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INFLUENCE OF DEMAND FORECASTING ON SUSTAINABILITY OF SEAPORTS IN NIGERIA

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ABSTRACT

This study examined the relationship between demand forecasting and sustainability of ports in Nigeria. The predictor variable (demand forecasting) was the independent variable. While the criterion variable or the dependent variable (sustainability of ports) was measured with economic orientation, social orientation and environmental orientation. The study was anchored on stakeholder's theory and resource dependence theory. Cross-sectional/survey design was used for the study. Data were obtained by using primary and secondary sources and a structured survey questionnaire was used as the research instrument to elicit data from the respondents. The population of the study consisted of all the 6 ports in Nigeria. The sample elements of the study consisted of 40 managerial staff from each of the 6 ports and that resulted in 240 respondents and 218 copies of questionnaire were retrieved from the respondents. After editing the retrieved copies of questionnaire, 211 of them (representing 87.92%) were found useful and valid for the study analysis. The study used descriptive and inferential statistical tools to analyse the data. Specifically, Pearson Products Moment Correlation Coefficient (r) was used to test the hypotheses with the aid of SPSS 25.0. The reliability of the research instrument was tested using the Cronbach Alpha. The study found that demand forecasting makes a credible outcome that influences the current contributions of economic orientation, societal orientation and environmental orientation in the port. The study concluded that: Demand forecasting significantly relates with economic orientation (r =0.801), social orientation (r = 0.725) and environmental orientation (r = 0.708). This study, therefore, recommended that Ports should design and evolve effective demanding forecasting strategies and policies, then implement and monitor them in collaboration with major strategic port operators for port sustainability initiatives and that ports in Nigeria should adapt digital demand forecasting in various forms so that their maritime logistics activities could be effectively and efficiently operated for sustainability of the ports in Nigeria.

Keywords: Demand Forecasting, Sustainability Of Ports, Economic Orientation, Social Orientation, Environmental Orientation.

I. INTRODUCTION

The necessity and prospects of a rapidly growing world population can only be met by the traversing of raw materials and finished goods through transportation arising from accurate demand forecasting, as ocean means of transport has always been connected by trade. Due to the geographical extension and dispersion of production places, global transportation modes are getting more attraction in the last decade (Özer et al., 2020).

Ports play a central role in countries' economic social orientation: they are essential to the wellbeing of humankind including the provision of direct and indirect employment (Nze et al., 2020). Ports act as a social caretaker for employees and communities, enhancing and supporting socioeconomic priorities. On the other hand, ports are inevitable nodes in maritime supply chains (Notteboom et al., 2020).

However, considering the magnitude of port activities, ports as nodes in the global supply chains always generate social and environmental externalities vis – a - vis economic social orientation (Notteboom & Lam, 2018). In general, ports generate environmental impacts through their various functions linked to cargo handling, connectivity to maritime and land transport networks, industrial and semi-industrial activities, logistics and distribution activities, and energy production and distribution (Notteboom et al. 2020). Ports' impacts extend to oceans and seas and worsen marine ecosystems even though oceans are pivotal to global and national economies by providing food, jobs and recreational activities (Okpara & Okpara, 2022).

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Sustainability issues in the field of shipping, port and maritime logistics, commonly known as the maritime transport and logistics industry, have historically received less stakeholder attention as compared to aviation and overland freight sectors. Other research stated that enhancing port sustainability from 25% to 75% may reduce transportation costs by 12% and boost bilateral trade by 25% (Song & Mi, 2016).

Maritime logistics encapsulates the entirety of activities which involve logistics flows (i.e., all the relevant activities of the flow of goods from the origin to ultimate destination, including demand forecasting, transportation, warehousing, purchasing, distribution, etc.) in two or more nations across the globe (Okpara & Enyioko, 2022; UNCTAD, 2022).

Lack of adequate information also, affects significant decision -making for planning, demand forecasting, warehousing and transportation in sustainable port investments (Okpara & Okpara, 2022). The challenges of integrated decision-making information on port sustainability activities affect the inputs of maritime logistics in Nigeria. There is a developing unanimity to fulfill the sustainability objectives inside seaports based on the triple bottom line (TBL). Nigerian ports' operations also have not been aligned to such specific sustainability framework including economic, social and environmental sustainability. Lack of implementation of sustainable social orientation-led port policies is an identical problem of the maritime sector in Nigeria (Okpara, 2020).. Despite a few attempts, there is limited knowledge on the scope and scale of demand forecasting and port sustainability literature across the wider maritime industry, including shipping, port, and maritime logistics businesses. Furthermore, there is a lack of understanding on what demand forecasting means for and sustainability of ports studies, with inconsistencies and conflicting views on the use of various concepts, models and measurements. Identification of key words and clusters based on a similarity/dissimilarity background would help formalize a framework to reflect the meaning, scope and application of the concept of demand forecasting and port sustainability in the maritime studies. This paper intends to establish the nature of relationship between maritime demand forecasting and port sustainability indicators in Nigeria.

Objectives of the Study

The main purpose of this study was to examine the relationship between demand forecasting and sustainability of seaports in Nigeria. Therefore, the following specific objectives were addressed in the proposed study: i. To evaluate how demand forecasting relates to economic orientation of seaports in Nigeria. ii. To ascertain how demand forecasting relate to social orientation of seaports in Nigeria. iii. To find out the nature of relationship between demand forecasting and environmental orientation of seaports in Nigeria.

Research Questions

The following research questions were raised based on the objectives of the study:

1. To what does demand forecasting relate to economic orientation of seaports in Nigeria?
2. To what extent does demand forecasting relate to social orientation of seaports in Nigeria?
3. To what extent does demand forecasting relate to environmental orientation of seaports in Nigeria?

Research Hypotheses

The following research hypotheses were tested in the proposed study:

Ho_1: There is no significant relationship between demand forecasting and economic orientation of seaports in Nigeria.

Ho_2: There is no significant relationship between demand forecasting and societal orientation of seaports in Nigeria.

Ho_3: There is no significant relationship between demand forecasting and environmental orientation of seaports in Nigeria.

II. LITERATURE REVIEW

Theoretical Foundation

This study was backed up with the theories as Social Exchange theory (SET) and Planed Behaviour Theory have been examined here:

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Social exchange theory (SET)

Social exchange theory (SET) was conceptualized by Blau (1964) as a relationship based on trust and unspecified obligation. It constitutes a long-term and open-ended transaction characterized by mutual commitment and socio-emotional investments (Buta, 2016). While economic exchange is based on a formal contract that stipulates the exact quantities to be exchanged, social exchange entails unspecified obligations (Blau, 1964). Like economic exchange, social exchange generates an expectation of some future return for contributions; however, unlike economic exchange, the exact nature of that return is unspecified. Thus, in contrast to economic exchange, where trust is not essential and obligations are specified and contractual, social exchange tends to engender feelings of personal obligation, gratitude, and trust (Blau, 1964). Social exchange is therefore premised on a long-term exchange of favors that precludes accounting and is based on a diffused obligation to reciprocate. In contrast, a prototype economic exchange rests on a formal contact that stipulates the exact quantities to be exchanged, and that can be enforced through legal sanctions. Although different views of social exchange have emerged in research, theorists agree that social exchange involves a series of interactions that generate obligations (Clark et al., 2004). These interactions are usually seen as interdependent and contingent on the actions of another person (Blau, 1964), and have the potential to generate high-quality relationships (Baron & Kenny, 1986).

