimity to fulfill the sustainability and performance objective inside seaports based on the triple bottom line (TBL), Nigerian ports operations have not been aligned to such specific sustainability framework, including economic, social and environmental sustainability (Cullinane, 2020), which encapsulates port administration and operations, warehousing, procurement and intermodal transport coordination. Lack of implementation of sustainable growth-led port policies is a problem in the maritime industry in Nigeria. similarly, the Nigerian blue economic lack the merit of fulfilling some specific performance frontier or framework such as shipping, food production, energy production and employment or job creation. Therefore, it is with these problems in focus that this study evaluated the moderating effect of technology on port logistics and blue economy performance of the maritime sector in Nigeria.

Objective

The main objective this study is to examine the moderating effect of technology adoption on port logistics and blue economy performance in maritime industry in Nigeria.

Research Question

What is the moderating effect of technology adoption on port logistics and blue economy performance in maritime industry in Nigeria?

Research Hypothesis

Technology adoption has no significant moderating effect on port logistics and blue economy performance in maritime industry in Nigeria

LITERATURE REVIEW

Theoretical Framework

This study is being backed up with the theories such as stakeholders' theory and Resource Dependence Theory.

Stakeholder's Theory

One of the theories considered to be very relevant for the explanation of the topic is the stake holders' theory. In his work extending the stakeholder theory, Jensen (2001) recognizes the multiplicity of stakeholders. He concurs with John and Senbet that certain actions of management might have conflicting effects on various classes of stakeholders. This implies that the managers have multiplicity of objective functions to optimize, something that Jensen sees as an important weakness of the stakeholder theory "because it violates the proposition that a single-valued objective is a prerequisite for purposeful or rational behaviour by any organization (Jensen, 2001). In search of a single valued objective function that conforms with rationality, Jensen suggests a refinement of the stakeholder theory-the enlightened stakeholder theory. For him, the enlightened stakeholder theory offers at least two advantages. First, unlike the earlier version with multiple objectives, the modified form of the theory proposes only one objective that managers should pursue: the maximization of the long-run value of the firm. If the interest of any major stakeholder was not protected, the objective of long-run value maximization would not be achieved (Martin, 2019).

A second, related, appeal of the enlightened stakeholder theory is that it offers a simple criterion to enable managers to decide whether they are protecting the interests of all stakeholders: invest the firm's resources as long as that will increase by at least one dollar the long-term value of the firm. There is an important caveat, however. Jensen himself cautions that the criterion may be weakened by the presence of a monopoly situation or externalities. Despite its appeal, the stakeholder theory of the variety proposed by Jenson (2001) has not been subjected to much empirical evaluation. At least two factors might have contributed to the gap between theory and evidence. The first, already alluded to, concerns the prevalence of externalities and monopoly situation. The second is the problem of measurement, especially in view of the problems associated with getting an accurate measure of the long-term value of the firm (Hussein et al., 2017).

Resource Dependence Theory

Resource Dependence Theory (RDT) is the study of how the external resources of organization affect the behaviour of the organization. The procurement of external resources is an important tenant of both the strategic and tactical management of any company. Nevertheless, a theory of the consequences of this importance was not formalized until the 1970s, with the publication of The External Control of Organsiations: A Resource

Dependence Perspective (Shrout & Fleiss, 1979). Resource dependence theory has implications regarding the optimal divisional structure of organizations, recruitment of board members and employees, production strategies, contract structure, external organizational links, and many other aspects of organizational strategy.

According to Takumi (2022) operational costs and specifically voyage cost, where the fuel cost is included, accounts for the 40% of the total costs. This explains the high rank that oil companies have among the list of the identified stakeholders and reveals the high dependency upon acquiring fuel resources. The fact that firms do not solely implement either technical or operational solutions, but rather choose to implement and seek for the best compilation of them is two-folded. The first is due to the subjected costs, whose minimization will free-up financial resources and secondly the efficiency will lead into the exploitation of less fuel resources per voyage (Scott, 1995).

This reaction to the stimuli of the intra-environment of the firms motivates and shapes the attitude of the planned behaviour (Yuen et al., 2018). The shift towards alternative solutions such as the promotion of maritime sector and electrical power solutions shows a positive shift and enhancement of the behavioural attitude towards sustainability and its practices (Scholz-Reiter et al., 2021) that in turn leads to endorsement of specific behaviour and hence to encouragement of the aforementioned alternative strategies (Yang et al., 2021).

Lee et al., (2019) argued that independence in business relationship helps focal firms and partnering firms to combine their resources together into a bundle of resources and by cultivating such relationship, it also creates specific capabilities that make the organizations superior to other firms in the same marketplace, thus enables firms to gain sustainable competitive advantage and better organizational performance. Therefore, based on Resource Dependence Theory maritime logistics-port sustainability connection in the present study can be viewed as the capability derived from maritime logistics performance to achieve better sustainable port practices. This thesis is treating maritime logistics-port sustainability relationship as capabilities of demand forecasting, warehousing and transportation vis-à-vis economic orientation, societal orientation, environmental orientation of seaports in Nigeria.

Conceptual Review

Port Logistics. (PL)

Deming. (2018) Port logistics plays an extremely important role in transportation and international trade. It involves moving goods between the sea and consumer centers, and its

efficiency is essential to ensure that products reach their destinations quickly and safely. Port logistics encompasses a set of strategic and operational activities related to the planning, control and execution of the transportation of goods through ports. It is a key link in the global supply chain, as it connects different modes of transportation, promoting the efficient movement of cargo between continents, countries and regional markets. These activities include the unloading of goods from ships, storage in specialized areas, internal handling in port facilities and final delivery to the intended destinations. Within this system, we highlight the organization of port zones, which play distinct but complementary roles. According to Fowler (2013) Port logistics is a fundamental component in the fabric of international trade. Seaports are key connection points between different countries and continents, and their efficient operation is vital to ensure a constant flow of goods and services globally. In this sense, port logistics plays an essential role in managing and coordinating the various activities related to the reception, storage, handling and transportation and delivery cargo. He explored in detail what port logistics is, its distinctive characteristics and the key functionalities that define it.

Gucwa and Durand (2021) “Maritime port logistics is a set of processes and activities covering the planning, management and coordination of logistics operations related to the transport and handling of goods in seaports. In other words, it is responsible for organizing and controlling the efficient flow of goods in port facilities, from the receipt of cargo to its storage, handling and subsequent distribution. Maritime port logistics is involved in every stage of the supply chain, playing a crucial role in connecting the various modes of transport and facilitating international trade.

Port Operation (PO)

Port operations are the direct operations that takes place in the port by the port employees, terminal operators, ship crew, stevedores and other relevant experts or professional linked with handling of cargoes and passengers. It includes loading, unloading, packaging, warehousing and vessel activities in the port. Sinay (2025), Port operations refer to the range of activities involved in the management and handling of vessels, cargo, and passengers at a seaport. These operations are critical to the efficient functioning of seaports, which play a crucial role in global trade and commerce. The activities involved in port operations can be broadly classified into three categories: Vessel operations involve the handling of vessels, including navigation and maneuvering within the port, berthing, and unberthing of vessels,

and anchorage management. Cargo operations involve the handling of cargo, including loading and unloading of cargo from vessels, cargo storage, and customs and immigration clearance. Passenger operations involve the handling of passengers, including embarkation and disembarkation, immigration and customs clearance, and passenger safety and security.

Shkuro (2023) says that Port operations play a significant role in the supply chain as they facilitate the smooth movement of cargo. Seaport activities are increasingly streamlined to ensure instant communication between all parties involved in the logistics campaign. The essence of port operations: on arriving at the port, the vessel with cargo must go through a series of procedures between terminals. Port operations ensure that the vessel arrives at the port on time for unloading without wasting time and money due to delays. Port operations consider the amount of data on the vessel's route, which helps to streamline the logistics process and predict the time of arrival of the vessel. To make the process of port operations clearer, it is necessary to note that, there are two groups of participants that control and carry out the main port operations: port authorities and port operators.

Procurement (P)

Procurement is the process of locating and agreeing to terms and purchasing goods, services, or other works from an external source, often with the use of a tendering or competitive bidding process. The term may also refer to a contractual obligation to "procure", i.e. to "ensure" that something is done. When a government agency buys goods or services through this practice, it is referred to as government procurement or public procurement. kotler et al (2009)

Procurement is the process a company uses to plan, source, purchase, and pay for goods and services. (Allison Reich, 2025). Procurement involves not only deciding on what to buy based on needs and budget, but also ensuring that the company is receiving enough value from the purchase. It is worthy to note that the value of any purchase made depends on the quality of the product, the amount of time it takes to be delivered to your doorstep, how much value you'll get out of your purchase, and many other factors. (Blaney, 2025). Procurement is defined as the buying of goods and services that enable an organization to operate its supply chains, in a profitable and ethical manner. There are many different interpretations of what procurement is, and this definition can vary from sector to sector, subject to the activities undertaken within your organization.

