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ISPS CODE IMPLEMENTATION AND OPERATIONAL EFFICIENCY OF SEAPORTS IN EASTERN NIGERIA

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Abstract

This study examines the relationship between ISPS code implementation and operational efficiency of Eastern Nigeria seaports The specific objectives are to empirically examine the relationship between ISPS code implementation and operational efficiency in terms of cargo dwell time, stakeholder satisfaction and operational cost of seaports in Eastern Nigeria. The study adopted the cross- sectional survey as its research design. The study population consists of - four (4) seaports operating in Nigeria. The study took a census. Thirty (30) respondents were drawn from each of the seaport making a total of one hundred and twenty (120) respondents to whom copies of structured questionnaires were administered. However, one hundred and fourteen (114) respondents were retrieved and used for analysis. The hypotheses were tested using the Pearson Product Moment Correlation with the aid of statistical packages of social science (SPSS) version 27.0. The study's findings revealed that there is a very strong, positive and statistically significant relationship between ISPS code implementation and operational efficiency of seaports in Eastern Nigeria. The study concludes that ISPS code implementation significantly relates to operational efficiency of seaports in Eastern Nigeria; and it is recommended that, port administrators in Eastern Nigeria should continually evaluate and gauge outcomes of implementation to the code in order to improve operational efficiency of the seaports.

Keywords

ISPS code implementation, Operational Efficiency, Cargo dwell time, Stakeholder satisfaction, Operational cost.

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INTRODUCTION

Notwithstanding the strategic importance of seaports in promoting economic development and regional commerce, Nigerian ports, particularly those in the Eastern corridor like Rivers, Onne, Delta, and Calabar, persistently have operational inefficiencies. A significant factor in this inefficiency is the increasing insecurity in and around the port areas. Maritime security violations, including as piracy, cargo theft, smuggling, and infrastructure sabotage, have grown pervasive, diminishing the competitiveness of Eastern Nigerian ports and hindering national development initiatives (Olalere et al., 2015; Okolie & Eze, 2019). The marine safety system of the Eastern Nigeria seaport remains unoptimised, potentially adversely affecting the transportation of commodities and the mobility of people along sea routes. Ufia et al. (2021) indicate that the incidence of marine assaults at Eastern ports markedly escalated during concessioning, highlighting enduring institutional deficiencies in port security control. The long-term safety and security of shipping routes and ports are essential for the sustainability of the marine ecology (Jesugbamila, 2010). The Nigerian government has adopted many International Maritime Organisation (IMO) standards or conventions related to the security and safety of ports and maritime infrastructure. The federal government has initiated actions to implement the provisions of the Act both domestically and via the relevant federal agencies (Onwuegbuchunam et al., 2021). Despite the adoption of international standards like the ISPS Code, implementation is hindered by corruption, insufficient budget, and a lack of political will (National Security Strategy, 2019; OECD, 2003).

The ISPS Code is a vital worldwide security project with ramifications extending well beyond the marine industry. The International Ship and Port Facility Security Code (ISPS) principally focusses on marine safety regulations concerning vessels, ports, cargo, and personnel. According to Nordfjeld and Dalaklis (2018), a pivotal framework of maritime security regulations in international law is the International Ship and Port Facility Security Code (ISPS Code), established by the International Maritime Organisation (IMO) in response to the catastrophic events of September 11, 2001, and implemented in 2004. The ISPS Code offers an extensive array of measures aimed at bolstering the security of vessels and port facilities, formulated in reaction to perceived threats, with an emphasis on preventing or mitigating the effects of terrorist activities (International Maritime Organisation, 2012). The security and safety of shipping and port facilities are essential for mitigating hazards for vessels entering and departing ports, as well as for users of port facilities. The ISPS protocol is an essential marine regulation for the security and safeguarding of boats, coastlines, cargo, and personnel. In light of increased efforts to enforce the ISPS Code, ports, cargo handlers, seafarers, and port operators have been recognised as noncompliant with the prescribed measures outlined in the codes. Septian et al. (2016) said that the effective application of the ISPS Code is shown by the safeguarding of port facilities, the inspection of individuals and commodities entering and departing the port area, and the enforcement of Port Facilities Security measures. Ndikom (2011) asserted that the operational efficiency of the port encompasses all activities necessary for facilitating the movement of cargo, including the processing of cargo documentation, from the vessel's arrival at the port, through the discharge of goods and internal mobility, to the subsequent transportation of the cargo out of the port by

a designated mode of transport to its final destination. The execution of this code may need supplementary security measures for vessels arriving, berthing, loading, or discharging cargo in port, and these extra procedures, instituted in accordance with the ISPS code, may enhance port operations or have an adverse effect.