The relevance of social exchange theory is that the study conceptualizes maritime logistics as signaling an organization's intent to form a long-term, mutually beneficial relationship with stakeholders' sustainability. Social exchange theory is applied in this study to show that in a maritime logistics relationship is initiated by an organization investing in the concept of integration which must occur in physical level (intermodal or multimodal), economic/strategic level (vertical integration, maritime transport structure) or organizational level (relationship based, people and process integration between organizations). In terms of perception of support for demand forecasting, and perception of overall justice and transportation), which will ultimately lead stakeholders' sustainability and perceive a social exchange relationship with an organization.

Consistent with social exchange theory, the study examines digital transformation as a moderator of the relationships between maritime logistics practices and the. Demand forecasting and indicators of seaport sustainability also signals the organization's intent to form a mutually binding relationship with its stakeholders' sustainability. Finally, the study shall examine some outcomes of social exchange maritime logistics as represented by demand forecasting with seaport sustainability defined in terms of economic orientation, social orientation, and environmental orientation.

Planed Behaviour Theory

Theory of planed behaviour poses that the adoption or the performance of seaport sustainability practices is correlated with the company's attitude, where attitude is the reflection of the firm'sbeliefs on the outcome of the selection (Yuan et a.l, 2017). The notion firms have towards sustainability is aligned to what academia poses and is reflected around the triple bottom line of people-planet-profit (Antoine, 2008). In this context the people (social orientation) aspect is reflected with the provision of safety, while the planet (environmental orientation) aspect relates to the environmental integrity and resource preservation. Lastly the profit (economic orientation) aspect is an operational derivative under the two previous lenses through a dynamic relationship among them, along with the reciprocal relationships coming from the outer environment of the firm.

The proactive approach that was showed by the seaports, along with the perception that there will be no field for conducting business unless it is secured, preserved and sustainable is aligned with Hong et al. (2011) and Yuan et al. (2017). Authors posed managerial philosophy towards sustainability and the viewpoint of incorporating sustainability into the values, goals, and objectives of the firm as suitable solutions, rather than a must-do trade-off. Examined seaports supported such a statement since they positioned themselves in the center of the responsibility and perceive the conduction of business and operations as an outcome with respect to the first two aspects of the triple bottom line (peopleand planet).

Giovannini and Psaraftis (2019) maintained that the norms an entity is encountering are influenced by the approval or disapproval of specific behaviors by the outer environment. Yuan et al. (2017) extended it to the shipping context by posing stakeholders as the outer environmentthat approved or reject a certain behavior. The position as a central actor showed by seaports, combined with the proactive strategy towards regulation

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compliance and the development of normative behavior when referring to the outer environment contradicts the notion of approval or disapproval. The evaluation of each proposed choice is filtered and as posed in the results, the already developed normative and proactive approach endorses straightforward and real-life applicable solutions. Such a behavior is also supported by the fact that the expansion and further development of the implemented measures is correlated with ensuring actual results in terms of emission reduction and resource preservation. Hence, the market-based mechanisms were not supported and wereinstead disregarded.

Conceptual Review

This study is examined the relationship between demand forecasting and sustainability of seaports in Nigeria. In the study, maritime logistics (independent variable or predictor variable) examined demand forecasting, warehousing and transportation. From the preliminary empirical studies, it is revealed that these dimensions have earlier been adopted by Psaraftis (2021); Okpara and Enyioko (2022); Xie et al. (2021) and UNCTAD (2022).

Also, sustainability of seaports served as the key dependent or criterion variable and measured with economic orientation, societal orientation, and environmental orientation, while the moderating variable was digital transformation. The study adopted part of the sustainable ports classification framework for enhancing port coordination system advocated by Xie et al. (2021). The overbearing desire to use demand forecasting and measures of port sustainability has become evident as revealed by the conceptual framework of the relationship between demand forecasting and measures of port sustainability of ports in Nigeria (Figure 1):

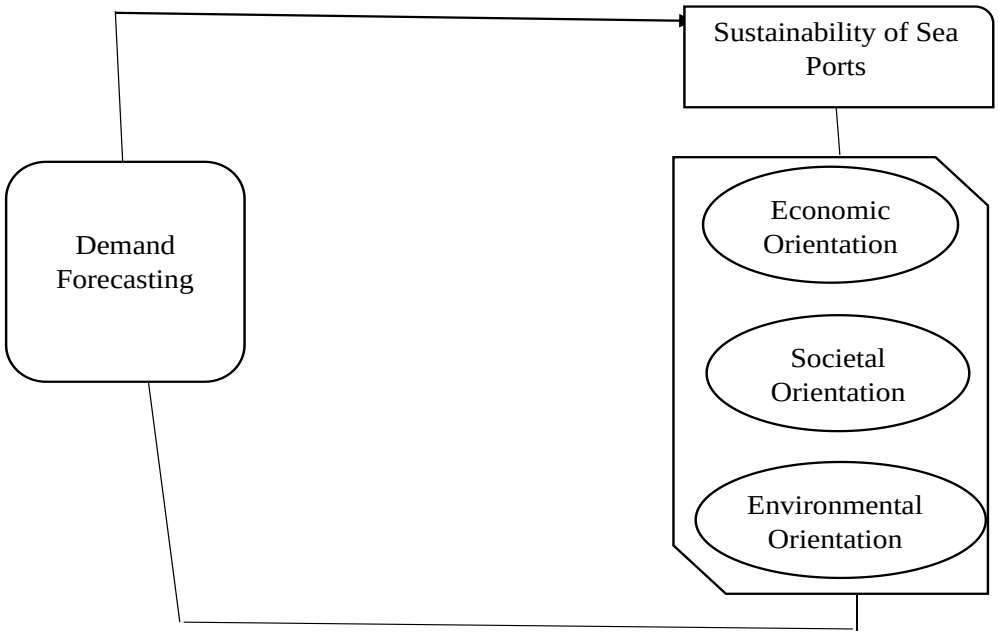

Figure 1: Conceptual Framework of the Relationship between Demand Forecasting Logistics and Sustainability of Ports in Nigeria.

Sources: Researcher (2023); Psaraftis and Kontovas (2021)); Okpara and Enyioko (2022); Xie *et al*. (2021); UNCTAD (2022).

Demand Forecasting

Demand forecasting in logistics refers to predicting future demand for goods, storage, transportation, and services within the supply chain. It involves analyzing historical data about orders, delivery, rates, and customers during different periods, attaching market trends and other periodic factors to make informed projections about future social orientation or decreasing demand (Balan, 2018). In the logistics industry, demand forecasting can be applied at various stages of the supply chain, including the collection, distribution, and delivery of goods. It is essential for logistics managers, as it helps them optimize their operations and make informed decisions about their resources to internal teams and clients (Bueger et al., 2020).

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Haasis and Hapsatou (2022) see demand forecasting as the area of predictive analytics dedicated to understanding consumer demand for goods or services. Many decisional processes, such as capacity planning, inventory management, product development, production and supply chain planning, require forecasting. In recent times, demand has tended to become more variable and uncertain in many services. Managing such uncertain demand has posed significant problems for some industrial sectors including maritime industry.

For Mikelsone and Liela (2016), demand forecasting is of critical essence to the maritime industry, due to the production of crude oil in commercial quantities. Shipping companies will have to forecast accurately in order to make appropriate capacity available to transport the oil. The social orientation of every industry and survival depends on how well it can forecast demand and make the required capacity available in order to fully satisfy demand. The maritime industry is not merely a service rendering sector but also an economic management entity whose efficiency is central to effective national development and thus the difficulties encountered in the implementation of demand forecasting and capacity planning, how little or no importance has been placed on the concept and suggest possible ways of improving the adverse effects in the industry (Kurniawan et al., 2022).

Alamoush et al. (2021) posited that demand forecasting is the demand for products that are expected to be realized for a certain period in the future. Bagoulla and Guillotreau (2020) observed that forecasting the demand for products in the immediate future and over longer time periods is one of the most crucial issues in organizations.

