

DRAFT LIMITATIONS AND LOGISTICS CONSTRAINTS AT CALABAR PORT: A CASE STUDY OF ECM TERMINALS

Otu Sunday

ECM Terminals Calabar, Cross River State

Out.unor@outlook.com

Abstract

Calabar Port occupies a strategically important location within Nigeria's maritime system, yet it has continued to struggle to attract steady vessel traffic and maintain consistent cargo throughput. This study examines how draft limitations, inadequate hinterland connectivity, and irregular vessel calls affect the operational performance of ECM Terminals, a key concessionaire within the Calabar Port Complex. Drawing on operational records, stakeholder interviews, and a comparative analysis of logistics costs, the research explores how shallow channel depths and poor road infrastructure encourage cargo diversion to competing ports, such as Onne, Apapa, and Tin Can Island. The findings reveal that the navigational depth of about 6.4 meters substantially limits the class and size of vessels that can safely access the port. In addition, the weak state of road connectivity raises inland transportation costs for exporters. The study therefore concludes that sustained channel dredging, improved road infrastructure, and stronger policy interventions are necessary to reposition Calabar Port as a competitive export gateway for Nigeria's eastern and north-central regions.

Keywords: Calabar Port, ECM Terminals, draft limitations, export logistics, port throughput, road infrastructure

1.0 Introduction

Calabar Port is one of Nigeria's six major seaports, located in Cross River State in the country's Southeast region. The port comprises several terminals, including the New Dockyard, Old Port, and Calabar Channel. The port is run by the Nigerian Ports Authority (NPA) and has been concessioned to private operators as part of the Nigerian port reform agenda of 2006. ECM Terminals Limited is one of the major

concessionaires at the port, handling general cargo, dry bulk, breakbulk, and containerized cargo (NPA, 2023).

ECM Terminals is well-positioned to serve Nigeria's North-Central and Eastern regions, as well as potential trade with landlocked nations such as Chad and the Republic of Niger. Despite its potential, ECM Terminals' activities have been significantly hampered by the port's draft limitation (about 6.4 meters), which restricts the

berthing of larger ships. Additionally, the poor condition of access roads, especially on the Odukpani-Calabar axis, has reduced the port's appeal to shippers and logistics companies (Eyo et al., 2020).

Calabar Port holds a unique strategic position within Nigeria's port ecosystem due to its proximity to the country's North-Central and Eastern geopolitical zones, as well as its potential as a significant marine gateway to the Gulf of Guinea sub-region. Nigeria's easternmost seaport, in Cross River State, offers direct access to Equatorial Guinea, Chad, and Cameroon (Okon & Ibe, 2020). Calabar Port, because of its location, can be accessed by both foreign and local companies.

It is a significant logistics center for all the states in the South-South, South-East, and North-Central regions, including Benue, Ebonyi, Enugu, Taraba, and Nasarawa, as well as part of Kogi state.

The port serves as a vital logistical center for many states in the South-South, South-East, and North-Central regions, including Benue, Ebonyi, Enugu, Taraba, and parts of Nasarawa and Kogi. It offers a faster route for the export of agricultural goods such as cocoa, palm kernels, and timber, as well as solid minerals such as iron ore and limestone, which are abundant in Nigeria's interior (Eyo & Nwagbara, 2019).

Calabar's location offers a less congested alternative with a faster turnaround time than Lagos and Port Harcourt under ideal operating conditions.

Besides, Calabar Port stands well to help Nigeria diversify its exports away from petroleum. The Calabar Free Trade Zone (CFTZ), Tinapa Business Resort, and location near raw material belts place it at the center of potentially robust regional trade and industrialization (UNCTAD, 2021). With prudence, these attributes can alleviate pressure on Lagos ports, increase the competitiveness of Nigeria's trade, and reduce logistics costs for hinterland exporters.

These natural strengths notwithstanding, the port is still underutilized to capacity due to infrastructural constraints, specifically shallow draft depth that hinders large ocean liners from accessing it, as well as deterioration of access roads, such as the Odukpani-Calabar road. Due to these factors, freight has shifted to more established ports like Apapa and Onne, discouraging their use as hub commercial ports (Ekong & Bassey, 2022).

Therefore, the key to maximizing Calabar Port's potential is direct investment in dredging, multimodal logistics infrastructure, and legislative measures to divert cargo from congested western ports.

Operating under a concession granted under the 2006 Nigerian port reform programme, ECM Terminals Limited, a multipurpose terminal, is among the major terminal operators in the Calabar Port Complex. By including the private sector in terminal operations, the reform sought to improve efficiency and competitiveness in Nigeria's marine industry (World Bank, 2018). ECM Terminals is a vital player in Nigeria's eastern corridor maritime logistics framework, owing to its strategic location, which enables it to supply diverse cargo, including dry bulk, liquid bulk, containerized cargo, and general cargo.

ECM Terminals is a concessionaire under the landlord-port model, in which the terminal operator handles quay operations, cargo handling, and customer service, while the Nigerian Ports Authority (NPA) owns and exercises control (NPA, 2023). The terminal boasts operational equipment such as mobile cranes, forklifts, reach stackers, stacking yards, and storage space, although full operational capacity is presently hindered by the systemic challenges that afflict Calabar Port (Nigerian Ports Authority, 2023).

