



2nd FPISMS International Conference

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SHIPPING HUSBANDRY AND ECONOMIC SUSTAINABILITY: EVALUATING NIGERIAN COMPANIES' STRATEGIES

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Abstract

Shipping husbandry, which incorporates the variety of services needed for sustenance, operational and managerial services of a ship, is integral in the maritime sector. In Nigeria, which is a country with an expansive range of maritime activities, sustainable shipping husbandry is paramount for the protection of the environment, economic development and standardization with global perspectives. This paper provides sustainable development strategies in shipping husbandry positioned in Nigeria with respect to vessel maintenance, bunkering and crew. The research had a descriptive research design with structured questionnaire designed to obtain information from a sample of 166 respondents extracted from the census of 286 workers of two shipping companies in Lagos, Nigeria. Analysis was done using simple linear regression from SPSS version 26, while results suggested that all the independent variables statistically significant with economic sustenance with p value of 0.000, 0.001 and 0.000 respectively. Hence the study concluded that sustainability in shipping husbandry is an important precondition for the sustainable development of Nigeria's maritime sector.

Keywords: Ship Husbandry, Vessel Management, Bunkering, Crew Management, Economic Sustainability.

Introduction

The shipping industry is a foundation of global trade, transporting goods and supplying resources worldwide shared on a daily basis, and shipping husbandry is a significant part of this maritime industry that includes services such as maintenance, crewing and compliance (legal and mandatory responsibilities). All of these are core principles and processes directly affecting maritime transport and its viability as a major part of international trade. In Nigeria where the maritime industry is a key facet of economic activities, adopting sustainable practice within its shipping husbandry to improve economic resilience and preserve environmental resource, with operational efficacy, continued growth of the industry and maintenance of international competitiveness has become more than a necessity (UNCTAD, 2023).

Nigeria, in being strategically poised along the Gulf of Guinea is an advantage for the region and the world by facilitating trade in crude oil, exports of agricultural products and manufactured goods. Nonetheless, it is challenged by insufficient port facilities, devoid of legal regime's enforcement, burden of operation cost and environmental threats associated with shipping. These challenges raised the need for Nigerian shipping companies to explore better sustainability strategies to sustain economic growth without compromising environmental and social responsibility (NIMASA, 2022).

In shipping husbandry, economic sustainability is the container and vessel's ability to perform their business with the intention of duly making a profit with minimum environmental footprint while being a viable business for the years to come, in entrusting a better environment for the next generations. Therefore, achieving this would require better management of resources, new approaches and advancement of green technologies, taking on skilled labor, working collaboratively with those having the same mindset, engaging with local, national, and international regulatory compliance with the use of all the information found from <https://www.imo.org/>. Here, shipping companies and ports, which are a shipping company's operations and logistics, must work together to enhance sustainability based on strategies such as e-business processes, green vessel maintenance, waste management systems (IMO, 2023).

The maritime industry is still a significant area contributing to economic development in Nigeria (particularly with an administration that has emphasised blue economy as sustaining the ocean resources for economic growth, better livelihood and economic conservation) (Adegbite and Eze, 2021). However, given the prospects it has to offer, the sector is facing multiple sustainability issues, that limits its efficiency and consequently long-term viability. Nigerian shipping companies cannot out compete, do sufficient vessel maintenance because of constraints such as not enough dry-docking facility, and limited supply of spare parts thus they are forced to operate at inflated costs more often resulting in operational surprises that leaves the operator to always being concerned without having a contingency plan, which is most dangerous and using spare parts that is deemed illegal.

Furthermore, where there are illegal bunkering discoverable as a service or operational culture of custom, and inefficient fuel management will demonstrates are operational efficiency and environmental harm (NIMASA, 2022). Moreover, shipping companies also experience barriers to examining, international registered mariners have remained the same as it can recruit, train and maintain its seafarers sustainably, as US\$1000.00 is not enough for a sustainable livelihood for maritime digits in Nigeria or the region as many maritime professionals seek beyond the Nigerian borders to realise better terms of engagement as challenges from low salary, poor working conditions and no advancement prospects.

Furthermore, there are sustained investment into meaningful maritime education and training institution like the Maritime Academy of Nigeria and Nigeria Maritime University, because of a limited pool of skilled members which is reflected in those areas for our efficient operations, which are also safety-conscious in light that many businesses may liable their business interests to any legal and international pledges and the institution of the human aspects of international labour standardisation is also a weakness performed by most companies (IMO, 2023).

It is thus necessary to address these issues and enhance the sustainability and competitiveness of Nigeria's maritime sector. Without tangible and effective remedies, the nation will continue to suffer from inefficiencies, putting people at risk, continuing to damage the environment, and losing money in the process. In this case, this research will assess the practices used by Nigerian companies to enhance sustainability in vessel maintenance, bunkering, and crew management, so ultimately best practice and policy recommendations can be offered for a more resilient maritime sector.

