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Effect of Port Congestion on Maritime Trade Performance in Nigeria: Evidence from The Nigerian Ports Authority

Mohammed Rabiu Musa, Phd
Department of Logistics and Maritime Economics, Faculty of Transportation Management, Federal University of Transportation Daura, Katsina State, Nigeria. Orchid Id: https://orcid.org/0000-0002-6845-6106

Zubaida Abubakar
Department of Logistics and Maritime Economics, Faculty of Transportation Management, Federal University of Transportation Daura, Katsina State, Nigeria. Orchid Id: https://orcid.org/0009-0009-4591-1987

Idris Safiyanu Elatikpo
Department of Logistics and Maritime Economics, Faculty of Transportation Management, Federal University of Transportation Daura, Katsina State, Nigeria. Orchid Id: https://orcid.org/0009-0007-0803-0668

Kabiru Musa Yusuf
Department of Logistics and Maritime Economics, Faculty of Transportation Management, Federal University of Transportation Daura, Katsina State, Nigeria. Orchid Id: https://orcid.org/0009-0004-0370-8263

Kabir Ibrahimm Halliru
Department of Logistics and Maritime Economics, Faculty of Transportation Management, Federal University of Transportation Daura, Katsina State, Nigeria. Orchid Id: https://orcid.org/0009-0002-3051-091X

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ABSTRACT: The effectiveness of international trade and maritime transportation has been negatively impacted by port congestion, especially in emerging nations like Nigeria. Prolonged vessel waiting times, higher demurrage fees, delays in customs clearance, and longer truck turnaround times are all consequences of congested ports that impair the performance of maritime trade by raising logistical costs and decreasing supply chain efficiency. Using data from the Nigerian Ports Authority (NPA), this study looked at how port congestion affected Nigeria's marine trade performance. The study specifically looked into how truck turnaround time, demurrage fees, customs clearing time, and vessel waiting times affected the performance of maritime trade. The Lagos Port Complex (Apapa) and Tin Can Island Port were the subjects of the study, which used a multiple case study design and a qualitative research methodology. Semi-structured interviews were used to gather information from 24 carefully chosen important players, including Nigerian Ports Authority officials, terminal operators, customs officers, freight forwarders, shipping companies, truck operators, and logistics service providers. Braun and Clarke's six-step framework served as a guide for the thematic analysis of the gathered data. The Lagos Port Complex (Apapa) and Tin Can Island Port were the subject of the study, which used a multiple case study design and a qualitative research methodology. 24 purposefully chosen important players, including representatives of the Nigerian Ports Authority, terminal operators, customs officers, freight forwarders, shipping companies, truck operators, and logistics service providers, participated in semi-structured interviews to gather data. The six-step framework developed by Braun and Clarke served as a guide for the thematic analysis of the gathered data. According to the study's findings, improving multimodal transport connectivity, modernizing port infrastructure, digitizing port operations, enhancing stakeholder collaboration, and implementing integrated policy reforms are all necessary to alleviate these operational constraints. To increase port efficiency, boost maritime trade performance, and bolster Nigeria's competitiveness in regional and international maritime commerce, it suggests consistent investment in smart port technology, customs automation, intelligent truck management systems, and capacity building.

KEYWORDS: Port Congestion, Maritime Trade Performance, Vessel Waiting Time, Customs Clearance, Demurrage Fees, Truck Turnaround Time.

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1.0 INTRODUCTION

Because it makes it easier to move commodities across continents and supports the integration of global supply chains, maritime transportation continues to be the foundation of international trade and global economic development (Mlambo, 2021; Poi & Ihunwo, 2021). The United Nations Conference on Trade and Development (UNCTAD, 2024) estimates that about 70% of the world's merchandise trade is carried by sea, accounting for around 80% of its volume. By allowing the effective flow of imports and exports, encouraging industrialization, aiding regional integration, and boosting national competitiveness, seaports play a crucial role as entry points for global trade (Tongzon, 2021; Mlambo, 2021). As a result, cargo throughput, logistical effectiveness, transportation costs, and economic productivity are all impacted by ports' operational efficiency, which is now a crucial factor in determining the performance of maritime trade (Tongzon, 2021; Ugboma & Oyesiku, 2021; Poi & Ihunwo, 2021). Therefore, effective port systems are essential to achieving the Sustainable Development Goals (SDGs) of the United Nations, especially SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 17 (Partnerships for the Goals), which highlight resilient infrastructure, sustainable industrialization, international trade, and economic development.

The fast expansion of international trade, containerization, and maritime logistics has put more strain on the operational capacity of many ports (Lin et al., 2022; Guo et al., 2023). As a result, the demand for port services such as vessel berthing, cargo handling, storage, customs processing, and cargo evacuation exceeds the available capacity, leading to the pervasive issue of port congestion (Xu et al., 2021; Lin et al., 2022). Because it results in vessel delays, longer cargo stay times, inefficient use of port infrastructure, higher logistics costs, and disruptions throughout the entire supply chain, port congestion has grown to be a significant problem for both developed and developing nations (Kabir & Helal, 2021; Guo et al., 2023; Zang et al., 2024). In addition to lowering port productivity, these operational inefficiencies jeopardize economic growth and international trade competitiveness (Mensah & Boateng, 2021; Svanberg et al., 2021; Okonkwo & Chukwu, 2024). Beyond its negative effects on the economy, port congestion raises serious environmental sustainability concerns and hinders the achievement of SDGs 13 (Climate Action) and 11 (Sustainable Cities and Communities) by causing excessive fuel consumption, greenhouse gas emissions from idle trucks and vessels, and inefficient resource use (Wen et al., 2024; Xu et al., 2021).