Surugiua and Surugiu (2015) stated that there are two uses of forecasts. One is to help managers plan the system, and the other is to help them plan the use of the system. Kim and Song. (2019) state that uncertainty is a fact of life and, therefore, a good forecast of future demand is necessary if proper planning for future level of production is to be made. In other words, most manufacturers "make to stock" rather than "make to order" – they plan ahead and then deploy inventories of finished goods into field locations.

According to Akbulaev and Bayramli (2020) forecasts never seem to be as accurate as the shipping company would like them to be or need them to be. As a result, the company is tempted to throw money at the problem in hopes of making it go away. Bagoulla and Guillotreau (2020) indicate that there are at least four kinds of reasons why the forecasts are not as accurate as firms would like them to be. They include unsuitable software – software that does not have the necessary capabilities, has mathematical errors, or uses inappropriate methods. It is also possible that the software is perfectly sound but due to untrained or inexperienced forecasters,it is misused.

The second reason is when untrained, unskilled, or inexperienced forecasters exhibit behaviour that affect forecast accuracy. This happens when a forecaster constantly adjusts the forecast based on new information. Yang (2019) suggests that much of this fiddling makes no improvement in forecast accuracy and is simply wasted effort. Zang et al. (2020) insist that forecasting should be a dispassionate and scientific exercise seeking a “best guess” at what is really going to happen in the future. The third reason for forecasting inaccuracy is process contamination by the biases, personal agendas, and ill intentions of forecasting participants. Instead of presenting an unbiased best guess at what is going to happen, the forecast comes to represent what management wants to see happen – no matter what the marketplace is saying.

The basic principles in demand forecasting for container terminals are (Enyinda et al., 2021): Local and transit cargo forecasting must be done separately, the data of cargo hinterland must be used, the forecasting must cover a time horizon and the local hinterland of the port must not be used in transit cargo forecasting. Shipping is a derived demand of the international trade, thus the type of commodities or the number of containers that a country imports and exports will vary from time to time. Therefore, it is essential to frequently update the forecast taking the trends of country’s external trade into consideration. The firm usually considers GDP social orientation rates, previous year actual loading/discharging of containers and calculate the export volume for the following year.

The usefulness of the forecast is gradually declining when the time period is shortened. This is because the shipping line cannot take any precautionary measures to minimize any repercussion arising out of the latest container position (Weerasinghe et al., 2023). Shipping lines usually consider seasonal variations at planning

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stage. They carefully analyse the country's external trade pattern when preparing the annual budget (Akbulaev & Bayramli, 2020).

Accurate demand forecasting is crucial for businesses in the transportation industry, as it allows them to plan for future shipping and capacity needs and optimize their operations. It also helps them identify potential bottlenecks and mitigate disruptions to the supply chain – avoiding urgent switches of carriers, delays, and overpriced rates. Aiello et al. (2020) posit a trucking company can use demand forecasting to predict the number of shipments it will receive from shippers and freight forwarders in the coming months and plan its capacity accordingly. This might involve leasing more trucks, preparing their vehicles for special cargo, or hiring more drivers if the forecast predicts an increase in demand. Without such preparation, this company would have to say no to new business opportunities.

Port sustainability

Ports play a role as crucial connectives within international logistics. Thus, they may become a chokepoint if they are inefficient to support the smooth flow process across borders. This is due to the complex role of a port, especially when it involves the movement of cargoes from land onto the ships or vice versa (Alrukaibi et al., 2020). The ever-changing nature and role of port ownerships has led to the establishment of ports as service centers that coordinate the transport network and introduce many value-added services, particularly in the shipping operations (such as consolidation services, cross-docking operations, and one-stop center for meetings among the stakeholders) (Alamoush et al., 2021). These new and vibrant roles of ports that drive port efficiency may attract more shippers that would, in turn, benefit the port authorities, service providers, customers, and other port stakeholders that may lead to the multiplier effect on the regional economy.

The concept of port sustainability according to Gunawan et al. (2020) includes three main perspectives (or the triple bottom line concept): i) an economic perspective including returns on investment, efficiency of the use of the port area, and provision of facilities for companies to maximize their performance; ii) a social scope such as the direct contribution to employment in port companies and activities connecting to the port (indirect employment, the interaction and relationship between port and city, the contribution to knowledge development and education, and the livability of the area surrounding the port); and iii) an environmental performance and management including noise pollution, air quality, dredging operations, and dredging disposal.

Through corresponding improvements in sustainability, the port can achieve more economic stability and continuous improvements in subsequent performance within the bounds of the environmental regulations (UNCTAD, 2020). All these sustainable motivations and opportunities are encouraging a port so as to adopt a policy of active and advanced environmental and social management (Ferrari et al., 2021). For example, annual sustainability reports published on port websites, suggest guidelines and strategic advice towards port sustainability to address issues related to sustainable port operations and development with economic, social and environmental considerations (Dwarakish & Salim, 2015).

The concept of sustainability in ports necessitates the simultaneous pursuit of economic prosperity, environmental quality and social responsibility (Psaraftis.& Kontovas, 2021). In the shipping and ports industries, with broadened port functions as an economic catalyst for revenue and employment and a central position for industries related to international trade. (Notteboom & Lam, 2018). Economic stability highlighted by the economic crisis and corporate responsibility issues may shed new light on port operations. Moreover, recently, owing to the growing environmental and social concerns regarding potential environmental impacts, "sustainability" has been progressively framed in port operations and development literature (Mudronja et al., 2020; Özer et al., 2020).

Sustainable port development strategies not only address problems in port areas including safe handling of goods or environmental management, but also includes the actual capacity development for the ports and the establishment of related training capacities in the region, aiming to develop a port and the area surrounding the port through a systematic approach working with the ports and addressing their specific needs" (UNCTAD, 2021). Sustainable development themes such as safety, health and environment should already be high on the shipping companies' list of priorities (Weerasinghe & Perera, 2021). However, currently sustainable

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development is mostly supported and dominated by land-based industries (Taghvaee et al., 2016.; Pérez-Rivera & Mes, 2019).

Economic Orientation

Economic orientation measures the economic impact of factors that have the potential to affect the market based on their performance and productivity. It will explain the factors that will lead to a higher increase in economic value. Economic sustainability enhances port economic performance (Park et al., 2019). While port economic orientations maintain port economic orientation, and facilitate trade, it goes without saying that such actions uphold environmental and social sustainability (Lam, 2013). For example, improving efficiency within the port logistics chain decreases CO_2 emissions (Alamoush et al., 2019).

Economic environment refers to the surrounding and the external factors that impact the commercial aspects of an economy, such as buying behavior and taste of consumers and organizations (Aziz et al., 2020). Economic orientations and measures are diverse (internally and externally). Although they are interconnected, an attempt is made to aggregate them into economic social orientation, trade and logistics facilitation, and digitalisation actions. Measures such as investment in port infrastructure, and attracting foreign investment improve port economic orientation and maintain competitive advantage (Chung & Choi, 2016). In addition, linked to economic social orientation, the trade facilitation measures improve the economic advantages of supply chains and stakeholders, and thus render their operation cost efficient (Lam, 2013). Given the need to continue trade and facilitate ships' berthing and handling while keeping social distancing measures or teleworking during the COVID-19 pandemic; digitalisation measures (technologies) are considered top priority for ports and the whole of maritime transport. Digitalisation can help resuming cruise business, for example in checking health certificates in passengers and cruise ships, considering that handling thousands of passengers' certificates manually complicates getting back to normal operations. However, the growing cyber risks due to dependence on Information Communication Technologies (ICT) has recently increased in ships and ports (UNCTAD, 2020). It should not be ignored that the cyber risk would disrupt operations and may even shut down the whole port. Therefore, cyber security measures are essential to advance secure digitalisation.

