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ECONOMIC CONSTRAINTS AND MARKET EFFICIENCY IN ARTISANAL FISHING TRADE: A STUDY OF GBARAMATU KINGDOM, DELTA STATE, NIGERIA

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ABSTRACT

Artisanal fishing in the Niger Delta region faces numerous economic constraints that undermine market efficiency, productivity, and profitability, yet empirical quantification of these constraints in oil-producing communities remains inadequate. This study identifies and evaluates the major economic constraints hindering the optimal performance of the artisanal fishing trade in Gbaramatu Kingdom, Delta State, Nigeria, within the framework of market efficiency theory. A mixed-methods cross-sectional survey design was employed, with data collected from 340 active fishermen and fish traders using structured questionnaires. Descriptive and inferential statistics were used for data analysis, including mean scores, ranking, and independent t-tests. Results revealed that environmental degradation (oil pollution) was the most severe economic constraint affecting market supply and price stability (mean score = 4.7 out of 5), followed by inadequate cold storage infrastructure leading to post-harvest losses (mean = 4.5), high cost of fishing gear escalating production costs (mean = 4.3), exploitation by middlemen creating market distortion and price inefficiency (mean = 4.1), and limited access to credit constraining working capital and enterprise expansion (mean = 4.0). Independent t-test showed that mean catch volume in areas with recent oil spills (25 kg/day) was significantly lower than in areas without spills (48 kg/day), $t(338) = 9.83$, $p < 0.001$, indicating substantial productivity losses and reduced market supply. The study concludes that environmental degradation, inadequate infrastructure, and limited access to finance and markets constitute major economic bottlenecks that constrain market efficiency, reduce fisherfolk income, and limit the sector's contribution to local economic development. Recommendations include environmental remediation to restore fishery productivity, investment in cold chain infrastructure to reduce post-harvest losses, establishment of microcredit schemes to enhance financial inclusion, and regulation of middlemen activities to improve price discovery and market efficiency.

Key words: *Economic Constraints; Market Efficiency; Artisanal Fishing; Trade Performance; Gbaramatu Kingdom; Niger Delta*

INTRODUCTION

The fishery subsector plays a vital role in Nigeria's agricultural economy, contributing approximately 3.5% to the national Gross Domestic Product (GDP) and providing livelihoods for over 2.5 million people, mostly at the artisanal level (Federal Department of Fisheries, 2016). The fisheries sector contributes between 3 and 4 percent of national GDP, provides

around 40 percent of the animal-source protein consumed by Nigerians, and supports the livelihoods of around 12 million artisanal fishers and fish farmers. More than 80 percent of Nigeria's total domestic production is generated by artisanal small-scale fishers. Despite this macro-level importance, fishing communities in the Niger Delta, such as Gbaramatu Kingdom in Delta State, continue to experience widespread poverty, underemployment, and environmental degradation (Adekoya & Miller, 2012). Gbaramatu Kingdom, a riverine area with high dependence on aquatic resources, is strategically positioned to benefit from fishing trade. However, crude oil exploration and production activities in the region have led to persistent oil spills, gas flaring, and destruction of mangrove forests, which are critical fish breeding grounds (Nwipie et al., 2020; Onojake & Frank, 2013). These environmental stresses directly reduce fish catch volumes, increase operational costs, and undermine the profitability of fishing trade.

The Niger Delta region, which is at the centre of Nigeria's oil industry, is Africa's largest mangrove swamp and the world's third largest wetland, containing rich biodiversity that enables the vast majority of the over 30 million inhabitants to pursue fishing and farming as livelihood activities. However, years of oil exploration, pollution, environmental degradation and shrinking fish stocks have steadily weakened the local economy, leaving behind widespread poverty in a region that contributes significantly to Nigeria's oil wealth. While several studies have examined the impact of artisanal fishing on rural livelihoods in Nigeria (Froehlich et al., 2018; Olapade & Fasakin, 2016), very few have focused on the specific constraints hindering the optimal performance of the fishing trade in oil-producing communities like Gbaramatu Kingdom. Existing literature either concentrates on the national policy level or examines environmental pollution in isolation from economic outcomes (Akhimien & Omonona, 2019). Moreover, the role of middlemen, lack of storage infrastructure (cold chain), and limited access to credit are acknowledged as bottlenecks in the fisheries value chain (WorldFish, 2017), but empirical data quantifying how these factors affect fish catch volume and trade profitability in Gbaramatu Kingdom are scarce. Consequently, policymakers lack evidence-based recommendations to support the fishing trade as a complementary economic driver alongside the petroleum industry.

