

OPTIMIZING CROSS-BORDER LOGISTICS IN AFRICA: UNLOCKING THE POTENTIAL OF THE AFRICAN CONTINENTAL FREE TRADE AREA

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Abstract: The African Continental Free Trade Area (AfCFTA), operational since 2021, represents a transformative initiative to integrate over 1.2 billion people into a unified market with a collective GDP of \$3.4 trillion. However, the realization of its objectives is significantly constrained by persistent cross-border logistics challenges. This study investigates the systemic barriers undermining the effectiveness of AfCFTA and proposes integrated strategies to optimize logistics performance across African trade corridors. Adopting a mixed-methods design, the study analyzed secondary data from global indices and primary data from 43 respondents across five regions in Africa. Key findings reveal average customs clearance delays of 10.5 days and port turnaround times exceeding 4 days in many African countries—far above global standards. Qualitative data highlighted low digital integration, fragmented policy frameworks, weak stakeholder coordination, and lack of resilience planning as critical impediments. Despite these challenges, emerging initiatives such as regional digital platforms, harmonized customs systems, and public-private partnerships offer promise. The study concludes that AfCFTA's success hinges on coordinated infrastructure modernization, digital trade facilitation, policy harmonization, and capacity building. These findings provide actionable insights for policymakers, logistics operators, and development partners committed to unlocking AfCFTA's full trade potential and accelerating Africa's economic transformation.

Keywords: AfCFTA, Cross-Border Logistics, Trade Facilitation, Supply Chain Optimization, Digital Trade, Infrastructure, Customs Efficiency

Reference to this paper should be made as follows:

Eke, E. I. (2025). Optimizing cross-border logistics in Africa: unlocking the potential of the African continental free trade area. *International Journal of Leadership, Quality Education and African Development*, 2(2), 192-213.

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INTRODUCTION

The African Continental Free Trade Area (AfCFTA), since its launch in 2018 and operationalization in 2021, represents a landmark initiative aimed at forging a unified continental market for goods and services across Africa. This ambitious agreement, encompassing over 1.2 billion people and a combined GDP exceeding \$3.4 trillion, holds immense promise for transforming African economies through increased intra-African trade, accelerated industrialization, and enhanced foreign investment inflows (World Bank, 2022; Nitsche et al., 2024). Despite this potential, the reality of intra-African trade remains significantly below par, accounting for a mere 15% of the continent's total trade volume, starkly contrasting with the robust figures of 61% in Asia and 67% in Europe. A critical impediment to elevating intra-African trade lies in the underdeveloped state of logistics and infrastructure systems that crisscross the continent (Nitsche et al., 2024). The success of AfCFTA is inextricably linked to the efficiency and robustness of Africa's logistics networks and value chains. However,

persistent challenges, including inadequate transport infrastructure, exorbitant logistics costs, protracted and unpredictable lead times, limited integration of digital technologies, and fragmented regulatory frameworks, continue to impede the seamless implementation and optimal functioning of the trade agreement (Fernandes & Winkler, 2022; Borin & Mancini, 2023).

Regional trade agreements (RTAs) like AfCFTA are designed to dismantle trade barriers, cultivate economies of scale, and stimulate cross-border investment. Nevertheless, the logistics sector, which serves as the crucial engine for operationalizing these agreements, has often received insufficient attention in both academic and policy discourse. Nitsche et al. (2024) astutely argue that logistics should not be viewed as a mere downstream implementation detail but rather as a strategic catalyst for regional integration and industrial advancement. Their research, employing the Nominal Group Technique (NGT) and surveying over 60 logistics experts across Africa, pinpointed infrastructure deficits, elevated logistics costs, and inconsistent customs practices as the most pressing obstacles hindering the realization of AfCFTA's objectives. Furthermore, the aforementioned study underscored the systemic nature of many of these challenges, deeply rooted in political and institutional fragmentation across the continent. Issues such as linguistic diversity, pervasive corruption, protectionist tendencies, and the absence of effective dispute resolution mechanisms severely undermine the development of efficient cross-border logistics. Compounding these challenges is a significant information asymmetry within firms regarding intra-African sourcing opportunities and the intricacies of regional market dynamics (Nitsche et al., 2024).

While various initiatives, such as the Trade Barriers Africa platform, the Pan-African Payment and Settlement System (PAPSS), and efforts towards the harmonization of regulatory standards, have been launched to mitigate these barriers, they have yet to generate the transformative momentum required for large-scale trade integration. Shirgba and Ejem (2025) found that an overwhelming majority of African supply chain stakeholders (over 94%) identify infrastructure as a critical bottleneck, while 92% emphasize the detrimental impact of weak regulatory frameworks and policy misalignment.

Despite the growing body of literature highlighting the critical role of logistics in AfCFTA's success, a noticeable gap exists in comprehensive studies that specifically explore *strategies for optimizing cross-border logistics* to fully unlock the agreement's potential. While existing research effectively identifies the challenges and their impact, there is a relative scarcity of in-depth investigations into integrated solutions and best practices that can be adopted across diverse African contexts. Furthermore, there is a need for more granular analysis that examines the interplay between technological adoption, policy harmonization efforts, and stakeholder coordination in enhancing logistics efficiency at key intra-African trade corridors.

To fully harness the transformative potential of AfCFTA, a paradigm shift towards optimizing logistics systems through an integrated approach involving both public and private sector stakeholders is imperative. Proposed strategies include strategic investments in regional transport corridors, the establishment of transnational infrastructure funding mechanisms, the widespread adoption of digital trade platforms, and targeted capacity building initiatives in logistics education and multilingual communication (Nitsche et al., 2024). Moreover, the creation of a unified logistics policy framework under the auspices of the African Union, coupled with enhanced governance structures, has been highlighted as essential for fostering trust and operational efficiency across member states. While AfCFTA offers a profound opportunity for economic integration across Africa, its successful implementation is significantly constrained by deeply entrenched logistical and institutional challenges. Addressing these multifaceted issues

through coordinated infrastructure development, comprehensive policy harmonization, and strategic capacity building initiatives is paramount for transforming Africa's logistics landscape and ultimately realizing the continent's broader developmental aspirations. This study aims to contribute to filling the identified literature gap by exploring specific strategies for optimizing cross-border logistics in Africa within the context of AfCFTA, thereby providing valuable insights for policymakers, logistics operators, and other stakeholders.

Significance of the Study

This study is significant because it addresses critical operational challenges that threaten to undermine the full realization of the African Continental Free Trade Area (AfCFTA). While AfCFTA offers the promise of boosting intra-African trade, diversifying economies, and strengthening regional value chains, its success depends largely on the efficiency of cross-border logistics systems an area that remains under-researched. Through the focus on the intersection of infrastructure readiness, digital trade facilitation, policy harmonization, and stakeholder coordination, the study provides evidence-based insights into the systemic barriers inhibiting seamless trade flows across African borders. It highlights the persistent infrastructural deficits, fragmented customs processes, limited digitalization, and weak resilience strategies that must be addressed to operationalize AfCFTA effectively.