In order to improve port performance and handle rising cargo volumes, governments and port authorities around the world have made significant investments in port modernization, digital transformation, automation, and intelligent logistics systems (Belcore et al., 2024; Aronietis et al., 2023). Automated container terminals, electronic customs systems, blockchain, artificial intelligence (AI), the Internet of Things (IoT), and port community systems are just a few examples of the technologies that have greatly improved supply chain visibility, decreased vessel turnaround times, increased cargo handling efficiency, and encouraged environmentally sustainable port operations (Okonkwo & Chukwu, 2024; Qu et al., 2024; Belcore et al., 2024). These technological advancements help achieve SDG 13 by lowering emissions and increasing energy efficiency, while also supporting SDG 9 by strengthening infrastructure and promoting innovation (Wen et al., 2024; Aronietis et al., 2023). However, inadequate infrastructure, institutional inefficiencies, poor governance, low investment, inadequate coordination among stakeholders, and poor hinterland transport connectivity continue to cause significant port congestion in many developing nations (Kabir & Helal, 2021; Dickson, 2025). One of the biggest barriers to trade facilitation, regional integration, and sustained economic development in Africa is still port congestion (Mlambo, 2021; Mensah & Boateng, 2021). Due to poor infrastructure, outdated cargo handling equipment, inadequate berth capacity, ineffective customs procedures, and weak multimodal transport systems, many African ports continue to operate below international efficiency standards (Mlambo, 2021). African economies are less competitive in international trade as a result of these issues, which also lead to longer cargo dwell times, increased transportation costs, postponed delivery schedules, and decreased logistics efficiency (Mensah & Boateng, 2021; Mlambo, 2021). Improving port efficiency has become crucial for boosting intra-African trade, promoting industrial growth, and realizing the goals of Agenda 2063 and the Sustainable Development Goals, especially SDGs 8, 9, and 17, as African nations work to take advantage of the opportunities provided by the African Continental Free Trade Area (AfCFTA).

For its international trade, Nigeria, the biggest economy in Africa, mainly depends on maritime transportation. The country's seaports handle over 80% of its imports and exports, making the maritime industry a vital component of the country's economic growth (Nigerian Ports Authority [NPA], 2023; Poi & Ihunwo, 2021). In order to promote trade and enable effective cargo transportation, the Nigerian Ports Authority (NPA) is responsible for developing, maintaining, and regulating port infrastructure (NPA, 2023). However, major seaports like the Lagos Port Complex (Apapa) and Tin Can Island Port continue to face ongoing congestion due to rising cargo volumes, poor infrastructure, limited cargo handling capacity, urban traffic congestion, and institutional bottlenecks, despite port reforms and investments in infrastructure development (Dickson, 2025; Gbolahan et al., 2025; Ikeogu et al., 2025). Nigeria's maritime trade has become less efficient and competitive as a result of these difficulties, which have also negatively impacted port productivity, raised logistics costs, and delayed cargo clearance (Edih et al., 2022; Dere & Ojekunle, 2025; Gbolahan et al., 2025). Nigeria's efforts to achieve resilient infrastructure, sustainable industrialization, and inclusive economic growth as outlined in SDGs 8 and 9 are further hampered by these inefficiencies.

A number of operational variables that directly affect the performance of maritime trade are indicators of port congestion. Vessel waiting time, or the amount of time a vessel must wait for berthing space before loading or unloading cargo, is one of the most important indicators. Long waiting times limit fleet utilization, interfere with vessel schedules, raise shipping costs, and lower port productivity (Ducruet & Itoh, 2022; Mazibuko et al., 2024; Dickson, 2025). Demurrage fees, which are extra costs incurred when cargo or containers remain in the port beyond the permitted free storage period, are another crucial indicator. Exporters and importers are financially burdened by high demurrage charges, which also reduce logistics efficiency (Adeyemi & Okafor, 2022; Michail & Melas, 2025). Similarly, delays in cargo documentation, inspection, and release increase cargo dwell time and hinder trade facilitation, making customs clearance time a key determinant of port performance (Adeyemi & Okafor, 2022; Edih et al., 2022). Likewise, truck turnaround time, which measures the time required for trucks to enter the port, load or unload cargo, and exit the port environment, has a significant influence on cargo evacuation efficiency while contributing to traffic congestion, increased fuel consumption, and environmental pollution (Nwokedi et al., 2021; Zang et al., 2024).

When considered collectively, these dimensions of port congestion have profound implications for maritime trade performance, including cargo throughput, port productivity, supply chain resilience, logistics efficiency, trade facilitation, and the competitiveness of the maritime industry (Edih

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et al., 2022; Eze & Nwosu, 2023). According to Poi and Ihunwo (2021), Eze and Nwosu (2023), and Michail and Melas (2025), persistent congestion increases transaction costs, prolongs delivery lead times, discourages foreign investment, weakens supply chain reliability, and diverts cargo traffic to neighbouring ports with more efficient operations. Beyond its economic consequences, congestion undermines environmental sustainability and Nigeria's commitment to achieving SDG 13 (Climate Action) and the Paris Climate Agreement by increasing unnecessary fuel consumption and greenhouse gas emissions from trucks and vessels operating within port environments (Wen et al., 2024; Xu et al., 2021).