The examination of empirical literature reveals a gap between the deployment of the ISPS code and operational efficiency. Deficiencies in enquiries mostly focus on characteristics that vary from those used in the present inquiry. Gkika et al. (2025) assessed and analyzed the major success elements influencing stakeholder satisfaction resulting from the implementation of the ISPS Code at Greek ports. Onwuegbuchunam et al. (2018) developed a performance evaluation criterion to analyse the impact of adherence to the ISPS Code's standards on port and terminal operations in Nigeria. Sadovaya and Thai (2015) investigate the effects of the Effective Maritime Security Management Model (EMSMM) on the organisational performance of shipping enterprises. The aim of this study was to augment the literature by examining the relationship between ISPS code implementation and the operational effectiveness of seaports in Eastern Nigeria.

ISPS CODE IMPLEMENTATION

The adoption of the ISPS Code refers to the extent of compliance with the International Ship and Port Facility Security (ISPS) Code mandates for the protection of vessels and port facilities (National Security Strategy, 2019; IMO, 2002). The International Ship and Port Facility Security (ISPS) Code is an essential marine legislation that guarantees the safety and security of vessels, ports, cargo, and personnel. Onwuegbuchunam et al. (2016) assert that the International Maritime Organization's adoption of the International Ship and Port Facility Security (ISPS) Code, along with other transport security measures, aims to address security challenges in maritime transport and thereby avert or mitigate potential adverse effects on the international transport and trading system. The adoption of the ISPS Code (International Ship and Port Facility Security Code) in ports seeks to safeguard port facilities and vessels against security threats, including terrorism, smuggling, and other criminal activities. Since its introduction on July 1, 2004, by the Nigerian State, the ISPS Code has established mandated security requirements for international maritime transit, aimed at mitigating various risks to the safety and security of ships and vessels. port infrastructure (UNCTAD, 2021).

The execution of this code encompasses many steps, including the evaluation of port facility security, the formulation of a port security strategy, and rigorous oversight and access restrictions. Furthermore, ports must include sufficient security apparatus, including surveillance cameras (CCTV), monitoring systems, and identification protocols. Consequently, to guarantee that the implemented solutions are optimal, an assessment of the specific hazards in each instance must be conducted (Moerel & Dezeure, 2017). The ISPS Code emphasises port cybersecurity practices concerning human factors, infrastructure, and procedures. These variables empower the pertinent operators to avert the loss of cyber infrastructure and assets due to cyber attacks. The International Code for the ISPS delineates the security protocols for vessels and port infrastructure in anticipation of potential attacks. The primary aims of the ISPS Code are standards, uniformity, and reliability. Collaboration

among port authorities, governments, and corporate organisations is essential for the effective execution of the ISPS Code, since port security is a collective duty rather than the obligation of a single entity (UNCTAD, 2021). The effective implementation of the ISPS Code can be achieved by securing port facilities, inspecting individuals and cargo entering and exiting the port area, and executing the Port Facility Security Plan as delineated in ISPS Code Part A.16 and Part B.16 (Septian et al., 2016). The enforcement of the ISPS Code on vessels necessitates a thorough ship security assessment, the designation of a Ship Security Officer (SSO), and the formulation of a ship security strategy including preventative measures and emergency protocols (UNCTAD, 2021). The implementation of the ISPS Code has improved the environment for port operations. It has facilitated the eradication of wharf rats, hawking, touting, and other unlawful activities in Nigeria's maritime domain, resulting in increased patronage by port users. The enforcement of the ISPS Code aboard vessels and harbours is crucial for maintaining operational safety and security in the maritime domain.