Literature Review

Ship Husbandry:

Ship husbandry encompasses all aspects of maintenance, cleaning and for general upkeep of a ship's hull, rigging, and equipment that contribute to aspects of routine care of ships such as hull cleaning, painting, and repairs as well as a variety of other types of underwater maintenance. Ship husbandry is necessary in maintaining or preparing vessels to be seaworthy, efficient and compliant with relevant safety regulations. This service is available for all vessel types, including cruise vessels, military vessels, famous sail vessels, and ships of schools. The role of ship husbandry in economic sustainability involves, but is not limited to, Improved operating efficiencies, Reduction in emissions and impacts to environment, Efficiencies to number of ship husbandry dollars spent, with ethical obligations to government compliance.

Vessel Maintenance

Vessel management includes all aspects of managing and administration of a vessel's operations, including maintenance, compliance with regulations, and safety plans. Effective vessel management will allow vessels to operate efficiently while reducing risks of failure, accidents, and pollution (UNCTAD, 2023). Proper vessel management will sustain its economic sustainability by shortening down time, cost of repairs, and lengthening the life of maritime assets.

Bunkering

Bunkering is a vital component of the maritime logistics system, and refers to supplying fuel to ships to power themselves and their auxiliary operations. Bunkering involves transferring Fuel oil from storage facilities or tankers to the vessel's bunker tanks and occurs at terminals or specific offshore locations (International Maritime Organization [IMO], 2022). Sustainable bunkering practices behaviour relate to the environmental implication in shipping bunker fuel storage and where reductions or eliminations in emissions or impacts result from the implementation of low-sulfur fuels or energy alternatives (NIMASA, 2022). The fuel management process greatly impacts economic sustainability of providing bunkering services in the shipping sector as being efficient in fuel management costs reduces the payout for the shipping company. At the same time, issues related to economic sustainability, such as illegal bunkering and fuel adulteration, are factors that also are risks that have both an economic impact through lost revenue and an environmental impact due to spills and other damages.

Crew Management

Crew management involves recruitment, training, and looking after the welfare of seafarers and ensuring that the vessels are being operated by capable professionals. There are clear benefits from a crew management perspective because a well-managed crew will enhance safety, operational efficiency, and compliance with the internationally agreed maritime labour standards (ILO, 2023). In the case of Nigeria, economic sustainability of crew management could be improved by sustainable investments in maritime education, promoting the attractive nature of competitive wages and better working conditions. However Nigeria faces challenges such as few maritime education facilities, and major attrition due to crew receiving better offers abroad (UNCTAD, 2023).

Economic sustainability: The concept of economic sustainability in ship husbandry practices relates to implementing maintenance and operational practices that afford the long-term profit and viability of the vessel's business while minimizing on-going environmental performance and social performance as part of that business. It is based on a resource management strategy to practice economic sustainability by complying with environmental regulations and looking after the well-being of the crew and crew member's families to ensure sustainable long-term vessel business decisions can be made for a sustainable maritime operation. Agriculture is going in a more sustainable direction - so if the focus of boat operators in shipping (say 30%) is on the vessel's sustainable ship husbandry practices, say vessel business, it is possible and likely that using and adhering to sustainable ship husbandry practices in this shipping sector could improve their fuel efficiencies and what they might spend on a sustainability basis. By having sustainable ship husbandry practices developed, ship operators can be assured a level of cost compliance and mission statement adherence while hoping for a long-term economic outlook on their investment in the wider direction of development that keeps developing shipping industry.

Theoretical Review

The study is anchored on Reliability-Centered Theory (RCM) for Ship Husbandry and Triple Bottom Line (TBL) Theory for Economic Sustainability.

Reliability-Centered Maintenance (RCM) Theory originated from the work of Stanley Nowlan and Howard Heap in 1978 while they were at United Airlines participating in a study commissioned by the U.S. Department of Defense. The study was aimed at improving aircraft maintenance processes, as a shift away from time-based maintenance (in which specific actions like inspections and part replacement occur at regular time intervals), to a planned-out and reliability-centered framework. The basic premises of RCM theory all focus on the need to sustain functions of a system through the lens of identifying the best maintenance actions for asset criticality, failure risks, and failure consequences based on operational needs.

In RCM thinking, maintenance follows the maintenance plans on the basis of reliability as opposed to the traditional time-based (or usage) maintenance strategy with no consideration of reliability (i.e., strict time intervals). Reliability-Centered Maintenance is an important strategic maintenance

philosophy that supports optimization for sustainable ship husbandry. If shipowners in Nigeria apply or adopt RCM as part of their ship husbandry philosophy, vessel reliability, fuel-efficient performance, and crew reliability will improve which contributes to long-term economic sustainability and environmental responsibility.