While earlier research has examined port operations, logistics efficiency, and maritime transportation in Nigeria, the majority of these studies have focused on specific operational issues such as cargo handling, infrastructure development, port concessioning, or customs procedures (Edih et al., 2022; Iwuoha et al., 2022; Gbolahan et al., 2025). Examining the combined impact of truck turnaround time, demurrage fees, customs clearance time, and vessel waiting time on maritime trade performance using data from the Nigerian Ports Authority has received limited empirical attention (Okonkwo & Chukwu, 2024; Ikeogu et al., 2025; Dere & Ojekunle, 2025). As a result, there is still a need for comprehensive evidence that can guide integrated policies and operational strategies aimed at improving port efficiency, enhancing trade competitiveness, and promoting sustainable development.

In light of this, this study uses the Nigerian Ports Authority as the analytical setting to examine the effect of port congestion on maritime trade performance in Nigeria. Specifically, the study investigates the influence of vessel waiting time, demurrage fees, customs clearance time, and truck turnaround time on maritime trade performance. The findings are expected to provide empirical evidence to assist policymakers, port managers, and other maritime stakeholders in developing integrated strategies for reducing port congestion, improving logistics efficiency, enhancing maritime trade competitiveness, and supporting Nigeria's attainment of SDGs 8 (Decent Work and Economic Growth), 9 (Industry, Innovation and Infrastructure), 11 (Sustainable Cities and Communities), 13 (Climate Action), and 17 (Partnerships for the Goals).

1.1 Statement of the Problem

One of the major challenges affecting the efficiency of Nigeria's maritime industry and the overall performance of maritime trade is port congestion. Despite the strategic importance of Nigerian seaports in facilitating international trade and contributing significantly to national economic development, major ports such as the Lagos Port Complex (Apapa) and Tin Can Island Port continue to experience persistent congestion, resulting in operational inefficiencies, increased logistics costs, cargo delays, and reduced port productivity (Nigerian Ports Authority [NPA], 2023; Gbolahan et al., 2025). This congestion is manifested through prolonged vessel waiting times, high demurrage charges, lengthy customs clearance procedures, and excessive truck turnaround times, all of which impede the efficient movement of cargo through Nigerian seaports (Ikeogu et al., 2025).

Prolonged vessel waiting times delay berthing and cargo discharge operations, disrupt shipping schedules, reduce fleet utilization, and increase shipping costs (Dickson, 2025). Similarly, high demurrage fees imposed on cargo that exceeds the allowable free storage period significantly increase the cost of doing business for importers and exporters, thereby reducing logistics efficiency and trade competitiveness (Adeyemi & Okafor, 2022). Furthermore, prolonged customs clearance procedures delay cargo release, while excessive truck turnaround times caused by traffic congestion, inadequate road infrastructure, and inefficient truck management systems slow cargo evacuation from the ports (Nwokedi et al., 2021). Collectively, these challenges reduce cargo throughput, increase transaction costs, discourage shipping lines from patronizing Nigerian ports, weaken supply chain efficiency, and adversely affect the overall performance of maritime trade (Eze & Nwosu, 2023).

Although several studies have examined port operations, logistics performance, port infrastructure, and maritime transportation in Nigeria (Iwuoha et al., 2022; Eze & Nwosu, 2023), limited empirical attention has been devoted to examining the combined influence of vessel waiting time, demurrage fees, customs clearance time, and truck turnaround time on maritime trade performance using evidence from the Nigerian Ports Authority (Okonkwo & Chukwu, 2024). Consequently, there remains a knowledge gap regarding the integrated effects of these key indicators of port congestion on maritime trade performance in Nigeria, limiting the empirical evidence needed to formulate effective policies and operational strategies for improving port efficiency and trade competitiveness.

Therefore, this study seeks to examine the effect of port congestion on maritime trade performance in Nigeria by investigating the influence of vessel waiting time, demurrage fees, customs clearance time, and truck turnaround time using evidence from the Nigerian Ports Authority. The findings are expected to provide empirical evidence to assist the Nigerian Ports Authority, policymakers, shipping companies, freight forwarders, customs authorities, and other maritime stakeholders in developing effective strategies to reduce port congestion, improve port operational efficiency, and enhance the competitiveness of Nigeria's maritime sector.

1.2 Specific Objectives

The main objective of this study is to examine the effect of port congestion on maritime trade performance in Nigeria, using evidence from the Nigerian Ports Authority (NPA). The specific objectives are to:

1. examine the effect of vessel waiting time on maritime trade performance in Nigeria.
2. determine the effect of demurrage fees on maritime trade performance in Nigeria.
3. assess the effect of customs clearance time on maritime trade performance in Nigeria.
4. evaluate the effect of truck turnaround time on maritime trade performance in Nigeria.