The inland Nigerian states of Benue, Kogi, and Nasarawa, and the surrounding countries along the Calabar-Mamfe-Bamenda trade corridor to Cameroon, rely heavily on ECM Terminals to facilitate trade. Through its transportation and

handling services linking hinterland production nodes to seaports, the terminal also supports exporters of solid minerals and agricultural products (Okon & Ekpenyong, 2021).

The draft restrictions on the Calabar channel, which limit larger commercial shipping vessels that dominate international shipping channels to those with a draft of less than 6.4 meters, have caused ECM Terminals to experience severe operational issues despite its strategic location. As a result, cargo has been redirected to deeper-draft ports such as Onne, Apapa, and Tin Can Island, leading to increased logistics costs for shippers using longer routes, loss of business, and underutilization of port facilities (Eyo et al., 2020).

1.1 Aim and Objectives of the Study

Aim of the Study

The main aim of this research is to evaluate how draft limitations and logistics constraints affect the operational performance and competitiveness of Calabar Port, using ECM Terminals as a case study.

Specific Objectives

To achieve the stated aim, the study is guided by the following specific objectives are to:

1. examine the impact of draft restrictions on vessel calls and cargo throughput at ECM Terminals.
2. analyze the logistics and economic implications of cargo diversion to alternative ports such as Onne and Apapa.
3. analyze the challenges of hinterland connectivity, in particular the role of the Odukpani-Calabar road, in influencing port utilization and export efficiency.
4. propose strategic infrastructure and policy interventions capable of improving the competitiveness of Calabar Port.

1.2 The Need for the Research

Despite its strategic geographic location and concessioned terminals, such as ECM Terminals, Calabar Port remains severely underutilized in Nigerian port logistics. The longstanding draft limitations, with a navigable depth of approximately 6.4 meters, have kept large vessels out of the port, forcing shippers to deliver cargo to other ports such as Apapa, Tin Can Island, and Onne. For companies in hinterland areas that would normally be best served by Calabar, this redirection leads to longer interior transport routes, higher freight costs, and decreased competitiveness (Okon et al., 2022; Okechukwu & Olayemi, 2021).

An empirical assessment of the ways in which these infrastructure issues more especially, the draft restrictions and inadequate road access, particularly the crumbling Odukpani-Calabar highway have hampered the expansion of ECM Terminals and, consequently, the commercial viability of Calabar Port is imperative. Exporters of bulk commodities such as cocoa, timber, palm kernel shells, and iron ore in states like Benue, Taraba, Ebonyi, and Cross River face significantly higher logistical costs when forced to use congested and distant ports (Eyo & Nwagbara, 2019).

Additionally, the Nigerian government's policy goals of diversifying the economy away from crude oil and increasing non-oil exports, particularly agricultural and solid mineral commodities, are undermined by the continued disregard for Calabar Port, which exacerbates regional economic disparities. Therefore, research is urgently needed to generate empirical data to inform policy changes, infrastructure investment, and stakeholder engagement to restore Calabar Port as a commercially viable and nationally significant maritime asset (Emefiele et al., 2020; UNCTAD, 2021).

This study also fills a significant knowledge gap in the literature on maritime logistics by providing terminal-level insights from ECM Terminals and by evaluating throughput patterns,

cost implications, and strategic opportunities using real operational data. Policymakers, port authorities, terminal operators, and investors in port infrastructure are expected to find the data beneficial.

2.0 Literature Review

This section outlines relevant academic literature on port performance, the economic consequences of inefficient port infrastructure, comparative port competitiveness within Sub-Saharan Africa, and pertinent government transport policy. These are the central issues that help us understand the systemic restraints on ECM Terminals and Calabar Port.

2.1 Overview of the Nigerian Port System

Nigeria's seaports play a strategic role in facilitating international trade, cargo distribution, and economic integration. With a coastline stretching roughly 850 kilometers along the Gulf of Guinea, maritime transport remains one of the country's most important logistics channels. The Nigerian Ports Authority (NPA), established in 1954 and later strengthened by subsequent port legislation, is responsible for regulating and managing public port infrastructure nationwide.

Nigeria currently has six major seaports: Lagos Port Complex and Tin Can Island Port in Lagos State; Calabar Port in Cross River State; Warri

Port in Delta State; Rivers Port in Rivers State; and Onne Port in Rivers State. These ports are complemented by a number of terminals operated by private companies pursuant to concessions concluded under the port reform program of 2006. As a result of the reform, Nigerian ports have shifted from state-run to landlord port models, with the NPA continuing to serve as both the technical regulator and the landlord, while private terminal operators manage cargo operations (World Bank, 2018; Akinwale & Shittu, 2022).

The Lagos ports of Apapa and Tin Can Island are unparalleled in the business for cargo traffic, container handling, and vessel movement, thanks to their advanced facilities, deep-draft capacity, and proximity to industrial and commercial areas. This, however, has resulted in congestion, inefficiency, and operational constraints, leading to a call for development at other terminals such as Calabar, Warri, and Port Harcourt (Okechukwu & Olayemi, 2021).

Many eastern and interior ports, such as Calabar, have low draft depths, decaying infrastructure, and restricted access to the hinterland despite their strategic locations. For shippers close to these other ports, these restrictions increase logistical costs and undermine port diversification efforts. Therefore, to fully achieve the economic potential of Nigeria's port network,

investments in dredging, port access roads, and multimodal transportation infrastructure are necessary (Emefiele et al., 2020).