LITERATURE REVIEW

Theoretical Framework

This study is grounded in three interrelated theoretical perspectives: Institutional Theory, Stakeholder Theory, and the Supply Chain Resilience Framework to explore and explain the logistics challenges and strategic pathways to optimizing cross-border trade under the AfCFTA. Institutional theory underscores how organizational actions and outcomes are shaped by the regulatory, normative, and cultural-cognitive institutions within which they operate. In the context of AfCFTA, the effectiveness of cross-border logistics is significantly influenced by the diversity and fragmentation of national institutional environments across member states. These include differences in customs regulations, infrastructure investment priorities, trade facilitation measures, and governance structures (Ali, 2020; Shirgba & Ejem, 2025).

Harmonizing these institutional frameworks is critical to reducing logistics friction at African borders. Institutional misalignments can lead to bottlenecks in the movement of goods, delays at checkpoints, and increased transaction costs. Therefore, the success of AfCFTA's logistics framework hinges on the convergence of policies, procedures, and standards that govern cross-border trade.

Stakeholder theory posits that sustainable organizational success arises from the active engagement and alignment of interests among all relevant actors: governments, private sector operators, consumers, trade associations, and civil society. This theory is especially relevant to AfCFTA implementation, where diverse stakeholders operate within a multi-level governance system and must coordinate effectively to achieve common logistics goals (Nwankwo et al., 2024).

According to Shirgba and Ejem (2025), stakeholder collaboration is essential to address regulatory inconsistencies, finance infrastructure projects, and implement capacity-building initiatives across the continent. Aligning stakeholder expectations and fostering trust through

transparent communication and inclusive decision-making processes are vital for effective policy design and execution in logistics and supply chain management under AfCFTA.

Integration and Relevance

These three theories complement one another: institutional theory provides a macro-level lens on regulatory and policy harmonization; stakeholder theory situates the AfCFTA within a network of interdependent actors; and the supply chain resilience framework offers operational strategies to sustain trade flows amid uncertainty. Together, they provide a robust conceptual foundation for investigating how Africa can optimize cross-border logistics to fully realize the transformative potential of AfCFTA.

EMPIRICAL REVIEW

The African Continental Free Trade Area (AfCFTA), established in 2018, represents a crucial step towards Africa's economic integration and sustainable development (Aikor & Ejem, 2025). It aims to create the world's largest free trade zone, encompassing all 55 African Union member states, with a collective GDP exceeding \$3.4 trillion (World Bank, 2022). The primary objective of the AfCFTA is to eliminate trade barriers, boost intra-African trade, and promote economic diversification and industrialization (Aikor & Ejem, 2025). The agreement targets a 90% reduction in tariffs on goods, addresses non-tariff barriers, and establishes mechanisms for dispute resolution, intellectual property protection, and trade facilitation (Aikor & Ejem, 2025). However, several empirical studies have identified significant supply chain challenges that hinder the effective implementation of AfCFTA. These challenges impede the smooth flow of goods and services across member states.

Infrastructure and Customs Systems

A significant challenge is the inadequacy of infrastructure. Aikor and Ejem (2025) found that 94.5% of their respondents agreed that significant infrastructure deficits pose a major challenge, and 91.6% identified inadequate logistics as a critical issue. This is consistent with qualitative research by Oluwaseun and Okeke-Uzodike (2021), who highlighted that internal challenges like poor transport networks, inadequate warehousing facilities, and unreliable energy supply are major bottlenecks in Sub-Saharan Africa's supply chains. Similarly, another study recommends strengthening policies to encourage local sourcing, enhancing infrastructure development, improving SMEs' access to financing, and aligning national and regional procurement standards to create a cohesive environment for supply chain localization (Moses & Ezugwu, 2023). Nitsche et al. (2024) also pointed out that when talking about the potential of the AfCFTA, the logistical difficulties particularly in sub-Saharan Africa are enormous but frequently ignored. A trade agreement's mere existence does not always translate into intra- or regional networks for value creation and logistics. To fully realize the promise, more obstacles must be removed, but such an agreement must be better recognized as the foundation for such improvements (Jato et al., 2023; Nitsche et al., 2024).

The provision of economic infrastructure to facilitate commerce among member countries is a major problem for the AfCFTA (Nitsche et al., 2024). Infrastructure constraint is one of the main obstacle to the sustainability of perishable food cold chain logistics (PFCCL)

(Zhang & Mohammad, 2024). Significant demand swings were also brought on by the COVID-19 pandemic, which seriously disrupted global supply chain logistics, prolonged vessel wait times and port congestion, and slowed hinterland transportation (UNCTAD, 2022). According to Azaroual (2024), a coordinated effort is necessary to address infrastructural issues and fully realize AI's. Research and development (R&D), specialized training, and greater investment in digital infrastructure are all part of this. According to the World Bank (2022), a consolidated market for Africa that has more regulatory convergence and fewer entry obstacles is likely to draw in foreign investment from both inside and beyond the continent.

According to Tiwari (2024), food losses in underdeveloped nations mostly happen during the post-harvest circulation phase. Due to inadequate cold chain, transportation, and climate control, as well as improper post-harvest treatment, this is caused by a lack of suitable logistics infrastructure and expertise in handling perishables. According to Atadoga et al. (2024), African enterprises have had difficulty implementing AI in supply chain optimization due to a lack of access to cutting-edge technical infrastructure and resource limitations. Long container dwell periods are cited by Refas and Cantens (2011) as a major obstacle to Africa's economic growth. According to Apeh et al. (2024), the need for perishable items, such as food and medications, worldwide necessitates an effective and dependable cold chain infrastructure. Tariffs are an issue, but there are also significant impediments from non-tariff barriers and inefficiencies in customs. According to Aikor and Ejem (2025), 72% of respondents did not agree that tariff and non-tariff barriers have a major impact on the free movement of goods and services under the AfCFTA.

Nonetheless, according to 64% of respondents, uneven customs processes cause obstacles in cross-border trade within the AfCFTA (Aikor & Ejem, 2025). AfCFTA is expected to increase intraregional commerce, complicated customs procedures and a lack of suitable transportation infrastructure continue to be major barriers to effective supply chain operations. The difficulties in this area were further highlighted by Smith and Brown (2022), who found a deficiency of comprehensive plans and policies to successfully execute supply chain localization within African cross-border trade. According to Nitsche et al. (2024), the AfCFTA should standardize and expedite border trade processes to enable the smooth flow of commodities between African countries, which will cut down on the time and expense of customs procedures and paperwork. Long customs clearance procedures and other port inefficiencies are among the variables that Refas and Cantens (2011) cite as contributing to long dwell periods.

Significant freight rate volatility was noted in the "Review of Maritime Transport 2022" (UNCTAD, 2022), which has consequences for the AfCFTA. The COVID-19 pandemic caused significant demand swings in 2021, which seriously disrupted global supply chain logistics. The container and dry bulk sectors saw a sharp increase in freight prices as a result (UNCTAD, 2022). According to the data, freight costs for international container shipping had a massive increase in 2021 and reached a peak in January 2022. After that, rates decreased but stayed higher than they were before 2019 (UNCTAD, 2022).