1.3 Significance of The Study

By offering empirical evidence on how vessel waiting times, demurrage fees, customs clearance times, and truck turnaround times affect the effectiveness and competitiveness of maritime trade, this study adds to the expanding body of knowledge on port congestion and maritime trade performance in Nigeria. The report presents a thorough overview of the operational issues facing Nigerian seaports and offers insights on methods for enhancing port performance by looking at these factors collectively. Additionally, the results add to the body of knowledge already available on port management, logistics, and maritime economics, especially in developing nations where port congestion still hinders trade competitiveness and economic progress.

The Nigerian Ports Authority (NPA), the Federal Ministry of Marine and Blue Economy, the Nigerian Customs Service, the Nigerian Shippers' Council, terminal operators, and other maritime regulatory organizations would find value in the study's conclusions. The study will provide

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evidence-based information to help operational decision-making, strategic planning, and policy formulation by identifying the crucial aspects of port congestion that limit marine trade performance. It is anticipated that the study's recommendations will help these organizations create successful interventions targeted at lowering vessel delays, increasing cargo evacuation, streamlining customs, and updating port infrastructure. These enhancements will boost port productivity, enhance service delivery, and make the maritime industry more competitive.

Shipping firms, terminal operators, freight forwarders, clearing agencies, importers, exporters, truck drivers, logistics service providers, and other players in the marine supply chain would also gain from the study. The results will improve stakeholders' comprehension of how port congestion impacts supply chain dependability, cargo delivery timetables, operational efficiency, and transportation costs. Better operational planning, better logistical coordination, more effective resource use, and well-informed investment decisions targeted at improving service quality and lowering the monetary losses related to port delays will all be supported by this knowledge.

From a policy standpoint, the report offers doable suggestions for improving Nigeria's maritime transportation system through improved port stakeholder collaboration, digital transformation, infrastructure development, modernization of customs, and intelligent traffic management. The government's efforts to enhance trade facilitation, boost port operations efficiency, draw in foreign investment, and solidify Nigeria's standing as a regional marine and logistics hub are anticipated to be aided by these recommendations.

Significantly, the study supports equitable and sustainable economic development, which is in line with the Sustainable Development Goals (SDGs) of the United Nations. Through the promotion of productive economic activities, trade expansion, employment creation, and sustainable economic growth, the study directly contributes to SDG 8 (Decent Work and Economic Growth) by suggesting ways for increasing port efficiency and decreasing logistics bottlenecks. By fostering resilient infrastructure and sustainable industrial development, the focus on enhancing port infrastructure, updating operational procedures, and boosting technological innovation promotes SDG 9 (Industry, Innovation, and Infrastructure). Additionally, by easing traffic around port corridors, increasing urban mobility, and boosting the effectiveness of freight transportation networks in significant port cities like Lagos, port congestion reduction will support SDG 11 (Sustainable Cities and Communities). In addition to lessening the strain on municipal infrastructure, improved traffic flow and more effective cargo evacuation will help create safer and more sustainable urban settings.

SDG 13 (Climate Action) is supported by the study's important environmental implications. Fuel consumption and greenhouse gas emissions related to port operations can be reduced by cutting down on vessel waiting periods, truck idling, cargo dwell times, and logistics efficiency. As a result, putting the study's recommendations into practice will support Nigeria's efforts to mitigate climate change under international environmental agreements and promote environmentally friendly maritime transport.

Additionally, by highlighting the significance of cooperation between government agencies, port authorities, customs administrations, shipping corporations, logistics service providers, private investors, and foreign development partners, the study advances SDG 17 (Partnerships for the Goals). In order to undertake integrated reforms, mobilize investment, share expertise, and achieve long-term gains in port performance and maritime trade, effective partnerships are crucial.

Lastly, researchers, postgraduate students, academics, policymakers, and development practitioners interested in international trade, supply chain management, port operations, logistics management, and maritime transport will find this study to be a valuable resource. Future empirical and comparative research on port congestion, marine trade performance, sustainable logistics, and port modernization in Nigeria, Africa, and other growing economies can be built upon it. The results are anticipated to spur additional study and policy debates with the goal of improving the maritime industry's effectiveness, sustainability, and worldwide competitiveness.

1.4 Scope of the Study

This study is geographically restricted to the Nigerian Ports Authority (NPA), with a focus on the Lagos Port Complex (Apapa) and Tin Can Island Port, which are among the busiest seaports in the nation and account for a significant portion of Nigeria's marine traffic. Given these ports' strategic importance to Nigeria's economy and sustainable trade development, the study looks at how port congestion affects maritime trade performance inside these ports.

Thematically, the study focuses on how port congestion affects the performance of maritime trade as assessed by vessel waiting times, demurrage charges, customs clearance times, and truck turnaround times. To shed light on the operational issues influencing port efficiency, information was gathered from the Nigerian Ports Authority and important players in the country's marine sector. The study supports the accomplishment of Sustainable Development Goals (SDGs) 8, 9, and 17, which encourage economic growth, sustainable infrastructure, and productive institutional partnerships. It also strengthens resilient port infrastructure and improves trade facilitation.