2.2 Studies on Port Performance and Draft Limitations

Draft depth is among the most significant factors influencing port performance, especially in global shipping chains that are increasingly reliant on larger, deeper-draft vessels in pursuit of economies of scale (Notteboom and Rodrigue, 2012). Calabar Port's shallow draft of less than 6.5 meters in Nigeria does not allow Panamax and post-Panamax vessels, which are widely used in global trade. Olayinka and Adedayo (2018) conducted a study on the effectiveness of Nigeria's port operations and concluded that draft restrictions significantly decimate productivity in ports in the east, including Calabar, where delay in vessel scheduling and inefficient utilization of berthing facilities were noted. Igbokwe et al. (2020) also determined that the failure to implement the long-proposed dredging of the Calabar channel has undermined the port's feasibility as a regional maritime hub.

2.3 Economic Impact of Inefficient Port Infrastructure

The economic effects of inefficient port infrastructure in Nigeria are far-reaching. Lack of quay depth, inadequate cargo handling equipment, and poor access roads all contribute

to logistics costs, extend delivery lead times, and render Nigerian ports unattractive to global shipping lines. Akinwale and Shittu (2022) have established a causal relationship between infrastructure shortfalls and increased logistics costs, particularly for exporters of bulk and perishable products that rely on timely and efficient port services.

In a comparative regional study, Emefiele et al. (2020) estimated Nigeria's annual loss of over ₦150 billion due to inefficiencies in logistics caused by underdeveloped eastern ports. North-Central and Eastern Nigerian exporters often prefer to move products through congested western ports like Apapa and Tin Can Island, thereby incurring additional transport and warehousing costs. Such inefficiencies not only reduce Nigeria's trade competitiveness but also limit the development of inland economies.

2.4 Port Competitiveness in Sub-Saharan Africa

The quality of infrastructure, hinterland connectivity, regulatory effectiveness, and private-sector involvement are the main factors driving port competitiveness in Sub-Saharan Africa. Hoffmann and Asariotis (2021) conducted a comparative analysis of 12 African ports and found that ports in Ghana (Tema), South Africa (Durban), and Kenya (Mombasa) were more competitive than their Nigerian

counterparts, mainly due to improved infrastructure and expedited customs processes.

Onne and Apapa ports in Nigeria have continued to outpace Calabar in vessel turnaround, dwell time, and container throughput. The operational gap, the African Development Bank (2020) asserts, is a consequence of enormous public and private investment in western ports but ongoing underfunding and regulatory abandonment of eastern ports like Calabar. Shippers in eastern and central Nigeria are thus systematically handicapped, and the strategic value of ports like Calabar is diminished.

2.5 Relevant Government Transport Policies

Successive Nigerian governments have put forward numerous transport and port policy proposals, including the National Transport Policy (NTP), the Economic Recovery and Growth Plan (ERGP), and the Nigerian Export Promotion Masterplan. These policies prioritize the rehabilitation of infrastructure, intermodal connectivity, and port efficiency as drivers of national development and trade diversification.

The implementation gaps, nonetheless, remain a challenge. While the NTP also pinpointed eastern ports as a decongestion priority for Lagos, financial and dredging promises have lagged behind, Okechukwu and Olayemi (2021) noted. The same remedies for road renewal and dredging of the Calabar channel are contained in

the Nigerian Ports Master Plan (NPA, 2023), but they have been continually delayed due to financial, legal, and contractual issues.

The benefits to operators such as ECM terminals and the entire export industry are being eroded by the continued stagnation of Calabar port expansion due to the absence of concerted investment and policy compliance.

3.0 Study Area and Methodology

This study employs both quantitative and qualitative data sources. Data spans from 2016 to 2023 and covers operational throughput, vessel calls, and cargo types.

3.1 Data Sources

The data sources used in this study are both quantitative and qualitative.

Operational Throughput Data: information was gathered from Calabar Port records and the internal operations management system of ECM Terminals. From 2016 to 2023, the data comprises:

The types and numbers of vessels that call at ECM Terminals, the annual volume of containers handled (measured in TEUs, or twenty-foot equivalent units), and the tonnage of cargo carried annually (expressed in metric tonnes).

The qualitative Semi-structured interviews with relevant port stakeholders were conducted with Solid mineral and agricultural commodity exporters, Shipping representatives in charge of vessel scheduling at ECM Terminals, customs officials and clearing agents, Terminal managers, and officials of the NPA.

Fifteen (15) participants were selected using a purposive sampling technique, ensuring representation from both the operational and logistical chains.

3.2 Data Sources for Cost Implication Analysis

To evaluate the cost implications of ECM Terminal operational conditions at Calabar Port, this study relies on secondary data from several institutional and industry sources. The purpose of using these data sources is to generate comparative estimates of logistics costs for cargo movements through Calabar Port in relation to other major Nigerian ports.

Information on port handling charges was obtained from publicly available tariff schedules and pricing notices issued by terminal operators, including ECM Terminals and other concessionaires operating within the Nigerian port system. Additional supporting data were drawn from regulatory publications and reports released by the Nigerian Shippers' Council and the Nigerian Ports Authority.