Warehousing (W)

A ware house in this context is a facility in the port built for temporary storage, processing and handling of cargoes awaiting demand or request for further movement into the vessel or towards the hinterland via train, trucks. William, (2025) Defined warehousing as the process of storing goods until they're ready for transport to retailers, distributors or customers. Businesses can benefit from warehousing in several ways, including more efficiently managing inventory and optimizing the shipment process. Learning what warehousing is and exploring the different types available can help you decide if upgrading to a warehouse is worth the initial investment. (William 2025). Warehousing is the process of buying goods from a manufacturer and then storing them in a warehouse before fulfilling the orders. The process of warehousing involves the organization and management of any products before distribution. Businesses may store goods in a warehouse, storage facility or, in the case of small businesses, in a home garage or basement.

Intermodal Transportation (IT)

Intermodal transportation is a transport system, arrangement or process that involves the use of more than one mode of transportation to complete a specific or agreed voyage. It combines modes, nodes, and transport units (ships, trains, truck and containers) to achieve efficient and effective logistics goals, thereby maximizing profit and enhancing business, industry and economic performance. Inbound Logistics (2022) Opined that Intermodal transportation is not as mysterious or complicated as the name would have it sound. The intermodal definition is transporting one set of goods in a steel container using two or more modes of transportation, such as rail and truck. An intermodal carrier using rail or truck is not the only means of transit that intermodal utilizes.

Intermodal transportation falls into four general categories: Truck, rail, sea, and air. Trucks can easily transport steel freight containers. They are usually the first mode of transportation that intermodal shipping relies on and uses to get the process underway. Additionally, trucks are typically the last mode of transportation to handle the freight on the way to its final delivery. Freight trains are an even more gainful means of transportation within intermodal transportation. Trains can transport hundreds of steel containers across thousands of miles with low transportation costs. But air and sea are the only modes with the potential to move freight containers between continents and across bodies of water.

Mearsk (2024) also describes intermodal transportation to mean the five pillars In international shipping, there are five main combinations of intermodal transportation linked to an ocean move: Direct truck: This method combines ships for ocean transport with trucks for inland transportation. It's a common choice for international shipping - when speed isn't a major concern, but cost-effectiveness is desired. Direct rail: It leverages trains for inland transportation and ships for overseas movement.

Blue Economy performance (BEP)

Blue economy performance refers to how well or bad, positive or negative a nation or region is using its ocean resources to achieve sustainable economic growth and development while preserving the health of the ocean ecosystem. It's about creating jobs, improving livelihoods, and contributing to the overall well-being of coastal communities, all while protecting biodiversity and managing resources responsibly. They are measures, indicators, criteria for ascertaining or accessing the efficacy of blue economy. (Dictionarycom, 2023)

Blue economy literally means ocean or water economy. It is an economic system whose resources and economic sustainability depends on the resources from the water. As posited by the common Wealth Action Group (2023): Blue Economy is an economic system or sector that seeks to conserve marine and freshwater environments while using them in a sustainable way to develop economic growth and produce resources such as energy and food. "the group seeks to reduce marine pollution, protect marine biodiversity, and ensure that the blue economy is sustainable" dictionary.com (2023).

Shipping Trade (ST)

Shipping trade is the total processes and activities involved in exchange of goods and services and distributing or delivering them to the desired location though any means of transportation. Shipping is the transport of cargo as a business, especially on ships (Collins dictionary. Com 2025). This definition is partially correct as shipping through ships constitutes the largest in global trade but the only transport means that completes the process. The ocean economy supports 90% of global trade and provides millions of jobs. It includes shipping, tourism and offshore energy valued at US$24 trillion. Marine fisheries and reefs, sea grass and mangroves are worth US$6.9 trillion; trade and transport US$5.2 trillion; and coastline productivity and carbon absorption US$12.1 trillion. Trade is the activity of buying, selling, or exchanging goods or services between people, firms, or countries.

Energy production (EP)

This concept addresses all the energy sources from the maritime domain. These sources include renewable, petroleum products from the marine offshore petroleum products use as a form of energy, and the renewable sources from the marine domain which includes wind energy, hydropower and tidal energy. This constitutes a major benefit and indicator for performance for Coastal states whose blue economy has been successfully developed and it has the ability to produce both renewable and nonrenewable sources of energy production. Energy is a vital element for economic growth and is generally viewed as the stimulus for most economic activities. The role of energy is equally important in income generation and employment. Non-renewable energy largely dominates energy supply in Nigeria. The growing concern is that they are exhaustible and adverse to the climate. In the country's electricity sector, natural gas (82 percent) and big hydro (18 percent) remain the major sources of electricity generation (Wikipedia.com, 2023).

Job Creation/ (JC)

Coastal states with well-developed blue economy have the potency to create jobs and employment enhancing economic development. Some analysts report that the Blue Economy is estimated to be worth more than $1.5 trillion per year globally. It provides over 30 million jobs and supplies a vital source of protein to over 3 billion people.

Sulaimon (2023) it is important to first understand what the blue economy encompasses and the great potential that it holds for the country. Nigeria's exploration of the untapped potential within the blue economy must be established, with a clear understanding of the concept and the immense benefits it holds for the nation.

Food production (security (aquaculture.)(FP)

Food production in this research is choice combination made to include all marine food resources and production which includes seafood and fisheries, aquacultures, desalination for salt and drinking water production which are all sources of food for consumption. One of the major benefits of successful implementation of Blue Economy is food production and security. It is obvious that greater percentage of the world food is sourced from the marine environment. So proper implementation of the blue economic process will ensure food production and security for the coastal states and also stands as a measure or indicator for its performance.

The Cable (2020) The fisheries sector, for instance, holds immense potential for coastal states (Nigeria's) economic development. With a coastline stretching over 850 kilometres, the country possesses abundant fishery resources. However, due to limited infrastructure, outdated fishing techniques, and inadequate regulatory frameworks, Nigeria's fisheries sector remains largely underdeveloped.

Idowu (2024) Nigeria maritime boasts is vast and rich sector that holds the promise of contributing over #7 trillion annually to the nation's economy. However, despite these potentials, the maritime industry faces significant challenges, primarily stemming from poor investment information technology (IT) infrastructure and other critical areas.

Technology Adoption (TA)

Technology adoption in the maritime industry refers to the acceptance, integration and use of new technologies to improve operations, enhance safety, and reduce costs. This process involves various stages, from initial awareness to full implementation and integration within the industry.

An example of technology that has boosted efficiency in the industry is the Nigeria Integrated Customs Information System (NICIS). NICIS is used by Nigerian Customs to ensure compliance with international regulations, surveillance on all ships, and improved operational efficiency in the industry (Wiafe et al., 2019).

Onwuegbuchunam et al. (2021) cited UNESCO Institute for Statistics (UIS), ICT is defined as set of technological resources such as computers, the internet, live broadcasting technologies (radio, television and webcasting), recorded broadcasting technologies (podcasting, audio and video players and storage devices) used to transmit, store, create, share or exchange information. ICT is similar to Information Technology (IT) but focuses primarily on communication technologies which include the internet, wireless networks, cell phones and other communication mediums Over time, ICT has proven to be very vital in restructuring and re-shaping business transactions and other activities. The challenges of using traditional paper based and manual data management systems in storing, retrieving, processing and transmitting information have been adequately addressed with the use of ICT through efficient management of information and physical flow. ICT facilitates management and timely processing of shipping documents. Electronic documents such as cargo stowage plan, manifest, bill of lading, booking instructions and customs declaration can be transmitted seamlessly among users via ICT platforms. Funds transfer, payments, tracking and tracing of

cargoes and containers are now common forms of ICT applications (UNESCO, Other areas of ICT deployment include port gate management, marshalling yard management, terminal management and custom's procedures. The integration of ICT in these areas has improved processes with positive impacts on overall productivity of supply chains. ICT applications in trade and transport are more bound to grow and become even more important with globalisation and emergence of global supply chains and processes. ICT usage could lead to decrease in shipping and trucking costs, timely delivery of goods and services, perceived increase in trade volume and enhanced organizational logistics capability. ICT has become an important technological adoption in transport & logistics enabling partner firms to share information between them. Thus, collaborative investment in information technologies among supply chain stakeholders has become a strategic thrust to achieve more transparent and efficient supply chains. Indeed, seaports can benefit from ICT developments as many of them still experience congestion and are in urgent need of procedures and technologies to increase cargo and ship throughputs and speed of goods handling (Nyquist. Seaports have grown in complexity due to the various types of cargoes handled, e.g. containers, bulks (wet and dry), RoRo, heavy-lift and out-of-gauge cargoes. Thus, investments in ICT infrastructure and facilities and integration in ports are needed to enhance their capacity to handle such diverse cargoes and thrive in such demanding transport markets. The present paper extends existing studies by seeking to evaluate the constraints to adoption and integration of ICT in ports operations.

