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ENVIRONMENTAL SUSTAINABILITY PRACTICES AND SUSTAINABILITY AWARENESS IN NIGERIA'S MARITIME INDUSTRY

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ABSTRACT

This article examined the relationship between environmental sustainability practices and sustainability awareness among maritime operators in Nigeria's maritime industry, with emphasis on Port Harcourt and Lagos. The study used the dissertation's original descriptive survey evidence. A structured questionnaire was administered to maritime stakeholders and 303 valid responses were analysed. Descriptive statistics and Pearson Product Moment Correlation (PPMC) were applied using SPSS 27 at a 5% significance level. Respondents disagreed that maritime organizations adequately complied with environmental sustainability policies and that environmental protection measures were effectively implemented, but agreed that waste management systems were adequately maintained, shipping activities were monitored to prevent marine pollution, and sustainability awareness was high. The reported PPMC result was $r = 0.189$, $p = 0.000$, $N = 303$, indicating a statistically significant positive relationship between organizational compliance with environmental sustainability policies and sustainability awareness. The article concludes that environmental awareness is associated with organizational sustainability practice, while implementation and compliance remain important areas for improvement.

KEYWORDS: Environmental Sustainability; Sustainability Awareness; Maritime Industry; Green Shipping; Port Harcourt; Lagos; Environmental Management.

1. INTRODUCTION

The maritime industry is central to international trade, transportation and economic integration. The dissertation notes that maritime transportation carries more than 80% of global trade by volume and more than 70% by value, making shipping a major component of global commerce (UNCTAD, 2023). The scale of maritime activity also creates environmental pressures through vessel emissions, oil spills, waste discharge, ballast water and other operational activities. Environmental sustainability in maritime transport therefore requires the industry to maintain economic functionality while reducing environmental degradation and protecting marine ecosystems (Abood, 2007; Lam & Notteboom, 2014).

In Nigeria, the environmental dimension of maritime activity is particularly relevant because Lagos and Port Harcourt contain major concentrations of port, shipping, logistics and oil-related activities. The dissertation identifies marine pollution, inadequate waste management, greenhouse-gas emissions, weak enforcement, outdated infrastructure and limited adoption of green technologies as sustainability concerns. These conditions create a need to understand not only the existence of environmental policies but also the extent to which maritime organizations translate those policies into operational practice.

Environmental sustainability practices in this article include compliance with environmental policies, environmental protection measures, waste management, monitoring of shipping activities to prevent pollution, and awareness among maritime operators. The article focuses on the first objective area as operationalized in the dissertation's results: the relationship between organizational compliance with sustainability policies and environmental sustainability awareness. This distinction is important because the dissertation's broader aim includes green shipping, but the objective-one inferential table directly connects policy compliance with awareness.

The literature reviewed in the dissertation indicates that environmental sustainability in ports depends on organizational practices, regulatory systems, technological capacity and stakeholder awareness. Lam and Notteboom (2014) discuss greening tools used by ports, while Liu et al. (2020) link sustainability practices with port competitiveness. Nigerian studies address environmental compliance, waste management, green port infrastructure and sustainability performance. Together, these studies provide the context for examining whether organizational environmental practices are statistically associated with sustainability awareness.

2. Problem Statement, Objective and Research Focus

The problem addressed by the study is the continuing gap between the importance of environmental sustainability in maritime operations and the practical level of implementation within the Nigerian maritime industry. The dissertation describes persistent concerns involving marine pollution, oil spills, waste disposal, vessel emissions, ballast water and weak enforcement. Although international instruments such as MARPOL and the IMO Sulphur Cap provide environmental standards, the dissertation notes that compliance and implementation can be constrained by inadequate infrastructure, high technology costs, limited monitoring capacity and institutional weaknesses.

The first objective in the dissertation is stated as examining the effect of green shipping practices on environmental sustainability in Port Harcourt and Lagos. In the abstract and empirical analysis, the first tested relationship is expressed more specifically as the relationship between environmental sustainability practices and sustainability awareness. The corresponding null hypothesis is tested through the correlation presented in Table 4.12. This article preserves the source's operationalization rather than substituting another result.