OPERATIONAL EFFICIENCY

Operational efficiency is defined as the organization’s ability to decrease wastage of inputs and maximize resource utilization by increasing supply quality and eliminating low-quality products and services for customers (Jayawardena, 2020). Ancor et al., (2016) define efficiency as the ability to achieve an end goal with little to no waste, effort, or energy. Being efficient means, achieving results by putting the resources available in the best way possible. Operational efficiency of ports is a keen component of port performance (Notteboom et al., 2021). With regard to port, input may be numerous and difficult to calculate. For example: utilized space, multiple currencies and operational hours. The major determinant of efficiency is berthing productivity. Port efficiency is a multi-dimensional concept that refers to operational performance, particularly the maximization of the produced output or the production of a given output with limited possible resources. The efficiency of port operations, which includes not only ship-to-shore gantry cranes, but also operations in the terminal area from container stacks to berth-side, as well as patterns of arrival and departure of containers through entry gates may influence vessel turnaround time. Efficient operations lead to reduced turnaround times for ships, lower operational costs for shipping companies, and increased customer satisfaction due to reliable schedules (Hart, 2019). Hence, in this study, operational efficiency in the ports is measured in terms of cargo dwell time, stakeholder satisfaction and operational cost.

Cargo Dwell Time

Cargo dwell time denotes the duration cargo remains at a port from its arrival until it is cleared and sent for further transit. Cargo dwell time is a crucial performance metric for assessing the operational efficiency of seaports worldwide, especially in developing areas. Theophilus, Nwokedi, Nwachukwu, Eru, and Nwokeka (2022) define cargo dwell time as the duration from the arrival of cargo at the port to the moment the consignee or their agent retrieves it from the port premises, following the completion of all permits, customs procedures, and other clearances. Effective cargo management and decreased stay times are essential for augmenting port competitiveness, lowering operating expenses for shippers and

importers, and improving the overall commerce flow. Detention time affects port productivity and efficiency; hence, decreasing detention time will enhance port productivity. From a supply chain viewpoint, stay time serves not only as a terminal statistic but also as an indicator of corridor efficiency, affecting shippers' route decisions and, therefore, port competitiveness (UNCTAD, 2021).

Stakeholder Satisfaction

Stakeholder satisfaction refers to the views and experiences of port users (importers/exporters, shipping lines) about the efficacy and efficiency of port security and operations (Okolie & Eze 2019; Mensah et al. 2023). Stakeholder satisfaction refers to the extent to which a stakeholder perceives that the advantages gained by using port services match or beyond their expectations. Stakeholders are individuals or groups that may influence or are influenced by the attainment of an organization's goals. Stakeholders, as defined by Blackburn (2019), are individuals or entities that influence or are affected by the success or failure of an organization's activities. A stakeholder is an entity or person with an interest in or expectation of an organization's activities, and organisations must understand the needs of various stakeholders. Comprehending how relationships with stakeholders might enhance the firm is an essential aspect of the strategic manager's responsibilities. An organisation may ascertain if its objectives align with the demands of diverse stakeholders by assessing their expectations. Ju and Liu (2015) said that a port must be readily accessible and fulfil the safety requirements of its users and the broader community to adequately serve its stakeholders. The importance of ensuring a safe, healthy, and secure environment at the port for workers and other stakeholders cannot be overstated.

Operational Cost

The operational cost of security delays refers to the financial impact resulting from extended inspections, redundancy, extortion, or disruptions associated with shortcomings in security management (Oyetunde et al. 2024; Ufia et al. 2021). The ocean functions as an international commercial route, offering economical and extensive transportation services. This indicates that port operations include a range of interdependent and interconnected duties performed daily by human resources and machinery to provide effective and efficient administration of port infrastructure. Inefficient ports beset by insecurity disrupt the seamless flow of imports and exports, resulting in delays and heightened costs across the supply chain. In the shipping industry, the cost of delivery, dependability, and predictability of the carrier are essential factors that importers and exporters must evaluate. The inadequate dependability and predictability of logistics services elevate hedging costs and inventory maintenance requirements, underscoring the need for effective service delivery, enhanced port infrastructure, and workforce training in security (Ziaul and Hans-Joachim, 2018). The efficacy of container terminal operations is a vital determinant of a port's competitiveness and, therefore, an indication of a nation's economic advancement and capacity to attract international commerce (Hlali, 2017).

