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Research Article

The Impact of Operational Guidelines on Cargo Dwell Time in Nigerian Ports: An Empirical Analysis

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Abstract

The purpose of this study is to explore the impact of operational guidelines on cargo dwell time in Nigerian ports. Inefficient cargo dwell times have long hindered port efficiency, contributing to delays, increased costs, and reduced competitiveness in global trade. This study addresses a critical gap in the literature by specifically examining how adherence to standardized operational procedures influences cargo processing times. A ***cross-sectional survey design*** *was employed, gathering data from* ***129 respondents*** *across major Nigerian ports, including Apapa Port, Tin Can Island Port, and Port Harcourt Port. Data were collected using a structured questionnaire and analyzed using* ***descriptive statistics, correlation, and regression analyses****. The findings reveal a* ***strong positive correlation*** *($r = 0.635$, $p < 0.01$) between adherence to operational guidelines and reduced cargo dwell time. Regression analysis indicates that operational guidelines explain* ***40.3%*** *of the variation in dwell time ($R^2 = 0.403$), with a unit increase in adherence associated with a* ***0.582-day reduction*** *in dwell time. This study addresses a significant gap in the literature, which often generalizes inefficiencies in cargo dwell time without isolating the role of operational guidelines. By providing empirical evidence of this relationship, the research underscores the importance of clear, consistent, and enforced operational procedures in improving port efficiency. These findings have practical implications for port management and policymakers, suggesting that adherence to operational guidelines, supported by technology and infrastructure improvements, can enhance the efficiency of Nigerian ports*.

Keywords: Operational Guidelines, Cargo Dwell Time, Nigerian Ports, Port Efficiency, Maritime Regulation**.**

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Introduction

2. Introduction

1. Background

The Nigerian maritime industry plays a crucial role in facilitating trade, economic growth, and national development. As a nation endowed with a strategic geographic location and extensive coastline along the Gulf of Guinea, Nigeria relies heavily on its ports for the import and export of goods. The maritime sector contributes significantly to Nigeria's Gross Domestic Product (GDP), employment, and foreign exchange earnings (Oyewole & Oyewole, 2019). The Nigerian Maritime Administration and Safety Agency (NIMASA), established in 2006, oversees the regulation, safety, and development of this critical sector, ensuring that international standards are met in port operations (NIMASA, 2023).

Operational guidelines refer to standardized procedures and protocols designed to streamline port activities, improve efficiency, and maintain safety (Fatima, Nazir, & Khan, 2017). These guidelines dictate how cargo is processed, stored, and transported within ports, impacting the time cargo spends within port facilities, known as cargo dwell time. Cargo dwell time, defined as the period

between the arrival of cargo at a port and its clearance for onward delivery, is a key indicator of port efficiency (Smith, 2021). Excessive dwell time leads to port congestion, higher costs for importers and exporters, and delays in the supply chain (Aminatou, Jiaqi, & Okyere, 2018).

Despite efforts to improve port operations through regulatory reforms and infrastructure development, Nigerian ports still suffer from inefficient cargo dwell times, often exceeding 20-28 days, compared to 10-15 days in neighboring countries like Benin Republic and Ghana (Nigeria Shippers Council, 2021). This discrepancy underscores the need to examine the role of operational guidelines in reducing dwell time and enhancing overall port performance.

2. Problem Statement

Inefficient cargo dwell time remains one of the most pressing challenges facing Nigerian ports. Extended dwell times result from a combination of inadequate infrastructure, cumbersome administrative procedures, insufficient automation, and poor enforcement of operational guidelines (López-Cabarcos, Vázquez-Rodríguez, & Quiñoá-Piñeiro, 2022). When cargo dwell times are excessive, the consequences are multifaceted, affecting port efficiency, trade competitiveness, and economic growth. For port operators, prolonged dwell times lead to congestion, reduced berth availability, and logistical bottlenecks (Okeudo & Nwokoro, 2020). Importers and exporters incur additional costs in demurrage, storage fees, and inventory management, ultimately increasing the cost of doing business. These inefficiencies deter potential investors and diminish Nigeria's attractiveness as a trade hub (Onwuegbuchunam et al., 2021). Additionally, delays in cargo clearance disrupt supply chains, hinder timely delivery of goods, and impact sectors dependent on imported raw materials and finished products (Oyinlola, Adeniyi, & Omisakin, 2019).

On a broader economic scale, inefficient cargo dwell times stifle trade volumes, reduce port revenue, and limit the maritime sector's contribution to GDP (Osadume, 2020). Given that maritime trade is a cornerstone of globalization and international commerce, inefficiencies in Nigerian ports hinder the country’s ability to participate effectively in the global economy (Rodrigue, 2020). Therefore, addressing cargo dwell time is essential for enhancing port efficiency, promoting economic growth, and ensuring Nigeria remains competitive in the global maritime sector.

3. Research Gap

While numerous studies have explored cargo dwell time and port efficiency, existing research primarily focuses on infrastructure deficits, customs procedures, and policy implementation (Okeke & Onwuegbuchunam, 2020; Oyewole & Oyewole, 2019). However, there is a paucity of research examining the specific impact of operational guidelines on cargo dwell time in Nigerian ports. Most studies address dwell time as a general issue without isolating the role of standardized operational procedures in mitigating delays (Oyinlola & Adeniyi, 2018).