According to Ferrari et al. (2021) one way of achieving economic orientation is by collaborating with the financial system to fix the value chain problems in the maritime sector, since economic development is about enhancing the productive capacity of an economy by using available resources to reduce risks, and remove impediments which, otherwise, could hinder investment. Giovannini and Psaraftis (2019) maintain that economic orientation or benefits can get to the poor using strategic objectives that enhance poorer households and the informal economy. It is also necessary for micro, small and medium-sized businesses to generate more jobs worldwide and boosting a nation's economy is one of the best ways to tackle poverty reduction (Havenga et al., 2017).

Economic orientation looks at how wealthy and fruitful is the country's social status showing if the Nigerian economy is flourishing and thriving with good fortune. Progress in each sector of a country's economy spurs advances in the others, with the result that the long-sought alignment of the stakeholders' prosperity with the best interests of the country seems not only possible but inevitable (Iheanachor et al. 2021). Economic orientation can be achieved in Nigeria, if the government; invests in maritime sector to provide adequate transport facilities and infrastructure in the country for all, deregulate the oil sector of the economy thereby attracting more investments in oil refineries in Nigeria and introduce healthy competition in the industry which will attract foreign direct investments.

Social Orientation

Social orientation is the contribution made by organizations to support the development of the environment (Kim & Song, 2019). It looks at what the entity has to offer to the society as a whole; it is the entities' obligation or duty to the environment/society, which will ensure balance within the economy and the ecosystem.

Social orientations in ports are of paramount importance. While being socially sustainable, ports take action—internally and externally—to improve issues regarding employees, community, supply chain members and stakeholders. Social orientations have been aggregated to encompass employees' rights, safety and security, community and seafarers. As indicated by Gani (2017) various measures can be utilised to realize relevant actions, thereby improving the welfare of employees, decreasing accidents and socially engaging and

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supporting the community. For example, vocational training in port skills for low-income young people (community) aims at social inclusion and, in so doing, enhances logistics careers for youth in the region. Furthermore, ports as a hub contribute to the employment of communities' personnel (Foroudi et al., 2021). Open and transparent sustainability reporting is a positive measure ports take towards showing the community their robust stance in corporate responsibility (Gherghina et al., 2018). Port sustainability reports exist, and typically include environmental and social orientations and measures, e.g., port sustainability report (Nze et al., 2020).

Also, Mudronja et al. (2020) stressed that social orientation reflects an entities' commitment to do the right thing for the society. The entity here could be an individual, business or an organization. If all the entities adopt social orientation in the country, it will be easy to drive the strategic priorities, which involves the provision of the basic amenities like stable power supply, good roads, water supply and education. If the electricity supply is stable, it will aid the lifestyle of the people and reduce the running cost of businesses, especially the small and medium scale businesses that will have to run on generators in the absence of power supply. The necessity of good roads in Nigeria cannot be over-emphasized; most of the federal roads in the country are no longer pliable (like the Enugu-Onitsha Expressway due to different levels of road decay, erosion, and poor road construction), thus resulting in increasing the cost of transportation from one point to the other along this axis. If the roads are good, there will be a smooth flow of businesses via transportation of goods and services (Olaniyan, 2020).

Environmental Orientation

Environmental orientation refers to the recognition by managers of the importance of environmental issues facing their firms (Pu & Lam, 2020). It can be conceived as a firm's strategic orientation of operating in a sustainable manner and constitutes an integral part of its overall strategic stance that guides its strategy development and business operations (Psaraftis.& Kontovas, 2021). In their study of environmental upgrading in global value chains: The potential and limitations of ports in the greening of maritime logistics corporate environmentalism, Poulsen et al. (2018) identified two types of environmental orientation: "internal" and "external." Internal environmental orientation (IEO) refers to the firm's internal values and ethical standards regarding the level of commitment it should render to environmental protection and is often manifested by its environmental policies and procedures, sustainability report, and environmental training for employees (Weerasinghe et al., 2023). External environmental orientation (EEO) reflects the firm's perceived urgency with which it should tackle the environmental demands of external stakeholders (Zoogah et al., 2015). Consistent with the premise of the strategic orientation literature (Nsan-Awaji, 2019). prior environmental management research has revealed that firms exhibiting high levels of environmental orientation are more prone to integrate their environmental concerns into their corporate culture, decision-making, and operations (Willems et al., 2016). Drawing on the resource-based perspective, Amavilah (2016) has demonstrated that the firm's environmental orientation is essential for the development of its eco-capability, namely, its ability to transform corporate resources into creating valuable eco-friendly offerings.

Ports' regular waste needs to be separated and classified along with litter control mechanisms (Akbulaev & Bayramli, 2020). On the other hand, for ships, ports provide ballast treatment facilities, and reception facilities (sewage treatment), including trash. This is important for cruise ships as they generate large amount of sewage and trash. Ports introduce floating or mobile reception facilities with the ability to collect, classify and separate various types of ship waste (Giovannini & Psaraftis, 2019). In addition, environmentally friendly services (e.g., ships' hull and propeller cleaning) can be delivered, while, on the other hand, care should be taken to observe the standard of ship's sanitation equipment (European Commission, 2020). Oil and chemical spills, from liquid bulk ships, are common within and around ports. In this manner, oil spill contingency plans cover measures that should be taken to prevent, control, and respond to any spill. Spillages can be secured by deploying booms and skimmers (Gani, 2017).

The stakeholders in the maritime sector need to consider the strategic nature of ports their context of business knowing that, it is vital to the economy. To achieve this, and to maintain and uphold the intergenerational equities. The people of today's generation utilizing the natural resources available so that there will be enough to carry the future generation, and the intra-generational equity; equally using and sharing the natural resources of today within the people of today (Kurniawan et al., 2022). Environment protection is there to

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provide a balance in the environment between human beings and the other components of the environment (Poulsen et al. 2018)). The environmental orientation laws should be compulsorily enforced to eliminate the damage to the environment because a well-protected environment enhances social orientation, development, and a sustainable economy. Environmental orientation will benefit the country by, minimizing decay of natural and social environment, reducing poverty and disharmony/conflict in Nigeria (Ukwuoma et al., 2020).

Empirical Review

Relationship between Demand Forecasting and Port sustainability

Martin (2019). studied sustainable coastal shipping in Australia and found that mode of transport to be much more energy-efficient than other modes and, consequently, to produce less CO_2 per passenger carried. Furthermore, according to the European Transport Safety Council, coastal shipping is relatively safer than other modes of transport, such as road and rail transport.

Shu et al. (2019) revealed that efforts have been made to address the implications of these benefits of demand forecasting, but the majority were focused on freight rather passenger transport. Most studies have placed the competitiveness, effectiveness and efficiency of coastal shipping in freight transport within the realm of multimodal logistics supply chains. Raelin (2018) submit that various components and strategies have been developed to improve the efficiency of demand forecasting, including port infrastructure, administrative infrastructure, port time, support policies, and funding from governments.

By applying factor analysis, Shu et al. (2019) investigated specific logistical strategies to integrate demand forecasting into multimodal transport chains.

Özer et al. (2020) conducted a study of shippers' needs in demand forecasting; they claimed that trucking achieved greater frequency than did coastal shipping. However, coastal shipping could be an alternative solution for complicated land transportation to cut down on environmental pollution. Similarity, demand forecasting is promoted as an alternative to road freight transport in Greece by comparing the private and social costs, such as road accidents, environmental impacts, and other undesirable externalities. The study adopted cost-benefit analysis and found that competitiveness of SSS against road haulage using the case of Northern Europe was significantly veritable. Ferrari et al. (2021) suggested a disaster management framework for the passenger shipping industry based on a case study of Greece.