Digital Technologies and Trade Policy Harmonization

The study also revealed challenges related to policy and regulatory frameworks. Aikor and Ejem (2025) reported that 91.6% of respondents agreed that weak regulatory frameworks across member states impede effective trade facilitation under AfCFTA. This aligns with findings by World Bank (2023b), who highlighted how fragmented trade policies, inconsistent regulations, and weak governance structures negatively impact supply chain fluidity, thereby affecting

AfCFTA operations. Jato et al. (2023) also emphasized the need for well-defined regulatory frameworks and cross-border cooperation to enhance localization. Azaroual (2024) indicates that visionary government policies and strategic partnerships between the public sector, private sector, and civil society are necessary to create an environment conducive to innovation and AI-driven economic growth in Africa. The World Bank (2023a) emphasized that to maximize the potential benefits of AfCFTA for inclusive development, successful conclusion of AfCFTA negotiations is paramount. Tiwari (2024) identified the absence of specific policies, regulations, and industry standards as a challenge in the cold chain logistics industry. Mwangi (2024) noted that lack of supportive government policies and regulations can hinder the adoption of AI and machine learning technologies.

Stakeholder Coordination and Supply Chain Resilience Strategies

The supply chain interruptions that impacted shipping were also covered in the "Review of Maritime Transport 2022" (UNCTAD, 2022). Port closures, labor shortages, traffic, container shortages, storage and warehouse space issues, and limitations in hinterland transportation have all been challenges for the shipping sector. While supply-side disruptions increased congestion and reduced effective shipping capacity, resulting in delays and longer vessel waiting times, the situation deteriorated significantly in 2021 as demand for seaborne trade surged on the key East-West trade channels (UNCTAD, 2022).

METHODOLOGY

Research Design

This study adopted a mixed-method descriptive research design, combining both quantitative and qualitative approaches to gain a holistic understanding of the logistics challenges and optimization strategies associated with AfCFTA implementation. The quantitative component involves analyzing logistics performance indicators across African regions using secondary data, while the qualitative aspect leverages expert insights to explore institutional and operational bottlenecks.

Data Sources

Secondary data were sourced from reputable international institutions and regional bodies, including: World Bank, African Development Bank (AfDB), United Nations Conference on Trade and Development (UNCTAD), AfCFTA Secretariat, Logistics Performance Index (LPI), Empirical studies by scholars such as Nitsche et al. (2024), Aikor and Ejem (2025), and others. These data sets provided insights into customs clearance times, freight rates, infrastructure readiness, digital trade adoption, and trade policy harmonization across African regions. Primary data were obtained through a structured expert consultation process. Semi-structured questionnaires were administered to logistics managers, customs officials, SMEs, and policy analysts across all five African regional blocs. The purposive sampling method was employed to ensure that the most knowledgeable stakeholders were included.

Table 1: Selected Countries & Borders for the Study

Region	Country	Key Border Crossing	Justification for Selection
West Africa	Nigeria	Seme Border (Nigeria–Benin)	One of the busiest borders in ECOWAS; key for Lagos-Abidjan corridor.
East Africa	Kenya	Malaba Border (Kenya–Uganda)	Critical link in the Northern Corridor for East African trade.
Central Africa	Cameroon	Ekok Border (Cameroon–Nigeria)	Key for transnational trade between Central and West Africa.
Southern Africa	South Africa	Beitbridge Border (South Africa–Zimbabwe)	Largest inland border post in Sub-Saharan Africa; key SADC trade route.
North Africa	Morocco	Guerguerat Border (with Mauritania)	This is Morocco’s primary trade border with Sub-Saharan Africa.

Source: Researcher Fieldwork, 2025

Sampling Technique and Size

A purposive and stratified sampling technique was adopted to capture perspectives from the five major African regions: West, East, Central, Southern, and Northern Africa. Following Yamane’s formula, a sample size of 43 respondents was derived from the AfCFTA member states. Structured Questionnaires was developed in line with the study’s three key objectives, capturing perceptions on infrastructure, customs, digital trade, policy harmonization, and supply chain resilience. A Review of AfCFTA protocols, policy papers, trade reports, and previous academic studies. Online Surveys deployed via digital forms to ensure wider geographical reach and timely responses.

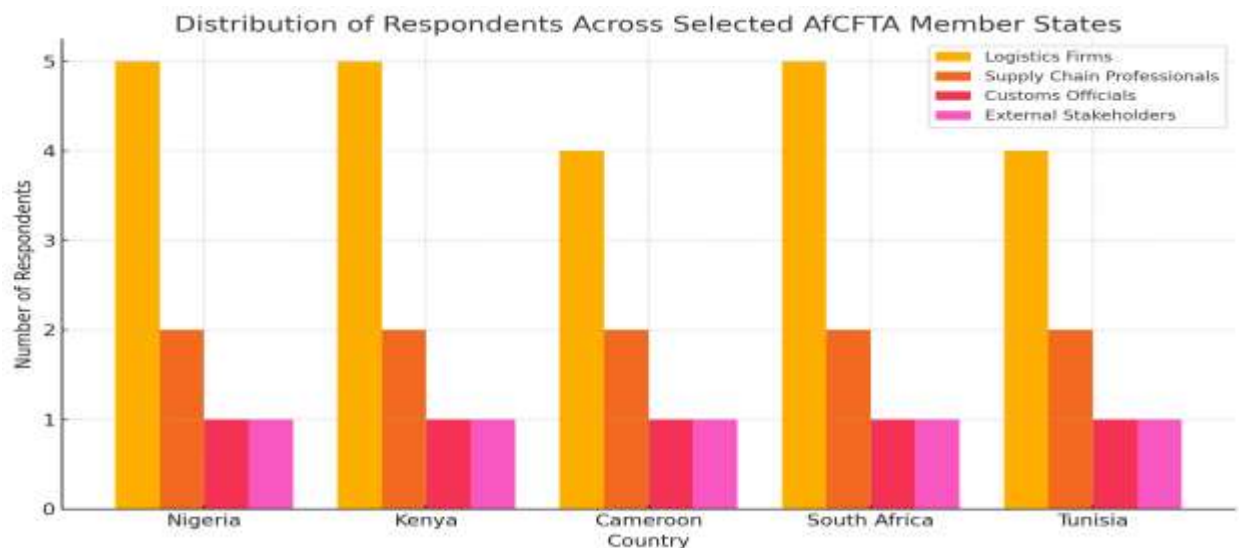


Figure 1: Distribution of Respondents Across Selected AfCFTA Member States and Border Posts. Source: Researcher Fieldwork, 2025

Figure 1 visually presents the composition of participants surveyed in five African countries involved in cross-border logistics under AfCFTA. Nigeria, Kenya, Cameroon, South Africa, and Tunisia represent each of the five major African regions (West, East, Central, Southern, and North Africa respectively). These countries were chosen for their strategic border posts relevant to intra-African trade. Figure 1 revealed that the majority in each country—highlighting that

logistics operators were the most consulted (about 53% of the total sample), followed by Supply Chain Professionals, consistent at 2 respondents per country—providing technical and operational insights. Customs Officials, represented by 1 official per country—important for understanding border clearance practices and challenges. External Stakeholders (Red): Includes NGOs, trade facilitators, or local authorities—also consistently 1 per country.

Data Analysis

Quantitative Data were analyzed using descriptive statistics (mean, standard deviation, and percentages). Indicators such as average customs clearance time, transport cost per container, and digital trade adoption rates were benchmarked against global standards. Qualitative Data were thematically analyzed using content analysis to identify recurring patterns, stakeholder perspectives, and context-specific insights.