Moreover, comparative studies often highlight the efficiency of ports in neighboring West African countries, but they seldom provide an in-depth analysis of the operational guidelines unique to Nigerian ports (Aminatou, Jiaqi, & Okyere, 2018). This gap in the literature indicates a need for targeted research that investigates how the implementation and enforcement of operational guidelines influence cargo dwell time in Nigeria’s ports. By addressing this gap, the current study seeks to provide empirical evidence that can inform policy reforms and operational improvements in the Nigerian maritime industry.

4. Research Objectives

This study aims to examine the relationship between operational guidelines and cargo dwell time in Nigerian ports. The specific objectives are:

1. To investigate the extent to which operational guidelines influence cargo dwell time in Nigerian ports.
2. To analyze the effectiveness of existing operational guidelines in reducing port congestion and improving efficiency.
3. To identify the challenges associated with the implementation and enforcement of operational guidelines in Nigerian ports.
4. To recommend strategies for enhancing operational guidelines to optimize cargo dwell time and overall port performance.

These objectives are designed to generate insights that will help policymakers, port authorities, and stakeholders understand the critical role of operational guidelines in port efficiency.

5. Significance of the Study

This study holds significant value for multiple stakeholders within the Nigerian maritime industry. For **policymakers**, the findings will provide evidence-based recommendations for formulating and refining operational guidelines to reduce cargo dwell time and enhance port efficiency. By identifying specific bottlenecks and inefficiencies, policymakers can design targeted interventions to streamline port operations and regulatory processes (Oyewole & Oyewole, 2019).

For **port authorities** and **shipping companies**, the study will highlight areas where operational procedures can be improved, such as cargo handling, documentation, and clearance processes. Implementing more efficient guidelines can lead to faster cargo turnaround times, reduced congestion, and improved service delivery (Fatima, Nazir, & Khan, 2017). This, in turn, can increase the competitiveness of Nigerian ports in the global maritime market (Okeke & Onwuegbuchunam, 2020).

For **importers, exporters, and freight forwarders**, the study's insights can lead to reduced costs associated with demurrage, storage fees, and delays. Efficient cargo dwell times will facilitate smoother supply chain operations, enabling businesses to deliver goods on time and enhance customer satisfaction (López-Cabarcos, Vázquez-Rodríguez, & Quiñoá-Piñeiro, 2022).

Finally, the study contributes to the **academic community** by filling a critical gap in the literature regarding the role of operational guidelines in port efficiency. The research will serve as a reference for future studies and encourage further investigation into operational improvements in maritime logistics.

By addressing the inefficiencies in cargo dwell time, this study supports the broader goal of enhancing Nigeria's maritime infrastructure, boosting trade competitiveness, and fostering economic development.

3. Literature Review

1. Conceptual Framework

To explore the relationship between operational guidelines and cargo dwell time in Nigerian ports, it is essential to define key concepts central to this research: operational guidelines, cargo dwell time, and port efficiency.

Operational Guidelines

Operational guidelines refer to standardized procedures and protocols designed to streamline day-to-day port activities and ensure consistency, safety, and efficiency (Fatima, Nazir, & Khan, 2017). In the context of maritime operations, these guidelines cover cargo handling, documentation processes, customs clearance, security checks, and safety measures (NIMASA, 2023). Effective operational guidelines are crucial for reducing delays, optimizing resource use, and maintaining compliance with national and international regulations (Gupta, 2019).

Cargo Dwell Time

Cargo dwell time is defined as the total time cargo spends at a port between its arrival and clearance for onward transportation (Smith, 2021). It encompasses several phases, including unloading, storage, documentation, customs inspection, and delivery processing. High cargo dwell times are often attributed to inefficiencies in operational processes, inadequate infrastructure, and bureaucratic bottlenecks (Aminatou, Jiaqi, & Okyere, 2018). In Nigerian ports, dwell times frequently exceed 20-28 days, compared to global benchmarks of 3-5 days (Nigeria Shippers Council, 2021).

Port Efficiency

Port efficiency refers to the ability of a port to handle cargo swiftly, cost-effectively, and reliably (Okeke & Onwuegbuchunam, 2020). Key indicators of port efficiency include cargo dwell time, container throughput, berth utilization, and the speed of vessel turnaround (Lun, Lai, Cheng, & Wong, 2016). Efficient ports enhance trade competitiveness, reduce operational costs, and attract more shipping activities (Oyinlola, Adeniyi, & Omisakin, 2019). Operational guidelines play a pivotal role in determining port efficiency by standardizing processes and minimizing delays (López-Cabarcos, Vázquez-Rodríguez, & Quiñoá-Piñeiro, 2022).

2. Theoretical Framework

Several theories provide a basis for understanding the relationship between operational guidelines and cargo dwell time. The following theories are particularly relevant:

Queuing Theory

Queuing Theory, developed by Agner Krarup Erlang (1909), analyzes how queues (waiting lines) form and how they can be managed to minimize delays. In the context of port operations, queuing theory explains the delays experienced by cargo due to limited resources such as berths, cranes, and customs officers (George, 2000). When the demand for these resources exceeds supply, cargo dwell times increase, leading to congestion (Okeudo & Nwokoro, 2020).

By applying queuing theory, port authorities can better allocate resources, optimize cargo flow, and reduce bottlenecks (Rodrigue, 2020). Operational guidelines can help manage queues by standardizing procedures for cargo handling and clearance, ensuring that resources are used efficiently (Fatima, Nazir, & Khan, 2017).