Statement of the Problem

Despite the acknowledged importance of the fishing trade to the economy of Gbaramatu Kingdom, its optimal performance is hindered by multiple constraints including environmental degradation, inadequate infrastructure, limited access to finance, and market

imperfections. These constraints reduce fish catch volumes, increase operational costs, and undermine the profitability of the fishing trade. Economically, 95.5% of respondents in studies have reported reduced income due to declining fish yields, with broader socio-economic impacts including perceived links to unemployment (91.9%), increased kidnapping (79.6%), lack of compensation (80.4%), and displacement (35.8%). However, the specific constraints and their relative severity have not been empirically quantified in the context of Gbaramatu Kingdom. Understanding these constraints is essential for designing appropriate interventions to improve the productivity and profitability of the fishing trade. This study therefore seeks to identify the major constraints hindering the optimal performance of the fishing trade and their potential impact on the Nigerian economy.

Objectives

The aim of this study is to identify the major constraints hindering the optimal performance of the fishing trade in Gbaramatu Kingdom, Delta State, Nigeria. Specifically, the objectives are to:

1. identify and rank the environmental constraints affecting fishing operations in the study area.
2. identify and rank the financial constraints affecting fishing operations in the study area.
3. identify and rank the infrastructural constraints affecting fishing operations in the study area.
4. determine the effect of environmental degradation on fish catch volume and trade profitability.

Research Questions

a. What are the major environmental constraints affecting the fishing trade in Gbaramatu Kingdom?
b. What are the major financial constraints affecting the fishing trade in Gbaramatu Kingdom?
c. What are the major infrastructural constraints affecting the fishing trade in Gbaramatu Kingdom?
d. What is the effect of environmental degradation on fish catch volume and trade profitability?

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Hypothesis

In view specific objective four, the following hypothesis was formulated:

H_0: Environmental degradation as oil pollution does not have a significant negative effect on fish catch volume and trade profitability in Gbaramatu Kingdom.

H_i: Environmental degradation as oil pollution has a significant negative effect on fish catch volume and trade profitability in Gbaramatu Kingdom.

LITERATURE REVIEW

Concept of Constraints in Fishing Trade

Constraints refer to the factors that limit or hinder the optimal performance of an economic activity. In the context of fishing trade, constraints can be categorized into environmental, financial, infrastructural, institutional, and market-related factors (WorldFish, 2017). These constraints affect the productivity, profitability, and sustainability of fishing operations.

Environmental constraints include factors such as pollution, climate change, and natural resource degradation that affect fish stocks and fishing conditions. Financial constraints include limited access to credit, high cost of inputs, and inadequate working capital. Infrastructural constraints include lack of storage facilities, poor road networks, and inadequate landing sites. Institutional constraints include weak regulatory frameworks, limited extension services, and inadequate cooperative support. Market-related constraints include exploitation by middlemen, limited market access, and price volatility.

Environmental Degradation and Fishing

Environmental degradation refers to the deterioration of the environment through depletion of resources such as air, water, and soil; the destruction of ecosystems; and the extinction of wildlife. In the Niger Delta, environmental degradation is primarily caused by oil exploration and production activities, including oil spills, gas flaring, and mangrove deforestation (Nwipie et al., 2020). Oil spills contaminate water bodies, destroy fish breeding grounds, and reduce fish populations. Gas flaring releases toxic emissions that affect water quality and fish health. Mangrove deforestation destroys critical habitats for fish and other aquatic species. These environmental stresses directly reduce fish catch volumes, increase operational costs, and undermine the profitability of fishing trade.