In addition, coastal shipping requires high efficiency if it is to contribute to a sustainable transport mode (Akbulaev & Bayramli, 2020). Hence, it is important to understand the impact of ferry disasters on the efficiency of demand forecasting operations. The study therefore hypothesizes that: Ho_1: There is no significant relationship between demand forecasting and economic orientation of seaports in Nigeria; Ho_2: There is no significant relationship between demand forecasting and societal orientation of seaports in Nigeria; Ho_3: There is no significant relationship between demand forecasting and environmental orientation of seaports in Nigeria.

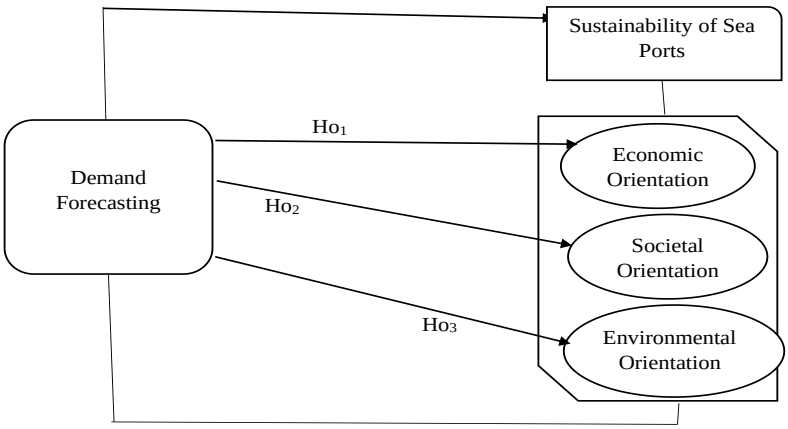

Figure 2: Operationalized Framework of the Relationship between Demand Forecasting and Sustainability of Ports in Nigeria.

Sources: Researcher (2023); Psaraftis and Kontovas (2021)); Okpara and Enyioko (2022); Xie *et al*. (2021); UNCTAD (2022).

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III. METHODOLOGY

The research design applied in this study is the cross-sectional survey research design. Hence, the research was conducted at one specific moment in time which means it qualifies as a cross-sectional study.

The consensus opinion emanating from scholars is that population of the study consists of a complete group of entities sharing some common characteristics (Akujuru & Enyioko, 2018; Bai et al. 2021). They also agree that population is the entire persons, organisations or the things of interest that the researcher wishes to study. The population of the study consisted of six ports in Nigeria.

The sample size of the study was the same as the population which consisted of 6 ports. Since the population was small and, also equaled to the sample size, it was considered as a census study. Questionnaire was the major research instrument used to elicit data from respondents on whom they were administered to in this study. The study utilized face validity for this study. Face validity deals with the researcher's subjective evaluation of the validity of a measuring instrument. In this study, the reliability was verified by conducting a confirmatory test of internal consistency on the instrument with the study sample, using the Crombach's (1970) alpha that was computed with the SPSS software. Hence, only result of 0.7 and above was considered as acceptable while any result below 0.7 was discarded.

Analysis as defined by Akujuru and Enyioko (2018) is the breaking and ordering of the quantitative information gathered for research purposes into their component parts to uncover their interrelationships, understand their nature or to determine their essential ingredients. In this study, percentages, ratios, frequency distribution, scaling, ranking and other statistical tools were used to analyse and achieve research objectives. Also, Pearson's Product Moment Correlation Coefficient (r) was used to test the hypotheses formulated in the study as they test relationships.

IV. RESULTS AND DISCUSSION

Data Analysis

In this section, the study presents the univariate data analysis on the examined dimensions of the construct. Essentially, it is highly appreciated if an exploratory or initial analysis of research data is started through the examination of the individual variables and their components. The research instrument-generated data that showed the extent of the existence of these variables, including their dimensions and measures have been considered in this regard. The univariate analysis on each of the operationalized variables is presented. In generating the data on the operationalized variables, the study used a 5-point Likert scale instrument. In this study the data were measured using a 5-point Likert Scale on the basis of "very strongly agree" (5); "strongly agree" (4); "agree" (3); "disagree" (2); "strongly agree" (1). Based on this scale; options, responses and associated rating points, the mean, standard deviation, variances, and responses to issues raised in the research are presented below, using the SPSS software package window output, Version 25.0. The analysis is commenced with the table on demand forecasting.

Table 1: Responses on Demand forecasting

	Question Items on Demand forecasting	Mean	STD
1	Demand forecasting makes the maritime transport of ports to put a lot of emphasis on having a credible maritime logistics outcome	3.010	1.969
2	Effective demand forecasting influences the current contributions of economic orientation, societal orientation and environmental orientation in the port	4.245	0.826
3	The impact of demand forecasting on firm's competitive advantage is advantageous to the overall performance of seaports	4.433	0.676
4	Seaports have developed and implemented strategies, initiatives and programmes that address issues related to demand	4.152	0.631

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	forecasting questions in maritime industry		
5	Adequate information is provided to predict future demand for goods, storage, transportation, and services within the supply chain in the port	3.533	0.887
	Valid N listwise	211	

Source: Survey Data, 2023, and SPSS Window Output, Version 25.0(Appendix A)

In Table 1 demand forecasting as a dimension of maritime logistics has been examined to know its relationship with sustainability of ports and to show its descriptive outcome based on the question items studied. The first question item was to find out whether demand forecasting makes the maritime transport of ports to put a lot of emphasis on having a credible maritime logistics outcome. From the mean and standard deviation scores of 3.010±1.969, there is consensus that demand forecasting makes the maritime transport of ports to put a lot of emphasis on having a credible maritime logistics outcome. The second question item was aimed at finding out if effective demand forecasting influences the current contributions of economic orientation, societal orientation and environmental orientation in the port. The mean and standard deviation scores of 4.245±0.826 indicate that the respondents are in agreement that effective demand forecasting influences the current contributions of economic orientation, societal orientation and environmental orientation in the port.

For the third question item was about determining if the impact of demand forecasting on firm's competitive advantage is advantageous to the overall performance of seaports. The mean and standard deviation scores of 4.433±0.676 show that the respondents agreed that the impact of demand forecasting on firm's competitive advantage is advantageous to the overall performance of seaports. The fourth question item was to find out if adequate information is provided to predict future demand for goods, storage, transportation, and services within the supply chain in the port; the mean and standard deviation scores of 4.152±0.631 imply that descriptively, the respondents agree that adequate information is provided to predict future demand for goods, storage, transportation, and services within the supply chain in the port. In the case of the fifth item, with the mean and standard deviation scores of 3.533±0.887, the respondents agree that seaports have developed and implemented strategies, initiatives and programmes that address issues related to demand forecasting questions in maritime industry.

Table 2: Responses on Economic Orientation

	Question Items on Economic orientation	**Mean**	**STD**
1	Economic orientation impacts on factors that have the potential to affect the stakeholders on their performance and productivity of ports	4.848	0.373
2	Economic orientation accentuates the factors that lead to higher increase in economic values in the ports	4.190	0.588
3	Economic orientation is achieved in seaports after giving bundles of satisfaction to clients and customers through effective and efficient services that enhance port sustainability	4.352	0.770
4	Port economic orientations maintain and facilitate trade, it goes without saying that such actions uphold environmental and social sustainability.	4.281	0.808
5	Economic orientation is linked to trade facilitation measures, improve the economic advantages of supply chains and stakeholders, and thus renders its operation cost efficient in port.	4.214	0.576
	Valid N listwise	211	

Source: Survey Data, 2023, and SPSS Window Output, Version 25.0(Appendix E)

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Table 2 shows descriptive results on economic orientation which is measured with five question items on the 5-point scale. The response distribution as shown by the results is indicative that economic orientation enhances sustainability of ports. The first question item which sought to know whether economic orientation measures the economic impact of factors that have the potential to affect the stakeholders on their performance and productivity of ports had the mean and standard deviation scores of 4.848±0.373 meaning that the respondents agreed that economic orientation impacts factors that have the potential to affect the stakeholders on their performance and productivity of ports.