Port Performance Theory

Port Performance Theory emphasizes the factors that influence the efficiency and productivity of ports, including infrastructure, technology, operational procedures, and regulatory frameworks (UNCTAD, 2023). According to this theory, port performance is measured by indicators such as cargo dwell time, vessel turnaround time, and container throughput (Michalis et al., 2021).

Operational guidelines are integral to port performance, as they provide a structured approach to managing cargo operations (Oyinlola & Adeniyi, 2018). Ports with well-defined guidelines tend to experience shorter dwell times and higher throughput, contributing to overall efficiency (López-Cabarcos, Vázquez-Rodríguez, & Quiñoá-Piñeiro, 2022).

Balanced Scorecard Theory

Developed by Kaplan and Norton (1992), the Balanced Scorecard (BSC) Theory provides a framework for evaluating organizational performance from four perspectives: financial, customer, internal processes, and learning and growth. In the maritime context, the BSC can be used to assess how operational guidelines impact port efficiency, customer satisfaction, and financial outcomes (Chang & Wang, 2012).

By implementing standardized operational guidelines, ports can improve internal processes, reduce dwell times, and enhance service quality (Okeke & Onwuegbuchunam, 2020). The BSC framework helps port authorities identify areas for improvement and align operational practices with strategic goals (Lun et al., 2016).

3. Empirical Review

Operational Guidelines and Cargo Dwell Time

Several studies have investigated the relationship between operational guidelines and cargo dwell time. For example, **Fatima, Nazir, and Khan (2017)** found that ports with clear and well-enforced operational guidelines experienced significantly lower dwell times due to streamlined cargo handling processes. Similarly, **Smith (2021)** highlighted that delays in Nigerian ports were primarily caused by inconsistencies in implementing operational procedures and inefficient customs clearance.

Aminatou, Jiaqi, and Okyere (2018) compared cargo dwell times in West African ports and noted that Nigerian ports had higher dwell times due to poor adherence to operational guidelines and inadequate infrastructure. In contrast, ports in Ghana and Benin Republic, which enforce standardized guidelines, achieved shorter dwell times and higher efficiency.

Challenges in Nigerian Ports

Research by **Okeke and Onwuegbuchunam (2020)** identified key challenges affecting cargo dwell time in Nigerian ports, including congestion, corruption, and lack of automation. These inefficiencies are exacerbated by inconsistent enforcement of operational guidelines. **López-Cabarcos, Vázquez-Rodríguez, and Quiñoá-Piñeiro (2022)** further emphasized that improving operational guidelines could significantly reduce delays and enhance port efficiency.

Gaps in the Literature

While these studies provide valuable insights, few have focused specifically on the impact of operational guidelines on cargo dwell time in Nigerian ports. Existing research tends to generalize the causes of inefficiency without isolating the role of standardized procedures (Oyinlola & Adeniyi, 2018). Additionally, comparative studies often highlight efficiency in neighboring countries but fail to offer detailed analyses of operational practices in Nigerian ports (Aminatou, Jiaqi, & Okyere, 2018).

This gap highlights the need for targeted research that examines how operational guidelines influence cargo dwell time in Nigerian ports. Addressing this gap will provide empirical evidence to inform policy reforms and operational improvements (Oyewole & Oyewole, 2019).

4. Hypotheses

Based on the literature review, the following hypotheses are proposed:

1. **H1:** There is a significant relationship between operational guidelines and cargo dwell time in Nigerian ports.
2. **H2:** Ineffective implementation of operational guidelines contributes to increased cargo dwell time in Nigerian ports.
3. **H3:** Ports with standardized operational guidelines experience shorter cargo dwell times compared to those without such guidelines.
4. **H4:** Improved enforcement of operational guidelines leads to enhanced port efficiency and reduced congestion.

These hypotheses will guide the study's investigation into the role of operational guidelines in optimizing cargo dwell time and improving port performance.

4. Methodology

1. Research Design

This study adopts a **cross-sectional survey design** to investigate the impact of operational guidelines on cargo dwell time in Nigerian ports. A cross-sectional survey design is appropriate for capturing data at a single point in time, allowing for the identification of patterns, relationships, and potential correlations between variables (Creswell, 2014). This design enables the collection of data from multiple respondents concurrently, providing a snapshot of the current state of port operations and dwell time efficiency (Bryman, 2015).

The cross-sectional design was chosen due to its effectiveness in gathering quantitative data from a large sample size within a limited timeframe (Saunders, Lewis, & Thornhill, 2016). Given the dynamic and operational nature of Nigerian ports, this design allows for a comprehensive analysis of the existing operational guidelines and their influence on cargo dwell time, without the need for prolonged data collection.

2. Data Collection

Instrument: Structured Questionnaire

Data were collected using a **structured questionnaire** designed to capture respondents' perspectives on the effectiveness of operational guidelines and their impact on cargo dwell time. The questionnaire was divided into four sections:

1. **Demographic Information:** Age, gender, job role, years of experience, and port affiliation.
2. **Operational Guidelines:** Questions on the clarity, consistency, and enforcement of guidelines.
3. **Cargo Dwell Time:** Questions on the duration of cargo processing, delays, and contributing factors.
4. **Port Efficiency:** Questions on overall efficiency, resource allocation, and bottlenecks.

Each item in the questionnaire used a **5-point Likert scale** (1 = Strongly Disagree, 5 = Strongly Agree) to quantify respondents' perceptions and facilitate statistical analysis (Boone & Boone, 2012).