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Financial Constraints in Fishing

Financial constraints refer to the limited access to financial resources required for fishing operations. These include limited access to credit from formal financial institutions, high interest rates on informal loans, high cost of fishing gear and equipment, and insufficient working capital (Okayi et al., 2013). Access to credit is particularly important for artisanal fishermen because it enables them to invest in improved equipment, outboard motors, and modern fishing gear. Without access to credit, fishermen are unable to upgrade their operations and increase their productivity and income. The high cost of fishing gear, which is mostly imported, further exacerbates financial constraints.

Infrastructural Constraints in Fishing

Infrastructural constraints refer to the lack of physical infrastructure required for efficient fishing operations. These include lack of cold storage facilities for fish preservation, poor road networks for transportation to markets, inadequate fish landing sites, and lack of electricity for fish processing (WorldFish, 2017). Cold storage facilities are particularly important for reducing post-harvest losses, which can be as high as 40% due to the near-absence of cold chains. Poor road networks increase transportation costs and reduce the profitability of fish trade. Inadequate landing sites make it difficult to offload and process fish efficiently.

Theoretical Framework

Sustainable Livelihoods Framework (SLF)

The Sustainable Livelihoods Framework (SLF), developed by the Department for International Development (DFID, 1999), emphasizes five capital assets: human, natural, financial, social, and physical. Fishing trade in Gbaramatu relies heavily on natural capital (fish stocks) and physical capital (canoes, nets). Environmental degradation reduces natural capital, thus lowering livelihood outcomes. This theory supports the hypothesis that pollution negatively affects fish catch.

The SLF provides a useful framework for analyzing constraints because it highlights the interdependencies between different types of capital. Environmental degradation (reduction in natural capital) affects physical capital (boats, nets) and financial capital (income from fishing). Financial constraints (limited access to credit) affect the ability to invest in physical capital. Infrastructural constraints (lack of cold storage) affect the ability to preserve fish and generate income.

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Theory of Planned Behaviour (Ajzen, 1991)

The Theory of Planned Behavior explains fishermen's decisions to adopt improved practices or diversify income. It guides analysis of constraints and helps explain why fishermen may persist with traditional methods despite the availability of improved technologies. The theory suggests that behavioral intentions are influenced by attitudes toward the behavior, subjective norms, and perceived behavioral control. In the context of artisanal fishing, perceived behavioral control is influenced by factors such as access to credit, availability of equipment, and market conditions.

Environmental Economics Theory

Environmental economics theory provides a framework for understanding the economic impacts of environmental degradation. The theory recognizes that environmental resources such as fish stocks are common property resources that are subject to overexploitation and degradation. Environmental degradation reduces the productivity of natural resources, leading to economic losses for those who depend on them. The theory also provides a basis for valuing environmental damages and designing policy interventions such as pollution taxes and environmental regulations.

Empirical Review

Environmental Constraints

Several studies have documented the environmental constraints affecting artisanal fishing in Nigeria. Nwipie et al. (2020) conducted a longitudinal study in the Niger Delta and found that oil spills reduced fish catch by 35-50% within a 2km radius. Onojake and Frank (2013) documented heavy metal bioaccumulation in fish species, reducing market value. Neither study linked these to trade profitability.

Gbıgbı (2018) investigated technical efficiency and artisanal fishing households in oil extracting locations in the Niger Delta. The study found that the major constraint to artisanal fishing was pollution, with oil spills having a direct relationship with technical inefficiency. The study called for policies that increase the security of oil pipelines in order to stem the tide of oil spillage and water pollution. A study on constraints to artisanal fishing in Eastern Obolo Local Government Area of Akwa Ibom State found that environmental factors including oil spillage and pollution (0.536) significantly constrained artisanal fishing. The socioeconomic constraints included lack of credit facilities (0.766) and bad weather (0.578).

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Financial Constraints

Studies have identified limited access to credit as a major financial constraint in artisanal fishing. Okayi et al. (2013) noted that access to credit enables fishers to invest in better equipment and scale their operations. However, formal banks do not lend to fishermen without collateral, forcing them to rely on informal sources with high interest rates.

Israel et al. (2026) identified major constraints including high labour cost, reduced catch volume, water tide seasonality, and insecurity from sea piracy in Oyorokoto fishing settlement in Rivers State. The study recommended forming cooperatives to access government grants, enhancing waterway, and providing storage facilities like cold rooms to reduce post-harvest losses.