EMPIRICAL REVIEW

In relation to port performance, the study based on the questionnaires developed by UNCTAD (2007) found that ISPS code compliance improved market standing, increased truck turnaround, and ship-owners' confidence, which in turn led to an increase in the number of ships calling at the port. Despite the high demand for security measures and the resulting increase in transport costs, particularly in developing nations, it was determined that factors such as screening procedures, port worker passes, improved planning of container yards, and improved internal organisation all contributed to greater efficiency. Applying the ISPS Code to Greece's ports allowed Gkika et al. (2025) to quantify and analyse key success indicators for stakeholder satisfaction. A total of 109 port operators, shipping businesses, government personnel, and stakeholders were surveyed using a simple sampling method. Stakeholders at the port were quite pleased with the outcomes of the ISPS Code implementation after using the multicriteria satisfaction analysis (MUSA) approach to examine the data. Compliance with the criteria of the ISPS Code on the operation of Nigerian ports and terminals was the subject of a performance evaluation criterion created in the research by Onwuegbuchunam et al. (2018). Questionnaires were sent out to a stratified random sample of port users in order to collect the main data for the research. The study's guiding hypotheses assumed that port operations would benefit from the ancillary impacts of more port facilities and security measures implemented to meet the requirements of the ISPS code. Analyses of the data showed that the operational performance of Nigerian ports improved when they were required to comply with the ISPS code. Profitability and consumer happiness were also shown to have similar impacts. Using the port of Tin-can Island as a case study, Onwuegbuchunam et al. (2016) evaluated the impact of ISPS code implementation on port operations. The Tin-can Island Annual Port Report, which details the operating statistics of the port, was the primary source of data. The t-test statistic of difference of means, together with the assistance of computer-based software known as SPSS version 21, was used to examine four hypotheses. There was no discernible drop in berth occupancy rate, cargo throughput, or vessel traffic when ISPS code was implemented. The effects of the Effective Maritime Security Management Model (EMSMM) on shipping company performance are investigated by Sadovaya and Thai (2015). Structural equation modelling (SEM) was used to examine the assumptions in this research. Security, company resilience, and customer performance were all positively affected by the suggested paradigm. Thai (2007) proposed a model for the expected effects of safety measures on the quality of marine transportation services and then carried out an experiment to back up their claims. Using a combination of in-depth interviews and mail surveys, researchers in Vietnam surveyed a cross-section of shipping, port, and freight forwarding firms. Results from the study's surveys and interviews corroborate all hypothesised connections between enhanced security and higher-quality service. Statistical analysis shows that out of thirteen predicted relationships, seven have reached a unanimous conclusion: service reliability, social responsibility awareness, operational and managerial efficiency, and brand image are all positively impacted by security upgrades. The study aims to address a substantial research gap, given the outcomes of earlier studies. Investigating how operational efficiency and ISPS code implementation interact is an important area for future research. Consequently, the focus of this article was

on the eastern Nigerian seaports and how efficient application of the ISPS code might manage operational efficiency.

THEORETICAL FRAMEWORK

This study is predicated on the Institutional theory. Institutional theory explains how formal structures, rules, and norms shape organizational behavior and performance (Scott, 2004). It is particularly relevant in analyzing compliance with international maritime standards such as the ISPS Code. According to the National Security Strategy (2019) and Nnwaogbe et al. (2023), many Eastern Nigerian ports exhibit weak compliance with ISPS regulations due to bureaucratic inertia, corruption, and limited enforcement. This institutional fragility undermines security effectiveness and port credibility. Institutional theory thus informs this study by showing how regulatory compliance, institutional legitimacy, and normative pressures influence security adoption and operational outcomes. On this basis, the hypotheses below are formulated:

$H_{01:}$ There is no significant relationship between ISPS code implementation and cargo dwell time of seaports in Eastern Nigeria.

$H_{02:}$ There is no significant relationship between ISPS code implementation and stakeholder satisfaction of seaports in Eastern Nigeria.

$H_{03:}$ There is no significant relationship ISPS code implementation and operational cost of seaports in Eastern Nigeria.