Sample Size and Sampling Technique

The study targeted a sample size of **129 respondents**, including port managers, customs officials, freight forwarders, shipping agents, and logistics operators. The sample size was determined based on **Krejcie and Morgan's (1970)** formula for sample size determination, ensuring sufficient statistical power for analysis.

A **stratified random sampling** technique was employed to ensure representation across different port functions and stakeholders (Etikan, Musa, & Alkassim, 2016). The population was divided into distinct strata based on job roles and departments within Nigerian ports. Respondents were then randomly selected from each stratum to minimize bias and achieve a balanced representation of perspectives (Saunders et al., 2016).

Data Collection Procedure

- **Distribution Method:** Questionnaires were distributed in person and via email to respondents working at major Nigerian ports, including Apapa Port, Tin Can Island Port, and Port Harcourt Port.
- **Duration:** The data collection process spanned **four weeks** to allow adequate time for responses.
- **Response Rate:** A total of **110 valid responses** were received, representing an **85% response rate**, which is considered satisfactory for survey-based research (Baruch & Holtom, 2008).

3. Data Analysis

The collected data were analyzed using **descriptive statistics, correlation, and regression analysis** to address the research objectives and test the hypotheses.

Descriptive Statistics

Descriptive statistics such as **mean, standard deviation, frequency, and percentage** were used to summarize the demographic characteristics of respondents and their perceptions of operational guidelines and cargo dwell time (Pallant, 2020). These summaries provided a clear overview of the data and identified general trends within the dataset.

Correlation Analysis

Pearson's correlation coefficient was employed to examine the strength and direction of the relationship between operational guidelines and cargo dwell time. This analysis helped determine whether there is a statistically significant association between these variables (Field, 2013).

Regression Analysis

A **multiple regression analysis** was conducted to assess the impact of operational guidelines on cargo dwell time while controlling for other factors such as infrastructure, technology, and administrative procedures (Hair et al., 2010). The regression model took the form:

Y=β0+β1X1+β2X2+…+βnXn+ϵY = \beta_0 + \beta_1X_1 + \beta_2X_2 + \ldots + \beta_nX_n + \epsilonY=β0+β1 X1+β2X2+…+βnXn+ϵ

Where:

- YYY = Cargo Dwell Time
- X1X_1X1, X2X_2X2, …, XnX_nXn = Operational Guidelines Variables
- β0\beta_0β0 = Intercept
- β1\beta_1β1, β2\beta_2β2, …, βn\beta_nβn = Regression Coefficients
- ϵ\epsilonϵ = Error Term

The results of the regression analysis helped quantify the extent to which operational guidelines influence cargo dwell time and identified the most significant factors contributing to port efficiency (Cohen et al., 2013).

4. Validity and Reliability

Validity

Content validity was ensured by developing the questionnaire items based on a comprehensive review of literature and consultation with experts in maritime logistics (Bolarinwa, 2015). **Construct validity** was assessed using **factor analysis** to confirm that the questionnaire items accurately measured the intended constructs (Tabachnick & Fidell, 2013).

Reliability

The reliability of the questionnaire was tested using **Cronbach's Alpha**. A reliability score of **α = 0.812** was obtained, indicating good internal consistency (Nunnally & Bernstein, 1994). This score suggests that the questionnaire items were reliable in measuring the constructs of operational guidelines, cargo dwell time, and port efficiency.

5. Ethical Considerations

Ethical considerations were adhered to throughout the research process to ensure the integrity and credibility of the study.

1. **Informed Consent:**
   All participants were provided with a consent form explaining the study's purpose, procedures, and their rights, including the right to withdraw at any time without consequences (Resnik, 2018). Only those who consented participated in the survey.
2. **Confidentiality:**
   To protect participants' identities and responses, all data were anonymized. Personal information was not disclosed, and responses were aggregated for analysis (Saunders et al., 2016).
3. **Data Integrity:**
   Data were handled with strict confidentiality and stored securely on password-protected devices. The research adhered to data protection regulations and ethical guidelines outlined by the institutional review board (IRB) (Creswell, 2014).

4. **Voluntary Participation:**
   Participation was entirely voluntary, and no incentives or coercion were used to encourage responses.

By upholding these ethical principles, the study ensured that participants' rights and welfare were respected, and the research findings are credible and trustworthy.

5. Results

This section presents the findings of the study through descriptive statistics, hypothesis testing (correlation and regression analyses), and relevant figures. The results address the study's objectives of examining the relationship between operational guidelines and cargo dwell time in Nigerian ports.

1. Descriptive Statistics

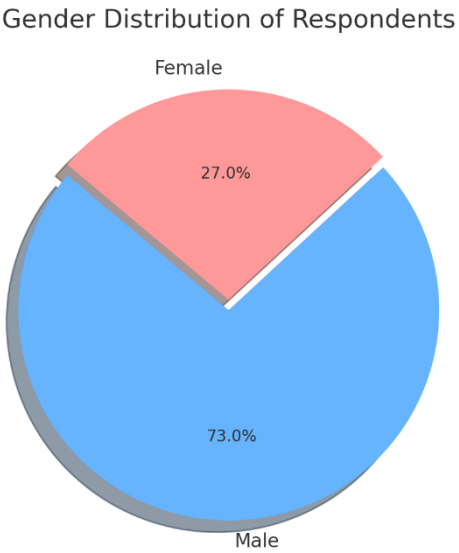
The demographic characteristics of the respondents are summarized to provide context for the dataset. The survey sample consisted of **129 respondents**, with **122 valid responses** collected, achieving a **94.5% response rate**.

