

African Continental Free Trade Agreement (AfCFTA) and Supply Chain Issues in Africa: An Exploratory Review

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Abstract: The African Continental Free Trade Area (AfCFTA), inaugurated in 2018, represents a pivotal initiative toward regional economic integration, trade liberalization, and sustainable development across Africa. Central to its framework are objectives such as the elimination of trade barriers, a 90% reduction in tariffs, the facilitation of trade in goods and services, and the promotion of economic diversification and industrialization. Despite the official commencement of trading under AfCFTA on January 1, 2021, substantive intra-African trade activities under its provisions remain limited, signaling critical implementation bottlenecks. This study examines the supply chain inefficiencies that hinder the achievement of AfCFTA's objectives and assesses stakeholder perceptions regarding its effectiveness in addressing structural trade challenges. Employing a quantitative research design, primary data were collected through structured surveys administered to stakeholders actively engaged in cross-border supply chain operations within the AfCFTA framework. Findings indicate that persistent infrastructural deficits, non-harmonized trade policies, border inefficiencies, and low levels of technological integration significantly constrain intra-African trade. These challenges have curtailed seamless supply chain operations, undermining the anticipated benefits of the agreement. To address these systemic constraints, the study recommends a multifaceted strategy centered on regional policy harmonization, enhanced public-private collaboration, investment in trade-enabling infrastructure, and the adoption of digital and logistics technologies to foster a resilient and efficient continental supply chain network.

Key-Words: AfCFTA, Regional Integration, Trade Facilitation, Supply Chain Resilience, Intra-African Trade, Infrastructure Deficits, and Non-Tariff Barriers.

I. Introduction

The African Continental Free Trade Area (AfCFTA), established in 2018 and officially launched in 2021, marks a significant step toward Africa's economic integration and sustainable development. AfCFTA 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 [1]. Its core objective is to eliminate trade barriers, boost intra-African trade, and support economic diversification and industrialization. The agreement seeks to reduce tariffs on 90% of goods, tackle non-tariff barriers, and establish frameworks for dispute resolution, intellectual property rights, and trade facilitation. As noted by [2], AfCFTA has the potential to "redefine Africa's economic landscape by significantly increasing the volume of intra-African trade, currently standing at approximately 15% of total trade." Its implementation is expected to strengthen regional value chains and promote deeper economic cooperation among member states. However, realizing these objectives will require overcoming structural and infrastructural limitations that currently hinder optimal performance.

Regional trade agreements (RTAs) like AfCFTA play a critical role in promoting economic integration, reducing trade costs, and fostering economic stability. These agreements provide a framework for harmonizing trade policies, enabling member states to capitalize on comparative advantages and economies of scale. RTAs are particularly important for Africa, given the continent's fragmented markets and low levels of intra-regional trade. The economic benefits of RTAs extend beyond trade liberalization. As posited by [3], "RTAs serve as catalysts for structural transformation by promoting investment in infrastructure, encouraging policy coherence, and supporting the growth of small and medium-sized enterprises." Moreover, regional cooperation can help mitigate external shocks, enhancing the resilience of member states to global economic fluctuations. AfCFTA, as an RTA, is uniquely positioned to address Africa's historical trade inefficiencies and spur inclusive economic growth.

Despite the ambitious objectives of the AfCFTA, several supply chain challenges remain significant barriers to trade and economic integration across Africa. Key issues include poor infrastructure, inefficient logistics networks, and restricted access to financing, particularly for small and medium-sized enterprises (SMEs) [4]. Additionally, non-tariff barriers such as customs delays, inconsistent regulations, and border inefficiencies further escalate trade costs and obstruct the smooth movement of goods and services. As highlighted by [5], "Africa's supply chain systems are marked by fragmentation, high transportation costs, and minimal technological adoption, all of which hinder the competitiveness of its economies." These challenges are further aggravated by political instability, weak institutional structures, and inadequate investment in critical infrastructure, including roads, ports, and energy facilities. Effectively addressing these issues calls for a collaborative approach that involves public-private partnerships, regional cooperation, and technology-driven strategies to improve supply chain efficiency and resilience. AfCFTA presents a transformative opportunity for Africa to boost trade, promote economic integration, and drive sustainable development. However, fully realizing its potential requires overcoming existing supply chain constraints and maximizing the benefits of regional trade

agreements. Ongoing academic and policy-driven research is crucial for identifying practical solutions and ensuring the effective implementation of AfCFTA's ambitious goals.

Statement of the Problem

While the African Continental Free Trade Area (AfCFTA) holds significant potential for boosting intra-African trade and fostering economic integration, persistent supply chain inefficiencies continue to obstruct its full realization. Challenges such as inadequate infrastructure, inconsistent trade policies, border delays, and limited technological adoption hamper smooth trade flows among member states. There is a limited body of research exploring these challenges, particularly in capturing the lived experiences and systemic barriers faced by supply chain participants. This study aims to fill that gap.

Objectives of the Study

- (i) To investigate the supply chain constraints impacting the effective implementation of AfCFTA across Africa.
- (ii) To examine the perspectives of key stakeholders on AfCFTA's effectiveness in addressing these supply chain issues.
- (iii) To identify strategies for enhancing supply chain resilience and efficiency within the AfCFTA framework

Status of AfCFTA Implementation

Since its launch in 2021, the African Continental Free Trade Area (AfCFTA) has made notable progress in advancing economic integration across the continent. Key milestones include:

Broad Ratification and Implementation: By 2021, 42 out of 55 African nations had ratified the AfCFTA agreement, reflecting a strong collective commitment to fostering economic unity across Africa.