The second question sought to determine whether economic orientation accentuates the factors that lead to higher increase in economic values in the ports and the mean and standard deviation scores of 4.190±0.588 indicate positive agreement from the respondents. In the case of the third the mean and standard deviation scores of 4.352±0.770 revealed that the respondents agreed that economic orientation is achieved in seaports after giving bundles of satisfaction to clients and customers through effective and efficient services that enhance port sustainability. Also, the fourth question items which sought to determine whether port economic orientations maintain and facilitate trade, it goes without saying that such actions uphold environmental and social sustainability had the mean and standard deviation scores of 4.281±0.808 as agreed by the respondents. The fifth question determined whether economic orientation is linked to trade facilitation measures, improves the economic advantages of supply chains and stakeholders, and thus renders its operation cost efficient in port. The item has the mean and standard deviation scores of 4.214±0.576 which reflects that the respondents agreed that economic orientation is linked to trade facilitation measures, improve the economic advantages of supply chains and stakeholders, and thus renders its operation cost efficient in port.

Table 3: Responses on Social Orientation

	Question Items on Social Orientation	Mean	STD
1	Social orientations in ports are of paramount importance for socially sustainable ports to take action—internally and externally—to improve issues regarding employees, community, supply chain members and stakeholders.	4.338	0.709
2	Ports' actions to minimise environmental externalities are overarching and highly covered in the ports. The environmental measures and actions are adopted in maritime transport systems, which are accredited and reported in different schemes	3.933	0.872
3	Social orientation is the contribution made by ports to support the development of the environment	4.295	0.823
4	Social orientation uses various measures to realize relevant actions, thereby improving the welfare of employees, decreasing accidents and socially engaging and supporting the community to enhance logistics sustainability in ports	4.262	0.832
5	A major way of achieving social orientation is by collaborating with the social system to fix the value chain problems in the maritime sector, enhancing the capacity of the society by using available resources to reduce risks, and remove impediments.	4.757	0.556
	Valid N listwise	211	

Source: Survey Data, 2023, and SPSS Window Output, Version 25.0(Appendix F)

Social orientation as a measure of sustainability of ports was examined and empirically expressed in Table 4.10, in the studied ports and 5 question items were raised. For the first question item, the result indicated that social orientations in ports are of paramount importance for socially sustainable ports to take action—internally and externally—to improve issues regarding employees, community, supply chain members and stakeholders. The mean and standard deviation scores of 4.338±0.709 prove that. The second question item with the mean and

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standard deviation scores of 3.933±0.872 is an indication that the respondents agreed that ports' actions to minimise environmental externalities are overarching and highly covered in the ports. The environmental measures and actions are adopted in maritime transport systems, which are accredited and reported in different schemes. The third question item has the mean and standard deviation scores of 4.295±0.823 revealed that the respondents agreed that social orientation is the contribution made by ports to support the development of the environment. The fourth question item also sought to know whether social orientation uses various measures to realize relevant actions, thereby improving the welfare of employees, decreasing accidents and socially engaging and supporting the community to enhance logistics sustainability in ports. The mean and standard deviation scores of 4.262±0.832 indicate that social orientation uses various measures to realize relevant actions, thereby improving the welfare of employees, decreasing accidents and socially engaging and supporting the community to enhance logistics sustainability in ports. The fifth question item also sought to know if A major way of achieving social orientation is by collaborating with the social system to fix the value chain problems in the maritime sector, enhancing the capacity of the society by using available resources to reduce risks, and remove impediments. The mean and standard deviation scores of 4.757±0.556 indicate that A major way of achieving social orientation is by collaborating with the social system to fix the value chain problems in the maritime sector, enhancing the capacity of the society by using available resources to reduce risks, and remove impediments.

Table 4: Responses Environmental Orientation

	Question Items on Environmental Orientation	Mean	STD
1	Social orientations in ports are of paramount importance for socially sustainable ports to take action—internally and externally—to improve issues regarding employees, community, supply chain members and stakeholders	4.605	0.765
2	Ports' actions to minimise environmental externalities are overarching and highly covered in the ports. The environmental measures and actions are adopted in maritime transport systems, which are accredited and reported in different schemes	4.605	0.699
3	Social orientation is the contribution made by ports to support the development of the environment	4.457	0.771
4	Environmental orientation is essential for the development of its eco-capability, namely, its ability to transform corporate resources into creating valuable eco-friendly offering	4.576	0.495
5	Social orientation is collaborating with the social system to fix the value chain problems in the maritime sector, enhancing the capacity of the society by using available resources to reduce risks, and remove impediments	3.957	1.159
	Valid N listwise	211	

Source: Survey Data, 2023, and SPSS Window Output, Version 25.0(Appendix G)

Environmental orientation as a measure of sustainability of ports was examined and empirically expressed in Table 4 in the studied ports; 5 question items were raised on it. For the first question item, the result indicated that social orientations in ports are of paramount importance for socially sustainable ports to take action—internally and externally—to improve issues regarding employees, community, supply chain members and stakeholders. The mean and standard deviation scores of 4.605±0.765 were the evidence that social orientations in ports are of paramount importance for socially sustainable ports to take action—internally and externally—to improve issues regarding employees, community, supply chain members and stakeholders. The second question item with the mean and standard deviation scores of 4.605±0.699 indicate that the respondents agreed that seaports allow staff to make variety of suggestions for the societal orientation of port. The third question item has the mean and standard deviation scores of 4.457±0.771 indicating that the

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respondents favour the statement that social orientation is the contribution made by ports to support the development of the environment. The fourth question item also sought to know if environmental orientation is essential for the development of its eco-capability, namely, its ability to transform corporate resources into creating valuable eco-friendly offering. The mean and standard deviation scores of 4.576±0.495 indicate that environmental orientation is essential for the development of its eco-capability, namely, its ability to transform corporate resources into creating valuable eco-friendly offering. The fifth question item also sought to know whether environmental orientation recognizes the managers of the importance of environmental issues facing ports, the mean and standard deviation scores of 3.957±1.159 authenticate that environmental orientation recognizes the managers of the importance of environmental issues facing ports.

Statistical Test of Hypotheses and their Interpretation

Relationship Between Demand Forecasting and Sustainability of Ports

The next step of our analysis is on the test outcomes on the examined dimensions and measures of the variables in terms of relationship.

To determine the relationships that exist between these variables, the study formulated the following hypotheses:

Ho_1: There is no significant relationship between demand forecasting and economic orientation.

Ho_2: There is no significant relationship between demand forecasting and social orientation.

Ho_3: There is no significant relationship between demand forecasting and environmental orientation.