Estimates for inland transportation costs were derived from average truck freight rates, expressed in naira per metric tons, across key cargo corridors connecting inland production zones to seaports. Particular attention was given to freight movements originating from Benue State to the ports of Calabar Port, Onne Port, and Apapa Port. These freight estimates were compiled from logistics market surveys and freight forwarding records. The estimates also take into account major factors that influence road transport costs, including travel distance, prevailing fuel prices, road conditions, and congestion levels along the different transport corridors.

To enhance the reliability of the analysis, the estimated costs were cross-validated using exporter case studies and information from freight forwarders and shipping agents involved in cargo movements through the selected ports. Since logistics costs are subject to seasonal and operational variations, all cost figures are presented as indicative ranges with an estimated variability margin of approximately ± 10 –15 percent. This method allows the analysis to reflect fluctuations in operational costs while maintaining a consistent basis for comparison.

It is important to emphasize that the cost figures presented in this study should not be interpreted as fixed tariff rates. Instead, they serve as

comparative logistics cost indicators to assess the relative competitiveness of Calabar Port under prevailing infrastructural and operational conditions.

3.3 Analytical Methods

The study employed a mixed-methods design that included descriptive statistics, trend analysis, and comparative cost analysis.

Trend Analysis: trends between 2016 and 2023 were compared using time-series plots for vessel calls, TEU throughput, and tonnage. This shows patterns and interruptions due to infrastructural constraints.

Cost Comparison: export logistics costs via Calabar Port were compared with those via Onne and Apapa ports. Transport distance and trucking rates were among the parameters used. Such a comparison reveals the economic cost of port underutilization to inland exporters.

Thematic Analysis (from interviews): interview transcripts were coded and tagged into important themes such as "draft restrictions," "road infrastructure," "customs delays," and "cargo diversion." NVivo software was used to enhance the consistency and traceability of emergent patterns.

4.0 Results and Discussion

This section presents a multi-year review of ECM terminals' operational data, emphasizing variations in vessel traffic, throughput levels, and efficiency measures.

4.1 Cargo Throughput Trends

A review of cargo throughput at ECM Terminals over the study period shows clear fluctuations in the volume of cargo handled. As presented in Table 1, total throughput reached a peak of 1,171,840 metric tons in 2016 but declined to 851,485 metric tons by 2019. Although there was a recovery in subsequent years, throughput recorded in 2023 was 1,162,646 metric tons, which remains below the level achieved in 2016 and 2020.

This pattern suggests that cargo activity at ECM Terminals has not followed a consistent upward trajectory during the period under review. One important factor contributing to these variations appears to be the change in vessel traffic. Vessel calls dropped considerably from 107 ships in 2016 to 73 in 2023. Since cargo handling operations depend largely on the frequency of vessel arrivals, a reduction in ship calls inevitably results in lower cargo volumes handled at the terminal.

Qualitative interviews with industry stakeholders further help explain this trend. Several respondents indicated that petroleum product marketers increasingly shifted their operations to

alternative ports due to operational uncertainties linked to the Calabar Channel. According to one shipping agent interviewed during the study:

“Many tanker operators prefer deeper ports because vessel movement into Calabar can sometimes be restricted by draft limitations and tidal conditions.”

This observation reinforces the quantitative evidence presented in Tables 1 and 2, which shows that the reduction in tanker vessel calls played a significant role in the decline of liquid bulk cargo throughput at ECM Terminals.

An examination of the cargo mix also reveals notable changes in the types of commodities handled at the terminal. In 2016, liquid bulk cargo accounted for the largest share of throughput, reaching 720,189 metric tons, largely driven by petroleum product imports, including Premium Motor Spirit (PMS). However, this category declined sharply by 2018, 2021, and 2022 when liquid bulk throughput dropped to 347,503, 240,144 and 338,718 metric tons respectively. Interviews with terminal stakeholders suggest that disruptions in petroleum product supply during those periods contributed to the reduction in tanker vessel calls.

Conversely, general cargo throughput grew gradually during the study period, rising from zero in 2016 to 281,022 metric tons in 2023. This

trend suggests that ECM Terminals has progressively expanded its activities as a multipurpose terminal by accommodating a wider range of cargo types. Nevertheless, the absence of containerized cargo throughout the period indicates that the terminal remains largely disconnected from global container shipping networks.

The decline in vessel calls and the instability in cargo throughput can also be linked to structural constraints affecting Calabar Port. The channel's limited navigational draft, estimated at approximately 6.4 meters, restricts the size of vessels that can safely access the port. This limitation discourages larger bulk carriers and container vessels from calling at the port. As a result, many shipping lines tend to favor deeper ports such as Onne Port and Apapa Port, which can accommodate larger vessels and offer more reliable shipping schedules.

These findings align with earlier studies that identify draft constraints and infrastructural deficiencies as key factors affecting the performance of eastern Nigerian ports (Igbokwe et al., 2020; Okechukwu & Olayemi, 2021). Consequently, despite its strategic location and relatively competitive handling charges, ECM Terminals continues to face structural challenges that limit its ability to attract steady vessel traffic and sustain higher cargo throughput.