Idemudia (2024) The Nigerian economy is touted to be the largest economy GDP-wise in Africa, and its maritime sector plays a very critical role in achieving this status given the fact that we are very oil export dependent. Despite her economic prowess, the maritime sector, which has about 0.3 trillion USD in economic potential, has been bedevilled by inefficiencies, delays, and corruption for the longest time, thereby retarding growth and development. Given this plethora of challenges, blockchain technology can improve business transparency, accountability, and process efficiency. Discipline.ng (2025) declares that with the exploration of new technologies and innovations, the Nigerian maritime sector is leveraging cutting-edge solutions to enhance its operations.. some of the adopted technologies in the Nigeria maritime/blue economy industry are **r**emote sensing technologies, such as satellite imagery and Automatic Identification System (AIS) data, have revolutionized vessel monitoring and management. These technologies provide real-time information on vessel positions, routes, and activities, enabling better decision-making and enhancing safety.

Unmanned Aerial Vehicles (UAVs) have also found applications in the maritime industry. These drones are equipped with cameras and sensors, allowing them to conduct aerial inspections, monitor illegal activities, and assist in search and rescue missions. UAVs provide a cost-effective and efficient way of monitoring large expanses of water, making them invaluable tools for maritime authorities.

Augmented Reality (AR) is another area gaining traction in the Nigerian maritime sector. AR technology is being used for training purposes, allowing maritime personnel to simulate real-life scenarios and practice emergency response procedures. This immersive training experience enhances the competency and preparedness of maritime professionals, ultimately contributing to safer operations.

Big Data analytics is another game-changer in the maritime industry. The vast amounts of data accumulated from various sources, such as weather conditions, vessel performance, and cargo tracking, can be analyzed to derive valuable insights. This data-driven approach enables operators to optimize routes, reduce fuel consumption, and improve overall operational efficiency.

Analysis of the use of Artificial Intelligence (AI) in the sector Artificial Intelligence (AI) is playing a crucial role in enhancing maritime operations in Nigeria. AI-powered predictive analytics techniques are being used to forecast vessel maintenance needs, preventing costly breakdowns and ensuring optimal performance. Advanced machine learning algorithms are employed to detect anomalies and identify potential security threats, enabling proactive measures to be taken to mitigate risks. AI chatbots are also being deployed to provide instant responses to customer inquiries and support. These virtual assistants leverage Natural Language Processing (NLP) to understand and respond to queries accurately. The use of AI chatbots improves customer satisfaction and reduces the workload of human operators.

Port logistics (PL) and blue economy performance (BEP)

Port logistics plays a strategic role in supporting the blue economy as they can serve as economic catalysts, generate added value and cluster supporting economic activities., while others focus on imports. In these cases, the same volume and trade composition can support different economic structures. The most significant financial indicators (the port as a source of revenue and investment) include: Fiscal revenue indicates how port activities contribute to the taxation income within their jurisdictions, ranging from national to municipal governments. This is particularly relevant to justify the public expenses supporting port activities, particularly infrastructure. (Emergent Cold 2024)

Investments by the public and private sectors in port activities over a given period. Port superstructure and infrastructure are capital-intensive and require constant maintenance. The blue economy refers to a sustainable economic approach focused on the oceans and seas as fundamental resources for economic development and environmental conservation. These immense bodies of water are considered drivers of the economy thanks to their huge potential for innovation and global growth. Sea and ocean water, in addition to sustaining life, also enable the connection of people and goods.

Logistics plays an important role in the blue economy as many of the freight forwarding operations are carried out by sea transport on container ships. Which characteristics link this type of sustainability and international logistics. Sustainable maritime transport: Maize the environmental impact of shipping: Protecting the marine environment: The logistics sector has an essential role to play in protecting the marine environment by guaranteeing that transport on container ships is carried out responsibly and sustainably. This includes proper waste management, prevention of oil spills and regulating shipping to avoid damage to marine ecosystems.

Fishing ports are important nodes in the collection of ocean living resources, including adjacent processing facilities (storage, freezing, canneries). This has further been expanded with the development of aquaculture, requiring servicing ports to act as input providers (feed and equipment).(Logistics Bureau, 2025)

Port operation and blue economy performance

The term blue economy is becoming more common as it expands the concept of the sustainable use of the oceans and the increasing role of information technologies, for which ports logistics play the following roles: Harvesting of living resources. Fishing ports are important nodes in the collection of ocean living resources, including adjacent processing facilities (storage, freezing, canneries). This has further been expanded with the development of aquaculture, requiring servicing ports to act as input providers (feed and equipment).

Extraction of non-living resources.: Conventionally, ports acted as resource and energy transformation platforms. For instance, the world's largest petrochemical hubs are all port complexes (e.g. Singapore, Ulsan, Houston, Rotterdam). Similar observations apply to mineral and coal complexes. The development of renewable energy led to new opportunities for ports as procurement and maintenance platforms, particularly with offshore wind farms. (Pazirandeh & Naim, 2018)

Maritime trade and commerce. The core value of ports in the blue economy is supporting trade flows and an ecosystem of related activities (warehousing, manufacturing, and distribution) for which container ports are salient. The recreational function of ports is also significant, with the harbor being subject to redevelopment (housing, commercial, museums), acting as marinas and ports of call for cruises.

As they can represent a substantial economic investment, ports are expected to provide enough value to justify these investments. Ports are viewed as economic catalysts for the regions they serve. Two distinct approaches can be followed when evaluating the strategic and economic significance of ports.

Port administration (PA) and blue economy performance (BEP)

Effective port administration is important and very crucial for every thriving blue economy, as ports serve as hubs for trade, logistics, and economic development, supporting industries like maritime transport, fisheries, and tourism. These includes; Ports as Economic Catalysts: Trade and Logistics: Ports facilitate the movement of goods and people, acting as vital links in global supply chains. Supporting Industries: They support a range of blue economy sectors, including fisheries, aquaculture, maritime transport, tourism, and offshore renewable energy. Economic Development: Ports can attract investment, create jobs, and stimulate economic growth in surrounding regions.(IADC85,(2004, Eleagu, et al 2018)

Roles of Port Administration: Infrastructure Development: Ensuring efficient port infrastructure, including terminals, wharves, and storage facilities, is essential. Logistics Management: Optimizing cargo handling, vessel traffic, and customs procedures to ensure smooth and efficient operations. Regulatory Framework: Implementing and enforcing regulations related to maritime safety, environmental protection, and security. Public-Private Partnerships: Fostering collaboration between public and private entities to attract investment and promote innovation. Sustainable Practices: Promoting sustainable port operations, including energy efficiency, waste management, and environmental protection. Blue Economy Performance Indicators:

Economic Growth: Measuring the contribution of the blue economy to GDP, employment, and investment. Trade Volume: Tracking the volume and value of goods transported through ports, indicating the health of trade flows. Industry Growth: Monitoring the performance of key blue economy sectors, such as fisheries, tourism, and maritime transport. Environmental Sustainability: Assessing the environmental impact of port operations and blue economy

activities. Social Equity: Evaluating the impact of the blue economy on local communities and ensuring fair distribution of benefits.

Some Examples of Blue Economy Initiatives in Port Harcourt: Fisheries and Aquaculture: The port can support the development of sustainable fisheries and aquaculture by providing infrastructure and access to markets. Maritime Transport: The port can facilitate the movement of goods and people, connecting Port Harcourt to regional and global markets. Coastal Tourism: The port can attract tourists to the region by promoting coastal activities, such as boat trips and water sports. Offshore Renewable Energy: The port can support the development of offshore renewable energy projects, such as wind farms and tidal energy plants. IADC85,(2004, Eleagu, et al 2018)

Procurement(P) and blue economy performance (BEP)

Procurement is the process of acquiring the right resources for use or operation. Blue economy development and operations requires a lot of resources which requires portlogistics operations to make them achievable. Sustainable Development: Procurement can prioritize environmentally friendly and socially responsible practices, ensuring that blue economy activities do not harm the environment or local communities. Allison (2025) Blaney, (2025)

Economic Growth: Strategic procurement can support local businesses and industries, creating jobs and stimulating economic growth in coastal regions. Job Creation: Procurement can lead to the creation of new jobs in sectors like renewable energy, marine biotechnology, and sustainable tourism. Food Security: Procurement can play a role in ensuring the sustainable management of fisheries and aquaculture, contributing to food security in coastal communities. Innovation: Procurement can encourage the development and adoption of innovative technologies and practices that promote sustainable blue economy activities.

According to Odey (2023). A procurement department is mandated to performs the following 3 Main Functions: Manage the organization's spending. A good procurement function is pivotal in deploying an effective Annual Buying Plan, leveraging robust forecasting, market analysis, purchasing processes, and cost reduction methodologies. this is very important because blue economy is made up of organization engaged in economic production and trade. Support operations by ensuring the timely acquisition of high quality, low cost, inputs and raw materials to be converted into products and services purchased by an organizations' internal customers. An organization exists to create value for its customers. The procurement

function is pivotal in supporting value creation processes. Protect the organization from risk by deploying risk management methodologies such as Failure Mode and Effects Analysis (FMEA). Contract management, and price shock mitigation and avoidance provide huge benefits to an organization, stakeholders and customers Blaney, (2025).