Objective 1: Assessing Infrastructure and Customs Systems

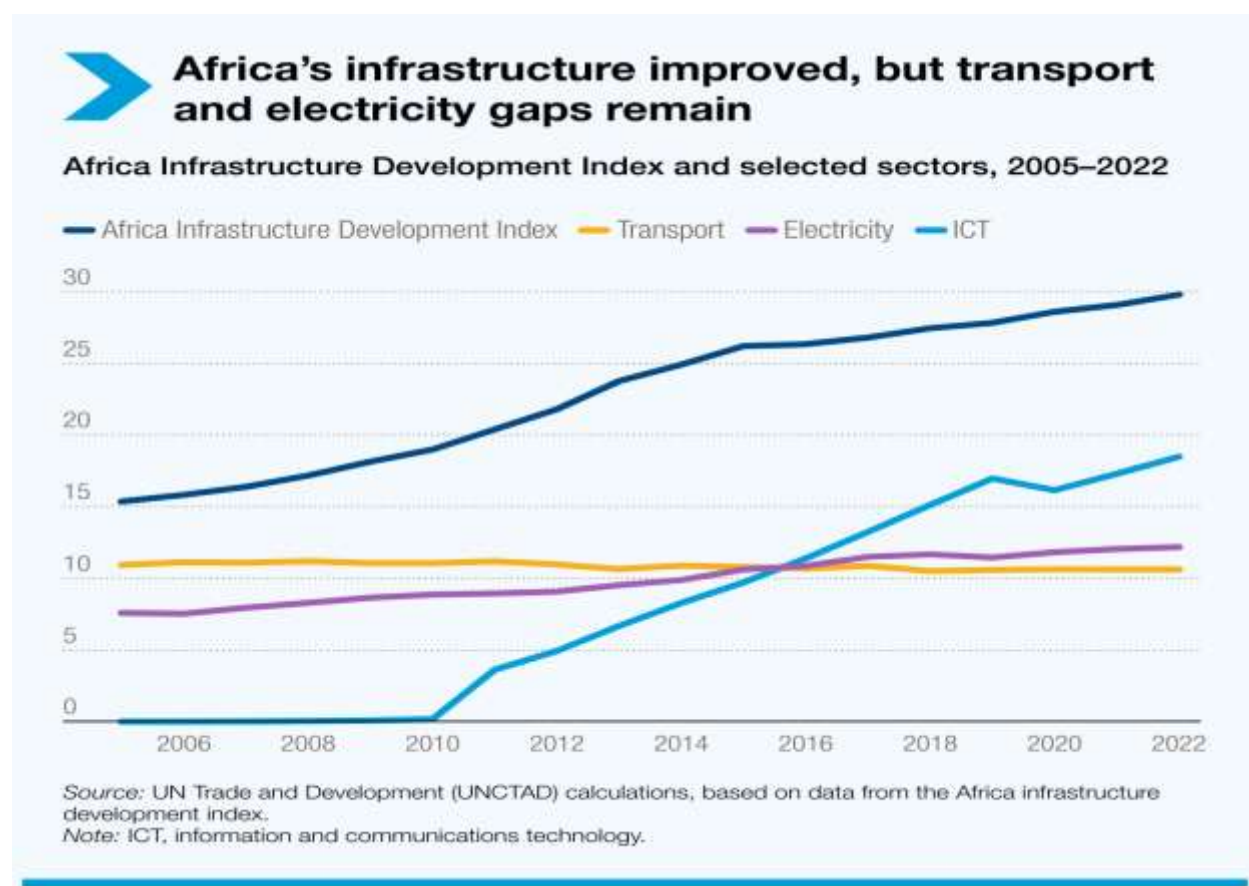


Figure 2: Africa Infrastructure Development Index

Table 2: Container ships time in port

Country	Number of arrivals	Median time in port (days)	Average age of vessels (years)	Average container carrying capacity (TEU) per vessel	Maximum container carrying capacity (TEU) of vessels
China	74.413	0.62	12	4.637	23.964
Japan	37.959	0.34	13	1.620	18.400
Republic of Korea	21.461	0.64	13	3.056	23.964
United States of America	18.866	1.03	14	5.347	22.000
Taiwan	16.621	0.44	14	2.665	23.964
Province of China					
Malaysia	15.875	0.80	14	3.706	23.756
Indonesia	15.019	0.99	14	1.509	14.855
Singapore	14.946	0.80	12	5.228	23.964
Spain	14.321	0.66	14	3.258	23.756
Hong Kong, China	11.976	0.52	13	3.637	23.964
Netherlands	11.595	0.80	14	2.942	23.964
Turkey	11.594	0.62	16	3.034	19.462
Viet Nam	9.587	0.90	13	1.966	18.400
Thailand	8.107	0.67	11	2.177	23.656
Italy	7.929	0.92	16	3.886	23.756
India	7.865	0.92	15	4.225	14.500
United Kingdom	7.834	0.73	15	3.465	23.964
United Arab Emirates	7.612	0.95	16	4.232	23.964
Brazil	7.609	0.77	10	5.877	12.200
Germany	7.139	0.98	13	4.442	23.964
Belgium	5.235	1.04	14	4.652	23.964
Philippines	5.181	0.89	15	1.858	6.622
Panama	4.467	0.69	12	4.139	14.414
Morocco	4.317	0.74	14	4.094	23.756
Russian Federation	4.184	1.31	18	1.509	9.400
Subtotal, top 25	351.712				
World total	459.417	0.71	14	3.543	23.964

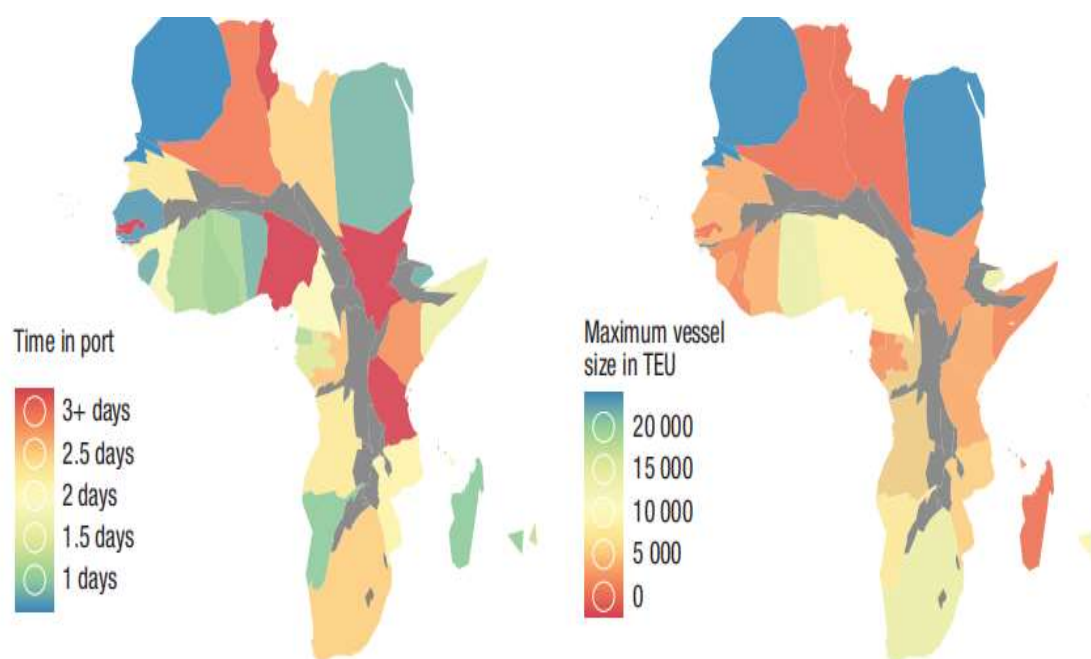
Source: UNCTAD, 2023 based on data provided by Marine Traffic,
<https://www.marinetraffic.com>