Table 5: Results of Demand forecasting (DF) and Sustainability of ports (SP)

Statistics	HO_1 DF (ECONO)	HO_2 DF (SOCO)	HO_3 DF (ENVO)
Pearson correlation	0.801**	0.725**	0.708**
Sig(2-tailed)	.000	.000	.000
N	211	211	211

**correlation is significant at the 0.01level (2-tailed)

Source: Survey Data, 2023, and SPSS Window Output, Version 25.0

The table 5 above shows the results of the test of hypothesized statements, Ho_1, Ho_2 and Ho_3. The results of the hypotheses tested showed positive relationships. For demand forecasting and economic orientation (H_{01}) the r -value outcome of 0.801 @ p0.000 <0.01 means that a positive and significant relationship exists between the examined variables. This implies that the null hypothesis as stated is rejected and the alternate is accepted. In respect of H_{02}, demand forecasting and social orientation, the r -value outcome of 0.725 @ p0.000 <0.01 means that there is positive relationship between demand forecasting and social orientation, and it is also significant, which also means that the null hypothesis is rejected, and the alternate is accepted. In the case of demand forecasting and environmental orientation, which is H_{03}, the r -value outcome 0.708 p0.000 < 0.0 1, shows a moderate positive and significant relationship among the examined variables. The null hypothesis in this instance is also rejected.

From the inferential analysis so far, it can be stated that:

1. Demand forecasting as a dimension of maritime logistics has a positive and significant relationship with economic orientation as a measure of sustainability of ports. This simply means that demand forecasting inclusiveness and equity sustenance of the workforce positively and significantly relate with the economic orientation as a measure of sustainability of ports of ports.

2. Demand forecasting as a dimension of maritime logistics has a positive and significant relationship with social orientation. This simply means demand forecasting well managed results to social orientation of ports in Nigeria.

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3. Demand forecasting as a dimension of maritime logistics has a positive and significant relationship with environmental orientation as a measure of sustainability of ports. This simply means that the demand forecasting if inclusively managed, positively relates with environmental orientation of ports in Nigeria.

From the various outcomes of the relationships between demand forecasting as a dimension of maritime logistics and the measures of sustainability of ports which include economic orientation, social orientation and environmental orientation, it simply means that demand forecasting has significant relationship with sustainability of ports.

Table 6 has revealed in summary that the study rejected all the null hypotheses and accepted the alternate hypotheses:

Table 6: Summary of the Results on Test of the Research Hypotheses

Research Hypotheses	r - value	Result	Decision
Ho_1: There is no significant relationship between demand forecasting and economic orientation	0.801	Positive and Significant	Reject
Ho_2: There is no significant relationship between demand forecasting and social orientation	0.725	Positive and Significant	Reject
Ho_3: There is no significant relationship between demand forecasting and environmental orientation	0.708	Positive and Significant	Reject

Source: Survey Data, 2023, and SPSS Window Output, Version 25.0

Hi_1: There is significant relationship between demand forecasting and economic orientation; Hi_2: There is significant relationship between demand forecasting and social orientation; Hi_3: There is significant relationship between demand forecasting and environmental orientation.

DEMAND FORECASTING

Table 7:

	N	Minimum	Maximum	Mean	Std. Deviation
Demand forecasting makes the maritime transport of ports to put a lot of emphasis on having a credible maritime logistics outcome	211	1.00	5.00	3.010	1.969
Effective demand forecasting influences the current contributions of economic orientation, societal orientation and environmental orientation in the port	211	1.00	5.00	4.243	.826
The impact of demand forecasting on firm's competitive advantage is favourable to the overall performance of seaports	211	1.00	5.00	4.433	.676
Seaports have developed and implemented strategies, initiatives and programmes that address issues related to demand forecasting questions in maritime industry	211	2.00	5.00	4.152	.631
Adequate information is provided to predict future demand for goods, storage, transportation, and	211	2.00	5.00	3.533	.887

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services within the supply chain in the port					
Valid N (list wise)	211				

SUMMARY: ECONOMIC ORIENTATION

Table 8:

	N	Minimum	Maximum	Mean	Std. Deviation
Economic orientation measures the economic impact of factors that have the potential to affect the stakeholders on their performance and productivity of ports	211	3.00	5.00	4.848	.373
Economic orientation accentuates the factors that lead to higher increase in economic values in the ports	211	1.00	5.00	4.190	.588
Economic orientation is achieved in seaports after giving bundles of satisfaction to clients and customers through effective and efficient services that enhance port sustainability	211	1.00	5.00	4.352	.770
Port economic orientations maintain and facilitate trade, it goes without saying that such actions uphold environmental and social sustainability	211	1.00	5.00	4.281	.808
Economic orientation is linked to trade facilitation measures, that improve the economic advantages of supply chains and stakeholders, and thus renders its operation cost efficient in port	211	1.00	5.00	4.214	.576
Valid N (list wise)	211				

SUMMARY: SOCIAL ORIENTATION

Table 9:

	N	Minimum	Maximum	Mean	Std. Deviation
Social orientations in ports are of paramount importance for socially sustainable ports to take action—internally and externally—to improve issues regarding employees, community, supply chain members and stakeholders. Social orientations have been aggregated	211	1.00	5.00	4.338	.709
Ports' actions to minimise environmental externalities are overarching and highly covered in the ports. The environmental measures and actions are adopted in maritime transport systems, which are accredited and reported in different schemes	211	1.00	5.00	3.933	.872

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Social orientation is the contribution made by ports to support the development of the environment	211	1.00	5.00	4.295	.823
Social orientation uses various measures to realize relevant actions, thereby improving the welfare of employees, decreasing accidents and socially engaging and supporting the community to enhance logistics sustainability in ports	211	1.00	5.00	4.262	.832
A major way of achieving social orientation is by collaborating with the social system to fix the value chain problems in the maritime sector, enhancing the capacity of the society by using available resources to reduce risks, and remove impediments	211	1.00	5.00	4.757	.556
Valid N (list wise)	211				

SUMMARY: ENVIRONMENTAL ORIENTATION

Table 10:

	N	Minimum	Maximum	Mean	Std. Deviation
Social orientations in ports are of paramount importance for socially sustainable ports to take action—internally and externally—to improve issues regarding employees, community, supply chain members and stakeholders	211	1.00	5.00	4.605	.765
Ports engage in activities that encourage demand forecasting and environmental orientation in ports	211	2.00	5.00	4.605	.699
Ports' actions to minimise environmental externalities are overarching and highly covered in the ports. The environmental measures and actions are adopted in environmental maritime transport systems, which are accredited and reported in different schemes	211	1.00	5.00	4.457	.771
Environmental orientation is essential for the development of its eco-capability, namely, its ability to transform corporate resources into creating valuable eco-friendly offering	211	4.00	5.00	4.576	.495
Social orientation is collaborating with the social system to fix the value chain problems in the maritime sector, enhancing the capacity of the society by using available resources to reduce risks, and remove impediments	211	1.00	5.00	3.957	1.159
Valid N (listwise)	211				

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COMPUTING PEARSON PRODUCT MOMENT CORRELATION COEFFICIENT BETWEEN DEMAND FORECASTING (x) AND ECONOMIC ORIENTATION (y) OF PORTS IN NIGERIA

The stated hypotheses are as follows:

H_0: $\rho_s = 0$: There is no significant correlation between demand forecasting and economic orientation of ports in Nigeria;

H_1: $\rho_s \neq 0$: There is a significant correlation between demand forecasting and economic orientation of ports in Nigeria;

Table 11:

Correlations

		Demand forecasting	Economic orientation
Demand forecasting	Pearson Correlation	1	.801**
	Sig. (2-tailed)		.000
	N	211	211
Economic orientation	Pearson Correlation	.801**	1
	Sig. (2-tailed)	.000	
	N	211	211

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS ver. 25 Output window

From the SPSS output window, the correlation coefficient of the variables x and y is 0.801

INTERPRETATION

This positive large value of r (= 0.801) says that there is a strong positive correlation between demand forecasting (x) and economic orientation (y) in the sample of ports in Nigeria

Because of the positive value of r direction is said to be the same: That is, as one increases, the other increases also.