Table 1: Cargo Throughput Trends (2016–2023)

<i>Year</i>	<i>Dry Bulk (MT)</i>	<i>Liquid Bulk (MT)</i>	<i>General Cargo (MT)</i>	<i>Total Throughput (MT)</i>	<i>Vessel Calls</i>
2016	451,651	720,189	0	1,171,840	107
2017	557,371	508,393	68,330	1,134,094	88
2018	485,420	347,503	86,371	919,294	76
2019	446,143	405,342	0	851,485	74
2020	706,140	417,314	0	1,223,454	102
2021	750,842	340,144	53,344	1,144,330	88
2022	760,981	338,718	62,303	1,162,002	87
2023	443,935	437,689	28,102	1,162,646	73

Source: ECM Terminal Operational Records (2024).

4.2 Vessel Traffic Composition

Table 2 presents the breakdown of vessel traffic that called at ECM Terminals between 2016 and 2023. The data show that tanker vessels accounted for the majority of ship calls throughout the study period, particularly in the earlier years. In 2016, for example, tanker vessels recorded 75 calls, making them the most dominant vessel category during that year. However, this number declined sharply to 24 vessels by 2023, indicating a significant reduction in liquid bulk cargo movements handled at the terminal.

This decline corresponds with the substantial drop in liquid bulk cargo throughput recorded during the same period, especially petroleum products such as (PMS). Interviews with industry stakeholders during the study revealed that disruptions in petroleum supply chains, as well as evolving distribution strategies adopted by

product marketers, contributed to a decrease in tanker vessel traffic at the port.

General cargo vessels also represented an important segment of vessel traffic, although their numbers varied over the years. In 2016, general cargo vessels accounted for 12 calls, but this figure declined in subsequent years before stabilizing later in the study period. These fluctuations reflect the irregular nature of bulk commodity shipments through the port, which are often influenced by project cargo movements, bagged commodities, and occasional export consignments.

Another notable finding from the data is the absence of container vessels calling at ECM Terminals throughout the study period. This suggests that the terminal’s activities remain largely concentrated on liquid bulk and conventional break-bulk cargo rather than containerized trade. One likely explanation for this pattern is the limited navigational depth of

the Calabar Channel, which restricts the entry of larger container vessels that dominate modern liner shipping. Container shipping lines generally favour ports with deeper channels and more advanced container-handling infrastructure.

In addition, the overall reduction in total vessel calls from 107 vessels in 2016 to 73 vessels in 2023 indicates a gradual decline in shipping activity at the terminal. This trend can be linked to several structural factors, including draft limitations, inconsistent cargo supply, and

increasing competition from deeper ports such as Onne Port and Apapa Port, which provide more reliable vessel access and stronger logistics infrastructure.

Overall, the composition of vessel traffic at ECM Terminals underscores the terminal’s heavy reliance on tanker, dry bulk operations and intermittent general cargo shipments. At the same time, it highlights the structural constraints that limit the port’s participation in containerized maritime trade.

Table 2: Vessel Traffic Composition (2016–2023)

Year	Container Throughput (TEUs)	General Cargo Vessels	Tankers	Bulk Carriers
2016	0	12	75	32
2017	0	5	44	39
2018	0	7	37	32
2019	0	0	42	28
2020	7	0	42	47
2021	0	5	30	44
2022	0	5	36	41
2023	0	13	24	28

Source: ECM Terminal Operational Records (2024).

This confirms Calabar's low-level integration into international shipping circuits, particularly for high-value container trade.

4.3 Strategic Implications

The operational trends observed in the cargo throughput and vessel traffic data carry important strategic implications for the performance and

long-term competitiveness of ECM Terminals and the Calabar Port Complex.

As indicated in Table 1, cargo throughput at ECM Terminals fluctuated considerably during the study period. Total throughput fell from 1,171,840 metric tons in 2016 to 851,485 metric tons in 2019, before partially recovering in the following years. This pattern suggests that cargo

movements through the terminal are highly sensitive to variations in vessel availability and shifts in cargo supply patterns.

A similar trend can be seen in vessel traffic. Table 2 shows that total vessel calls declined from 107 ships in 2016 to 73 ships in 2023. Fewer vessel arrivals directly affect the terminal's operational output, since reduced ship traffic inevitably leads to lower cargo volumes. The close relationship between vessel calls and cargo throughput, highlighted in Tables 1 and 2, underscores the importance of maintaining regular shipping services to sustain terminal operations.

Another strategic issue relates to the structure of vessel traffic. As shown in Table 2, tanker vessels accounted for the majority of ship calls throughout the study period. This explains why liquid bulk cargo dominated the throughput structure, particularly during the earlier years of the analysis presented in Table 1. However, the sharp decline in tanker vessel calls between 2016 and 2022 coincided with the reduction in liquid bulk cargo volumes recorded during the same period.

The absence of container vessel calls in Table 2 further indicates that ECM Terminals currently plays only a limited role in containerized maritime trade. This situation reflects structural constraints associated with the Calabar Channel, particularly its shallow navigational draft, which

restricts access for the larger container vessels commonly deployed in international liner shipping.

From a strategic standpoint, these findings suggest that ECM Terminals remains heavily dependent on liquid bulk cargo, dry bulk cargo, and occasional general cargo shipments. Such reliance makes the terminal's performance vulnerable to fluctuations in these cargo segments. Without expanding into containerized cargo or diversifying into other bulk commodities, the terminal may continue to experience unstable cargo throughput.