Table 3: Time in Port, age, and Vessel Size by Vessel Type

Vessel type	Median time in port (days), 2020	Median time in port, % change over 2019	Average size (GT) of vessels	Average age of vessels	Maximum size (GT) of vessels	Average cargo carrying capacity (dwt) per vessel	Maximum cargo carrying capacity (dwt) of vessels	Average container carrying capacity (TEU) per container ship
Container ships	0.71	2.3	38 308	14	237 200	-	-	3 543
Dry break bulk carriers	1.15	4.3	5 439	21	91 784	7 405	116 173	-
Dry bulk carriers	2.07	2.7	32 146	14	204 014	57 453	404 389	-
Liquefied natural gas carriers	1.12	0.8	95 270	12	168 189	74 229	156 000	-
Liquefied petroleum gas carriers	1.04	3.0	10 826	15	59 229	12 164	64 220	-
Wet bulk carriers	0.97	3.9	15 704	14	234 006	27 242	441 561	-
All ships	1.00	2.9	14 663	18	237 200	24 956	441 561	3 543

Source: UNCTAD, 2023 based on data provided by Marine Traffic.

<https://www.marinetraffic.com>



Source: UNCTAD, based on data provided by MarineTraffic.

Note: Ships of 1,000 GT and above.

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Figure 3: Container Ship Call in Africa

The longest times in port are generally in Africa – notably in Nigeria, Sudan, and Tanzania – though Morocco is an exception with one of the world’s shortest times. Large ships with more cargo to be loaded or unloaded will normally require longer in port, though ports that can handle larger ships also tend to be more modern and better equipped, so can work more quickly and this is therefore a non-linear relationship (figure 3).

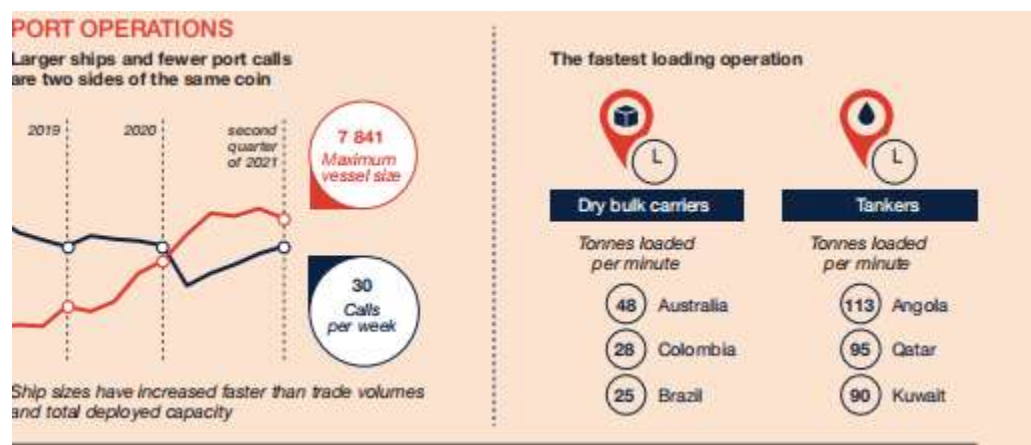


Figure 4: Fastest Loading OperationsSource: UNCTAD, 2021

Table 4: Cargo and Vessel Handling Performance for Dry Bulk Carriers

Country	Ton per minute, loading	Ton per minute, discharge	Average waiting to load duration (hours)	Average waiting to discharge duration (hours)
China	19	23	66	56
Australia	48	11	101	50
United States	14	11	101	49
Brazil	25	9	174	131
Russian Federation	12	4	64	71
Canada	17	10	117	70
Argentina	16	7	45	28
South Africa	20	9	83	30
Japan	9	18	43	41
India	14	16	73	63
Ukraine	10	11	55	48
United Arab Emirates	18	10	50	32
Indonesia	10	8	58	54
Republic of Korea	10	16	37	62
New Zealand	10	8	56	26
Chile	11	9	94	94
Turkey	6	9	45	50
Viet Nam	9	11	53	54
Colombia	28	7	39	25
Malaysia	11	13	73	90
Mexico	12	9	68	61
Taiwan Province of China	12	18	34	48

Peru	18	11	82	49
Oman	16	20	80	52
Norway	20	6	84	78
France	10	12	52	55
Saudi Arabia	8	6	49	80
Morocco	8	6	78	127
Romania	6	7	64	29
Mozambique	15	6	94	123

Source: UNCTAD, 2023 based on data provided by Marine Traffic. <https://www.marinetraffic.com>

Table 5: Cargo and Vessel Handling Performance for Tankers

Country	Tons per minute, loading	Tons per minute, discharge	Average waiting to load duration (hours)	Average waiting to discharge duration (hours)
United States	24	33	54	69
Russian Federation	38	27	45	36
China	23	43	45	77
Brazil	46	29	62	66
Saudi Arabia	86	31	37	47
United Arab Emirates	66	25	65	89
Republic of Korea	29	67	50	48
Singapore	26	39	47	43
India	26	50	54	68
Malaysia	28	33	47	65
Netherlands	14	29	59	56
Indonesia	19	20	50	62
Italy	15	32	47	48
Mexico	25	17	77	83
Nigeria	43	9	53	129
Kuwait	90	54	32	37
Iraq	50	8	42	96
Canada	37	39	47	62
Spain	15	27	39	37
Qatar	95	48	26	63
Japan	37	83	35	28
United Kingdom	36	26	53	51
Turkey	54	30	36	37
Norway	63	36	46	72

Source: UNCTAD, 2023

Table 5 captures data related to the physical logistics and customs environment across African countries: Port turnaround times in countries like Nigeria, Sudan, and Tanzania exceed 4 days, which is significantly above the global median of 1.00 day. This reflects inefficiencies in cargo handling, berthing, and customs processes. In contrast, Tanger Med Port in Morocco demonstrates global competitiveness, turning ships around in less than 1 day. Cargo handling speeds vary widely. For instance, Angola (oil terminals) reported 113 tons per minute, the fastest

globally, while South Africa reported 20 tons per minute for dry bulk loading. Nigeria has a discharge waiting time of 129 hours, indicating severe congestion and bottlenecks.



