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Influence of Transportation on Sustainability of Seaports in Nigeria

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ABSTRACT

This study examined the relationship between transportation 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 transportation, as a complex network, connects cities and accommodates human activities coupling the social, economic and environmental systems with the urbanization and population social orientation. The study concluded that: transportation significantly relates with economic orientation (r = 0.753), social orientation (r = 0.804) and environmental orientation (r = 0.658). This study, therefore, recommended that government should create and encourage conducive transportation environment so that maritime logistics operators can benefit from the economic, social and environmental gains arising from port sustainability in Nigeria and that Ports in Nigeria should adapt digital transportation system in various forms so that their maritime logistics activities could be effectively and efficiently operated for sustainability of the ports in Nigeria.

Keywords: Transportation, Sustainability of Ports, Economic Orientation, Social Orientation, Environmental Orientation

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, 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). UNCTAD (2021) stated that almost 85% of international trade in products is carried at sea by shipping industry. Thus, the shape of the world economy is highly dependent on maritime industry. Ports are the milestones of that industry in all over the world. Ports measure the volume of containers they handle in twenty-foot equivalent units (TEU), the standard size of a container. In 2020, approximately, 798.9 million TEUs of containers were handled in ports worldwide (UNCTAD, 2022). Based on BIMCO (2023), after growing by 4.0% in 2022, the container fleet is forecast to grow by 6.3% in 2023 and by 8.1% in 2024. Okpara and Okpara (2022) submit that containerization has fragmented the shipping operations and network integration. In the maritime industry, there exist a range of actors which offer various activities and stand for different functions. Suppliers (shipyards, educational institutes, bunker, provision), ship owners and ship maritime transport companies, intermediaries (ship agents, ship brokers, freight forwarders), customers (charterers, shippers), port authorities, customs, stevedores, class and survey institutions, insurance companies, and banks are the actors in maritime logistics system (UNCTAD, 2021).

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. In Europe, 2200 port operators employ more than 110,000 workers who are engaged in loading and unloading ships and in port-based services such as warehousing and logistics (UNCTAD, 2O22). 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). Such external impacts (*externalities*), both from port expansion and operations, and from the activities of shipping and land transport, have severe impacts on the environment (Nsan-Awaji, 2019.; Okpara, 2020; Onifade, 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).

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.

Furthermore, there is a lack of understanding on what transportation 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 transportation and port sustainability in the maritime studies.

The purpose of this study was to examine the relationship between transportation and sustainability of seaports in Nigeria. Therefore, the following specific objectives were addressed in this 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:

i. To what does transportation relate to economic orientation of seaports in Nigeria?

ii, To what extent does transportation relate to social orientation of seaports in Nigeria?

iii.To what extent does transportation 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 transportation and economic orientation of seaports in Nigeria.

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

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

LITERATURE REVIEW

Theoretical Foundation

This study was backed up with the theories as Stakeholder's Theory and Resource Dependence Theory and they have been examined here:

Stakeholder's 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 a 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 Jensen (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).

Consequently, the highly competitive environment of the maritime industry dictates an ongoing process of keeping up with updating and improving the implemented methods, in accordance with what the leaders of the industry are conducting (Gholami & Salimi, 2014). The causal relationship between the implemented methods, their development and expansions are viewed through the scope of competitive advantage and serve as differentiating factors for the enhancement of the maritime logistics performance. Hence, the leading companies of the shipping industry turn into a more collaborative spirit for the relationship with the regulators for uncovering better and viable solutions.

The results of the collaborative relationship with the regulators are further exploited and induced in the relationships with suppliers and customers who become the focal point that affects maritime logistics performance. In the context of including actors across the supply chain the shipowners showed a normative approach when it comes to sustainability and decarbonization in extension (Hussein *et al.,* 2017). The development of the normative behaviour in the inner/competitive environment of the firm is the one that will aid in the formation of an appropriate green supply chain management. The importance of such an implication lies on the fact that shipowners bear the responsibility of ownership of the vessel, thus sustain the responsibility of being the central actor that will affect the market mostly in the maritime industry (Zis *et al.*2020).

Resource Dependence Theory

Resource dependence theory (RDT) is the study of how the external resources of organizations affect the behavior of the organization. The procurement of external resources is an important tenet 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 Organizations: A Resource Dependence Perspective (Pfeffer & Salancik 1978). 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.