Furthermore, the decline in vessel calls shown in Table 2 reinforces concerns raised by industry stakeholders about the competitiveness of Calabar Port compared with deeper Nigerian ports such as Onne Port and Apapa Port. Shipping lines often prefer these ports because they offer deeper channels, greater vessel accommodation capacity, and more predictable shipping schedules.

Taken together, the evidence presented in Tables 1 and 2 suggests that improving channel navigability, strengthening hinterland transport links, and encouraging cargo diversification are essential strategic measures to enhance the long-term viability of ECM Terminals and the Calabar Port Complex.

4.4 Trend Analysis Summary: ECM Terminals (2016–2023)

The trend analysis of operational activities at ECM Terminals between 2016 and 2023 reveals significant fluctuations in both cargo throughput and vessel traffic. As shown in Table 1, total cargo throughput peaked in 2016 at 1,171,840 metric tons, after which it declined to 851,485 metric tons in 2019. Although throughput improved slightly in subsequent years, the terminal recorded 1,162,646 metric tons in 2023, which remains below the 2016 and 2020 level.

This pattern suggests that cargo handling activities at the terminal have not experienced consistent growth over the study period. One important factor contributing to this trend is the decline in vessel calls observed during the same period. As shown in Table 2, the number of vessels calling at ECM Terminals decreased from 107 in 2016 to 73 in 2023, a substantial reduction in shipping activity.

The relationship between vessel traffic and cargo throughput indicates that fluctuations in ship arrivals directly influence the terminal's operational performance. Since cargo delivery and evacuation depend largely on vessel availability, a reduction in ship calls inevitably results in lower cargo volumes handled at the terminal.

Another important observation from the trend analysis is the changing composition of cargo handled at ECM Terminals. Earlier years of the study period were dominated by liquid bulk cargo, particularly petroleum products imported by tankers. However, the reduction in tanker vessel calls between 2016 and 2018 corresponded with the sharp decline in liquid bulk cargo volumes during the same period, as reflected in Table 1.

The limited number of containerized cargoes throughout the study period also highlights structural limitations affecting the terminal's integration into modern maritime trade. Containerized shipping currently dominates global seaborne trade, and ports lacking the infrastructure or navigational conditions to accommodate container vessels often experience reduced shipping activity.

From an operational perspective, these trends suggest that ECM Terminals remains highly dependent on a limited number of cargo types and vessel categories. This dependence exposes the terminal to fluctuations in specific cargo markets, particularly petroleum product imports. In addition, structural constraints affecting the Calabar Channel especially the limited navigational draft may discourage larger vessels from calling at the port, thereby limiting opportunities for cargo diversification.

Overall, the trend analysis presented in Tables 1 and 2 indicates that improving navigational access, attracting more vessel traffic, and diversifying cargo types will be critical to enhancing ECM Terminals' long-term operational performance.

Tonnage by Cargo Type

Table 3: Cargo Tonnage by Type at ECM Terminals (2016–2023)

Year	Dry Bulk (MT)	Liquid Bulk (MT)	General (MT)	Car Container (MT)	Car Total (MT)
2016	451,651	720,189	0	0	1,171,840
2017	557,371	508,393	68,330	0	1,134,094
2018	485,420	347,503	86,371	0	919,294
2019	446,143	405,342	0	0	851,485
2020	706,140	417,314	0	7	1,223,454
2021	750,842	340,144	53,344	0	1,144,330
2022	760,981	338,718	62,303	0	1,162,002
2023	443,935	437,689	28,102	0	1,162,446

Source: ECM Terminal Operational Records (2024).

4.5 Discussion of Cargo Tonnage by Type

The breakdown of cargo handled at ECM Terminals during the study period is summarized in Table 3. The data indicate that liquid bulk cargo constituted the largest share of the terminal's cargo throughput between 2016 and 2023.

According to Table 3, liquid bulk cargo reached its highest level in 2016 at 720,189 metric tons. However, this volume declined to 338,718 metric tons by 2022, reflecting the broader decrease in total cargo throughput recorded during that period. The reduction in liquid bulk cargo can be partly explained by the decline in tanker vessel calls discussed earlier in Table 2.

In comparison, dry bulk cargo volumes remained moderate relative to liquid bulk cargo. As presented in Table 3, dry bulk throughput increased gradually from 451,561 metric tons in 2016 to 760,981 metric tons in 2022. Although this increase is not dramatic, it suggests a gradual broadening in the range of cargo types handled at the terminal.

General cargo volumes also showed a steady upward trend throughout the study period. The data indicate that general cargo rose from 68,330 metric tons in 2017 to 281,022 metric tons in 2023. Despite this increase, general cargo still represents a relatively small proportion of the terminal's overall cargo throughput.

Another notable feature of the data in Table 3 is the complete absence of containerized cargo during the study period. Container cargo volumes remain at zero metric tons, indicating that ECM Terminals currently does not handle containerized shipments. This situation may be linked to infrastructural limitations or navigational constraints that restrict the entry of container vessels into **4.6 Calabar Port**.

Overall, the cargo composition shown in Table 3 highlights the strong dependence of ECM Terminals on liquid bulk cargo particularly petroleum-related products and, to a lesser extent, dry bulk cargo such as **Wheat**. Such reliance exposes the terminal to fluctuations in petroleum import demand and variations in tanker vessel availability, which may help explain the changes observed in total cargo throughput during the study period.