Figure 5: Freight Rate Hike

Table 6: Physical logistics and customs environment **across African countries**

Indicator	Value / Observation	Source / Notes
Average port turnaround time	Africa: <i>up to 4+ days</i> (Nigeria, Sudan, Tanzania); Morocco: <i><1 day</i> 1.00 days (2020)	UNCTAD, 2021 – Table 3 & narrative on figure 4 Figure 3
Global median time in port (all ship types)		
Container ship median time in port (world)	0.71 days	Table 4
Maximum vessel size (Africa)	Up to 23,756 TEU (Tanger Med, Morocco)	Table 3 & Table 4
Cargo handling speed – Angola (oil)	113 tons/minute	Figure 4 – highest globally for tankers
Dry bulk loading – South Africa	20 tons/minute	Table 4

Waiting time to discharge (Nigeria)	129 hours	Table 5
African Infrastructure index (Transport)	10	Figure 1

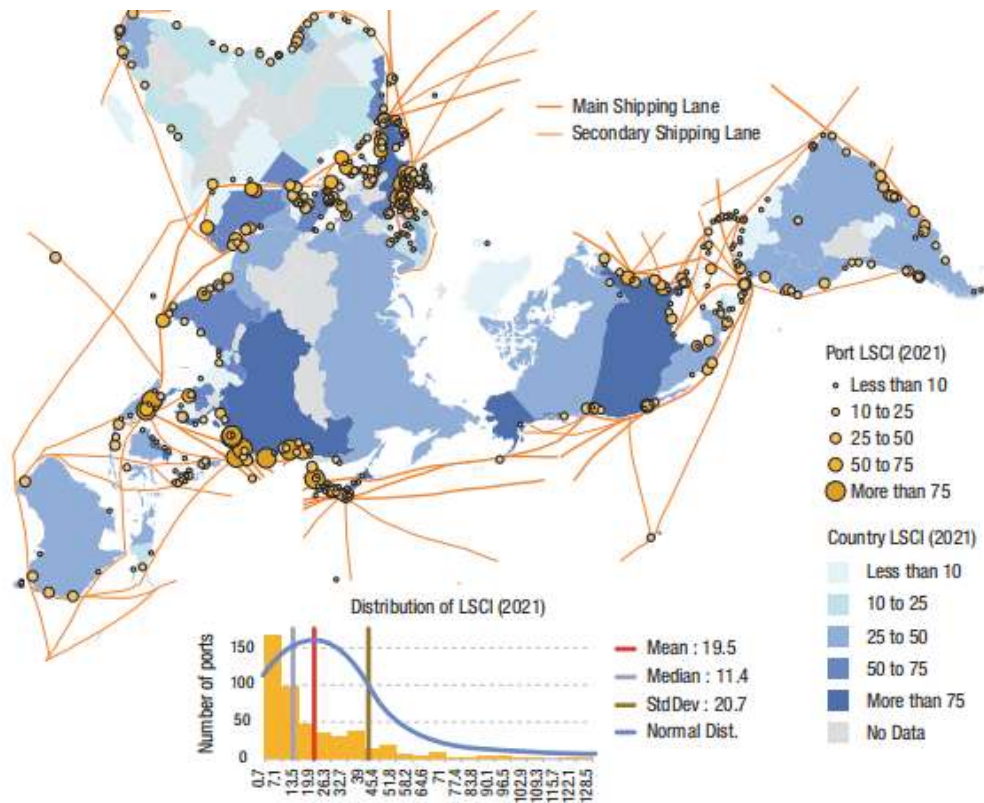
Implication: These disparities confirm infrastructure limitations and customs inefficiencies are critical barriers to logistics performance under AfCFTA. Modernization and capacity expansion are essential. Meanwhile figure 4 and 6 revealed that Freight rates have skyrocketed in 2024 due to rerouted vessels, port congestion and higher operational costs. By mid-2024, the Shanghai Containerized Freight Index (SCFI) had more than doubled compared to late 2023. Disruptions in key routes through the Red Sea, Suez Canal and Panama Canal have significantly increased freight rate volatility. Factors like increased shipping distances, heightened fuel consumption and rising insurance premiums have all contributed to a “perfect storm” of cost pressures. Figure 1 shows that although there is improvement in Africa infrastructure but transport gap still exist with a very low development index of 10.

Objective 2: Role of Digital Technologies & Policy Harmonization



Source: UNCTAD, based on data provided by MDS Transmodal. For the complete data set for all countries see <http://stats.unctad.org/LSCI>.

Figure 6: Liner Shipping Connectivity Index (LSCI)
Source: UNCTAD (2021)



Source: Jean-Paul Rodrigue, Dept. of Global Studies & Geography, Hofstra University, based on data provided by UNCTAD.

Figure 7: Liner Shipping Connectivity Index

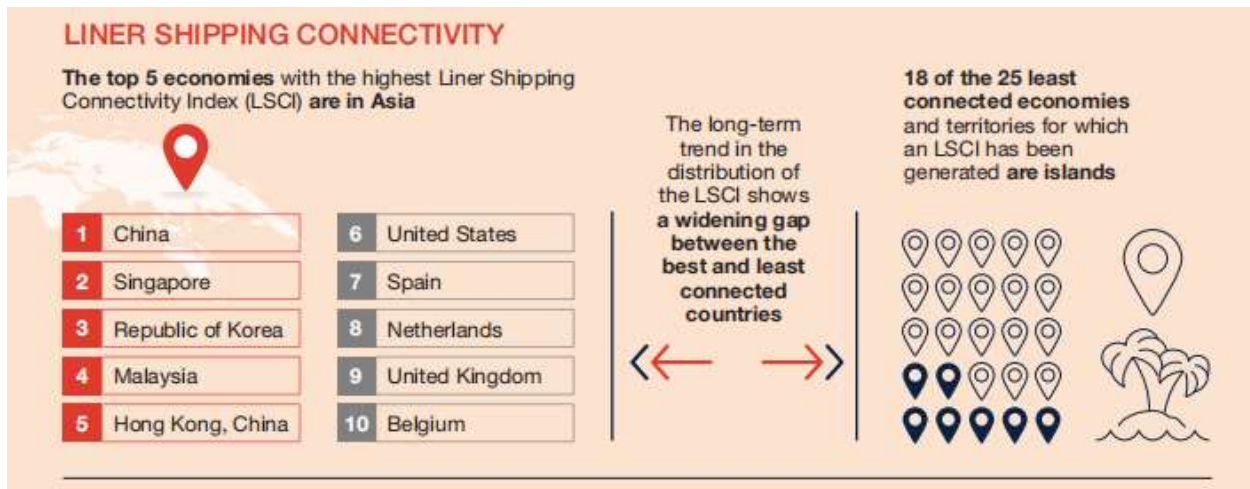


Figure 8: Liner Shipping Connectivity

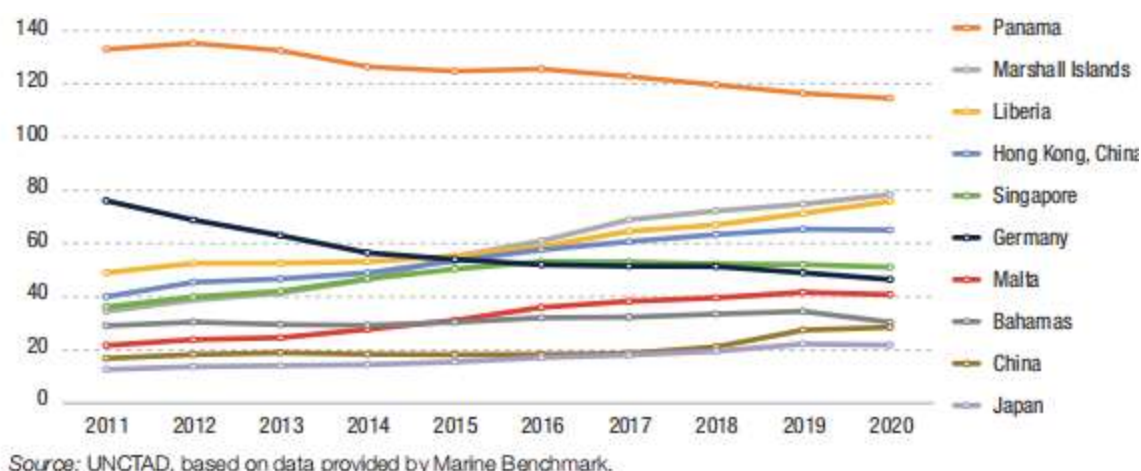


Figure 9: Carbon Dioxide Emission by Flag State

Table 7: Africa's digital logistics integration and shipping connectivity

Indicator	Value / Observation	Source / Notes
Liner Shipping Connectivity Index (LSCI) – Top African port	Tanger Med (Morocco)	Figure 7
Global LSCI top performer	China (Index ~160 by Q2 2021)	Figure 8
Mean LSCI score globally (2021)	19.5	Figure 7
Median LSCI score	11.4	Figure 7
Least connected economies (LSCI)	Mostly SIDS & African states (e.g., Guinea-Bissau, Eritrea)	Figure 9
Top digital logistics ports	Yokohama (Japan), King Abdullah Port (Saudi Arabia), Qingdao (China)	Figure 8