Resource Dependence Theory claims that different ports will have different level of sustainability in marketplace with different set of capabilities and organizational routines (Gunawan *et al*., 2016). Lee *et al.* (2012) argued that interdependence 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 sustainability of ports. 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-a-vis economic orientation, societal orientation, environmental orientation of seaports in Nigeria.

Conceptual Review

This study is examined the relationship between transportation and sustainability of seaports in Nigeria. In the study, transportation (independent variable or predictor variable). 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 transportation 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):

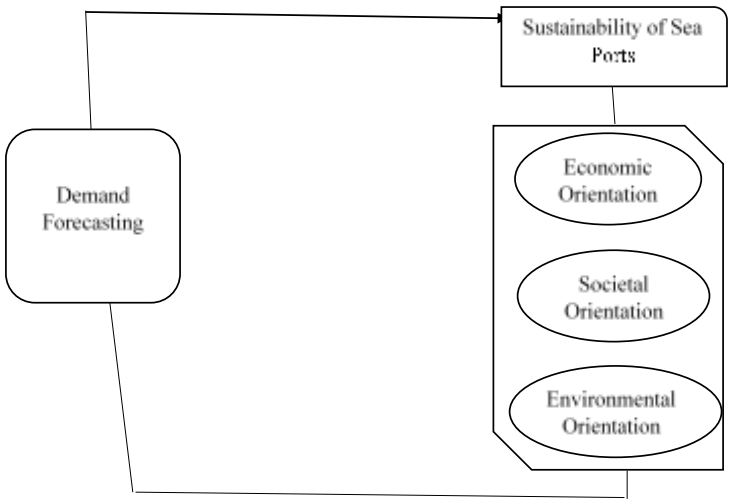

Figure 1: Conceptual Framework of the Relationship between Demand Forecasting Logistics and Sustainability of Ports in Nigeria.

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

Conceptual Review

In this section the key concepts used in the study have been reviewed, they include transportation, port sustainability, economic orientation, social orientation, environmental orientation.

Transportation

Transportation is the operational main activity in the maritime logistics system. Because of its fundamental importance, all decision makers have directed significant attention toward reducing cost of transportation. Economies of scale benefit and reduction in unit cost can be achieved by carrying high volume of cargo in one voyage. Maritime transportation can be classified into three types: industrial, tramp and liner shipping (Psaraftis & Kontovas, 2010). Industrial Shipping: Industrial shipping refers to the case where the cargo owner also owns the ship and aims to minimize shipping costs (Lane & Pretes, 2020). Tramp Shipping: Tramp ships are similar to taxis as they try to catch up the available cargo that cargo shipped generally belongs to one owner. Tramp shipping is a kind of shipping which in the long run does not have a fixed itinerary, and which carries mainly bulk cargoes over relatively long distances and from one or more ports to one or more ports by any vessel with a tonnage of 4,000 dwt or above (Moon *et al.*, 2014). The freight rate in tramp shipping fluctuates seasonally according to the ship size, charter durations and market conditions. The major difference between tramp and liner shipping is the unscheduled, open market mode of operation (Özer *et al.*, 2020). The cargoes carried in tramp shipping are generally in the form of semi-product or raw material that will be used in industry to produce final products. There are three main categories of bulk cargo carried in tramp shipping (Stopford, 2009, p.64): i. The five major bulks: Iron ore, coal, grain, bauxite/ alumina and phosphate rock, ii. Minor bulks: Agri-bulks, fertilizers, metals, minerals, steel and forest products, iii, Liquid bulk: Crude oil, petroleum products, and liquid chemicals cargoes.

Liner shipping offers a special service for the shippers who prefer a constant rate rather than a fluctuating market rate. Liner shipping specializes in the transport of small cargo parcels, which do not fill the hold of a ship, on regular services. The main classes of cargoes in liner shipping are loose cargo, containerized cargo, palletized cargo, pre-slung cargo, liquid cargo, refrigerated cargo, and heavy cargoes (Stopford, 2009).