2.0 LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Concept of Port Congestion

Port congestion refers to a situation in which the demand for port services exceeds the available operational capacity, resulting in delays in vessel berthing, cargo handling, customs clearance, and cargo evacuation. It occurs when ports are unable to efficiently handle the volume of vessels and cargo due to inadequate infrastructure, operational inefficiencies, administrative bottlenecks, or weak logistics systems (Mensah & Boateng, 2021). Port congestion increases transportation and logistics costs, disrupts supply chains, reduces port productivity, and weakens the competitiveness of ports in international trade (Okonkwo & Chukwu, 2024). In Nigeria, port congestion remains a persistent challenge, particularly at the Lagos Port Complex (Apapa) and Tin Can Island Port, where increasing cargo volumes continue to place considerable pressure on existing port infrastructure and operational capacity (Nigerian Ports Authority [NPA], 2023; Gbolahan et al., 2025). The independent variable in this study is port congestion, which is quantified by truck turnaround time, demurrage fees, vessel waiting time, and customs processing time.

2.1.2 Vessel Waiting Time

Vessel waiting time refers to the length of time a vessel spends waiting to be allocated a berth before commencing loading or unloading operations. It is one of the primary indicators of port congestion, reflecting inadequate port capacity and operational inefficiencies (Ducruet & Itoh, 2022).

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Excessive vessel waiting times increase shipping costs, delay cargo delivery, disrupt vessel schedules, reduce fleet utilization, and lower overall port productivity (Dickson, 2025). Prolonged waiting times also discourage shipping companies from patronizing congested ports, thereby reducing port competitiveness and adversely affecting maritime trade performance (Ikeogu et al., 2025).

2.1.3 Demurrage Fees

Demurrage fees are charges imposed on importers or exporters when containers or cargo remain at the port beyond the stipulated free storage period. These charges are typically incurred due to delays in cargo clearance, documentation, or evacuation (Adeyemi & Okafor, 2022). High demurrage fees significantly increase logistics costs, reduce the profitability of businesses engaged in international trade, and undermine supply chain efficiency (Adeyemi & Okafor, 2022; Michail & Melas, 2025). In Nigeria, persistent port congestion has contributed to rising demurrage costs, thereby increasing the overall cost of imports and exports and reducing the competitiveness of the country's maritime trade (Dickson, 2025).

2.1.4 Customs Clearance Time

Customs clearance time refers to the period required to complete customs documentation, inspection, assessment, and approval before cargo is released from the port. Efficient customs clearance facilitates timely cargo movement, enhances port efficiency, and promotes international trade (Adeyemi & Okafor, 2022). However, delays arising from excessive documentation, manual processing, bureaucratic procedures, and poor inter-agency coordination significantly contribute to port congestion. Prolonged customs clearance increases cargo dwell time, delays cargo evacuation, reduces port operational efficiency, and raises logistics costs, thereby undermining maritime trade performance (Adeyemi & Okafor, 2022; Edih et al., 2022).

2.1.5 Truck Turnaround Time

Truck turnaround time refers to the time required for a truck to enter a port, load or unload cargo, and exit the port premises. It is an important indicator of the efficiency of port logistics and cargo evacuation systems (Nwokedi et al., 2021). Prolonged truck turnaround times are primarily caused by inadequate parking facilities, poor road infrastructure, traffic congestion, and inefficient truck scheduling and management systems (Nwokedi et al., 2021). These delays increase transportation and logistics costs, slow cargo movement, reduce supply chain efficiency, and contribute to congestion within and around port environments, thereby adversely affecting maritime trade performance (Gbolahan et al., 2025).

2.1.6 Concept of Maritime Trade Performance

Maritime trade performance refers to the efficiency and effectiveness with which maritime transportation facilitates the movement of goods through seaports. It reflects the ability of ports to support international trade by ensuring timely cargo handling, improving logistics efficiency, reducing transportation costs, and enhancing the competitiveness of the maritime sector (Poi & Ihunwo, 2021). Effective maritime trade performance contributes significantly to economic growth by facilitating the smooth flow of imports and exports and promoting trade competitiveness (Poi & Ihunwo, 2021; Mlambo, 2021). Furthermore, improvements in port infrastructure and operational efficiency enhance maritime trade performance through increased cargo throughput, higher port productivity, and more efficient trade facilitation (Eze & Nwosu, 2023). Consequently, reducing vessel waiting time, demurrage fees, customs clearance time, and truck turnaround time is essential for improving maritime trade performance in Nigeria.

2.2 Theoretical Framework

A study's theoretical framework serves as its cornerstone. It describes the theoretical stances that support how the independent and dependent variables relate to one another. The Theory of Constraints is used as the anchor theory and is covered under Queuing Theory, Systems Theory, and the Theory of Constraints.

2.2.1 Anchor Theory

The Theory of Constraints (TOC) is the foundation of this investigation. In 1984, Eliyahu M. Goldratt developed the Theory of Constraints (TOC). Every system or organization has at least one constraint or bottleneck that keeps it from accomplishing its objectives, according to the theory.This is due to the fact that it offers the best theoretical justification for the connection between maritime trade performance and port congestion. The Theory of Constraints explicitly describes how operational bottlenecks lower an organization's or system's performance, in contrast to Queuing Theory, which primarily focuses on waiting lines, and Systems Theory, which highlights interactions among various system components.

Vessel waiting times, demurrage charges, customs clearance times, and truck turnaround times all of which reflect operational limitations inside Nigerian ports are the independent variables used to quantify port congestion in this study. These limitations have a detrimental impact on marine commerce performance, delay cargo transit, raise logistical costs, and lower port productivity. According to the Theory of Constraints, locating and removing these bottlenecks will boost marine commerce performance, promote trade, and increase port efficiency.