The **Triple Bottom Line (TBL) Theory** was originally set out by John Elkington in 1997. Elkington, a British sustainability consultant, and entrepreneur, came up with the idea in his book *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. TBL Theory describes the importance of redefining success to include sustainability in a company's corporate performance, NOT just in terms of profit made. TBL Theory argues that organizations need to embrace three pillars of sustainability, the 3P (People, Planet and Profit). The stark difference between TBL as explained by Elkington and typical capitalist business models is that TBL requires that all three represent a balance. Most capitalist models of business operate for profit only, not considering beneficial impact for people and planet, therefore no long-term "value" for shareholders in terms of beneficial outcomes for company stakeholders.

Empirical Review

In the current study by Poi and Moko (2023), The paper provided empirical evidence of the relationship of Sustainable Shipping Practices on Supply Chain Performance of Shipping Firms in south-south Nigeria. The method used for the research was survey design, and descriptive research design. The population of study had and comprised twenty-three (23) Supply chain managers of shipping firms in south-south Nigeria. Due to the population size, the census approach was used. The authors administered twenty-three (23) copies of questionnaire and retrieved twenty (20) usable copies for data analysis. The authors appropriated research hypotheses and tested them using Multiple Linear Regression with the use of IBM (SPSS) software, version 25. The authors' data analysis revealed that a 1% decimal increase in Sustainable shipping practices, Supply chain performance will increase as a decimal by a value of 0.523% (B value). The study's conclusion was Sustainable shipping practices have substantial and positive impact on Supply chain performance.

Methodology

The study adopted a descriptive research design in order to describe and expand the knowledge of the research phenomenon. The population of the study covered two hundred and eighty-six (286) employees of two selected Shipping companies: Wasa Demas Shipping Company Ltd and Lagos and Niger Shipping Company Ltd, Lagos Nigeria. The rationale behind the choice of only these two companies was because they receive and are involved in more shipping activities than the others. Using the Taro Yamane formula, a sample size of 166 respondents were purposively selected and a structured questionnaire on a 4-point Likert scale of strongly agree to strongly disagree was used to collect data from them. From the 166 questionnaires, only 149 was retrieved and found valid for analysis. The data was analyzed using descriptive and inferential statistics while the hypothesis was tested using simple linear regression method from SPSS version 26.

Result and Findings

Table 1: Reliability Statistics

Cronbach's Alpha	No of Items
.867	20

The table shows an alpha value $\alpha = .867$ in the reliability test which is an indication that the instrument is very reliable. This indicates that, it can measure accurately, what is set to measure in a similar circumstance all the time.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.687 ^a	.473	.463	3.60346	.473	100.330	3	367	.000

a. Predictors: (Constant), VEM, BUN, CRM

b. Dependent Variable: ES

The R-Square value $R^2 = .473$ indicates that the independent variables when combined influence green innovation . It means that about 4738% of the total variability in economic sustainability is jointly explained by vessel management, bunkering and crew management.

Table 3: Anova

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3809.328	3	1302.658	100.380	.000 ^b
	Residual	4736.542	367	13.589		
	Total	8530.997	370			

a. Dependent Variable: ES

b. Predictors: (Constant), VEM, BUN, CRM

The table above shows the associated probability value of the analysis of variance f-statistics $P < .05$ in $(f[3/367] = 100.380; P < .05)$ implies that the null hypothesis is rejected at 5% significant level.

Table 4: Coefficients

		Unstandardized Coefficients		Standardized Coefficients		

Model		B	Std. Error	Beta	T	Sig.
1	(Constant)	4.023	.623		8.389	.000
	VEM	.857	.085	.667	9.856	.001
	BUN	.324	.075	.199	3.237	.000
	CRM	.328	.067	.280	6.356	.000

- Dependent Variable: ES

The coefficient table demonstrates both relative effect and significance of each of the explanatory variable on the dependent variable. The results highlighted a positive relationship between vessel management, bunkering and crew management with statistical value $\beta = .857, .324$ and $.324$; $t = 9.856, 3.237$ and 6.356 respectively on economic sustainability. The table further shows the significance of the variables in terms of significance at the 0.05 level from which the hypothesis will be tested.

Conclusion and Recommendation

The study objective was to examine the strategies adopted by Nigerian Shipping Companies in Ship Husbandry and Economic Sustainability using Wasa Demas and Lagos/Niger Shipping Companies, Lagos Nigeria. The first and second objective examined the effect of vessel management, bunkering and crew management on the economic sustainability of the companies. With a p-value of 0.000, 0.001 and 0.000 respectively, the study concluded that there is a statistical significance and strong positive relationship between the sub-variables and dependent variable.

Following the referenced conclusions, this research proposed that;

Shipping businesses would be well-served by investing in more modern predictive maintenance and digital monitoring technologies to increase fuel efficiency and operational dependability and ultimately reduced costs and improved environmental sustainability;

Implementation of tighter regulatory frameworks and eco-friendly fuels, such as LNG (Liquefied Natural Gas), can help positively advance Nigeria's maritime fuel industry;

The government should address maritime labour mobility issues with enhanced training programs and financial support to optimize workforce retention and create a supply of skilled labour to meet the ship-crewing needs of the industry.

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