One of the key issues in realising the full national potential is the availability of appropriate transport vessels and containers across the archipelago. Reefer containers, for example, tend to be in the western part of Nigeria where the value gains and profits can be greater received from this area. Within Eastern Nigeria, where there is a wealth of natural resources, ineffective maritime transport and funding have led to low levels of movement of goods from these regions into national markets or international export centres. This leads to the perceived low value of reefer container use within Eastern Nigeria and hence their lack of availability within that region. One factor suspected of influencing the efficiency of transportation costs is characteristics of sea transport (e.g., ships, fleet, and vessel size). Most of the Nigerian seaports can only dock ships under 2,000 TEUs (twenty feet equal units) (Nigeria Shippers Council, 2021)

Many transport vehicles are old and underpowered, making it challenging to tackle moderate to steep gradients and this often causes extensive traffic hold-u ps. This causes dwelling time for a container to be unloaded and then transported. As a result, the central government, through the Ministry of Transportation, has committed to reducing dwelling time from 6-7 days to 4 days (Akbulaev & Bayramli, 2020). Overall, road social orientation still gets left far behind compared to the increase in vehicle number. For example, in East Java, the increase in vehicles reaches 11-14%/year, but the increase in road length is generally less than 2%/year. In addition, trucks with cooling facilities) are also very limited (Lane & Pretes, 2020).

The logistics system concept cannot be separated from the process of transportation of goods. Therefore, the maritime logistics system cannot be separated from the process of transportation of fisheries, both production and production inputs (Olaniyan *et al.*, 2020). The transportation processes are closely related to logistics infrastructure, both in the form of necessary infrastructure and commercial infrastructure. Basic infrastructure includes wharves, ports, airports, and terminals while commercial infrastructure includes frozen warehouses, transportation equipment, and other supporting tools (Pu & Lam, 2020).

As a matter of fact, in the process of distributing frozen, fresh, dry and wet goods, an important characteristic is that each condition of the goods has its prerequisites, so that appropriate infrastructure is needed. In fresh, frozen products and wet products, the cold chain system is used in order to produce a product with the required food safety standards (Rezaei *et al.*, 2018). By standard business practices fresh or frozen product transfer usually use transportation, which takes longer time. So, most of the transportation of fresh or frozen products use land and or sea transportation. In the transportation process with a longer time, it is necessary to use refrigerated containers or what is often known as a reefer container (Psaraftis.& Kontovas, 2021).

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 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).

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 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).

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)..

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 world we live in is our environment; it is an asset all human beings share in common, so the responsibility of protecting the earth is common to all men. The environment is at the center of the concern for environmental sustainability meaning that the next thing to man's life is his environment (Lane & Pretes, 2020). Environmental orientation means protecting the environment, an individual, an organization from harm. Due to the rise in activity and new technological advancement, the springing up of industries continuously degrades our environment (that is the built environment and the natural environment), sometimes this degradation stays permanently (Jović *et al.,* 2022).

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 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 Transportation and Port Sustainability

Transportation, as a complex network, connects cities and accommodates human activities coupling the social, economic and environmental systems with the urbanization and population social orientation. Kim and Song (2019) disclose that the transportation network contributes to the socioeconomic development and the increased quality of life through generating inter- or intra-city connections of ports. Dwarakish and Salim (2015) observe that goals such as low-carbon, resilient and sustainable development should not be ignored when the transportation networks used by ports are expanded. Also, Ferrari *et al.* (2021) detect that transportation among cities leads to urban aggregation and diffusion, greatly boosting sustainable port development.

Efficient transportation is the capacity to support the mobility needs of a society in a manner that is the least damageable to the environment and does not impair the mobility needs of future generations (Bersenev et al., 2020). According to Serra *et al*. (2020), among the logistics functions, transportation induces highest environmental hazard, hence sustainable logistics practice becomes a popular approach among service providers. Kurniawan *et al.* (2022) highlighted the importance of incorporating sustainable transportation practices for logistics service providers more especially in port cannot be over emphasized. Proper practice on sustainable logistics helps in reducing carbon footprint, reduces travel time, increases truck load utilization and improves proper planning on resource usage.

Tierney *et al.* (2019) who examined the change management for sustainability: Evaluating the role of human, operational and technological factors in leading Indian firms in home appliances sector. With the aid of correlational analysis, they found that clients often request their transporters to increase the security measures to avoid cargo theft that results in multi-million dollars loss to their manufacturing plants.