4.7 Cost Comparison: Calabar, Onne, and Apapa Ports

To assess the economic implications of diverting cargo away from Calabar Port to alternative ports such as Apapa Port in Lagos and Onne Port in Rivers State, a comparative logistics cost model was developed. The analysis focuses on three key parameters: the total cost per metric tons paid by exporters located in Nigeria's central and eastern regions particularly Benue State, Taraba State, and Ebonyi State as well as port-related charges and inland transportation costs.

Table 4. Inland Transport Cost (₦/MT)

Origin State to Port	Distance (km)	Road Condition	Avg. Trucking Cost (₦/MT)
Benue to Calabar	~360 km	Poor	₦18,000 – ₦20,000
Benue to Onne	~610 km	Fair	₦23,000 – ₦25,000
Benue to Apapa	~830 km	Congested	₦27,000 – ₦30,000

Insight: Calabar is the most cost-effective port for exporters in landlocked regions; however, due to poor road conditions (especially on the Odukpani axis) and reliability issues, shippers have had to use more distant ports.

To assess the operational competitiveness of ECM Terminals at Calabar Port, a comparative analysis of port handling charges and overall

logistics costs was conducted using data obtained from terminal tariff schedules, freight forwarders, and stakeholder consultations within the Nigerian maritime sector. The analysis compares Calabar Port with two major Nigerian ports, the Port of Onne and Apapa Port, which serve as major gateways for cargo movement in southern Nigeria.

Table 5: Port Handling Charges by Port and Cargo Type

Port	Cargo Type	Average Handling Cost (₦/MT)
Calabar	Bulk (Dry/Liquid)	₦4,000 – ₦6,000
Onne	Bulk & Container	₦6,000 – ₦9,000
Apapa	Containerized	₦8,000 – ₦12,000

Source: Compiled from terminal tariff schedules and stakeholder consultations.

4.8 Discussion of Port Handling Charges

The handling cost ranges shown in Table 5 represent indicative averages derived from terminal tariff schedules, logistics market surveys, and exporter case studies conducted between 2022 and 2024. These figures are intended to serve as comparative cost indicators rather than fixed tariff rates, since actual charges may differ depending on the type of cargo, operational conditions, and periodic adjustments to tariff structures. The comparative data in Table 5 suggest that Calabar Port generally offers lower cargo handling costs than Onne Port and Apapa

Port. For instance, bulk cargo handling charges at Calabar typically range between ₦4,000 and ₦6,000 per metric tons. This is noticeably lower than the ₦6,000–₦9,000 per metric tons recorded at Onne Port and the ₦8,000–₦12,000 per metric tons commonly observed at Apapa Port. The relatively lower handling costs at Calabar Port may be partly due to lower congestion at the port, which reduces handling costs. However, the high handling costs at Apapa Port are partly due to high demand for containerized cargo handling services, which is also associated with increased operational

complexities in handling high volumes of international trade. Despite the relatively lower handling costs at Calabar Port, it is still not competitive in containerized cargo handling when compared to Apapa and Onne Ports. Unlike Apapa and Onne Ports, which are well equipped

to handle containerized cargo, ECM Terminals at Calabar Port are only equipped to handle bulk cargo operations. Containerized cargo handling is the dominant type of cargo handling in global maritime logistics operations today.

Table 6: Estimated Total Logistics Cost for Export Routes (₦/MT)

Export Route	Avg. Inland + Handling Cost (₦/MT)
Benue → Calabar	₦22,000 – ₦26,000
Benue → Onne	₦29,000 – ₦34,000
Benue → Apapa	₦35,000 – ₦42,000

Table 7: Logistics Cost per 30-MT Truckload

Route	Estimated Total Cost
Benue → Calabar	₦660,000 – ₦780,000
Benue → Onne	₦870,000 – ₦1,020,000
Benue → Apapa	₦1,050,000 – ₦1,260,000

4.9 Discussion of Logistics Cost Differences

The logistics cost estimates presented in Table 6 show that exporting goods through Calabar Port is considerably more economical for shippers located in Nigeria’s central and eastern regions. For instance, the average logistics cost of transporting cargo from Benue State to Calabar ranges between ₦22,000 and ₦26,000 per metric tons. In comparison, moving the same cargo

through Onne Port costs about ₦29,000–₦34,000 per metric tons. The cost gap becomes even wider for shipments routed through Apapa Port, where logistics expenses typically range between ₦35,000 and ₦42,000 per metric tons. When these costs are calculated for a standard 30-metric-tonne truckload, the total logistics expense for cargo routed through Calabar falls between ₦660,000 and ₦780,000. By

comparison, shipments moving through Onne cost roughly ₦870,000–₦1,020,000, while those routed through Apapa range from ₦1,050,000 to ₦1,260,000. These figures indicate that exporters who bypass Calabar Port and instead route cargo through alternative ports face noticeably higher logistics costs.

Despite the geographic advantage of Calabar Port, particularly for exporters in the central and eastern regions of Nigeria, the findings of this study show that the port remains underutilized, a situation which, based on the findings of this study, can be attributed to a number of structural issues, including the shallow navigational depth of the Calabar Channel, poor infrastructure, as well as poor road connectivity to the hinterland, which make shipping lines reluctant to fully utilize the facilities of the port, despite the relatively low costs of transporting goods through the port.