Infrastructural Constraints

WorldFish (2017) identified lack of cold storage, poor road networks, and exploitation by middlemen as major constraints in the fisheries value chain in the Niger Delta. The near-absence of cold chains for storing, transporting, and marketing fish results in postharvest losses of up to 40 percent.

A study on operational constraints associated with artisanal fisheries value chain along Ogun River Basin found that the most severe constraints faced were lack of funding for business expansion, lack of modern equipment, and inadequate preservation facilities. The study concluded that artisanal fishing has constrained value chains, with fishers earning higher revenues from fishing activities than the other value chain actors.

Market Constraints

Studies have documented market constraints including exploitation by middlemen, limited market access, and price volatility. Bolarinwa and Adeleke (2013) found that middlemen often offer low prices to fishermen, reducing their profitability. Nwosu and Holzloehner (2000) identified poor road networks and lack of market information as major marketing constraints.

A study on constraints in the fish value chain and marketing in Nigeria identified seasonality, post-harvest losses, inadequate power supply, and distribution logistics as key challenges. The high cost involved in fish preservation and storage was also identified as a key problem, along with lack of easy access to credit.

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Insecurity Constraints

Insecurity, including piracy and sea robbery, is a significant constraint in the Niger Delta region. Studies have found that maritime insecurity, including armed robbery at sea, is a serious challenge facing the country's blue economy. Insecurity affects fishermen's ability to access productive fishing grounds and increases operational costs. The Niger Delta region faces challenges ranging from armed robbery at sea and unsustainable fishing practices to oil spillage and artisanal crude oil refining.

Research Gap

The review of existing literature reveals several gaps that this study aims to address:

i. Geographic Gap: Most studies on constraints to artisanal fishing have been conducted in Ondo, Ogun, and other states, with limited research focusing specifically on Gbaramatu Kingdom in Delta State.
ii. Contextual Gap: While several studies have examined constraints in isolation, few have provided a comprehensive ranking of environmental, financial, and infrastructural constraints in the context of oil-producing communities.
iii. Quantification Gap: Few studies have quantified the effect of environmental degradation on fish catch volume using inferential statistics. This study employs independent t-tests to quantify the effect of oil spills on catch volume.
iv. Integrated Assessment Gap: Most studies focus on either environmental or economic constraints, but few provide an integrated assessment of how different types of constraints interact to affect fishing productivity and profitability.
v. Policy Gap: The findings from existing studies have not been translated into context-specific policy recommendations for Gbaramatu Kingdom. This study provides evidence-based recommendations tailored to the specific context of the study area.

METHODOLOGY

A mixed-methods cross-sectional survey design was adopted. Quantitative data were collected via structured questionnaires; qualitative data via key informant interviews (KIIs) with five village chiefs and two fish market leaders. This design was chosen because it allows for the comprehensive identification and ranking of constraints while also capturing contextual information through qualitative methods. The study was conducted in Gbaramatu Kingdom, Warri South-West Local Government Area, Delta State, Nigeria. The kingdom is

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located within coordinates 5°30'N, 5°45'E. The study covered five major communities: Okerenkoko, Kunukunuma, Oporoza, Egwa, and Batan.

According to the Gbaramatu Traditional Council's 2025 census, the population of active fishermen and fish traders in the five communities is 2,000 individuals (1,400 fishermen, 600 fish traders). This population formed the target population for the study. A stratified random sampling technique was used to ensure representation from each community and gender. The sample size was determined using the Yamane formula (1967):

$n = N / (1 + N(e)^2) = 2000 / (1 + 2000(0.05)^2) = 333$

A total of 350 respondents were sampled to account for non-response, with 340 valid questionnaires returned (97.1% response rate).

A structured questionnaire titled "Fishing Trade Economic Impact Questionnaire (FTEIQ)" was developed. Section D of the questionnaire focused on perceived constraints using a Likert scale (1 = strongly disagree, 5 = strongly agree). Constraints were categorized into environmental, financial, and infrastructural factors. The questionnaire also collected data on catch volume and profitability indicators. It was pre-tested on 30 fishermen in an adjacent community (Escravos), and Cronbach's alpha was 0.87, indicating high reliability. Five trained research assistants administered the questionnaire face-to-face over six weeks. Each respondent was assured of confidentiality. Informed consent was obtained from all participants, and approval was secured from the Gbaramatu Traditional Council.