Warehousing(W) and blue economy Performance (BEP)

Inbound logistics (2024) Warehousing plays a crucial role in modern business operations, offering numerous benefits and contributing significantly to the success of an organization. A primary advantage of warehousing is increased storage capacity, allowing businesses to safely and efficiently store excess inventory. Warehousing is an essential aspect of supply chain management that encompasses storing, maintaining, and handling goods in a centralized location. This process typically occurs in large physical buildings called warehouses or distribution centers, where businesses store their raw materials, finished products, or perishable items under optimal conditions, and manage various warehouse operations. Some of the primary functions of public warehouses which makes the vital for blue economy performance include: Receiving goods from suppliers; Efficiently managing inventory with tracking systems; Picking and packing customer orders for shipment; Ensuring quality control measures are met. Providing security against theft, damage, or natural disasters Warehouse storage personnel play a vital role in executing these tasks to ensure business operations run smoothly while maintaining high levels of customer satisfaction. Small and large corporations can significantly improve their operational efficiency by investing in good warehousing practices. Inbound logistics (2024) Williams, (2025)

According to Inbound logistics (2024) Warehousing brings several benefits to businesses, including increased storage capacity, knowing how much inventory you have, efficient order fulfillment, reduced transportation costs, improved customer service, and enhanced supply chain flexibility. Effective warehousing also ensures visibility and synchronization across the entire supply chain, contributing to timely deliveries and overall operational efficiency. According to worldwide logistics group (2025) Warehousing helps companies satisfy the demands of their customers for fast and efficient order fulfillment, which has become more aggressive in the digital era. It also ensures maximum productivity and efficiency, reducing the risk of supply chain disruptions and inventory mishaps thereby improving blue economy performance.

Businesses are under a lot of pressure to provide cheaper and faster shipping to satisfy customer demand and increase satisfaction. Warehousing helps a business stay more competitive in the industry by elevating the customer experience. Through the facility's services, businesses can provide faster and cheaper shipping, while minimizing damage or errors during order fulfillment. worldwide logistics group (2025). Warehousing gives businesses access to shipping and logistics experts who can improve their supply chain and streamline their operations. They can delegate order fulfillment tasks to warehouse staff and focus on the core aspects of growing their business by this creating room for high scale of production for blue economy. (Scullin, 2025, Adobe Com Team 2025, Inbound logistics 2024)

Intermodal transportation (IT) and blue economy performance (BEP)

Intermodal transportation, using multiple modes like sea, rail, and truck, is crucial for a thriving blue economy by enabling efficient and cost-effective movement of goods, supporting sustainable practices, and facilitating global trade, ultimately boosting economic performance.

Intermodal transportation. The movements of passengers or freight from an origin to a destination relying on a sequence of transportation modes. Each carrier is issuing its own ticket (passengers) or contract (freight). Transfers from one mode of transport to another are commonly taking place at a specifically designed terminal.

Intermodal transportation relies on an exchange of passengers or freight between two transportation modes. The term has become more commonly used for freight and container transportation across a sequence of modes. In North America, the term intermodal is also used to refer to containerized rail transportation. With intermodal transportation, what initially began as improving the productivity of shipping evolved into an integrated supply chain management system across modes and the development of multi-modal transportation networks. (The Geography of Transport Systems 2024, Oyetola, 2024)

Empirical Review

Lin-Miao, & Pan, (2022) carried out a study titled, Empirical Studies on the Dynamic Relationship between Port Logistics and Marine Economic Development in Fujian Province. The study discovered that marine economy in coastal areas has a great role in promoting social development, and efficient port logistics serves the high-quality development of the

marine economy. They found out that there is a dynamic relationship of dependence, restriction, and mutual promotion between port logistics and marine economy, which has regional differences. Based on panel vector autoregressive model (PVAR model), the relevant panel data of Fujian Province from 2000 to 2020 were analyzed by using the Granger causality test, impulse response, and variance decomposition methods. The interactive relationship between port logistics and marine economic development was discussed, and development suggestions were put forward. The results show that the development level of port logistics in Fujian Province is low, the logistics supply cannot meet the needs of marine economy, the effect of port logistics is not significant, and the support ability for the development of marine economy is insufficient. On the contrary, the development of marine economy promotes the development of port logistics industry and the economic growth of logistics related industries, and the strong market demand promotes the further improvement of logistics supply capacity.

Oyetola,(2024) studied Intermodal transportation, key component in unlocking full potential of Blue Economy –and found out that efficiently linking the ports with road, rail and inland waterways is key to optimizing the movement of goods and enhancing trade. Minister of Marine and Blue Economy, He stated said the integration of intermodal transportation is a critical component of unlocking the maritime sector's full potential.He went further to say that efficiently linking the ports with road, rail and inland waterways is key to optimising the movement of goods and enhancing trade. He said intermodal transportation also aligns with the broader objective of reducing congestion, lowering carbon emissions and enhancing the overall efficiency of our logistics chain. He highlighted that the blue economy extends beyond traditional sectors like fishing and shipping, encompassing tourism, maritime trade, aquaculture, and renewable energy. In an effort to diversify the economy and reduce dependence on oil, Oyetola stressed the importance of harnessing the potential of the nation's oceans and seas. He noted that the blue economy could significantly contribute to the GDP, enhance food security, and create millions of jobs.

Giffen and Sylvia, (2024) on the World Maritime Day: presented a paper on the study titled How ports can catalyze blue economy innovation; Port of San Diego; blue economy, and says that Ports can play a key role in the blue economy through the sustainable development of ocean resources. Ports play a critical part in supporting the sustainable expansion of this ocean economy through many roles including landlord, operator, regulator and environmental

steward. By playing these roles within a public-private partnership model, ports can help to drive sustainable development of the ocean economy.

Unctad 2022). investigated blue economy and its impact on global maritime transportation in Galatasaray University a research and observations on Baltic Indices in April 2021 showed that shipping costs increased from 1478 USD to around 7485 USD in March 2021, an increase of 500%, a historical record. The study explains Blue economy and maritime transportation. Maritime transportation is the oldest and largest mode of logistics transport. However, due to developing and changing technology, technological developments, on the one hand, act for the benefit of humans and, on the other hand, affect the environment. In this context, it became inevitable to start working under the guidance of the EU, a leading authority in environmental sustainability, and the concept of the Blue Economy was created. Although Blue Economy includes many headings as a concept, Maritime Transport has a binding force above all sub-elements. Therefore, uninterrupted and sustainable maritime transportation is required to succeed in the Blue Economy. Since developed countries have thoroughly evaluated these and similar formations and their benefits, ships and their operations will be of interest in the future.

Munim&Schramm (2018) examined the impacts of port infrastructure and logistics performance on economic growth: the mediating role of seaborne trade, this study conducted an empirical inquiry into the broader economic contribution of seaborne trade, from a port infrastructure quality and logistics performance perspective. Investment in quality improvement of port infrastructure and its contribution to economy are often questioned by politicians, investors and general public. A structural equation model (SEM) is used to provide empirical evidence of significant economic impacts of port infrastructure quality and logistics performance. Furthermore, analysis of a multi-group SEM is performed by dividing countries into developed and developing economy groups. The results reveal that it is vital for developing countries to continuously improve the quality of port infrastructure as it contributes to better logistics performance, leading to higher seaborne trade, yielding higher economic growth. However, this association weakens as the developing countries become richer Ozer et al., (2020) The Importance of Maritime Transport for Economic Growth in the European Union: A Panel Data Analysis Bucharest, Romania. Maritime transport is one of the main activities of the blue economy, which plays an important role in the EU. T5he study aim to assess the impact of maritime transport, related investment, and air pollution on economic growth within 20 countries of the European Union, using eight panel data

regression models from 2007 to 2018. Our results confirm that maritime transport, air pollutants (NOx and SO2) from maritime transport, and investment in maritime port infrastructure are indeed positively correlated with economic growth. In other words, an increase of 10% in these factors has generated an associated increase in economic growth rate of around 1.6%, 0.4%, 0.8%, and 0.7% respectively.