Zang *et al*. (2020) examined the impact of supply chain security practices on security operational performance among logistics service providers in an emerging economy: Security culture as moderator. With regression analysis they found that sustainable logistics performance significantly affirms strong relationship between sustainability approach and transport services in their service delivery to clients. To measure sustainable logistics practices, the

study formulated logistics service execution to measure environmental aspects, pricing and service offerings to gauge the economic measure and labor as part of social aspect and found all to be significantly related to port performance.

Transportation is one of the highest logistics costs users may need to spend to transit their goods from origin to desired destination. Freight cost and other related charges to move the goods are borne by clients. Good pricing is one of the factors transport users consider when any firms decide to outsource the transport services from transporters. Pricing is frequently related to revenue management in most industries, but it is also a useful tool for cost management. In logistics, especially for transportation, pricing is often linked with demands, empty equipment repositioning cost, quantifying certain value for payment or charges and inventory replenishment. In the scenario of outsourcing transportation services, Moghadamzadeh *et al.* (2020) stated that price is an important attribute client will consider when they decide to procure transport services. Service offering is a reflection on what type of services transport service provider offers to their clients and it is an important term emerged in logistics literature from 1990s. The study incorporated service offering as a variable to understand what type of sustainable logistics practices transport service provider crafted for their clients (Mudronja *et al.*, 2020).

Song (2016) investigated entrepreneurial universities and social capital: The moderating role of entrepreneurial intention in the Malaysian context. With the help of chi-square statistical analysis, the study revealed that supplier support has positive relationship with logistics transport performance. The results are in line with previous study, where researchers studied on the importance of providing good supplier support to gain better logistics transport performance from the buyers' perspectives. Supplier support is measured based on clients' trust, communication ability, transporters' commitment and information sharing which reflect the effort taken by transporters to maintain their relationship strength with their clients to achieve better logistics transport performance. Haasis and Hapsatou (2022) mentioned that sustainable supplier co-operation enhances the sustainability of the buying firm and improves the performance of both parties (buyer/supplier).

Based on the above empirical expositions the study hypothesizes that: Ho_1: There is no significant relationship between transportation and economic orientation of seaports in Nigeria; Ho_2: There is no significant relationship between transportation and societal orientation of seaports in Nigeria; Ho_3: There is no significant relationship between transportation and environmental orientation of seaports in Nigeria.

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). The population of the study consisted of six ports in Nigeria.

Sample Size and Sampling Technique

The sample size of the study is 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.

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 2: Responses on Transportation

	Question Items on Transportation	Mean	STD
1	Transportation actualizes operational main activity in the maritime logistics system as its fundamental importance, all decision makers have directed significant attention toward reducing cost in ports	4.062	0.571
2	Transportation assists seaports to grow and maintain their roles in changes as well as helping them to initiate cooperation of movement of persons and goods that can bridge the gap in port	3.981	0.757
3	Ports have policies in place to ensure there are many transport vehicles that are old and underpowered remodeled and repackaged, making it challenging to tackle moderate to steep gradients to avoid causing extensive traffic hold-u ps. performance of seaports	4.552	0.634
4	The transportation processes are closely related to logistics infrastructure, including wharves, ports, airports, frozen warehouses, transportation equipment, and other supporting tools in the port	4.211	0.930
5	Transportation facilitates the formation of a wider variety of spatial patterns of human activities and along with communication helps in the governing of a larger area by a single government and tends to promote uniformity in the application of laws and justice in ports	4.333	0.734
	Valid N listwise 211		

Source: Survey Data, 2023, and SPSS Window Output, Version 25.0 *(appendix c)*

Table 2 shows the rate at which transportation as a dimension of maritime logistics relate with organization performance. The results from the five question items on the 5 points scale show a distribution that reflects affirmation to the inquiries. The first question item on the Table has the mean and standard deviation scores of 4.062±0.571, showing that the respondents generally agreed that transportation actualizes operational main activity in the maritime logistics system as its fundamental importance, all decision makers have directed significant attention toward reducing cost in ports.