Overall, the results indicate that exporters who divert cargo through Onne or Apapa incur a logistics cost penalty of roughly 30% to 60% compared with shipments handled through Calabar Port. This finding underscores the economic significance of improving channel navigability, upgrading port infrastructure, and investing in container-handling capacity at Calabar Port in order to strengthen its competitiveness within Nigeria's port system.

5.0 Recommendations and Conclusion

5.1 Recommendations

To fully realize Calabar Port's potential, a number of strategic actions are required, as supported by empirical evidence from ECM Terminals' operational data and qualitative input from port customers and stakeholders:

1. **Channel dredging:** The existing 6.4-meter draft of the Calabar waterway has to be deepened to at least 10 meters in order to draw bigger ships and containerized services. This would put the port in line with worldwide shipping trends and substantially reduce transshipment dependencies and ship diversion to Apapa and Onne.
2. **Improving Inland Connectivity:** The hinterland logistics of the port are still hampered by the state of the Odukpani-Calabar route. Rehabilitating this vital route is urgently needed at the federal and provincial levels in order to lower inland transport costs and enable a more seamless freight evacuation.
3. **Investment in Containerization:** The strategic location of Calabar port as a trade corridor to the south-south region, North-central, south-east and some west African Countries calls for ECM

Terminals collaboration with the Nigerian Ports Authority (NPA) and private investors, to acquire modern container handling equipment such as reach stackers, rubber-tired gantry cranes (RTGs), and yard management systems to facilitate container handling.

4. Quay length extension: The existing quay length of ECM Terminals (480) meters can only accommodate simultaneous vessels operations of length overall (LOA) of 200 meters. In order to minimize vessel waiting times and maximize berth occupancy, which has been about 47% in recent years, the planned wharf extension need to be given first priority.
5. Policy and Regulatory Engagement: The federal government must apply equal regulatory and investment policies to all ports. The inclusion of Calabar Port in national port digitization, increased rail connectivity, and tax incentives for the utilization of Eastern ports would decongest Lagos and drive balanced growth.
6. Export Corridor Development: With support from the government to develop a coordinated North Central–Calabar export corridor, logistics costs on agricultural produce and mineral exports

would come down, making the country more competitive and supporting Nigeria's non-oil trade agenda.

5.2 Conclusion

In this study, the operational capacity and challenge of Calabar Port were assessed by the prism of ECM Terminals from 2016 to 2023. The evidence overwhelmingly suggests that while the terminal has recorded operational effectiveness with productivity levels above national benchmarks in a number of cargo categories its expansion is constrained by structural, infrastructural, and policy constraints. Through targeted investments in the handling of containers, road infrastructure, dredging, and quay expansion, ECM Terminals can be the impetus for regional economic integration and export diversification.

Unlocking the full potential of ECM Terminals and the entire Calabar Port facility is not only feasible but inevitable if Nigeria must relieve its western ports congestion, lower the cost of export logistics, and set itself up for its vision of inclusive economic growth.

References

- Akinwale, Y., & Shittu, O. I. (2022). Assessing the impact of port reforms on maritime

- logistics performance in Nigeria. *Journal of African Maritime Studies*, 4(2), 45–61.
- African Development Bank. (2020). *Port infrastructure and logistics assessment report for West Africa*. Abidjan: AfDB Publications.
- Emefiele, C., Okon, C. A., & Adebayo, S. T. (2020). Challenges of Eastern ports in Nigeria and the imperative for infrastructure renewal. *Journal of Transport and Infrastructure*, 7(1), 88–104.
- Eyo, A. E., & Nwagbara, O. N. (2019). Maritime trade and economic potentials of Calabar Port. *Journal of Maritime and Port Studies*, 6(2), 101–117.
- Hoffmann, J., & Asariotis, R. (2021). *Port performance and competitiveness in Africa: UNCTAD Review*. Geneva: United Nations Conference on Trade and Development.
- Igbokwe, I. C., Etim, J. B., & Nwosu, L. I. (2020). Operational constraints and performance of Eastern Nigerian ports: The case of Calabar Port. *Journal of Port Economics*, 5(1), 33–47.
- Nigerian Ports Authority. (2023). *Terminal Concession Report 2023*. Retrieved from <https://www.nigerianports.gov.ng>
- Notteboom, T., & Rodrigue, J. P. (2012). The port hinterland concept revisited. *Journal of Transport Geography*, 19(5), 785–796. <https://doi.org/10.1016/j.jtrangeo.2011.05.003>
- Okechukwu, I., & Olayemi, A. (2021). Port congestion and efficiency challenges in Nigeria’s maritime sector. *International Journal of Transport Economics and Logistics*, 5(3), 201–216.
- Okon, C. A., & Ekpenyong, A. B. (2021). Private sector involvement in Nigeria’s maritime logistics chain: Evidence from ECM Terminals Calabar. *Journal of Transport and Supply Chain*, 5(1), 44–59.
- UNCTAD. (2021). *Port development strategies in emerging economies: Lessons from Africa*. Geneva: United Nations Conference on Trade and Development. <https://unctad.org/publication/port-development-strategies-africa>