Covin and Wales (2018) worked on the topic, Effect of shipping trade on economic growth in Nigeria: The Vector Error Correction Model The maritime industry is significant to the growth and development of nations. The relationship between shipping trade and economic growth in Nigeria is acknowledged in the literature. Still, the need to emphasize the role of shipping import and export volume and exchange rate volatility in Nigeria's economic growth remains a matter of contention. The economic growth and development level that a maritime nation will derive from its ocean depends on its import and export volumes in the face of exchange rate volatility. Using the Vector Error Correction Model, this study analyses the effect of shipping trade on economic growth in Nigeria from 1970 to 2020. The study examines the effect of seaport imports, exports, and real exchange rates on GDP to determine if Nigeria's economic growth is sustainable, that is if the current pattern of shipping imports and exports for economic growth will not hamper future economic development. The cointegration test established a short- and long-term causality from import, export and exchange rates to GDP. The result showed that Nigeria's economic growth is import-dependent and that, in the long run, import and exchange rates significantly affect GDP. The study further indicates that the present export volume does not significantly contribute to GDP growth. The results imply that building an economic system on an import-dominated trade system is not sustainable for future development.

Liza, Majumder. Rahman, (2025) carried out research on the topic, Scrutinizing the impact of blue economy factors on the economic growth in Bangladesh: An empirical study by analyzing the blue economy's short- and long-term effects on economic growth in Bangladesh, according to the authors, this study seeks to understand how the country's economic growth is influenced by various blue economy elements. The study used the Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) tests to discover which variables need to be differentiated first and which are stationary at levels. To determine if these variables are cointegrated, the autoregressive distributed lag (ARDL) model is utilized. The World Development Indicators (WDI) secondary time series data for the years 1990–2022 are

used in the ARDL model to show a long-term cointegration among the variables. The findings show that Bangladesh's economic growth has been positively and significantly impacted by growth variables like labor and capital as well as elements of the blue economy like fisheries and aquaculture production and policies have been presented based on results and findings.

Enueshike, and Anyanwu (2025) Studied Nigeria's Blue Economy: A Panacea for Employment Generation, Trade and Development, Purpose being to examine how blue economy can help phase off the current economic challenge facing the country: Nigeria is facing serious economic challenges that necessitate a shift towards diversification to achieve sustainable development. The recent change in government has brought new promises to combat corruption and uplift the common man, but economic diversification remains a pressing priority. Thus, the Blue Economy, is an innovative and dynamic approach that balances economic growth with environmental sustainability. It seeks to harness the potential of Nigeria's vast coastline, marine resources, and inland water-ways to drive national development and identify opportunities for employment generation in coastal and marine - related industries. Findings: The blue economy offers significant opportunities for Nigeria to achieve sustainable development and economic growth by investing in the sustainable use of marine resources, Nigeria can diversify its economy, create jobs, and improve livelihoods. Unique Contribution to Theory, Practice and Policy: Finally, policy should be formulated to make the Federal Ministry of Marine and Blue Economy should establish a comprehensive national policy on marine and blue economy, aligning with United Nations Convention on Law of the Sea (UNCLOS) 1982 integrate provisions of the Sustainable Development Goals 14 and engage public private partnerships (PPP) to develop port and transport infrastructure to promote coastal recreation and tourism along the coast.

METHODOLOGY

This gives details of the following; the design, population of the study, sample size and sampling technique, method of data collection, reliability and reliability of instrument and the statistical tool for testing and analyzing the hypothesis Obihiele (2012)

Research Design

In this study, the research design applied is the cross-sectional survey design. The cross-sectional survey research design is chosen because it emphasizes quantitative analysis whereby data can be collected through questionnaire, interviews, or from existing documents.

Population of the Study

Population of the study by different scholar's consensus opinion is that it must consist of a complete group of entitles sharing some common characteristics (Akujuru & Enyioko 2018, Bai, et al 2021). They also opined that population is the entire persons, organizations or the things of interest that the researcher wishes to study.

Hence the population of this study shall consist of the six main ports operational in Nigeria with the respective level of management staff/managers. This is in exclusion of the new port whose operational capacities cannot be readily ascertained now. Hence the population is as follows:

Table 1: Names of Ports in Nigeria.

	Ports
1	Lagos port complex
2	Tin can port
3	Warri port
4	Port Harcourt port
5	Calabar port
6	Onne port
Total	**6**

Source: *NPA (2026)*

The sample plan is as follow:

Table 2: Sample Distribution Plan.

Population	**Sampling Elements**
Lagos port complex	15
Tincan port	15
Warri port	10
Calabar port	10
Port Harcourt port	10
Onne port	15
Total	**75**

Source: *Desk Research, 2025*

Data collection is the process of gathering data to complete a research process using either or both primary and secondary sources for the purpose of analysis of the study constructs (variables).

Table 3: Test of Reliability.

Variables	No. of Items	Alpha (α)
Port administration	4	0.875
Procurement	4	849
Warehousing	4	0.791
Intermodal transport	4	0.886
Port operation	4	0.825
Shipping trade	4	0.798
Food production	4	0.824
Energy production	4	0.822
Job creation	4	0.780
Advance technology	4	0.830
Total		8.260
Reliability test		0.826

Source: *Survey data 2026, SPSS Output Version 25.0*

Cronbach's alpha greater than 0.7 following the acceptable standard for reliability (>7.0) and the overall reliability test of the instruments is 0.826

Method of Data

Akujuru and Enyioko (2018) defined analysis as the breaking and ordering of the quantitative information gathered for research purpose into their component parts to uncover their inter-relationships, understand their nature. in this study, percentages, ratio, frequency distribution; scaling, ranking and other statistical tools were used to analyze and achieve the research objectives. Also, Regression Analyses (multiple) were used for testing the hypotheses generated in this study as it is one of the best statistical tools used for testing effect/relationships. Statistical Package for Social Sciences (SPSS) was used. Regression Analyses (multiple) equation is given: as $Y= a + b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5+e$

Model Specification

Portlogistics (PL)=X + Blue Economy Performance (BEP)=Y

Port administration (PA) =x_1 Shipping Trade (ST)= y_1

Port Operation (PO) =x_2 Marine Food Production (MFP)=y_2

Procurement (P) =x_3 Job Creation (JC)= y_3

Warehousing (W) =x_4 Marine Energy Production (MEP)=y_4

Intermodal Transport(IT) =x_5

Where =(X_1, X_2, X_3, X_4, X_5) =(Y_1, Y_2, Y_3, Y_4)

Therefore ;

$Y1 = bo + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + e$…….(i) for testing H_1, H_2, H_3, H_4, H_5

$St = f$ (PA, PO, P, W, IT)

Where:

ST = Shipping Trade, PA= Port Administration, PO= Port Operation, P= Procurement, W= Warehousing, IT= Intermodal Transportation.

$Y_2 = bo + b_6x_6 + b_7x_7 + b_8x_8 + b_9x_9 + b_{10}x_{10} + e$……(ii) for testing $H_6, H_7, H_8, H_9, H_{10}$

MFP = f (PA, PO, P, W, IT)

Where:

MFP = Marine Food Production, PA= Port Administration, PO= Port Operation, P= Procurement, W= Warehousing, IT= Intermodal Transportation.

$Y_3 = bo + b_{11}x_{11} + b_{12}x_{12} + b_{13}x_{13} + b_{14}x_{14} + b_{15}x_{15} + e$…(iii) for testing $H_{11}, H_{12}, H_{13}, H_{14}, H_{15}$

JC = f (PA, PO, P, W, IT)

Where:

JC = Job Creation, PA= Port Administration, PO= Port Operation, P= Procurement, W= Warehousing, IT= Intermodal Transportation.

$Y_4 = bo + b_{16}x_{16} + b_{17}x_{17} + b_{18}x_{18} + b_{19}x_{19} + b_{20}x_{20} + e$……(iv) for testing $H_{16}, H_{17}, H_{18}, H_{19}, H_{20}$

MEP = f (PA, PO, P, W, IT)

Where:

MEP = Marine Energy Production, PA= Port Administration, PO= Port Operation, P= Procurement, W= Warehousing, IT= Intermodal Transportation.

$ST = ß_0 + ß_1 PA + ß_2 PO + ß_3 P_t + ß_4 W + ß_5 IT + B_6TA +$

$$\beta_1 PA * TA + \beta_2 POt * TA_t + \beta_3 Pt * TA + \beta_4 W * TA + \beta_5 ITt * TA_t + \varepsilon_t ------5$$

Where:

TA = technology adoption, PA= Port Administration, PO= Port Operation, P= Procurement, W= Warehousing, IT= Intermodal Transportation. ST = Shipping Trade, MFP = Marine Food Production, JC = Job Creation, MEP = Marine Energy Production

e = Stochastic error term

a_0 = Constants that are estimated which are not explained by the independentvariable. a_1= is the estimate of the regression coefficients.

RESULTS

Port Administration as a predictor variable of Port logistics

Table 4 gives the detailed analysis on how port administration as a predictor variable of port logistics has been examined to determine its effect on blue economy performance in the maritime industry in Nigeria and to show its descriptive statistical outcome based on the questions deposed.

port logistics and blue economy performance in the maritime industry in Nigeria

Table 4: Port Administration as a predictor variable of Port logistics.