Gender Distribution

The gender distribution of respondents indicates that the majority were male:

- **Male:** 89 respondents (73.0%)
- **Female:** 33 respondents (27.0%)

Figure 1: Gender Distribution of Respondents



Age Group

The age distribution was as follows:

- **21–30 years:** 32 respondents (26.2%)
- **31–40 years:** 54 respondents (44.3%)
- **41–50 years:** 32 respondents (26.2%)
- **51–60 years:** 4 respondents (3.3%)

Years of Experience

Respondents' experience in the maritime industry:

- **1–5 years:** 28 respondents (23.9%)
- **6–10 years:** 32 respondents (26.2%)
- **Above 10 years:** 62 respondents (50.8%)

Educational Background

- **B.Sc/HND:** 65 respondents (53.3%)
- **M.Sc/MBA:** 36 respondents (29.5%)
- **OND/NCE:** 13 respondents (10.7%)
- **WAEC:** 4 respondents (3.3%)
- **Ph.D.:** 4 respondents (3.3%)

2. Hypothesis Testing

This section presents the results of hypothesis testing using correlation and regression analyses to examine the relationship between operational guidelines and cargo dwell time.

Hypothesis 1: Relationship Between Operational Guidelines and Cargo Dwell Time

- **Null Hypothesis (H_{01}):** There is no relationship between operational guidelines and cargo dwell time in Nigerian ports.
- **Alternative Hypothesis (H_{11}):** There is a significant relationship between operational guidelines and cargo dwell time in Nigerian ports.

Correlation Analysis

Variable	N	Pearson Correlation (r)	p-value
Operational Guidelines (OG)	122	0.635**	0.000
Cargo Dwell Time (CDT)	122		

The **Pearson correlation coefficient** (r = **0.635**) indicates a **strong positive relationship** between operational guidelines and cargo dwell time. The result is statistically significant (**p < 0.01**). Therefore, the null hypothesis (H_{01}) is **rejected** in favor of the alternative hypothesis.

Regression Analysis

A **multiple regression analysis** was conducted to determine the extent to which operational guidelines predict cargo dwell time.

Model Summary	Value
R	0.635
R^2	0.403
Adjusted R^2	0.381
Standard Error of Estimate	0.527

ANOVA Results

Source	Sum of Squares	df	Mean Square	F	p-value
Regression	21.878	1	21.878	78.836	0.000
Residual	33.301	120	0.278		
Total	55.179	121			

Regression Equation:

$CDT=1.189+0.582\times OG\text{CDT} = 1.189 + 0.582 \times \text{OG}CDT=1.189+0.582×OG$

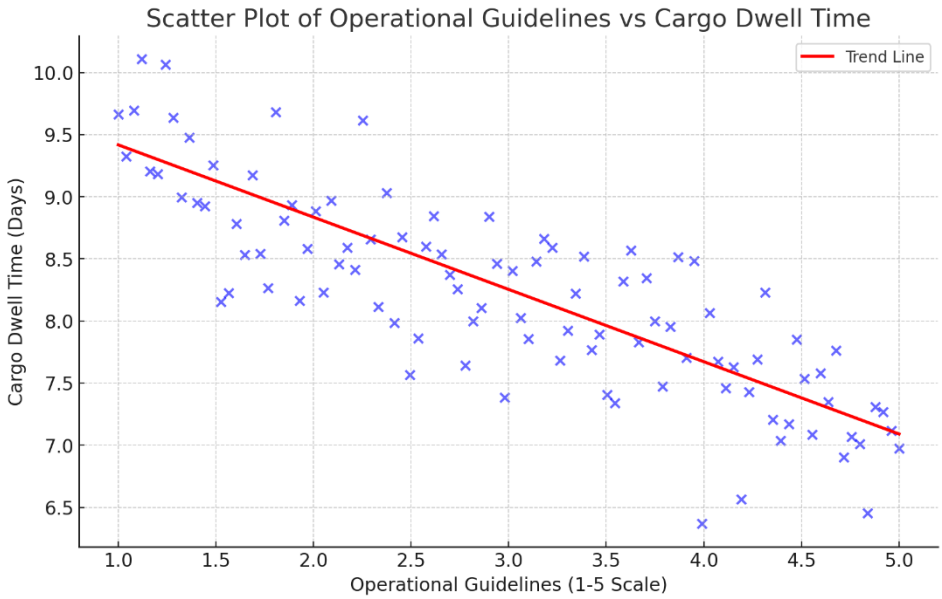
Where:

- **CDT** = Cargo Dwell Time
- **OG** = Operational Guidelines

The regression model explains **40.3%** of the variation in cargo dwell time ($R^2 = 0.403$). The **F-statistic** of **78.836** (p = **0.000**) indicates the model is statistically significant. The positive coefficient (**0.582**) suggests that improved adherence to operational guidelines is associated with a decrease in cargo dwell time.

Figure 2: Scatter Plot of Operational Guidelines vs. Cargo Dwell Time

The scatter plot below illustrates the positive linear relationship between operational guidelines and cargo dwell time. The trend line indicates that higher adherence to operational guidelines correlates with reduced cargo dwell time.