The second question item on the Table sought to know whether transportation assists seaports to grow and maintain their roles in changes as well as helping them to initiate cooperation of movement of persons and goods that can bridge the gap in port, the results indicate that transportation assists seaports to grow and maintain their roles in changes as well as helping them to initiate cooperation of movement of persons and goods that can bridge the gap in port; this was shown by the mean and standard deviation scores of 3.981±0.757. For the third question item, sought to ascertain if ports have policies in place to ensure there are many transport vehicles that are old and under powered remodeled and repackaged, making it challenging to tackle moderate to steep gradients to avoid causing extensive traffic hold-ups. performance of seaports. The respondents were also more inclined to the agree range with the mean and standard deviation scores of 4.552±0.634. This descriptively revealed that ports have policies in place to ensure there are many transport vehicles that are old and under powered remodeled and repackaged, making it challenging to tackle moderate to steep gradients to avoid causing extensive traffic hold-ups. performance of seaports.

In the case of the fourth question item, the mean and standard deviation scores of 4.211±0.930, implies that respondents were more favorable to the agree option that the transportation processes are closely related to logistics infrastructure, including wharves, ports, airports, frozen warehouses, transportation equipment, and other supporting tools in the port. The fifth question item on transportation is to know how transportation facilitates the formation of a wider variety of spatial patterns of human activities and along with communication helps in the governing of a larger area by a single government and tends to promote uniformity in the application of laws and justice in ports. The mean and standard deviation scores of 4.333±0.734, indicate that transportation facilitates the formation of a wider variety of spatial patterns of human activities and along with communication helps in the governing of a larger area by a single government and tends to promote uniformity in the application of laws and justice in ports.

Table 3: 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)*

Table 3: 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 option, 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 4: 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, 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 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 5: 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 5 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 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 Transportation and Sustainability of Ports

In order to examine the relationships that exist between transportation and sustainability of ports the following hypotheses where formulated:

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

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

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

Table 6: Test Result of transportation and sustainability of ports

Statistics	**HO_1**	**HO_2**	**HO_3**
	T (ECONO)	**T (SOCO)**	**T (ENVO)**
Pearson correlation	0.753**	0.804**	0.658**
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

Table 6 shows the inferential test results on the relationships between transportation as a measure of maritime logistics and the measures of sustainability of ports which include economic orientation, social orientation and environmental orientation. These are also expressed in the research hypotheses F_{07}, H_{08} and H_{09}. In the case of H_{07}, the r- value of 0.753 @ p0.000 < 0.01 shows that a strong positive and significant relationship exists between transportation and economic orientation. This means that the null hypothesis has been rejected and alternate hypothesis 7 accepted.

In the case of Ho_8 which examined the relationship between transportation and social orientation, it shows a strong positive and significant relationship. This is indicated with the r- value of =0.804 @ p0.000 0.01. The null hypothesis stated is also rejected in that instance. For $H0_9$, the r- value of 0.658 @ p0.000 <0.01 shows a moderate but significant relationship between transportation as a dimension of maritime logistics and environmental orientation as a measure of sustainability of ports. The null hypothesis stated is also rejected. The inferential results are indicative of the nature of the relationship, thus:

1. Transportation as a dimension of maritime logistics has a positive and significant relationship with economic orientation as a measure of sustainability of ports.

2.Transportation as a dimension of maritime logistics has a strong positive and significant relationship with social orientation as a measure of sustainability of ports.

3.Transportation as a dimension of maritime logistics has moderate and significant relationship with environmental orientation as a measure of sustainability of ports.

From the foregoing, there is a strong positive and significant relationship between transportation and economic orientation, social orientation, and environmental orientation of ports in Nigeria.

DISCUSSION

Relationship between Transportation and Sustainability of Ports in Nigeria

The result associated with the relationship between transportation and sustainability of ports, points to the fact that, transportation, as a complex network, connects cities and accommodates human activities coupling the social, economic and environmental systems with the urbanization and ocean clusters. A vivid examination of the finding reveals that a strong, positive, and significant relationship exists between transportation and economic orientation as a measure of sustainability of ports in Nigeria with r -value of 0.753. This finding agrees with the works of Ezenwa *et al.* (2020) as they submitted that archaeologists have used the occurrence of characteristic technologies as the basis for the classification of prehistorical societies. These classifications are largely based on artefacts left behind by the peoples who once used them and not transport them to where they can be effectively put in use.