	QUESTION ITEMS ON PORT ADMINISTRATION	MEAN	Standard Deviation
1	To what extent does your vessel inspection improve safety and security and affect blue economy performance?	3.8496	1.0480
2	To what extent do port communication enhance shipping trade activities?	3.7744	0.91797
3	To what extent does efficient administration such as documentation influence business activities in port?	3.9474	1.0023
4	To what extent do booking and recording in port improve logistic activities and enhances performance?	3.8271	1.0262

Source: Survey Data, 2026, and IBM SPSS Statistics 25 Window Output

Table 4 shows that four question items represent a dimension in the 5-point scale. The data revealed that with the mean and standard deviation scores of 3.9474±1.0023, the respondents agreed that to a large extent vessel inspection improve safety and security and affect blue economy performance. This is followed by the mean and standard deviation scores of 3.8496±1.0480, implying that to a large extent, port communication enhances shipping trade activities. With the mean and standard deviation scores of 3.7744±0.91797 the respondents indicated that to a large extent efficient administration such as documentation influence business activities in port. The data also revealed that to a large extent booking and recording in port improve logistic activities and enhances performance; the mean and standard deviation scores of 3.8271±1.0262 confirm statistically the respondents' agreement that booking and recording in port improve logistic activities and enhances performance.

Port operation as a predictor variable of Port logistics

Table 5 shows the descriptive statistical results on the effect of port operation as a predictor variable of port logistics on blue economy performance in the maritime industry in Nigeria. The outcomes from the four question items on the 4-point-scale show a distribution

indicating that Port operation is a veritable platform for port logistics and it leads to blue economy performance in the maritime industry in Nigeria.

Table 5: Port operation as a predictor variable of Port logistics.

	QUESTION ITEMS	MEAN	Standard Deviation
1	To what extent does cargo and material handling activities vital elements of port logistics?	3.7895	1.13520
2	To what extent does your efficient loading of transport units improve port logistics productivity?	3.4962	1.14564
3	To what extent mooring reduce congestion and improve cargo flow in port and within the logistic system?	3.3008	1.36507
4	To what extent does your berthing of vessels influence vessel turnaround time and improve port business and economic activities within and outside the port?	3.6015	1.16085
		3.4762	1.14567

Source: Survey Data, 2026, and IBM SPSS Statistics 25 Window Output

Table 5 shows that the mean and standard deviation scores of 3.7895±1.13520 as indicated by the respondents implying that to a large extent cargo and material handling activities vital elements of port logistics. Also, the mean and standard deviation scores of 3.6015±1.16085 imply that the respondents were favorable to the large extent option that efficient loading of transport units improve port logistics productivity. The data revealed that the mean and standard deviation scores of 3.4962±1.14564 as indicated by the respondents confirm moderately that mooring reduce congestion and improve cargo flow in port and within the logistic system. The mean and standard deviation scores of 3.4211±1.23221 depict moderate agreement by the respondents regarding the extent to which berthing of vessels influence vessel turnaround time and improve port business and economic activities within and outside the port.

Procurement(P) as a predictor variable of Port Logistics

Table 6 shows the descriptive statistical results on the effect of procurement as a predictor variable of port logistics on blue economy performance in the maritime industry in Nigeria. The outcomes from the four question items on the 4-point-scale show a distribution indicating that procurement is a genuine platform for port logistics and it leads to blue economy performance in the maritime industry in Nigeria.

Table 6: Descriptive Statistics of Procurement as a predictor variable of Port logistics.

	QUESTION ITEMS	Mean	Std. Deviation
1	To what extent is acquiring resources for operation vital for blue economic activities?	4.75	.538
2	To what extent is buying of handling equipment in port in ports beneficial for easy, fast and safe operation?	4.57	.689
3	To what extent does leasing of some water crafts and marine offshore operational platform enhance logistics and improve blue economy performance?	3.97	1.107
4	To what extent does hiring of vessel and other marine craft improve logistics operation and enhance blue economy business activities?	4.37	.809

Survey Data, 2026

Table 6 shows results of a descriptive analysis on the acquiring resources for operation vital for blue economic activities, using sum, mean, standard deviation and variance. As shown in the Table, question 1 which sought to ascertain the extent to which seaports in Nigeria 'buying of handling equipment in port in ports beneficial for easy, fast and safe operation?' has the highest sum - which is 299, and hence the highest mean score of 4.75. This result indicates that among the four questions posed, respondents revealed that this is the aspect in which technology is predominantly applied. However, question 3 has the highest standard deviation and variance of 1.107 and 1.225 respectively. This means that, question 3 has the most data variations.

Warehousing as a predictor variable of Port logistics

In order to ascertain the extent to which warehousing as a predictor variable or component of port logistics affects blue economy performance in the maritime industry in Nigeria, the study used 4 question items on the 5-point scale as shown in Table 7:

Table 7: Warehousing as a predictor variable of Port logistics.

	QUESTION ITEMS	MEAN	Standard Deviation
1	To what extent does storage of goods in the warehouse vital in the logistics and supply chain system in the maritime industry?	3.5188	1.16516
2	To what extent do storage of goods in the warehouse vital in the logistics and supply chain system in the maritime industry?	3.3910	1.34747
3	To what extent do efficient packaging of cargoes in the warehouse enhance, safety, improve handling and make delivery easy?	3.6992	1.10086
4	To what extent do your warehousing engender changes in custom and vendor compliance issues with greater emphasis on	3.7820	1.06641

	supply chain visibility and customer satisfaction in ports especially as distribution centres?		
		3.3610	1.34745

Source: Survey Data, 2026, and IBM SPSS Statistics 25 Window Output

As shown in Table 7 above, the responses of the respondents have indicated the mean and standard deviation scores of 3.7820±1.06641, showing that the respondents collectively agreed that to a large extent storage of goods in the warehouse vital in the logistics and supply chain system in the maritime industry. Also, with the mean and standard deviation scores of 3.6992±1.10086 it is quite obvious that the respondents indicated on the aggregate that to large extent storage of goods in the warehouse vital in the logistics and supply chain system in the maritime industry. As to the extent to which efficient packaging of cargoes in the warehouse enhance, safety, improve handling and make delivery easy 3.6316±1.06936 indicate aggregately that efficient packaging of cargoes in the warehouse enhance, safety, improve handling and make delivery easy. The data additionally revealed that to large extent warehousing engender changes in custom and vendor compliance issues with greater emphasis on supply chain visibility and customer satisfaction in ports especially as distribution centres; this is shown by mean and standard deviation scores of 3.5188±1.16516.

Intermodal Transport (IT) as a Dimension of Port Logistics

Intermodal transport as a measure of sustainable maritime operations in Nigeria was examined and empirically expressed in Table 8

Table 8: Intermodal transport as a Dimension of Port logistics.

	QUESTION ITEMS	MEAN	Standard Deviation
1	To what extent does your intermodal transport which is the flow of transport activities between two or more transportation modes to complete a voyage improve business profitability?	3.5489	1.13128
2	To what extent is marine transportation a very cardinal to logistics and supply chain systems and also blue economy development in the maritime industry?	3.6692	1.22302
3	To what extent are your hinterland and water world link created by intermodal transport vital for port logistics and beneficial to global trade and economic performance?	3.5639	1.04703
4	To what extent does your intermodal terminal and transshipment hubs promote logistics and trade?	3.8120	1.00866

Source: Survey Data, 2026 and IBM SPSS Statistics 25 Window Output

Table 8 shows that the respondents through their responses aggregated on the mean and standard deviation scores of 4.0752±0.90975 proving that to a large extent, intermodal transport which is the flow of transport activities between two or more transportation modes to complete a voyage improve business profitability. Also, the mean and standard deviation scores of 3.8120±1.00866 indicate that to a large extent marine transportation is very cardinal to logistics and supply chain systems and also blue economy development in the maritime industry. The mean and standard deviation scores of 3.6692±1.22302 indicate the respondents' agreement that to a large extent hinterland and water world link created by intermodal transport is vital for port logistics and beneficial to global trade and economic performance. The mean and standard deviation scores of 3.5639±1.04703 indicate that to a large extent intermodal terminal and transshipment hubs promote logistics and trade.

Shipping trade as a Measure of Blue economy performance in the maritime industry in Nigeria

Table 9 shows the descriptive statistical results on shipping trade which is measured with five question items on the 5-point scale. The response distribution as shown by the results is indicative that shipping trade will enhance blue economy performance in the maritime industry in Nigeria.

Table 9: Shipping Trade as a Measure of Blue economy performance in the maritime industry in Nigeria.