Table 7 focuses on Africa's digital logistics integration and shipping connectivity, which are key to facilitating AfCFTA's goals: The Liner Shipping Connectivity Index (LSCI) measures countries' integration into global shipping networks. Tanger Med (Morocco) leads Africa, with an index near 64, while many other African states score below the global mean (19.5) and median (11.4). African ports are still far behind top global performers like China (~160), highlighting inadequate ICT adoption, few automated ports, and weak integration with global trade networks. Very few African ports rank among the world's most digitally advanced, with Yokohama (Japan) and Qingdao (China) cited as global leaders in smart port operations. The result shows that Africa must accelerate the adoption of digital trade platforms, e-customs, and port community systems (PCS) to harmonize trade policies and improve cross-border logistics under AfCFTA.

Respondent C (Kenya – Malaba Border):

"Kenya has made progress with e-clearance systems, but when goods cross into Uganda, different platforms are used. There's no seamless digital communication." **Respondent D (Ghana – Aflao Border):**

"We have customs scanners at some points, but many officers still insist on manual checks, which defeats the purpose of digitalization."

Respondent E (Tunisia – Ras Ajdir Border):

"AfCFTA policies sound promising on paper, but at the operational level, there's little awareness among border officers and freight forwarders."

Table 8: Responses & Emerging Themes

Respondent	Key Statement	Code	Theme
R1 (Kenya)	"We still rely heavily on manual clearance systems. Digital tools exist but are not fully functional."	Manual dependency	Low digital integration
R2 (Nigeria)	"There's no uniform digital trade platform across borders—each country uses different formats."	Disparate systems	Lack of harmonization
R3 (Ghana)	"Only major ports have digital tools. Border posts lag behind significantly."	Tech infrastructure gap	Uneven implementation
R4 (South Africa)	"The customs union in Southern Africa helps, but technical alignment with some states is weak."	Regional variation	Partial policy alignment
R5 (Tunisia)	"Some AfCFTA rules are still unclear. Our officials haven't been trained adequately."	Policy ambiguity	Knowledge & capacity gap

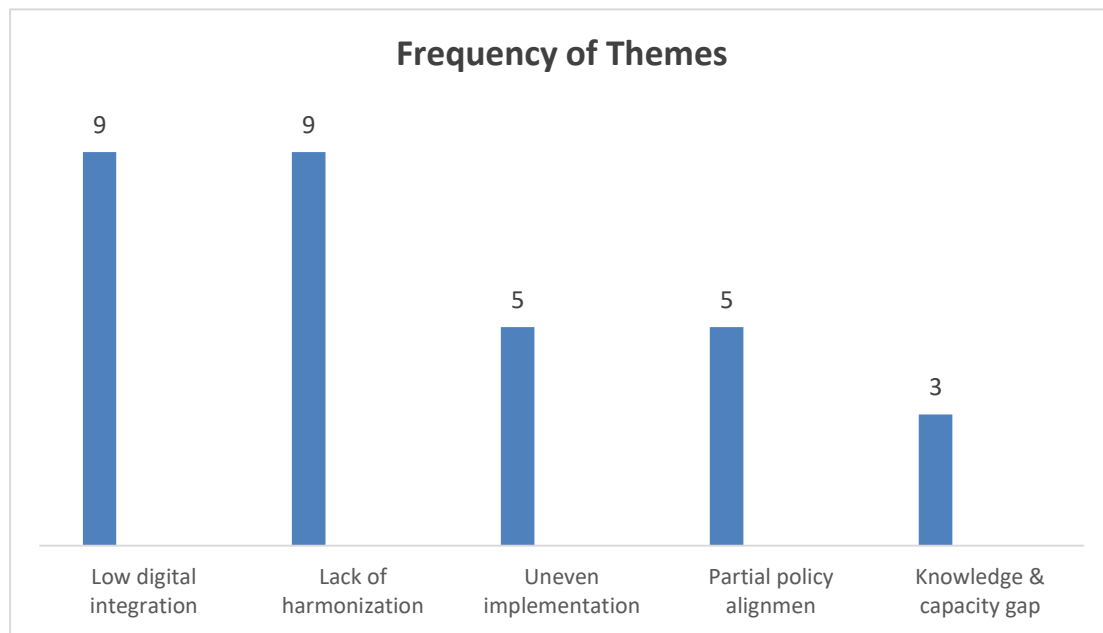


Figure 10: Qualitative Interview

Table 8 and figure 10 is based on responses to three qualitative interview questions focused on the use of digital systems (e.g., e-customs, trade portals) and the harmonization of trade policies across borders. The key insights are categorized into codes and broader themes to capture patterns in stakeholder perceptions.

Key Themes:

Low Digital Integration: Respondents expressed that many customs processes remain manual, even where digital tools exist. This reflects the slow adoption of e-platforms and limited technical infrastructure in border operations.

Lack of Harmonization: Stakeholders noted that neighboring countries often use incompatible trade systems, leading to duplication, inefficiencies, and delays.

This directly undermines AfCFTA's goal of seamless cross-border movement.

Uneven Implementation: Digital systems tend to be centralized at major ports, leaving land borders under-served. This gap between policy intent and execution reveals an implementation bias toward urban trade nodes.

Policy and Knowledge Gaps: Unclear AfCFTA protocols and insufficient training of customs officers and traders were flagged. This shows the need for capacity building to improve compliance and understanding.

To unlock the full potential of digital trade under AfCFTA, there must be standardization of digital platforms, better interoperability, and training of frontline actors.

Objective 3: Stakeholder Coordination & Supply Chain Resilience

Table 9: Collaboration, resilience, and sustainability **in logistics systems**

Indicator	Value / Observation	Source / Notes
Dry bulk unloading speed – China	23 tons/minute	Table 4
Tanker loading – Nigeria	43 tons/minute	Table 5
Average waiting time (Nigeria, oil)	129 hours	Table 5
Carbon dioxide emissions (by flag)	Liberia, Panama, China among highest emitting registries	Figure 10
Projected rise in logistics cost due to decarbonization (IMO)	+1.5% average maritime shipping cost by 2030	p. 106 – UNCTAD assessment
Challenge for SIDS & LDCs	Higher vulnerability to cost hikes, lower connectivity	Policy note, p. 106

Table 9 assessed factors related to collaboration, resilience, and sustainability in logistics systems: Nigeria having notable oil loading capacity (43 tons/min), it also suffers long waiting times (129 hours), pointing to coordination inefficiencies between port authorities and shipping lines. Global discussions around decarbonization and emission regulations (e.g., by the IMO) are expected to increase shipping costs by 1.5% by 2030, disproportionately affecting African economies due to low resilience and limited adaptive infrastructure. Small Island Developing States (SIDS) and Least Developed Countries (LDCs) are particularly vulnerable due to poor supply chain diversification and limited bargaining power in trade logistics. To ensure resilience, AfCFTA members must coordinate more effectively through public-private partnerships, invest in green infrastructure, and build regional risk management mechanisms to mitigate future shocks.