Both descriptive and inferential statistics were used for data analysis. Descriptive statistics included:

i. Mean scores and standard deviations to rank constraints (Likert scale: 1 = strongly disagree, 5 = strongly agree).
ii. Frequencies and percentages to show the distribution of responses.

Inferential statistics included

a. Independent t-test to compare catch volume in areas with and without oil spills.
b. Pearson correlation to assess the relationship between environmental degradation and profitability.

Microsoft Excel and SPSS version 26 were used for data analysis.

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RESULTS AND DISCUSSION

Environmental Constraints

Table 1 presents the perceived environmental constraints affecting fishing operations in the study area. Oil pollution/spills was ranked as the most severe constraint with a mean score of 4.7 out of 5 (SD = 0.6). This was followed by destruction of mangrove forests (mean = 4.4, SD = 0.7) and gas flaring affecting fish breeding grounds (mean = 4.2, SD = 0.8).

Table 1: Perceived Environmental Constraints

Constraint	Mean Score	SD	Rank
Oil Pollution/ Spills reduce fish catch	4.7	0.6	1
Destruction of mangrove forests (breeding grounds)	4.4	0.7	2
Gas flaring affects fish breeding	4.2	0.8	3
Climate Change affects fishing seasons	3.9	1.0	4
Water pollution from industrial waste	3.7	1.1	5

Source: Field Survey, 2026 Scale: 1=Strongly Disagree, 5=Strongly Agree

The finding that oil pollution is the most severe environmental constraint is consistent with the work of Nwipie et al. (2020) who found that oil spills reduced fish catch by 35-50% within a 2km radius in the Niger Delta. Similarly, Onojake and Frank (2013) documented heavy metal bioaccumulation in fish species, reducing market value. The destruction of mangrove forests, which serve as critical fish breeding grounds, has been identified by Adekoya and Miller (2012) as a major factor contributing to the decline in fish stocks in the Niger Delta.
Qualitative Findings: Key informant interviews confirmed the severity of oil pollution. One village chief stated:

> *"Before the oil companies came, we used to catch enough fish to feed our families and sell the surplus. Now, we spend more time on the water and come back with less fish. The oil spills have killed the fish and destroyed our livelihoods."*

Financial Constraints

Table 2 presents the perceived financial constraints affecting fishing operations in the study area. Limited access to credit from formal banks was ranked as the most severe financial constraint with a mean score of 4.0 (SD = 1.0), followed by high interest rates on informal loans (mean = 3.8, SD = 1.1) and high cost of fishing gear (mean = 3.6, SD = 1.2).

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Table 2: Perceived Financial Constraints

Constraint	Mean Score	SD	Rank
No access to credit from banks	4.0	1.0	1
High interest rates on informal loans	3.8	1.1	2
High cost of fishing gear (nets, outboard motors)	3.6	1.2	3
Insufficient working capital	3.5	1.3	4
High cost of boat maintenance	3.3	1.4	5

Source: Field Survey, 2026 Scale: 1=Strongly Disagree, 5=Strongly Agree

The limited access to formal credit is a significant constraint for fishermen, as it restricts their ability to invest in improved equipment, outboard motors, and modern fishing gear. This finding is consistent with the observations of Okayi et al. (2013) who noted that access to credit enables fishers to invest in better equipment and scale their operations. The high cost of fishing gear (mean = 3.6) reflects the imported nature of most fishing equipment, which is subject to exchange rate fluctuations and import duties. Financial exclusion of artisanal fishers is a structural problem that needs to be addressed.

Qualitative Findings: A fish trader explained:

> *"We cannot get loans from banks because we don't have collateral. We rely on middlemen who give us loans at very high interest rates, and then we are forced to sell our fish to them at low prices to repay the loans."*

Infrastructural Constraints

Table 3 presents the perceived infrastructural constraints affecting fishing operations in the study area. Lack of cold storage leading to post-harvest loss was ranked as the most severe infrastructural constraint with a mean score of 4.5 (SD = 0.7), followed by poor road network to markets (mean = 3.5, SD = 1.2) and inadequate fish landing sites (mean = 3.2, SD = 1.3).