	QUESTION ITEMS	MEAN	Standard Deviation
1	To what extent does Shipping trade which implies global trade and movement of traded cargo globally influence port logistics, and global supply chain?	3.7744	1.01217
2	To what extent shipping trade improve coastal trade and transportation?	3.9624	1.85213
3	To what extent does your production and sales of oil and gas products improve blue economy performance in the Nigerian maritime industry?	3.8195	1.16666
4	To what extent do reduced importation increase National GDP bring about favourable balance of trade	3.9098	0.90837

Source: Survey Data, 2026, and IBM SPSS Statistics 25 Window Output

Table 8 shows the mean and standard deviation scores of 3.9624±1.85213 indicating that the consensus opinion of the respondent is that to a large extent Shipping trade which implies global trade and movement of traded cargo globally influence port logistics, and global

supply chain. Also, the mean and standard deviation scores of 3.9098±0.90837 imply that to a large extent shipping trade improve coastal trade and transportation. The statistical result of 3.8195±1.16666 (mean and standard deviation scores) show that to a large extent production and sales of oil and gas products improve blue economy performance in the Nigerian maritime industry. Table 8 also reveals the mean and standard deviation scores of 3.7744±1.01217 implying that the respondents agreed that to a large extent reduced importation increase National GDP bring about favourable balance of trade.

Food production (Marine) as a Measure of Blue economy performance in the maritime industry in Nigeria

Table 10 shows how food production (Marine) as a measure of blue economy performance in the maritime industry in Nigeria was examined and empirically expressed through the raising descriptive statistical analysis of 4 question items.

Table 10: Food production (Marine) as a Measure of Blue economy performance in the maritime industry in Nigeria.

	QUESTION ITEMS	MEAN	Standard Deviation
1	To what extent is your marine food production a proof of blue economy performance?	3.7519	1.06689
2	To what extent is your marine environment produces over 60% of the world food production?	3.7744	1.04166
3	To what extent is fishing and aquaculture are the most important food production sources for individual, business and economic performance?	3.8496	0.93336
4	To what extent do desalination process produce salt and water for consumption, impacts on human, business and blue economy performance?	3.9323	1.05310

Source: Survey Data, 2026, and IBM SPSS Statistics 25 Window Output

As shown in Table 10 above, the responses of the respondents have indicated the mean and standard deviation scores of 3.9323±1.05310 showing that to large extent marine food production is a proof of blue economy performance. Also, the mean and standard deviation scores of 3.8496±0.93336 imply that to a large extent marine environment produces over 60% of the world food production. With the mean and standard deviation scores of 3.7744±1.04166, the respondents have indicated that to a large extent fishing and aquaculture are the most important food production sources for individual, business and economic performance. Table 10 shows the mean and standard deviation scores of 3.7519±1.06689

proving that the respondents indicated that to a large extent desalination process produces salt and water for consumption, impacts on human, business and blue economy performance.

Energy production as a Measure of Blue economy performance in the maritime industry in Nigeria

Energy production as a measure of blue economy performance in the maritime industry in Nigeria was examined and empirically expressed in table 11:

Table 11: Energy production as a Measure of Blue economy performance in the maritime industry in Nigeria.

	QUESTION ITEMS	MEAN	Standard Deviation
1	To what extent does your renewable energy sources for green logistics agenda are relevant to the world maritime industry and blue economy performance?	3.5489	1.13128
2	To what extent are maritime renewable and nonrenewable energy currently the major source of global energy production?	3.6692	1.22302
3	To what extent does your Development of marine wind energy production (wind farm) improve energy production for port logistic and enhance business or global blue economy performance?	3.5639	1.04703
4	To what extent does your hydropower electronic automobile transport facilities and equipment promote eco-friendly environment, safety, easy operation?	3.8120	1.00866
5		3.6341	1.22745

Source: Survey Data, 2026, and IBM SPSS Statistics 25 Window Output

Table 11 shows that the respondents through their responses aggregated on the mean and standard deviation scores of 4.0752±0.90975 proving that to a large extent, renewable energy sources for green logistics agenda are relevant to the world maritime industry and blue economy performance. Also, the mean and standard deviation scores of 3.8120±1.00866 indicate that to a large extent maritime renewable and nonrenewable energy are currently the major source of global energy production. The mean and standard deviation scores of 3.6692±1.22302 indicate the respondents' agreement that to a large extent development of marine wind energy production (wind farm) improve energy production for port logistic and enhance business or global blue economy performance. The mean and standard deviation scores of 3.5639±1.04703 indicate that to a large extent hydropower electronic automobile transport facilities and equipment promote eco-friendly environment, safety, easy operation.

Job/Employment Creation as a Measure of Blue economy performance in the maritime industry in Nigeria

Table 12 shows how job/employment creation as a measure of blue economy performance in the maritime industry in Nigeria was examined and empirically expressed through the raising descriptive statistical analysis of 4 question items.

Table 12: Job/Employment Creation as a Measure of Blue economy performance in the maritime industry in Nigeria

	QUESTION ITEMS	MEAN	Standard Deviation
1	To what extent is your job creation and employment enhancing economy development?	3.7519	1.06689
2	To what extent is your Blue economy provides over 30 million jobs and supplies a vital source of protein to over 3 billion people?	3.7744	1.04166
3	To what extent is desalination development creating self-employment and boast economy. ?	3.8496	0.93336
4	To what extent do maritime offshore operation create considerable amount of jobs for the youth and reduces youth restiveness?	3.9323	1.05310
5		3.7467	1.04134

Source: Survey Data, 2026, and IBM SPSS Statistics 25 Window Output

As shown in Table 12 above, the responses of the respondents have indicated the mean and standard deviation scores of 3.9323±1.05310 showing that to large extent job creation and employment enhance economy development Also, the mean and standard deviation scores of 3.8496±0.93336 imply that to a large extent blue economy provides over 30 million jobs and supplies a vital source of protein to over 3 billion people. With the mean and standard deviation scores of 3.7744±1.04166, the respondents have indicated that to a large extent desalination development create self-employment and boast economy. Table 12 shows the mean and standard deviation scores of 3.7519±1.06689 proving that the respondents indicated that to a large extent maritime offshore operation create considerable number of jobs for the youth and reduces youth restiveness.

Technology adoption as a Moderator of Port logistics and Blue economy performance in the maritime industry

The study has considered the likely role of a moderating element in a port logistics environment; therefore, it examined the moderating effect of technology adoption on port logistics and blue economy performance in the maritime industry in Nigeria. Technology adoption has been measured in this study with 4 question items as shown in Table 13:

Table 13: Technology adoption a Moderator of Port logistics and Blue economy performance in the maritime industry in Nigeria.

	QUESTION ITEMS	MEAN	Standard Deviation
1	To what extent do technology adoption in the maritime industry or blue economy operation makes operations better more efficient and safer?	3.7444	1.15898
2	To what extent has big data and analytics help logistic firms reduce cost and improve safety in operation. Also, robotics and automation have the potential to alleviate humans from monotonous, hazardous, physically demanding or heavy works?	3.8496	0.97309
3	To what extent does your Block chain technology when properly used can enhance transparency, visibility, security and efficiency across different domains such as supply management vessel registration and cargo tracking?	3.4962	1.11208
4	To what extent do autonomous ship have the capacity to disrupt the blue economy and help countries leapfrog and scale impact when adopted effectively?	3.7669	1.03636
5		3.8472	0.97311

Source: Survey Data, 2026, and IBM SPSS Statistics 25 Window Output

As revealed in Table 13 above the respondents agreed that to a large extent technology adoption in the maritime industry or blue economy operation makes operations better more efficient and safer; this is evidenced by the mean and standard deviation scores of 3.8496±0.97309. The data show that to large extent big data and analytics help logistic firms reduce cost and improve safety in operation. Also, robotics and automation have the potential to alleviate humans from monotonous, hazardous, physically demanding or heavy works as the respondents' mean and standard deviation scores of 3.7669±1.03636 have indicated. Regarding the issue of Block chain technology when properly used can enhance transparency, visibility, security and efficiency across different domains such as supply management vessel registration and cargo tracking, the mean and standard deviation scores of 3.7444±1.15898 on this, prove that to a large extent the respondents are of the opinion that Block chain technology when properly used can enhance transparency, visibility, security and efficiency across different domains such as supply management vessel registration and cargo tracking. The analysis also reveals that to a large extent autonomous ship has the capacity to

disrupt the blue economy and help countries leapfrog and scale impact when adopted effectively as the mean and standard deviation scores of 3.6165±1.13299 have indicated.