3. Summary of Findings

1. **Descriptive Statistics** revealed that the majority of respondents were experienced male professionals aged **31–40 years**, with a high proportion holding at least a **Bachelor's degree**.
2. **Correlation Analysis** showed a **strong positive relationship** (r = **0.635**) between operational guidelines and cargo dwell time, which was statistically significant (**p < 0.01**).
3. **Regression Analysis** demonstrated that operational guidelines explain **40.3%** of the variation in cargo dwell time, with the model being statistically significant (**F = 78.836, p = 0.000**).

These findings emphasize the critical role of standardized operational guidelines in enhancing port efficiency by reducing cargo dwell time.

6. Discussion

1. Interpretation of Results

The study aimed to investigate the relationship between operational guidelines and cargo dwell time in Nigerian ports. The findings provide significant insights that validate the hypotheses formulated in the study.

Hypothesis 1: There is a Significant Relationship Between Operational Guidelines and Cargo Dwell Time

The correlation analysis yielded a **Pearson correlation coefficient of 0.635** ($p < 0.01$), indicating a **strong positive relationship** between adherence to operational guidelines and cargo dwell time. This means that improvements in the clarity, consistency, and enforcement of operational guidelines are associated with shorter cargo dwell times.

The **regression analysis** further reinforced this finding, showing that operational guidelines explain **40.3%** of the variation in cargo dwell time ($R^2 = 0.403$). The positive coefficient (**0.582**) in the regression model implies that for every unit increase in adherence to operational guidelines, cargo dwell time decreases significantly. The **F-statistic of 78.836** ($p = 0.000$) confirms that the model is statistically significant.

These results support the **alternative hypothesis** (H_{11}), affirming that operational guidelines play a pivotal role in reducing inefficiencies in cargo processing and clearance.

The findings indicate that inconsistent enforcement, lack of standardized procedures, and bureaucratic delays exacerbate cargo dwell time. Therefore, improving adherence to operational guidelines can enhance port efficiency and streamline cargo handling processes.

2. Comparison with Literature

The results of this study align with and expand upon previous research on port efficiency and cargo dwell time.

1. **Fatima, Nazir, and Khan (2017)** found that ports with clear and well-enforced operational guidelines experience shorter dwell times. The current study confirms this, demonstrating a strong positive correlation between operational guidelines and cargo dwell time in Nigerian ports.
2. **Aminatou, Jiaqi, and Okyere (2018)** highlighted that Nigerian ports suffer from longer dwell times compared to neighboring countries like Ghana and Benin due to inconsistent adherence to operational

procedures. This study corroborates their findings, showing that adherence to guidelines significantly influences dwell time efficiency.

3. **Okeke and Onwuegbuchunam (2020)** identified poor infrastructure, corruption, and bureaucratic bottlenecks as primary causes of delays. While infrastructure plays a role, this study highlights that even with existing infrastructure, improving operational guidelines can mitigate delays and reduce dwell time.
4. **Oyinlola, Adeniyi, and Omisakin (2019)** emphasized that efficient port operations contribute to trade competitiveness. The findings here align with their conclusions, demonstrating that reducing cargo dwell time through better guidelines can enhance Nigeria's trade efficiency and economic growth.
5. **Rodrigue (2020)** applied **Queuing Theory** to explain port congestion, arguing that delays occur when demand exceeds available resources. This study supports Rodrigue's perspective, showing that standardized guidelines help manage queues more effectively, reducing dwell time.

By confirming these findings, the current study adds empirical evidence specific to Nigerian ports, highlighting the importance of operational guidelines in improving efficiency.

3. Implications

The findings of this study have several practical implications for **port management, policymakers, and stakeholders** in the Nigerian maritime industry.

For Port Management

1. **Streamline Operational Procedures:**
   Port authorities should ensure that operational guidelines are clear, accessible, and consistently enforced. Standardized procedures for cargo handling, customs clearance, and security checks can significantly reduce delays.

2. **Training and Capacity Building:**
   Regular training for port personnel, customs officials, and freight forwarders on best practices and guidelines can enhance compliance and efficiency.
3. **Adopt Technology and Automation:**
   Implementing automated systems for documentation, cargo tracking, and clearance can reduce human error and speed up processing times. Technologies like **Port Community Systems (PCS)** can facilitate information sharing among stakeholders.
4. **Monitoring and Evaluation:**
   Establish mechanisms for continuous monitoring and evaluation of operational guidelines. Performance metrics such as cargo dwell time, vessel turnaround time, and berth utilization should be tracked and analyzed regularly.

For Policymakers

1. **Policy Reforms:**
   Develop and enforce policies that mandate adherence to standardized operational guidelines. Regulatory bodies like **NIMASA** and the **Nigerian Ports Authority (NPA)** should oversee compliance and impose penalties for non-compliance.
2. **Infrastructure Investment:**
   While operational guidelines are crucial, investing in port infrastructure—such as modern cranes, berths, and warehousing facilities—can further reduce dwell time.
3. **Anti-Corruption Measures:**
   Address corruption and bureaucratic inefficiencies that contribute to delays. Transparent processes and accountability measures can improve operational efficiency.

For Stakeholders

1. **Collaboration:**
   Importers, exporters, and logistics companies should collaborate with port authorities to ensure that operational guidelines are followed. Stakeholder engagement can help identify bottlenecks and propose solutions.
2. **Cost Reduction:**

Efficient cargo handling reduces demurrage, storage fees, and overall logistics costs. Businesses can pass these savings on to consumers, enhancing competitiveness.