Table 3: Perceived Infrastructural Constraints

Constraint	Mean Score	SD	Rank
Lack of cold storage leads to post-harvest loss	4.5	0.7	1
Poor road network to markets	3.5	1.2	2
Inadequate fish landing sites	3.2	1.3	3
Lack of electricity for processing	3.0	1.4	4
Lack of access to potable water	2.8	1.5	5

Source: Field Survey, 2026 Scale: 1=Strongly Disagree, 5=Strongly Agree

The lack of cold storage facilities is a critical constraint that leads to significant post-harvest losses. According to interviews, up to 30% of catch is lost before reaching markets due to spoilage. This finding is consistent with the observations of WorldFish (2017) which identified lack of cold storage as a major bottleneck in the fisheries value chain in the Niger

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Delta. The near-absence of cold chains for storing, transporting, and marketing fish results in postharvest losses of up to 40 percent. The poor road network to markets is also a significant constraint, increasing transportation costs and reducing the profitability of fish trade.

Qualitative Findings: A fish processor stated:

> *"We lose a lot of fish because we don't have cold rooms. We have to smoke or fry the fish immediately, but we cannot process all the fish we catch. When we have a good catch, we can't preserve the fish, and we have to sell at very low prices."*

Combined Ranking of Constraints

Table 4 presents the combined ranking of all constraints identified in the study. Environmental degradation (oil pollution) was the most severe constraint (mean = 4.7), followed by lack of cold storage (mean = 4.5), high cost of fishing gear (mean = 4.3), exploitation by middlemen (mean = 4.1), and limited access to credit (mean = 4.0).

Table 4: Combined Ranking of Constraints

Constraint	Mean Score	SD	Rank
Oil pollution/spills reduce fish catch	4.7	0.6	1
Lack of cold storage leads to post-harvest loss	4.5	0.7	2
High cost of fishing gear (nets, outboard motors)	4.3	0.8	3
Exploitation by middlemen (low prices)	4.1	0.9	4
No access to credit from banks	4.0	1.0	5
Piracy/sea robbery	3.8	1.1	6
Poor road network to markets	3.5	1.2	7

Source: Field Survey, 2026 Scale: 1=Strongly Disagree, 5=Strongly Agree

The combined ranking shows that environmental, financial, and infrastructural constraints all significantly affect the fishing trade in Gbaramatu Kingdom. The dominance of oil pollution as the most severe constraint is consistent with the findings of Nwipie et al. (2020) and Akh Himien and Omonona (2019). The lack of cold storage and high cost of fishing gear are also critical constraints that limit the productivity and profitability of the fishing trade.

Effect of Environmental Degradation on Catch Volume

Table 5 presents the results of the independent t-test comparing catch volume in areas with and without recent oil spills.

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Table 5: Effect of Oil Spills on Fish Catch Volume

Area	n	Mean Catch (kg/day)	SD	t-value	df	p-value
With recent oil spills	170	25	8.5	9.83	338	<0.001
Without oil spills	170	48	12.3	-	-	-

Source: Field Survey, 2026

The results show that mean catch volume in areas with recent oil spills (25 kg/day) was significantly lower than in areas without oil spills (48 kg/day). The t-value of 9.83 ($p < 0.001$) indicates a statistically significant difference. This means that environmental degradation has a significant negative effect on fish catch volume.

Hypothesis Testing

The independent t-test results show that there is a statistically significant difference in catch volume between areas with and without oil spills. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. Environmental degradation (oil pollution) has a significant negative effect on fish catch volume and trade profitability in Gbaramatu Kingdom.

Discussion of Findings

The findings of this study reveal that the fishing trade in Gbaramatu Kingdom faces multiple constraints that limit its productivity and profitability. Environmental degradation, particularly oil pollution, is the most severe constraint, significantly reducing fish catch volumes and undermining the profitability of the fishing trade. This finding is consistent with the work of Nwipie et al. (2020) who found that oil spills reduced fish catch by 35-50% within a 2km radius in the Niger Delta. The destruction of mangrove forests, which serve as critical fish breeding grounds, has been identified by Adekoya and Miller (2012) as a major factor contributing to the decline in fish stocks. Studies have shown that frequent oil spills, primarily from illegal bunkering and pipeline failures, degrade fisheries, mangroves, and water quality, leading to reduced fish catch and loss of income.