Since the p-value (= 0.000) is less than the level of significance, α (= 0.05), we therefore, reject the null hypothesis and conclude that:

H_1: $\rho_s \neq 0$: There is a significant correlation between demand forecasting and economic orientation of ports in Nigeria;

COMPUTING PEARSON PRODUCT MOMENT CORRELATION COEFFICIENT BETWEEN DEMAND FORECASTING (x) AND SOCIAL ORIENTATION (y) OF PORTS IN NIGERIA

The stated hypotheses are as follows:

H_0: $\rho_s = 0$: There is no significant correlation between demand forecasting and social orientation of ports in Nigeria;

H_1: $\rho_s \neq 0$: There is a significant correlation between demand forecasting and social orientation of ports in Nigeria;

Table 12:

Correlations

		Demand forecasting	Social orientation
Demand forecasting	Pearson Correlation	1	.725**
	Sig. (2-tailed)		.000

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Social orientation	N	211	211
	Pearson Correlation	.725**	1
	Sig. (2-tailed)	.000	
	N	211	211

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS ver. 25 Output window

From the SPSS output window, the correlation coefficient of the variables x and y is 0.725

INTERPRETATION

This positive large value of r (= 0.725) says that there is a strong positive correlation between demand forecasting (x) and social orientation (y) in the sample of ports in Nigeria

Because of the positive value of r direction is said to be the same: That is, as one increases, the other increases also.

Since the p-value (= 0.000) is less than the level of significance, α (= 0.05), we therefore, reject the null hypothesis and conclude that:

H_1: $\rho_s \neq 0$: There is a significant correlation between demand forecasting and social orientation of ports in Nigeria;

COMPUTING PEARSON PRODUCT MOMENT CORRELATION COEFFICIENT BETWEEN DEMAND FORECASTING (x) AND ENVIRONMENTAL ORIENTATION (y) OF PORTS IN NIGERIA

The stated hypotheses are as follows:

H_0: $\rho_s = 0$: There is no significant correlation between demand forecasting and environmental orientation of ports in Nigeria;

H_1: $\rho_s \neq 0$: There is a significant correlation between demand forecasting and environmental orientation of ports in Nigeria;

Table 13:

Correlations

		Demand forecasting	Environmental orientation
Demand forecasting	Pearson Correlation	1	.708**
	Sig. (2-tailed)		.000
	N	211	211
Environmental orientation	Pearson Correlation	.708**	1
	Sig. (2-tailed)	.000	
	N	211	211

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS ver. 25 Output window

From the SPSS output window, the correlation coefficient of the variables x and y is 0.708

INTERPRETATION

This positive large value of r (= 0.708) says that there is a strong positive correlation between demand forecasting (x) and environmental orientation (y) in the sample of ports in Nigeria

Because of the positive value of r direction is said to be the same: That is, as one increases, the other increases also.

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Since the p-value (= 0.000) is less than the level of significance, α (= 0.05), we therefore, reject the null hypothesis and conclude that:

H_1: $\rho_s \neq 0$: There is a significant correlation between demand forecasting and environmental orientation of ports in Nigeria;

DISCUSSION

This chapter has been used to discuss the findings to draw conclusions. The discussion of the findings has been subdivided into four areas. The first segment deals with the relationship between demand forecasting and sustainability of ports in Nigeria, the second one is on relationship between warehousing and sustainability of ports in Nigeria**,** the third slice is about the relationship between transportation and sustainability of ports in Nigeria and the fourth segment deals with the influence of digital transformation on maritime logistics and sustainability of ports in Nigeria.

Relationship between demand forecasting and Sustainability of ports in Nigeria

The findings connected to the relationship between demand forecasting and sustainability of ports discovered that demand forecasting relates with sustainability of ports. A critical appraisal of the finding discloses that a strong, positive, and significant relationship exists between demand forecasting and economic orientation as a measure of sustainability of ports in Nigeria with r -value of 0.801. This finding corresponds with the works of Hu et al. (2019) who reportedly found that firms that conduct demand forecasting as part of their maritime logistics activities churn out better results and performance in their business operations. Also, Shu et al. (2019) revealed that the benefits of demand forecasting are for organisations whose majority of staff are focused on freight and transport dealings.

The study revealed critically that there is significant relationship between demand forecasting and social orientation with r -value of 0.725. This agrees with the work of Serra et al. (2020) as they found that forecasting demand in innovative two-hub freight network for shipping services compared to the existing connections within the social domain. The demand forecasting and redesigning of the networks used in shipping transport help to diminish air pollutants and the greenhouse gas emissions and promote the emergence of more sustainable transport networks within the Mediterranean Sea.

The study found that demand forecasting makes the maritime transport in ports to put a lot of emphasis on having a credible maritime logistics outcome and that effective demand forecasting influences the current contributions of economic orientation, societal orientation and environmental orientation in the port. This is in tandem with Shu et al. (2019) investigation that adduces specific logistics strategies to integrate demand forecasting into supply chains' outfit. World Maritime News (2020) suggested the need to concentrate on port and transport system efficiency to promote demand forecasting.

Also, the study found that there is significant relationship between demand forecasting and environmental orientation, and this has been revealed with r- value of 0.708. On this, Poulsen et al. (2018) affirmed that ports that do demand forecasting have considerable potential for enhancing environmental change toward reducing pollution, through promoting lower complexity of the tool implementation by a stronger collaboration within global value chains, and by promoting alliances with cargo-owners and regulators to enhance emission visibility.

The study revealed that the impact of demand forecasting on firm's competitive advantage is favourable to the overall performance of seaports and that seaports have developed and implemented strategic, initiatives and programmes that address issues related to demand forecasting questions in maritime industry. On this, Poulsen et al. (2018) found that the development of demand forecasting requirements should be put into practice in the logistics sector and that there was a need for continued care and maintenance by logistics personnel. The study also, revealed that adequate information is provided to predict future demand for goods, storage, transportation, and services within the supply chain in the port. This is in contrast to Özer et al. (2020) submission that coastal shipping could be an alternative solution for complicated land transportation to cut down on environmental pollution. Similarly demand forecasting is promoted as an alternative to road freight transport predictive modeling by comparing the private and social costs, such as road accidents, and other undesirable externalities.

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V. CONCLUSION

The conclusion of this study offers all-inclusive outcomes of the study. The values possessed by different maritime logistics complement each other and they tend to achieve better performance. Thus, well managed maritime logistics is most likely to engender sustainability of ports. Conclusively, it is apparent in this study that: there is positive relationship between demand forecasting and economic orientation with r -value outcome of r =0.801; there is significant relationship between demand forecasting and social orientation (r = 0.725 @ p0.000 <0.01); there is a strong positive relationship between demand forecasting and environmental orientation (r = 0.708 p0.000 < 0.0 1).

VI. RECOMMENDATIONS

This study has been embarked upon to empirically examine the relationship between demand forecasting and sustainability of ports in Nigeria. Based on the findings and conclusions of the study, the following recommendations have been made:

1. Ports should design and evolve effective demanding forecasting strategies and policies, then implement and monitor them in collaboration with major strategic port operators for port sustainability initiatives.

2. Global competition is furious and growing in maritime industry. Therefore, Nigeria maritime companies are dependent on constantly developing products and production methods. The development of maritime logistics by ports in Nigeria should be based on knowledge, technologies and innovative research, which would help to build effective demand forecasting and integrate other sectors that align with ports for sustainability objectives.

3. Ports in Nigeria should adapt digital demand forecasting in various forms so that their maritime logistics activities could be effectively and efficiently operated for sustainability of the ports in Nigeria.

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