The study observed that that transportation actualizes operational main activity in the maritime logistics system as its fundamental importance, all decision makers have directed significant attention toward reducing cost in ports. This finding matches the submission of Ferrari *et al.* (2021) as they revealed that transportation among cities leads to urban aggregation and diffusion, greatly boosting sustainable port development. Also, Gunawan *et al.* (2020) found that the irrational planning of transportation also generates negative effects, such as the ecological destruction, increased traffic accidents, climate change, CO_2 emissions and lower transport efficiency on port sustainability. Hu *et al.* (2019) revealed that the impact of transportation has been a hot topic, and the economic effect of transportation has been receiving more attention and debate because of the pursuit to direct sustainable social orientation of ports.

Tierney et al. (2019) have contended that transportation has a positive effect on sustainability of ports as it creates a pool of investors and business opportunities that transporters can tap into for positive performance results. The point is that transportation allows or permits the firm to match individuals from different professions or tasks and assignments in which they are most competent (Zis *et al.*, 2020). According to Monday et al. (2021) transportation also has a similar impact on sustainability of ports as materials or equipment handling. This view is supported by Kurniawan et al.(2022) who found that transportation increases creativity and innovativeness in business diversification.

Gunawan and Permatasari (2020) found that efficient transportation is the capacity to support the mobility needs of a society in a manner that is the least damageable to the environment and does not impair the mobility needs of future generations. According to Serra *et al.* (2020)., among the logistics functions, transportation induces highest environmental hazard, hence sustainable logistics practice becomes a popular approach among service providers. Kurniawan *et al.*(2022) highlighted the importance of incorporating sustainable transportation practices for logistics service providers more especially in port cannot be over emphasized. Proper practice on sustainable logistics helps in reducing carbon footprint, reduces travel time, increases truck load utilization and improves proper planning on resource usage. At the same time, sustainable logistics practice creates an opportunity for transport service providers to reduce logistics crisis such as cargo theft, damage of cargo/products and mishandling of chemical substances and valuable medical devices instruments.

A further critical analysis of the finding revealed that a strong, positive, and significant relationship exists between transportation and social orientation as a measure of sustainability of ports in Nigeria with r-value of 0.804. On the other hand, the costs associated with more transportation would be related to more difficult communication and coordination (Bankole *et al.*, 2017).

The study found that transportation facilitates the formation of a wider variety of spatial patterns of human activities and along with communication helps in the governing of a larger area by a single government and tends to promote uniformity in the application of laws and justice in ports.

Categorically, a critical analysis of the finding revealed that a moderate, positive, and significant relationship exists between transportation and environmental orientation as a measure of sustainability of ports in Nigeria with r -value of 0.658. The results agreed with Wong et al. (2017) where the

results showed that engaging supplier with higher environmental management capabilities will help focal firm for a better performance environmentally and financially.

The study found that transportation assists seaports to grow and maintain their roles in changes as well as helping them to initiate cooperation of movement of persons and goods that can bridge the gap in port and that the transportation processes are closely related to logistics infrastructure, including wharves, ports, airports, frozen warehouses, transportation equipment, and other supporting tools in the port. Mudronja *et al.* (2020) observed that clients do not favor this particular practice under service offerings, even though transporters are willing to contribute towards client's logistics goals and give full commitment to deliver services as per contract term.

Conclusion

The conclusion of this study offers all-inclusive outcomes of the study. The values possessed by different transportation measures of sustainability of ports. Conclusively, it is apparent in this study that: Transportation is positively related with sustainability of ports. The r = 0.753 @ p0.000 < 0.01 shows a strong positive and significant relationship between transportation and economic orientation. This means that the null hypothesis stated earlier was rejected. In the case of transportation and social orientation the r = 0.804 shows a strong positive and significant relationship. The r = 0.658 @ p0.000 <0.01 shows a weak but significant relationship between transportation and environmental orientation.

Recommendations

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

1. Government should create and encourage conducive transportation environment so that maritime logistics operators can benefit from the economic, social and environmental gains arising from port sustainability in Nigeria.
2. Ports should design and evolve effective transportation strategies and policies, then implement and monitor them in collaboration with major strategic port operators for port sustainability initiatives.
3. The development of transportation by ports in Nigeria should be based on knowledge, technologies and innovative research, which would help to build effective access to transport and integrate other sectors that align with ports for sustainability objectives.
4. Ports in Nigeria should adapt digital transportation system 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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