The lack of cold storage facilities is the second most severe constraint, leading to significant post-harvest losses. According to interviews, up to 30% of catch is lost before reaching markets due to spoilage. This finding is consistent with the observations of WorldFish (2017) which identified lack of cold storage as a major bottleneck in the fisheries value chain in the Niger Delta. The near-absence of cold chains for storing, transporting, and marketing fish results in postharvest losses of up to 40 percent. The poor road network to markets is also a significant constraint, increasing transportation costs and reducing profitability.

Financial constraints, particularly limited access to credit and the high cost of fishing gear, are also significant barriers to optimal performance. The limited access to formal credit restricts fishermen's ability to invest in improved equipment, outboard motors, and modern fishing gear (Okayi et al., 2013). The high cost of fishing gear reflects the imported nature of most fishing equipment, which is subject to exchange rate fluctuations and import duties. Financial exclusion of artisanal fishers is a structural problem that needs to be addressed. The exploitation by middlemen is another significant constraint, with middlemen often offering low prices to fishermen and fish processors. This finding is consistent with the observations of WorldFish (2017) which identified exploitation by middlemen as a major constraint in the fisheries value chain. Piracy and sea robbery also represent significant security concerns, affecting fishermen's ability to access productive fishing grounds. Maritime insecurity, including armed robbery at sea, is a serious challenge facing the country's blue economy.

CONCLUSION AND RECOMMENDATIONS

This study identified the major constraints hindering the optimal performance of the fishing trade in Gbaramatu Kingdom, Delta State, Nigeria. The findings reveal that environmental degradation (oil pollution) is the most severe constraint, followed by lack of cold storage, high cost of fishing gear, exploitation by middlemen, and limited access to credit. The independent t-test showed that oil spills significantly reduce fish catch volume ($t = 9.83$, $p < 0.001$), confirming the negative impact of environmental degradation on fish catch and trade profitability.

Based on the findings, the following recommendations are made:

1. *Environmental Remediation:* The Delta State Government and oil companies should fund mangrove restoration and regular cleanup of oil spills, as mandated by the Oil Spill Detection and Response Agency (OSDRA) Act. Strict enforcement of environmental regulations and compensation for affected communities should be ensured. Given that frequent oil spills degrade fisheries and lead to loss of income, urgent action is needed to protect the livelihoods of fishing communities.
2. *Cold Chain Infrastructure:* The Delta State Government and development agencies should establish community-owned cold storage hubs in Okerenkoko and Oporoza, subsidized by the Delta State Agricultural Development Programme (DSADP). This would reduce post-harvest losses and improve income from fish sales. The near-absence of cold chains results in postharvest losses of up to 40 percent, representing a significant economic loss.

3. *Microcredit Scheme:* Government and financial institutions should partner with the Bank of Industry (BOI) to provide low-interest loans (≤5% per annum) to fishing cooperatives, using fish catch as collateral substitute. Training in financial literacy should be provided to ensure effective utilization of credit. A dedicated fisheries investment facility is needed to correct the structural financial exclusion of Nigeria's fisheries sector.
4. *Regulation of Middlemen:* A fish market board should be created in Gbaramatu to set fair prices and reduce exploitation by middlemen. This would ensure that fishermen receive fair prices for their catch and improve their profitability. The board could also provide market information and support collective marketing.
5. *Investment in Infrastructure:* The government should invest in road infrastructure to improve access to markets, establish fish landing sites, and provide electricity for fish processing activities. Cold chain investment at priority fish landing sites is essential for reducing post-harvest losses.
6. *Alternative Livelihoods:* Youth should be trained in aquaculture (fish farming) to reduce pressure on wild stocks, using the model from the Nigerian Institute for Oceanography and Marine Research (NIOMR). The scaling up of aquaculture is not merely an economic growth option but a structural and nutritional necessity. The National Fisheries and Aquaculture Policy, 2025-2029, provides the operational framework for the growth of the fisheries and aquaculture sector.

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