Because it clearly explains the link between the study variables and offers a solid theoretical foundation for investigating the impact of port congestion on maritime trade performance in Nigeria, the Theory of Constraints is therefore thought to be the best suitable theory for this investigation.

3.0 RESEARCH METHODOLOGY

With a focus on the Lagos Port Complex (Apapa) and Tin Can Island Port under the Nigerian Ports Authority (NPA), this study uses a qualitative research approach to investigate the impact of port congestion on maritime trade performance in Nigeria. Because the study aims to gain a comprehensive understanding of the experiences, perceptions, and opinions of important stakeholders regarding the causes of port congestion, its implications for maritime trade performance, and the strategies necessary to improve port efficiency, a qualitative approach is deemed appropriate. In contrast to quantitative approaches, which concentrate on numerical measurements and statistical correlations, qualitative research makes it easier to examine intricate institutional and operational problems that affect port performance in their actual setting.

The Lagos Port Complex and Tin Can Island Port are the main subjects of the study, which uses a multiple case study design. These ports were specifically chosen because they handle a significant amount of Nigeria's marine traffic and have frequently faced issues with congestion. The case study design makes it possible to compare the operational experiences of the two ports while delving deeply into the issue of port congestion.

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Important parties directly involved in port operations and maritime trade make up the target demographic. The Nigerian Ports Authority (NPA) officials, terminal operators, Nigeria Customs Service officials, freight forwarders, shipping company representatives, clearing and forwarding agents, truck operators, logistics service providers, maritime consultants, and representatives of pertinent regulatory agencies are among them. These participants are in a good position to offer rich information pertinent to the study's goals since they have firsthand knowledge and expertise with port operations.

Participants were chosen using a purposive sampling technique according to their involvement in port operations, professional duties, and level of competence. Because it allowed the researcher to find information-rich individuals who could offer in-depth insights into the research problem, this non-probability sampling technique was deemed suitable for the qualitative study. 24 important informants in all were questioned; the ultimate sample size was established by the data saturation principle, which states that interviews should continue until no noteworthy new information was discovered.

Semi-structured interviews were used to gather primary data. Based on the study's goals, the parameters of port congestion—vessel waiting time, demurrage costs, customs clearing time, and truck turnaround time—and the idea of maritime commerce performance, an interview guide was created. While maintaining consistency throughout interviews, the semi-structured interview method allowed participants to freely share their perspectives. In order to supplement the interview data and offer context, field observations and documentary evidence such as reports from the Nigerian Ports Authority (NPA), policy documents, yearly reports, and other government publications were used when needed.

The six-step process outlined by Braun and Clarke (2006) was followed in the thematic analysis of the gathered data. To guarantee familiarity with the data, the verbatim transcriptions of the interview recordings were thoroughly examined. Based on commonalities and trends, the initial codes were created and then organized into more general themes. In light of the study's goals and underlying theories especially the Theory of Constraints, which functioned as the study's anchor theory that the detected themes were examined, improved, and interpreted. Thematic analysis made it easier to find recurrent patterns about the reasons behind port congestion, how it affects the performance of maritime trade, and potential solutions for increasing port efficiency in Nigeria.

A number of quality assurance techniques were used to increase the findings' legitimacy and dependability.Member checking, which allowed participants to confirm the accuracy of the interview summaries, increased credibility.Giving thorough descriptions of the study environment and participants improved transferability.While confirmability was attained by maintaining objectivity throughout data collection and analysis and by bolstering interpretations with evidence gathered from participants and documentary sources, dependability was guaranteed by keeping an audit trail that documented the research process.

The investigation was conducted with rigorous adherence to ethical considerations. Permission was acquired from the appropriate authorities and organizations prior to data gathering. Following a thorough explanation of the study's objectives, the voluntary nature of participation, and the participants' freedom to withdraw at any time without consequence, informed consent was obtained from each participant. Pseudonyms were used to protect participant confidentiality and anonymity, and all research data was stored securely. Additionally, by correctly reporting the results and properly citing all documentary sources, the study complied with recognized standards of academic integrity.

This study's qualitative methodology produced thorough insights into the institutional, operational, and policy aspects of port congestion in Nigeria. In addition to offering evidence-based suggestions for policymakers, port managers, and other stakeholders looking to boost the effectiveness and competitiveness of Nigerian seaports, the findings advanced knowledge of how congestion impacted maritime trade performance.

4.0 FINDINGS

The main themes that surfaced from the interviews with important stakeholders, such as Nigerian Ports Authority (NPA) officials, terminal operators, customs officers, freight forwarders, shipping companies, truck operators, and logistics service providers, are used to present the study's findings. According to the report, one of the biggest operational issues affecting Nigeria's marine commerce performance is still port congestion. The investigation revealed four main themes: truck turnaround time, demurrage expenses, customs processing time, and vessel waiting time. Another theme that surfaced has to do with ways to increase port efficiency.