The research focus is therefore the association between organizational compliance with environmental sustainability policies and sustainability awareness. The decision rule is based on a 5% significance level, with a null hypothesis rejected where $p < 0.05$. Pearson Product Moment Correlation provides the direction and statistical significance of the relationship.

The practical importance of this objective lies in determining whether environmental sustainability awareness is accompanied by organizational environmental practice. A statistically significant association does not by itself establish causation. It indicates that the two measured indicators varied together within the surveyed data.

3. Conceptual Review: Environmental Sustainability

Environmental sustainability refers to the protection, conservation and responsible use of natural resources so that present needs can be met without compromising future generations. The dissertation traces the concept to the Brundtland formulation of sustainable development and emphasizes environmental protection, resource efficiency, pollution prevention and intergenerational responsibility. In maritime operations, the concept includes minimizing emissions, preventing marine pollution, controlling waste, protecting biodiversity and maintaining environmentally responsible port and shipping systems.

Maritime environmental sustainability is multidimensional. Air emissions from ship engines include carbon dioxide, sulphur oxides and nitrogen oxides; marine pollution can arise from

oil, sewage, plastics and other waste; and ballast water can introduce organisms into ecosystems. The dissertation therefore treats sustainability as a system rather than a single environmental indicator. Sustainable maritime operations require coordinated action among shipping companies, ports, regulators, environmental agencies and other stakeholders.

Awareness is one part of this system. Awareness in this study refers to respondents' recognition of environmental sustainability as an important component of maritime operations. Awareness can support organizational commitment, but the dissertation's findings also show why awareness should not be equated automatically with implementation. Respondents reported high sustainability awareness while simultaneously disagreeing that organizations adequately complied with sustainability policies.

Environmental management systems, monitoring, waste reception, pollution prevention and staff awareness are therefore complementary. The literature associates effective environmental management with better port performance and sustainability outcomes (Lam & Notteboom, 2014; Ojo & Yusuf, 2022; Eboh & Okoye, 2024).

4. Green Shipping and the Maritime Context

Green shipping refers to environmentally responsible shipping practices intended to reduce pollution, energy consumption and greenhouse-gas emissions while maintaining maritime transport efficiency. The dissertation identifies low-sulphur fuels, energy-efficient vessels, ballast-water treatment, digital navigation, waste management and slow steaming as examples. Acciaro et al. (2014), Nguyen and Notteboom (2020), Psaraftis (2019), Wan et al. (2020), and Yuen et al. (2020) provide supporting literature.

Nigeria's maritime industry operates within national and international environmental frameworks. MARPOL, the Ballast Water Management Convention and the IMO greenhouse-gas strategy provide international standards, while Nigerian institutions such as NIMASA, NPA and NOSDRA have responsibilities related to maritime administration, port operations and environmental response. The dissertation emphasizes institutional coordination because sustainability outcomes are influenced by multiple organizations.

Port Harcourt and Lagos are important because they contain major concentrations of maritime and logistics activity. The study therefore treats sustainability awareness as a stakeholder issue rather than a matter restricted to vessel owners. The involvement of port personnel, independent operators and other maritime stakeholders allows the study to consider perceptions across organizational categories.

Green shipping should consequently be understood as part of broader environmental governance. Cleaner technology without monitoring may not deliver intended outcomes, while regulation without infrastructure may be difficult to implement.

5. Theoretical Framework

Ecological Modernization Theory (EMT) is central to the dissertation. Mol and Spaargaren (2000) explain ecological modernization through technological innovation, institutional transformation and integration of environmental concerns into production systems. In maritime transport, this translates into cleaner technologies, efficient systems and stronger environmental governance.

EMT is relevant to sustainability awareness because organizations require institutional mechanisms through which environmental considerations become part of routine decision-making. Environmental policies, audits, training, monitoring and technological investment can make environmental concerns visible in operational systems. The dissertation's finding that sustainability awareness is significantly related to organizational environmental-policy compliance is compatible with this perspective.