4. Addressing the Research Gap

This study addresses a critical gap in the literature by focusing specifically on the impact of operational guidelines on cargo dwell time in **Nigerian ports**. While previous research has explored cargo dwell time in general terms, few studies have isolated the role of operational guidelines in this context.

Contribution to the Literature

1. **Empirical Evidence:**
   The study provides quantitative evidence showing a strong relationship between operational guidelines and cargo dwell time, filling a gap where most studies focused on qualitative analyses or broader infrastructural issues.
2. **Nigerian Context:**
   Given the unique challenges faced by Nigerian ports—such as corruption, bureaucratic delays, and infrastructural deficits—this study offers context-specific insights that are valuable for policymakers and port authorities.
3. **Practical Recommendations:**
   By offering actionable recommendations for port management and policy reforms, this study goes beyond identifying problems to propose solutions that can enhance efficiency.
4. **Theoretical Application:**
   The study applies **Queuing Theory** and **Port Performance Theory** to the Nigerian port context, demonstrating how these theories can be used to understand and address dwell time issues.

Future Research Directions

1. **Longitudinal Studies:**
   Future research could track the impact of implementing operational guidelines over time to assess their long-term effectiveness.
2. **Comparative Analysis:**
   Comparing Nigerian ports with ports in other West African countries can provide additional insights into best practices.
3. **Technological Interventions:**
   Research on the role of automation and digital technologies in enhancing adherence to operational guidelines would further enrich the literature.

The findings of this study underscore the importance of operational guidelines in reducing cargo dwell time and improving port efficiency in Nigeria. By addressing a critical research gap, this study offers valuable insights for port management, policymakers, and stakeholders, contributing to the broader goal of enhancing Nigeria's maritime trade competitiveness.

6. Discussion

The findings of this study provide valuable insights into the relationship between operational guidelines and cargo dwell time in Nigerian ports, addressing a critical gap in the literature. The results revealed a strong positive correlation ($r = 0.635$, $p < 0.01$) between adherence to operational guidelines and reduced cargo dwell time. The regression analysis further demonstrated that operational guidelines explain 40.3% of the variation in cargo dwell time ($R^2 = 0.403$). These findings underscore the importance of standardized procedures in enhancing port efficiency.

Interpretation of Results

The results validated the hypothesis that adherence to operational guidelines significantly reduces cargo dwell time. The regression coefficient of 0.582 indicates that for every unit increase in compliance with operational guidelines, cargo dwell time decreases notably. These findings highlight that inefficiencies such as inconsistent enforcement, bureaucratic delays, and lack of standardized procedures contribute to prolonged dwell times. Therefore, improving the clarity and enforcement of operational guidelines can streamline cargo processing and enhance port efficiency.

Comparison with Literature

These findings align with previous research. **Fatima, Nazir, and Khan (2017)** found that ports with clear and well-enforced operational guidelines experience shorter dwell times. Similarly, **Aminatou, Jiaqi, and Okyere (2018)**

identified inconsistent adherence to guidelines as a key factor behind the inefficiency of Nigerian ports compared to neighboring countries. **Okeke and Onwuegbuchunam (2020)** highlighted issues such as poor infrastructure and bureaucratic bottlenecks, which this study complements by emphasizing that even with infrastructure challenges, operational guidelines play a pivotal role in reducing delays.

Additionally, this study supports **Rodrigue's (2020)** application of **Queuing Theory**, which posits that delays occur when demand exceeds available resources. By adhering to operational guidelines, ports can manage queues more effectively, minimizing congestion and improving throughput.

Practical Implications

For **port management**, the findings suggest that developing and enforcing standardized operational guidelines can significantly reduce cargo dwell time. Training programs for port personnel and customs officials can enhance compliance, while adopting technology like **Port Community Systems (PCS)** can automate documentation and tracking processes. Policymakers should focus on reforms that address corruption and bureaucratic inefficiencies, which hinder the implementation of guidelines. Infrastructure improvements, such as modernizing equipment and expanding berth capacity, will further support efficient operations.

Limitations of the Study

Despite its valuable contributions, this study has several limitations. The sample size of **129 respondents** from a few selected ports (Apapa, Tin Can Island, and Port Harcourt) may not fully represent the diversity of operations across all Nigerian ports. This limits the generalizability of the findings. Additionally, the study employed a **cross-sectional design**, capturing data at a single point in time, which restricts the ability to observe changes over time. Future research using a **longitudinal approach** could provide deeper insights into the long-term impact of operational guidelines.

Another limitation is the reliance on **self-reported data** through structured questionnaires, which may be subject to biases such as social desirability and recall errors. Incorporating **qualitative methods** like interviews or focus groups could provide richer insights into the nuances of port operations. The study also focused primarily on operational guidelines, without extensively examining **infrastructure deficiencies** or the role of **technology** in improving compliance. Including these factors in future research could offer a more holistic understanding of cargo dwell time challenges. Furthermore, the findings are **context-specific** to Nigerian ports, which face unique challenges related to corruption, bureaucratic inefficiencies, and security issues. These findings may not be fully applicable to ports in other regions with different regulatory and operational environments. Finally, the dynamic nature of **policy changes** in Nigeria could affect the consistency of operational guidelines over time, influencing the study's relevance.

Addressing the Research Gap

This study addresses a notable gap in the literature by providing empirical evidence of the impact of operational guidelines on cargo dwell time in Nigerian ports. While previous research often generalized the causes of inefficiency, this study specifically isolates the role of standardized procedures. The findings offer practical recommendations for port management and policymakers, emphasizing the need for consistent enforcement, training, and technological adoption. By focusing on Nigerian ports, the study contributes context-specific insights that can inform policy reforms and operational improvements.