4.1 Vessel Waiting Time and Maritime Trade Performance

The results show that low maritime trade performance in Nigerian seaports is largely caused by extended vessel waiting times. Due to limited berth capacity, insufficient cargo handling equipment, and growing cargo traffic, participants repeatedly noted that vessels frequently encounter significant delays before gaining berthing space. These delays increase shipping costs, disrupt shipping timetables, impair vessel turnaround efficiency, and dissuade international shipping companies from using Nigerian ports. Long wait times have a detrimental impact on customer satisfaction and make Nigerian ports less competitive in the West African subregion, according to a number of respondents.

4.2 Demurrage Fees and Logistics Costs

According to the study, one of the main financial effects of port congestion is exorbitant demurrage charges. Participants clarified that importers and exporters sometimes have to pay high demurrage fees due to delays in cargo clearance, documentation, and evacuation. These extra expenses lower the profitability of foreign trade operations and dramatically raise the total cost of doing business. Importers and freight forwarders voiced worry that ongoing demurrage fees had turned into a significant barrier to effective trade facilitation and deter investment in port-related enterprises.

4.3 Customs Clearance Time

The results showed that protracted customs clearance processes continue to be a major cause of port congestion in Nigeria. Multiple paperwork requirements, manual processing procedures, poor interagency collaboration, and sporadic system outages were cited by respondents as the causes of these delays. Participants noted that bureaucratic bottlenecks continue to postpone the discharge of cargo, despite recent digitalization attempts improving some areas of customs processing. As a result, importers pay more for storage and logistics, cargo dwell time rises, and supply chain efficiency decreases.

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4.4 Truck Turnaround Time

Excessive truck turnaround times within and around the ports are another significant issue. Participants stated that inadequate truck holding bays, ineffective truck scheduling systems, heavy traffic congestion, and poor road infrastructure all greatly contribute to cargo evacuation delays. According to truck drivers, cars frequently have to wait for hours or even days to enter the ports. The timely flow of imports and exports is ultimately impacted by these delays, which also lower fleet productivity and raise fuel and vehicle operating costs.

4.5 Overall Effect of Port Congestion on Maritime Trade Performance

According to the study, Nigeria's maritime commerce performance is severely hampered by the combined effects of extended vessel waiting times, expensive demurrage costs, drawn-out customs clearing processes, and exorbitant truck turnaround times. Participants concurred that these operational obstacles raise logistics costs, lower port productivity, impede cargo flow, erode supply chain dependability, and make Nigerian seaports less competitive. The results also imply that ongoing congestion deters shipping firms from using Nigerian ports and may cause cargo to be diverted to nearby nations with more effective port infrastructure.

4.6 Strategies for Improving Port Efficiency

Participants suggested a number of ways to improve maritime trade performance and lessen port congestion. Increasing port infrastructure, boosting berth capacity, updating cargo handling machinery, speeding up the digitalization of customs, streamlining documentation processes, enhancing interagency cooperation, enhancing road and rail connectivity to the ports, setting up efficient truck holding bays, and implementing intelligent traffic management systems are some of these. In order to improve operational efficiency and enable quicker cargo flow, respondents also underlined the significance of implementing digital technology, such as port community systems, artificial intelligence, and real-time cargo tracking.

Discussion of Findings

The results show that port congestion continues to be a significant barrier to Nigeria's marine trade performance. The issues that have been identified that truck turnaround time, demurrage costs, delays in customs clearance, and vessel waiting times represent operational bottlenecks that lower Nigerian seaports' productivity and competitiveness. The Theory of Constraints, which contends that bottlenecks limit organizational performance and must be found and removed in order to enhance total system performance, is supported by these findings. The results also support systems theory, which emphasizes the necessity of efficient coordination among port system stakeholders, and queuing theory, which explains that insufficient service capacity results in higher wait times and operational inefficiencies.

The study's conclusion is that in order to improve maritime trade performance and reduce congestion, port infrastructure must be improved, digitalization must be strengthened, institutional coordination must be strengthened, and integrated logistics management systems must be implemented. These actions will boost Nigeria's competitiveness in regional and international marine trade in addition to increasing the efficiency of its ports.

5.0 CONCLUSION

With a focus on the Lagos Port Complex (Apapa) and Tin Can Island Port under the Nigerian Ports Authority (NPA), this study investigated the impact of port congestion on maritime trade performance in Nigeria. The study investigated the opinions and experiences of important stakeholders on the operational limitations brought on by port congestion and their effects on the performance of maritime trade using a qualitative research methodology. The results show that one of the biggest obstacles to effective port operations and foreign trade in Nigeria is still port congestion.

According to the report, the main aspects of port congestion that negatively impact maritime trade performance are lengthy vessel waiting times, high demurrage costs, drawn-out customs clearing processes, and protracted truck turnaround times. These operational obstacles raise the cost of logistics, cause delays in the transportation of goods, lower port productivity, interfere with supply chain operations, and make Nigerian seaports less competitive in the international maritime market. The results also show that these issues are interrelated and collectively compromise port operations' effectiveness, which impacts import and export operations and restricts Nigeria's ability to optimize the financial gains from maritime trade.

Inadequate port infrastructure, limited cargo handling capacity, ineffective customs procedures, poor inter-agency coordination, inadequate road connectivity, inadequate truck management systems, and the sluggish adoption of contemporary digital technologies are all major contributors to the persistent nature of port congestion, according to the study. A comprehensive and integrated strategy involving government organizations, port authorities, terminal operators, customs services, shipping firms, freight forwarders, and other stakeholders in the marine logistics system is needed to address these issues.