Sustainable Development Theory provides a second supporting perspective. It emphasizes balance among economic, environmental and social objectives. In maritime transport, environmental protection cannot be separated from trade, employment, logistics and coastal livelihoods. The dissertation applies this framework to argue that sustainable shipping should reduce environmental harm while maintaining economic and social functions.

Institutional Theory is also relevant. Scott (2014) explains how organizations respond to regulative, normative and cognitive institutional pressures. International conventions, national regulations, professional standards and industry expectations can influence environmental practices. The result can therefore be interpreted within an institutional environment.

6. Empirical Literature Review

The empirical literature reviewed in the dissertation covers port environmental management, shipping emissions, green technologies, regulatory compliance and sustainability. Abood (2007) emphasizes sustainable maritime transport, while Lam and Notteboom (2014) examine environmental management tools in ports. Acciaro et al. (2014) examine the economics of green shipping technologies.

Studies within the Nigerian context identify environmental governance and implementation challenges. Adamu (2022) addresses maritime environmental laws and regulatory effectiveness, Ogunleye (2021) considers environmental compliance among shipping operators, Ibrahim (2021, 2022) discusses institutional capacity, and Chukwu and Nwosu (2021) examine waste management and marine pollution.

Recent studies consider green port infrastructure and sustainability performance. Akinwale (2026) reports on green port infrastructure in West African maritime hubs, while Eboh and Okoye (2024) examine green port development. Liu et al. (2020) connect environmental sustainability practices with port competitiveness.

The literature also shows that environmental awareness alone does not guarantee implementation. Institutional capacity, technology, finance, infrastructure and enforcement influence whether policies are translated into operational action. The present study contributes stakeholder evidence linking organizational environmental-policy compliance with sustainability awareness.

7. METHODOLOGY

The dissertation adopted a descriptive survey research design. The study focused on maritime stakeholders in Port Harcourt and Lagos and examined environmental sustainability and green shipping practices in Nigeria. The target population was reported as 1,250 stakeholders across relevant maritime categories. A sample of 303 respondents was derived using the Taro Yamane formula at a 0.05 level of significance.

A stratified random sampling technique was used. The questionnaire was the principal instrument for primary data collection. Section A collected demographic information, while Section B addressed environmental sustainability and green shipping practices.

The dissertation reports that 303 questionnaires were administered, 303 were retrieved, none was unreturned, none was invalid, and all 303 were used for analysis. This represents a 100% retrieval and valid-response rate. Respondents included port authority personnel and independent operators.

Data were analyzed using frequencies, percentages and weighted means. A criterion mean of 3.0 was used for the four-point Likert analysis reported in the results. Inferential analysis was conducted using Pearson Product Moment Correlation with SPSS version 27.0. The decision rule was to reject the null hypothesis when $p < 0.05$.

8. Descriptive Analysis of Sustainability Practices

Table 1. Sustainability-practice indicators from dissertation Table 4.8.

Indicator	Mean	Decision
Policy compliance	2.3	Disagreed
Protection measures implemented	2.5	Disagreed
Waste management maintained	3.3	Agreed
Pollution monitoring	3.3	Agreed
Sustainability awareness	3.3	Agreed

Source: Field Survey (2026), dissertation Table 4.8.

The descriptive results present a mixed picture of sustainability practice. Policy compliance and effective implementation were below the criterion mean, while waste management, pollution monitoring and awareness were above it. This indicates that respondents recognized some operational sustainability activities and awareness while perceiving weaknesses in broader organizational compliance.

The distinction is important: waste management and monitoring can exist within operational routines even where wider policy compliance is perceived as inadequate. Similarly, awareness may be relatively high without corresponding institutional implementation.

9. Inferential Analysis and Hypothesis Test

Table 2. Pearson Product Moment Correlation for Objective One.

Relationship	r	p-value	N	Decision
Policy compliance ↔ sustainability awareness	0.189	0.000	303	Reject H0 ₁

Source: Research Survey (2026), dissertation Table 4.12.