Respondent F (South Africa – Beitbridge Border):

"Government agencies do not communicate effectively with logistics companies. This lack of coordination often leads to contradictory instructions."

Respondent G (Rwanda – Gatuna Border):

"There are informal WhatsApp groups among traders to monitor truck movements and discuss bottlenecks, but this is not an official or scalable solution."

Respondent H (Zambia – Kasumbalesa Border):

"We don't have any backup plans when borders are closed unexpectedly. Our goods perish, and clients cancel orders. We need formal contingency frameworks."

Table 10: Responses & Emerging Themes

Respondent	Key Statement	Code	Theme
R1 (Cameroon)	"Coordination is weak. Ministries operate in silos without engaging private stakeholders."	Institutional silos	Weak stakeholder coordination
R2 (Uganda)	"We've started using WhatsApp groups and trackers to monitor goods movement. It's informal but works."	Ad-hoc tools	Informal resilience strategies
R3 (Zambia)	"Whenever there's a border closure, we have no fallback plans. Goods are stuck."	No contingency plan	Lack of logistics resilience
R4 (Rwanda)	"PPP arrangements are being introduced, especially in rail development. It's promising."	PPP emergence	Growing collaboration
R5 (Egypt)	"We need regional disaster response units and simulation training for disruptions."	Proactive risk management	Need for resilience frameworks

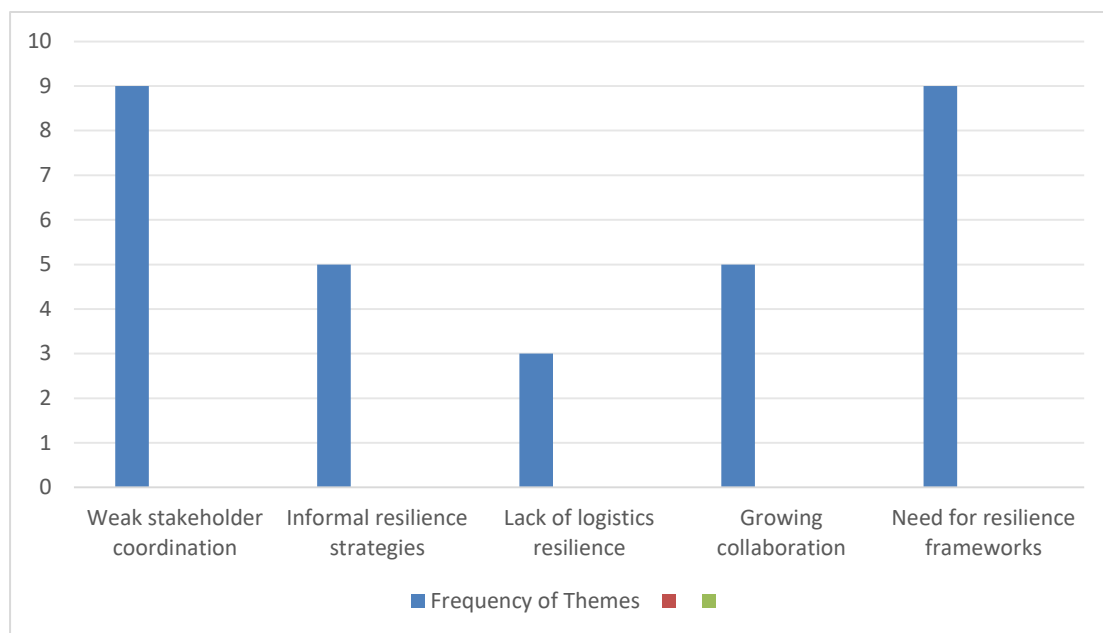


Figure 11: Current Coordination Practices, the State Of Preparedness, and needed Interventions.

Table 10 summarizes responses to questions about coordination among stakeholders and how countries prepare for or manage logistics disruptions. The analysis highlights current coordination practices, the state of preparedness, and needed interventions.

Key Themes:

Weak Stakeholder Coordination: Government ministries and logistics actors are working in **silos**, leading to poor alignment on trade operations. This hinders timely responses to border delays and infrastructure problems.

Informal Resilience Practices: In the absence of formal systems, traders and officials are using **ad hoc tools** like WhatsApp groups for communication. While innovative, such practices lack sustainability and structure.

Lack of Contingency Planning: Stakeholders reported that when disruptions (e.g., border closures) occur, there are no fallback strategies; leaving cargo stranded. This exposes the fragility of Africa's cross-border logistics systems.

Emerging Public-Private Partnerships (PPPs): Some regions (e.g., Rwanda, Egypt) are beginning to formalize partnerships in rail and port logistics. This shows potential for collaborative solutions when governments and the private sector align.

Call for Proactive Resilience Frameworks: Respondents advocate for disaster response units, risk simulations, **and** regional contingency plans. This aligns with global trends in supply chain risk management. The development of regional logistics coordination platforms, formal PPPs, and resilience policies is critical for supporting sustainable trade under AfCFTA.

CONCLUSION AND RECOMMENDATIONS

The findings of this study demonstrated that while the African Continental Free Trade Area (AfCFTA) holds immense potential for catalyzing intra-African trade and regional integration, its success is currently undermined by persistent cross-border logistics constraints. Key challenges include underdeveloped transport and port infrastructure, high customs clearance times, fragmented trade regulations, and limited adoption of digital trade facilitation tools. Interview data and secondary sources revealed that average port turnaround times in African countries exceed 4 days, with customs clearance delays averaging 10.5 days, and both were significantly above global performance standards.

Furthermore, the qualitative analysis revealed recurring themes of low digital integration, lack of harmonization, weak stakeholder coordination, and absence of structured resilience frameworks. These issues indicate systemic institutional and operational gaps across AfCFTA member states. Nonetheless, emerging initiatives such as regional digital platforms, growing public-private partnerships, and policy dialogues signal an evolving momentum towards trade facilitation reform.

To fully unlock AfCFTA's trade-enhancing potential, the following actionable recommendations are proposed:

- Infrastructure Modernization: Strategic investment is needed in multimodal transport networks, smart border infrastructure, and regional trade corridors to reduce logistics costs and improve cargo movement.
- Digital Trade Alignment: Member states should harmonize digital systems such as e-customs and port community platforms to enable interoperability and faster clearance across borders.
- Institutional Coordination: Establish national and regional trade facilitation committees involving both public and private sector stakeholders to ensure alignment, cooperation, and accountability in logistics operations.
- Capacity Building and Training: Enhance training for customs officials, trade operators, and SMEs on AfCFTA protocols, digital tools, and regional market opportunities to improve compliance and operational efficiency.
- Resilience Planning: Develop cross-border contingency frameworks including early warning systems, joint crisis simulations, and logistics risk management strategies to enhance supply chain continuity

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