Additionally, the results confirm that the Theory of Constraints, which served as the study's anchor theory, is applicable. The operational impediments that limit Nigerian seaports' overall performance are represented by the dimensions of port congestion that have been established. Therefore, improving maritime commerce performance requires lowering these barriers through institutional reforms, strategic investments, and operational enhancements. By highlighting the significance of good coordination, integrated management of port operations, and efficient service delivery, the findings also reinforce the ideas of Queuing Theory and Systems Theory.

Based on the results, the study comes to the conclusion that significant investments in contemporary port infrastructure, berth capacity expansion, automation of cargo handling operations, digitalization of customs procedures, deployment of intelligent traffic and truck management systems, and increased cooperation among all port stakeholders are necessary to improve Nigeria's maritime trade performance. Adoption of cutting-edge technologies, such as artificial intelligence, port community systems, big data analytics, and real-time cargo tracking, also presents substantial chances to boost Nigerian seaports' competitiveness, decrease traffic, and increase operational efficiency.

The study comes to the conclusion that eliminating port congestion is essential to raising Nigeria's marine industry's effectiveness, dependability, and competitiveness. Faster cargo movement, lower logistics costs, improved trade facilitation, increased supply chain resilience, and sustainable economic growth and national development will all result from the effective execution of the suggested methods. Policymakers, maritime

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administrators, researchers, and business professionals looking to develop evidence-based plans for enhancing port operations and maritime trade performance in Nigeria would find the study to be a useful starting point.

5.1 Recommendations

The study's conclusions lead to the following suggestions for boosting Nigeria's marine trade performance and port efficiency:

1. **Expand and Modernize Port Infrastructure:** By expanding berth capacity, dredging navigation channels, acquiring cutting-edge cargo handling equipment, and modernizing terminal facilities, the Federal Government, acting through the Nigerian Ports Authority (NPA), should give priority to the expansion and modernization of port infrastructure. These actions will shorten vessel wait times, increase the effectiveness of cargo processing, and make Nigerian seaports more competitive overall.
2. **Accelerate the Digitalization of Port Operations:** By implementing integrated Port Community Systems (PCS), electronic documents, cargo tracking systems, and single-window platforms, government organizations and port operators should completely automate port operations. Digitalization will speed up cargo clearance, decrease administrative bottlenecks, enhance information sharing among stakeholders, and minimize manual operations.
3. **Reform Customs clearing Processes:** By increasing the use of risk-based cargo inspection, electronic payment systems, and automated cargo release mechanisms, the Nigeria Customs Service may streamline and standardize customs documentation and clearing processes. This will speed up trade facilitation, cut down on cargo dwell time, and speed up customs clearance.
4. **Enhance Road and Rail Connectivity to Seaports:** In addition to expediting the development of rail links for cargo evacuation, the Federal Government should make investments in the extension and renovation of road infrastructure leading to major ports. An integrated multimodal transport system will speed up truck turnaround times, ease freight transit, and lessen traffic congestion near ports.
5. **Use Intelligent Truck Management Systems:** The Nigerian Ports Authority should use intelligent traffic management technology, electronic call-up systems, and designated truck holding bays to improve truck scheduling. Improved vehicle turnaround times, less traffic in port corridors, and cheaper transportation will all result from efficient truck management.
6. **Encourage Inter-Agency Cooperation:** Through standardized operating procedures and real-time information sharing, pertinent government agencies, such as the Nigerian Ports Authority, Nigeria Customs Service, Nigerian Shippers' Council, terminal operators, and security agencies, should improve institutional coordination. Enhanced cooperation will reduce process redundancy and boost operational effectiveness.
7. **Adopt Emerging Digital Technologies:** To enhance cargo tracking, demand forecasting, berth allocation, equipment maintenance, and operational decision-making, port operators and logistics service providers should invest in emerging technologies like artificial intelligence (AI), big data analytics, the Internet of Things (IoT), blockchain, and predictive analytics. These innovations will help reduce traffic and increase port efficiency.
8. **Boost Human Capacity Development:** To improve their understanding of contemporary port management systems, digital technologies, and global best practices in maritime logistics, port staff, customs officers, freight forwarders, and other maritime stakeholders should participate in ongoing training and capacity-building programs.
9. **Improve Policy and Regulatory Reforms:** The government should create and put into effect rules that encourage accountability, openness, operational efficiency, and private sector involvement in port administration. To guarantee ongoing improvement, port performance indicators should be routinely monitored and assessed.
10. **Promote More Research:** Future studies should use mixed-method or longitudinal research designs, broaden their scope to include more Nigerian seaports and inland dry ports, and look at how emerging technologies, climate resilience, and multimodal transport systems affect port efficiency and maritime trade performance. These studies would offer more comprehensive empirical data to help formulate policies and promote sustainable growth in Nigeria's maritime industry.

By putting these suggestions into practice, port congestion would be greatly reduced, operational efficiency will be increased, logistical costs will be decreased, international trade will be facilitated, and Nigerian seaports will become more competitive. In the end, these actions would improve marine trade performance and help Nigeria achieve its goals for sustainable development and wider economic growth.

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