The Pearson coefficient of 0.189 indicates a positive association between organizational compliance with environmental sustainability policies and environmental sustainability awareness. The p-value of 0.000 is below 0.05, so the dissertation rejects the null hypothesis. The coefficient is small, so the finding should be interpreted as a statistically significant association rather than evidence that compliance alone determines awareness.

Other influences may include professional training, regulatory exposure, organizational culture, technological capacity, stakeholder engagement and prior environmental experience. The result is consistent with the dissertation's conclusion that sustainability awareness is increasing while implementation and compliance remain areas of concern.

10. DISCUSSION OF FINDINGS

The first objective found a statistically significant positive relationship between organizational compliance with environmental sustainability policies and sustainability awareness. The descriptive findings provide context: respondents agreed that waste management systems were adequately maintained, shipping activities were monitored to prevent pollution, and sustainability awareness was high, but disagreed that organizations adequately complied with sustainability policies.

The finding is broadly consistent with literature emphasizing environmental management systems and institutional practices in ports. Lam and Notteboom (2014) identify environmental management tools as important elements of port greening, while Ojo and Yusuf (2022) discuss environmental management systems in Nigerian seaports.

The result can also be interpreted through Ecological Modernization Theory. If environmental concerns become embedded in organizational structures, awareness may become more prominent among operators. However, the small coefficient suggests that awareness is not explained by compliance alone.

The finding has practical implications for port operators and regulators. Awareness programmes should be accompanied by measurable environmental management systems, audits, reporting mechanisms and corrective-action processes.

11. Implications for Maritime Environmental Management

Environmental sustainability should be managed through integrated organizational systems. Maritime organizations should translate environmental policies into operational procedures defining responsibilities for waste management, pollution prevention, monitoring and reporting.

Awareness programmes should be continuous rather than one-off activities. Training should connect environmental requirements with everyday maritime operations. Regulators and port authorities can strengthen monitoring through routine inspections, documentation and environmental performance indicators.

Because maritime operations involve several institutional actors, fragmented responsibilities may reduce implementation effectiveness. Collaboration among NIMASA, NPA, environmental agencies, port operators and shipping companies can support consistent standards and reduce monitoring gaps.

Environmental indicators can also be incorporated into operational reviews, contractor management, procurement and staff performance. Such integration would make environmental responsibility a routine component of maritime management.

12. Recommendations

Maritime organizations should strengthen compliance with environmental sustainability policies by developing comprehensive environmental management systems, conducting regular environmental audits and implementing continuous awareness programmes.

Shipping and port organizations should maintain and improve waste management systems and pollution monitoring. Environmental monitoring should cover waste, emissions, pollution incidents and other relevant operational risks.

Regulatory institutions should improve the consistency of environmental enforcement through inspections, effective sanctions, policy review and improved institutional capacity.

Training should cover international conventions, national requirements, pollution prevention, waste handling, incident reporting and green technologies, with programmes adapted to specific stakeholder responsibilities.

13. CONCLUSION, CONTRIBUTION AND LIMITATIONS

The article concludes that environmental sustainability practices and sustainability awareness are statistically associated among the maritime stakeholders studied. The PPMC result of $r = 0.189$ and $p = 0.000$ provides evidence of a significant positive relationship.

The contribution is Port Harcourt- and Lagos-focused stakeholder evidence linking organizational environmental-policy compliance with sustainability awareness and highlighting the difference between statistical significance and relationship strength.

The cross-sectional survey design does not establish causality. Future research can combine survey responses with emissions measurements, waste records, inspection data, environmental-performance indicators and longitudinal observations.

Overall, the study supports an integrated environmental-management approach in which awareness, policy compliance, operational monitoring, technology and enforcement are treated as connected elements.

14. Publication Note

This article was prepared directly from the uploaded M.Sc. dissertation. The terminology, methodological approach, statistical results and interpretations are retained from the source. The correlation reported here is the relationship presented in the dissertation's Table 4.12.

The complete reference list from the dissertation is reproduced below so that the article captures the publication base supplied in the source file.

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