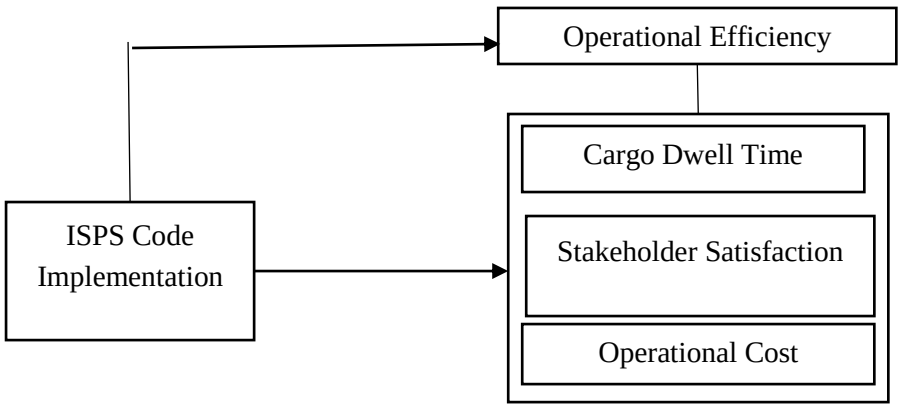

Fig 1: Conceptual Framework

METHODOLOGY

The study assessed the relationship between ISPS code implementation and operational efficiency of seaports in Eastern Nigeria, using a quantitative methodology. Four (4) seaports operating in Eastern Nigeria as obtained from the Nigeria Ports Authority (NPA), constituted the population of the research. The research sample was identical to the population. A total of 114 respondents from port environment were selected to serve as the unit of observation and provide data for the research. The primary method of data collection was used in this research

investigation. The tool for data collection was the structured questionnaire. Adopted and adapted items were used in evaluating questionnaire validity, and academic experts were involved in making sure that the content was valid. In evaluating the reliability of the research instrument, the Cronbach's alpha reliability test was conducted, and a reliability criterion of 0.70, as stated by Nunally (1978), was used to assess the study instrument's dependability. The three hypotheses outlined in the research were evaluated using the Pearson Product Moment Correlation (PPMC) at a critical value of 0.05. All analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 25.0.

Limitations: There are certain factors that may restrict the applicability of this study. First, the geographical location is limited to Eastern Nigeria, which may not reflect the rest of the areas. Moreover, the research target of seaports may restrict its generalizability in other sectors and industries. The results might not apply to other ports not in the trade sector. Also, the methodology and sampling frame used in the study can reduce its generalizability. Thus, care must be taken when generalizing the results of this study to other settings.

Ethical Consideration: The researchers did not engage in any activities with the participants that could be considered as deception. The researchers also avoided all types of plagiarism and data falsification. Privacy in companies with regard to liberty in defining time, extent and circumstances of sharing information was also observed.

Data Findings

Table 1: Reliability Analysis

Variables	No. of Items	Alpha Coefficient
ISPS Code Implementation	5	0.881
Port Community Policing	5	0.809
Stakeholder Satisfaction	5	0.847
Dwell Time	5	0.922
Operational Cost	5	0.922

Source: SPSS Output from Survey Research

The reliability analysis of the research in instrument is shown in Table 1. As shown in Table, all the variables in the study have high Cronbach's alpha reliability coefficients that surpass the minimum acceptable level (0.70) set by Nunally (1978). The implication is that, if this study is carried out again in a similar context the results will be similar to the results of this study.

Test of Hypotheses

The test for the significance of the relationship between ISPS implementation and the measures of operational efficiency is examined in this sub-section.