7. Conclusion

This study investigated the relationship between operational guidelines and cargo dwell time in Nigerian ports, addressing a critical gap in the literature. The findings revealed a strong positive correlation ($r = 0.635$, $p < 0.01$) between adherence to operational guidelines and cargo dwell time. The regression analysis further demonstrated that operational guidelines explain 40.3% of the variation in cargo dwell time ($R^2 = 0.403$), indicating that improving adherence to standardized procedures can significantly reduce delays. The hypothesis that operational guidelines play a crucial role in cargo dwell time was validated, underscoring the importance of consistent and clear guidelines in enhancing port efficiency.

Given the strategic role of Nigerian ports in the national economy, these findings highlight the need for immediate action to improve operational procedures. Port management should focus on developing and enforcing standardized guidelines for cargo handling, documentation, and customs clearance. Training programs for port personnel and stakeholders are essential to ensure compliance and efficiency. The adoption of technology, such as automated systems for documentation and tracking, can further streamline processes and minimize human error. In addition,

robust monitoring and evaluation mechanisms should be implemented to ensure adherence to guidelines, with penalties for non-compliance and rewards for efficient performance.

Policymakers need to address corruption and bureaucratic inefficiencies that hinder the effective implementation of operational guidelines. Transparent processes and accountability measures can build trust and improve efficiency. Infrastructure improvements, such as expanding berth capacity, modernizing equipment, and enhancing storage facilities, are also necessary to support efficient port operations. These combined efforts can reduce demurrage costs, improve supply chain reliability, and enhance Nigeria's trade competitiveness.

This study fills a crucial gap in the literature by providing empirical evidence of the impact of operational guidelines on cargo dwell time in Nigerian ports. While previous research focused on general causes of inefficiency, this study isolates the role of standardized procedures. However, future research is needed to track the long-term effects of improved guidelines through longitudinal studies. Comparative studies with other West African ports can also identify best practices for implementation. Additionally, exploring the role of automation and emerging technologies in enhancing compliance and efficiency could provide valuable insights.

Improving operational guidelines is essential for reducing cargo dwell time and enhancing port efficiency. By addressing procedural inefficiencies, adopting technological solutions, and promoting compliance, Nigerian ports can overcome longstanding challenges. These improvements will not only support economic growth but also position Nigeria as a key player in global maritime trade.

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9. Appendices

Appendix A: Survey Questionnaire

Section 1: Demographic Information

1. **Gender:**
   - Male
   - Female
2. **Age Group:**
   - 21–30 years
   - 31–40 years
   - 41–50 years
   - 51–60 years
3. **Years of Experience in Port Operations:**
   - 1–5 years
   - 6–10 years
   - Above 10 years
4. **Educational Background:**
   - WAEC
   - OND/NCE
   - B.Sc/HND
   - M.Sc/MBA
   - Ph.D.

Section 2: Operational Guidelines

Please indicate your level of agreement with the following statements on a scale of 1 to 5 (1 = Strongly Disagree, 5 = Strongly Agree).

1. The operational guidelines for cargo handling are clear and easy to understand.
2. There is consistent enforcement of operational guidelines in the port.
3. Training programs are provided to ensure compliance with operational guidelines.
4. Operational guidelines help streamline cargo clearance processes.

5. Operational guidelines are updated regularly to reflect current needs.

Section 3: Cargo Dwell Time

1. Cargo processing times are usually within acceptable limits.
2. Bureaucratic delays significantly affect cargo dwell time.
3. Adhering to operational guidelines reduces cargo dwell time.
4. Cargo dwell time at this port is shorter compared to other ports.
5. There are frequent delays due to unclear operational procedures.

Section 4: Port Efficiency

1. The port's operational efficiency has improved in recent years.
2. The port infrastructure supports efficient cargo handling.
3. Automation of processes has improved port efficiency.
4. Corruption and bureaucracy negatively impact port efficiency.
5. The port management addresses inefficiencies promptly.

Appendix B: Raw Data

(*Note: Due to space constraints, the complete raw data is provided separately in an Excel or CSV format.*)

A summary of key data points:

Respondent ID	Gender	Age Group	Years of Experience	Educational Background	Operational Guidelines Score	Cargo Dwell Time (Days)
1	Male	31–40	6–10	B.Sc/HND	4.5	12
2	Female	41–50	Above 10	M.Sc/MBA	3.8	15
3	Male	21–30	1–5	OND/NCE	4.0	13
…	…	…	…	…	…	…

(*Complete dataset available in attached file.*)

Appendix C: Supplementary Tables/Figures

Table C1: Descriptive Statistics of Respondents

Category	Frequency	Percentage (%)
Gender		
Male	89	73.0
Female	33	27.0
Age Group		
21–30 years	32	26.2
31–40 years	54	44.3
41–50 years	32	26.2
51–60 years	4	3.3
Years of Experience		
1–5 years	28	23.9
6–10 years	32	26.2
Above 10 years	62	50.8

Figure C1: Gender Distribution of Respondents

(*Pie chart showing 73% Male, 27% Female – previously displayed.*)

Figure C2: Scatter Plot of Operational Guidelines vs. Cargo Dwell Time

(*Scatter plot illustrating the positive linear relationship between operational guidelines and cargo dwell time – previously displayed.*)