Model: $ST = ß_0 + ß_1 PA + ß_2 PO + ß_3 P_t + ß_4 W + ß_5 IT + B_1TA + \beta_1 PA * TA + \beta_2 POt * TA_t + \beta_3 Pt * TA + \beta_4 W * TA + \beta_5 ITt * TA_t + \varepsilon_t ------5$

{for testing Ho} For Objective, Research Question and Hypothesis (Ho)}

The next step is to look at the effect of technology adoption on port logistics and blue economy performance in the maritime industry in Nigeria. To do that the study formulated this hypothesis – Ho_5: Technology adoption has no significant effect on port logistics and blue economy performance in the maritime industry in Nigeria. The Process Regression-Model regression which is used to generate incremental validity evidence in psychometrics and moderation effect has been used to test hypothesis 5 as shown in matrix procedure and Table 4.19 and 4.20:

Table 14: Result of the Regression Output of the Effect of Technology adoption on Port logistics and Blue economy performance in the maritime industry in Nigeria (Process Regression-Model Summary).Model Summary[c]

Model 5	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Statistics	df1	df2	Sig. F Change	
1	0.819[a]	0.661	0.669	0.20866	0.661	266.394	1	131	0.000	
2	0.827[b]	0.664	0.669	0.20547	0.012	5.106	1	130	0.026	1.626

a. Predictors: (Constant), Technology adoption

b. Predictors: (Constant), Technology adoption, Port operation

c. Dependent Variable: Blue economy performance in the maritime industry in Nigeria

Source: Research Data 2026, and IBM SPSS Statistics 25 Window Output

Table 1t, shows the model depicting the moderating effect of technology adoption on port logistics and blue economy performance in the maritime industry in Nigeria through the use of Process Regression-Model) multiple regression. The output on Process Regression-Model) regression model summary shows that the multiple correlation coefficient R of 0.819 and the coefficient determination R^2 of 0.661 revealed the fitness of the model to test the significant effect of the variables. The R^2 of 0.661 confirms that 66.10% of the sample variation in blue economy performance in the maritime industry in Nigeria is explained by technology adoption in the model. The F- statistic or F-change value is found to be 266.394 indicating

that the F value is significant at the 5 percent level. The overall fit of the regression model measured by the F- statistic, is statistically significant at this level. The Durbin Watson (DW) statistic of 1.626 indicates that there is no problem of serial correlation or autocorrelation in the regression model.

Table 15: Result of the Regression Output of the Effect of Technology adoption On Port logistics and Blue economy performance in the maritime industry in Nigeria.

(Process Regression-Model)- Coefficients)

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.315	0.104		22.235	0.000
	Shipping Trade	0.472	0.029	0.819	16.352	0.000
2	(Constant)	2.215	0.112		19.827	0.000
	Technology adoption	0.353	0.060	0.613	5.904	0.000
	Port Administration	0.148	0.066	0.235	2.260	0.026
1. Dependent Variables: Blue economy performance in the maritime industry in Nigeria						
Source: Research Data 2026, and IBM SPSS Statistics 25 Window Output						

The Process Regression-Model) regression in Table 15 reveals that at the first level of operation the t-value of technology adoption was found to be 16.35 indicating significant effect on port logistics. Also, at the second order level of the regression the t-value of technology adoption was found to be 5.90 indicating significant effect on blue economy performance in the maritime industry in Nigeria. Using the Process Regression-Model) regression procedure, the study found that technology adoption is moderating the effect of port logistics on blue economy performance in the maritime industry in Nigeria.

Technology adoption has a significant effect on port logistics and blue economy performance in the maritime industry in Nigeria	16.35; 5.90	0.000	Reject
Source: Research Data 2026, and IBM SPSS Statistics 25 Window Output			

Moderating Effect of Technology Adoption on Port Logistics and Blue Economy Performance in The Maritime Industry in Nigeria

Technology adoption is the moderating variable in this study and was found to be positively and significantly influential. The findings revealed that technology adoption positively and significantly influenced port logistics and blue economy performance in the maritime industry in Nigeria of seaports in Nigeria. The study found that the Process Regression-

Model) regression analysis revealed the effect of technology adoption on port logistics to be significant with a t-value of 16.35 and the effect of technology adoption on blue economy performance in the maritime industry in Nigeria equally significant with a t-value of 5.90. These values indicate positive and significant control in moderating the influence of technology adoption on the effect of port logistics on blue economy performance in the maritime industry in Nigeria. This is expressed with strong positive and statistically significant. At the Process Regression-Model) regression order levels, a strong positive control for moderating the effect of technology adoption on port logistics and blue economy performance in the maritime industry in Nigeria was found. The study concludes that: technology adoption significantly moderates the effect of port logistics on blue economy performance in the maritime industry in Nigeria (Okpara & Enyioko, 2022).

The study found that cultivating interpersonal confidence is a key instrument to online/port logistics and building technology adoption is much more difficult than other issues . Technology adoption is significantly related to the extent of interunit resource exchange (Li & Zhang, 2019). Ghosh and Thomas (2018) found that technology adoption has a downstream effect on members' intentions to both give information and get information through the virtual community. Emrouznejad and Yang (2018) opine that high levels of inflammatory remarks were associated with slow technology adoption development in computer mediated businesses. In their own study, Garcia et al. (2019) found that positive interaction and port logistics among friends can motivate a sustainable growth of technology adoption. Interpersonal technology adoption (including both affect based and cognition-based technology adoption) has positive influence on complex knowledge sharing.

Also, Levinson (2019) argue that students' usage of a specific intermodal transport could be attributed to competence-based port Administration, intermodal transport and the technology adoption in maritime logistics development. For Lambert and Cooper (2020) maritime logistics digitalization, and technology adoption have positive effects on the quality and the quantity, of 38igitalization performance. Kshetri (2018) found that users' technology adoption in the ability of using port operation increase their willingness to achieve effective performance. Koberstein et al. (2021) observe that people's interpersonal technology adoption and online information sharing performance differ from different cultural perspectives. Kaplan and Norton (2019) argue that maritime logistics-based technology adoption in a team, positively relates to the degree of knowledge digitalization intensity in the

team. Technology adoption positively influences seaports that drive innovation, productivity, and competitive advantage (Kamble & Gunasekaran, 2021). So once customers have built faith in maritime logistics digitalization the maritime logistics operators that they are going to interact with, they will highly possibly have better experience with less worries or concerns being involved. All the above highlighted studies confirm the finding of this study conclusively that technology adoption has positive and significant effect on port logistics and blue economy performance in the maritime industry in Nigeria.

Moderating effect indicates the extent to which higher technology adoption changes (usually strengthens) the effect that better port logistics has on blue economy performance. For example, even with good warehousing and intermodal transport, if technology adoption is low, outcomes may be weak; but when tech adoption is high, the same improvements in logistics can produce more or better blue economy gains (Ikegwuru & Gabriel, 2022).

So, technology adoption is a moderator (interaction term) that scales up the impact of port logistics quality (efficient operations, administration, procurement, warehousing, intermodal transport) on blue economy performance metrics (e.g. maritime GDP share, trade volume, employment, environmental compliance etc.). Technology adoption plays a *critical moderating role* between improvements in port logistics and blue economy performance. With higher technology adoption, improvements in logistics (better operations, warehousing, intermodal transport etc.) lead to disproportionately greater improvements in performance (trade, GDP, sustainable use, safety, jobs etc.). But Nigeria faces several hurdles: infrastructure, regulation, skills, investment. For maximum effect, envoys of policy, financing, capacity, stakeholder buy-in must accompany tech adoption.

CONCLUSION

Based on the findings of the study, the following conclusions have been made:

1. Port administration, port operation and Intermodal transport have positive and significant effect on shipping trade, while procurement, and warehousing have insignificant effect on shipping trade
2. Port administration, port operation, procurement warehousing and intermodal transport have insignificant effect on food production
3. Port administration, port operation, procurement and warehousing have insignificant effect on energy production, while intermodal transport has positive and significant effect on energy production

4. Port administration, port operation, procurement, warehousing and intermodal transport have positive and insignificant effect on job/employment creation
5. Technology adoption has a significant effect on port logistics and blue economy performance in the maritime industry in Nigeria

RECOMMENDATIONS

This study empirically examined the moderating effect of technology adoption on port logistics and blue economy performance in the maritime industry in Nigeria. Based on the findings, the conclusion and implications of the study, the following recommendations have been made:

1. Port logistics is a recent phenomenon; it has proven to be very effective and efficient tool and should be viewed as a major actor in handling shipping trade. Seaport managers should use port Administration, warehousing, port operation and intermodal transport to their advantage by encouraging seaport staff to use in port logistics for the improvement of shipping trade to enhance the blue economy performance in the maritime industry in Nigeria.
2. Por Managers should set up proactive and workable port logistics platforms by adopting effective port Administration, warehousing, port operation and intermodal transport in order to maintain food production (Marine) optimization for optimum blue economy performance in the maritime industry in Nigeria.
3. Seaports should update their knowledge with respect to port logistics by adopting very operative port Administration, warehousing, port operation and intermodal transport and the opportunities provided by digital measurement solutions so as to be able to sustain energy production in all port operations in order to achieve efficient port performance in Nigeria.
4. Governments, ports and maritime industry stakeholders should promote intermodal transport links - rail, inland waterways, efficient road networks to distribute cargo quickly with hubs / dry ports to reduce congestion and distribute jobs more broadly. They should also, encourage the development of bonded warehouses, cold chain storage, value-added services. Encourage logistics parks near ports to cluster warehousing + distribution, resulting in more jobs
5. Port Managers and maritime sector stakeholders should ensure that technology adoption which enhances the adoption of effective port Administration, warehousing, port

operation and intermodal transport are made to support port logistics to achieve the best performance outcome in Nigerian ports.

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