Table 2: ISPS Implementation and the Dimensions of Operational Efficiency

		ISPS Code Implementation	Stakeholder Satisfaction	Dwell Time	Operational Cost
ISPS Code Implementation	Pearson Correlation	1	.979**	.999**	.985**
	Sig. (2-tailed)		.000	.000	.000
	N	114	114	114	114
Stakeholder Satisfaction	Pearson Correlation	.979**	1	.980**	.987**
	Sig. (2-tailed)	.000		.000	.000
	N	114	114	114	114
Dwell Time	Pearson Correlation	.999**	.980**	1	.986**
	Sig. (2-tailed)	.000	.000		.000
	N	114	114	114	114
Operational Cost	Pearson Correlation	.985**	.987**	.986**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	114	114	114	114

Source: Survey Data, 2025

Interpretation

Table 2 shows that there is a strong and positive association between operational efficiency and the deployment of ISPS codes in seaports in Eastern Nigeria. The Pearson Correlation value for this relationship is 0.979. What this means is that the variables are strongly correlated with one another. Furthermore, the correlation between the variables is statistically significant since the probability value of 0.000 is lower than the crucial value of 0.01, proving the relevance of the association. Put differently, the deployment of ISPS codes is positively and significantly correlated with stakeholder satisfaction ($r= 0.979$, $N= 114$, $p= p0.000<0.01$). This conclusion led to the rejection of the null hypothesis, which claimed that there is no significant association between the application of the ISPS code and the satisfaction of stakeholders in Eastern Nigerian seaports.

Moreover, a very high positive correlation between the ISPS code implementation and the cargo dwell time in Eastern Nigerian seaports is indicated by the Pearson Correlation coefficient of 0.999, which indicates the strength and direction of the relationship. Furthermore, the correlation between the variables is statistically significant since the probability value of 0.000 is lower than the crucial value of 0.01, proving the relevance of the association. Put simply, the application of ISPS codes is strongly correlated with cargo dwell time ($r= 0.999$, $N= 114$, $p= p0.000<0.01$), and this association is statistically significant. Based on these findings, we can reject the null hypothesis that the ISPS code deployment and cargo stay time in Eastern Nigeria do not have a significant connection.

An impressive Pearson Correlation Coefficient of 0.985 was produced by the study that correlated the operating cost in seaports in Eastern Nigeria with the application of ISPS codes. The variables are highly correlated with one another. The results show that 114 people filled out the survey. Table 2 shows that operating cost within Eastern Nigerian seaports was positively and strongly correlated with ISPS code deployment. There is a statistically significant link between the variables since the association's relevance is within a probability value of 0.01. The connection between operating cost and the application of ISPS codes is statistically significant ($r= 0.985$, $N= 67$, $p< 0.01$). As a result, the conclusion that the ISPS code installation and operating cost in Eastern Nigerian seaports do not have a significant link was rejected.

DISCUSSION OF FINDINGS

Cargo dwell time, stakeholder satisfaction, and operational cost were shown to be significantly correlated with ISPS code installation, according to the hypothesis tests. According to UNCTAD (2007), compliance with the ISPS code improved the port's market standing, increased truck turnaround and ship-owners' confidence, and brought more ships to the port. On the other hand, Onwuegbuchunam et al. (2016) found that there was no drop in vessel traffic, berth occupancy rate, or cargo throughput after implementing the ISPS code.

Stakeholders at Greece's ports are pleased with the ISPS Code's implementation, according to the current results, which corroborate those of Gkika et al. (2025). According to Onwuegbuchunam et al. (2018), who created a performance evaluation metric to measure the impact of ISPS Code compliance on Nigerian port and terminal operations, the study found that ISPS code compliance improved operational performance. Similarly, Thai (2007) argued that security improvements can improve service quality through raising awareness of social responsibility, increasing efficiency in operations and management, and improving the overall image in the market..

CONCLUSION AND RECOMMENDATIONS

In view of the findings of this study and the findings of previous studies examined, this study concluded that, ISPS code implementation positively and significantly relates with operational efficiency of seaports in Eastern Nigeria. This means that ISPS code implementation is an important port security strategy that will improve the efficiency of

seaports operations in Eastern Nigeria. Thus, implementing the ISPS code, seaports in Eastern Nigeria will be able to improve cargo dwell time, reduce operational cost and enhance stakeholders' satisfaction. Therefore, it is recommended that, port administrators in Eastern Nigeria should continually evaluate and gauge outcomes of implementation to the code in order to improve operational efficiency of the seaports. it is also recommended that concerned ports stakeholders should adopt a pragmatic approach to the Code's implementation, by complementing security gadgets with human resource training and development within the maritime industry.

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