Operational Tools for Trade Facilitation: AfCFTA has introduced various mechanisms to support trade efficiency:

Trade Barriers Africa: An online platform that allows member states to identify and address non-tariff barriers, improving cross-border trade flow. Pan-African Payment and Settlement System (PAPSS): Launched on January 13, 2022, PAPSS facilitates cross-border transactions using local currencies, minimizing reliance on foreign currencies and cutting transaction costs.

Advancements in Trade Liberalization: The agreement has reached 88% completion in finalizing product-specific rules of origin, covering over 70% of intra-African trade. These rules are essential for determining which goods qualify for tariff reductions under the agreement.

Economic Benefits: According to [1] projections, AfCFTA could raise real income across Africa by 7% and help lift approximately 30 million people out of extreme poverty.

Country-Level Implementation Efforts: Ghana: Hosting the AfCFTA Secretariat in Accra, Ghana, has played a central role in driving the agreement's implementation. The country has also adjusted its national policies to maximize the benefits of AfCFTA, particularly in enhancing its industrial and manufacturing sectors. Rwanda: Rwanda has simplified its customs processes and invested in infrastructure to support trade under AfCFTA, positioning itself as a regional trade hub. These accomplishments highlight AfCFTA's potential to reshape Africa's economic landscape by encouraging intra-African trade, reducing poverty, and improving global competitiveness [6].

III. Literature Review

Theoretical Framework

The African Continental Free Trade Area (AfCFTA) marks a pivotal step toward Africa's economic integration, aiming to establish a unified market for goods and services across the continent. However, achieving AfCFTA's goals relies on effectively addressing existing supply chain challenges [7]. Theoretical frameworks such as institutional theory, stakeholder theory, and the supply chain resilience framework offer valuable perspectives for examining these challenges [8].

Institutional Theory

Institutional theory suggests that organizational behavior is shaped by the norms, regulations, and policies of the institutional environments in which they operate. Within the AfCFTA context, differences in regulatory standards, infrastructure quality, and policy environments across African countries can hinder smooth supply chain integration. [9] emphasize that "building sustainable supply chain resilience in Africa requires collaboration among various stakeholders, including governments, businesses, academia, and civil society." This highlights the importance of harmonizing institutional frameworks to enable efficient supply chain operations under AfCFTA.

Stakeholder Theory

Stakeholder theory emphasizes the importance of all parties affected by organizational activities. Within AfCFTA, stakeholders encompass governments, businesses, consumers, and civil society. The successful implementation of AfCFTA necessitates aligning the interests and expectations of these diverse groups. [10] assert that "collaboration among various stakeholders, including

governments, businesses, academia, and civil society," is essential for developing sustainable supply chain resilience in Africa. This collaboration is vital for addressing supply chain challenges and ensuring the benefits of AfCFTA are equitably distributed.

Supply Chain Resilience Framework

Supply chain resilience refers to the ability of a supply chain to anticipate, adapt to, and recover from disruptions. Africa's supply chains are susceptible to various disruptions, including political instability, infrastructural deficiencies, and environmental challenges. [10] Discuss the importance of "strategically investing in critical materials manufacturing infrastructure and fostering sustainable practices" to enhance supply chain resilience in Africa. Implementing robust risk management strategies and fostering adaptability are crucial for the resilience of supply chains under AfCFTA.

In summary, integrating AfCFTA with Africa's complex supply chain landscape requires a multifaceted approach. Institutional theory highlights the necessity for harmonized regulations and policies, stakeholder theory underscores the importance of inclusive collaboration, and the supply chain resilience framework emphasizes the need for robust and adaptable supply chains. Addressing these dimensions is essential for AfCFTA to achieve its goal of enhancing intra-African trade and fostering economic development across the continent.

Empirical Review

The following studies offer valuable insights into the qualitative aspects of AfCFTA and the supply chain challenges in Africa, shedding light on existing research gaps and suggesting directions for future exploration:

[11] examines the logistics challenges associated with the AfCFTA and proposes potential solutions and development pathways for future value chains. By employing a two-stage research process involving industry experts, the authors identify current challenges and strategies to overcome them, emphasizing the critical role of logistics in developing pan-African value chains. The primary research gap identified in this study is the insufficient exploration of how AfCFTA affects both more and less developed member states, particularly in the logistics and supply chain sectors. The study recommends that future research should focus on the varying impacts of AfCFTA across member states, advocating for the development of tailored logistics strategies that address the unique challenges and opportunities within each country

[12] provides a digital supply chain (DSC) framework that could be utilized to accelerate intra-African trade through the optimization of supply chain and logistics processes of the AfCFTA. The study emphasizes the potential of digital technologies in enhancing visibility, agility, and efficiency in the flow of intra-African trade in goods and services. The study highlights that the AfCFTA's protocol on trade in goods lacks explicit language regarding the digitalization of supply chain and logistics processes, indicating an opportunity for further development in this area. It recommends that AfCFTA should adopt a comprehensive digital supply chain framework to better leverage digital technologies for enhancing supply chain and logistics processes, which would contribute to increased intra-African trade

[13] discusses the practical challenges of combining the AfCFTA with industrial ambitions, focusing on how the trade agreement can promote industrial development through diversification and regional value chain development. The authors analyze the gap between policy and practice in achieving industrialization goals within the AfCFTA framework. The study identifies a disconnect between the AfCFTA's industrialization objectives and the practical implementation strategies at the national and regional levels. To bridge this gap, there is a need for coherent policy frameworks and effective implementation mechanisms that align national industrial strategies with the AfCFTA's objectives, ensuring that industrial ambitions translate into tangible outcomes

[14] carried out a study on supply Chain Localization Strategies in African Public Procurement Systems. This article examines the importance of localizing supply chains within African public procurement systems, highlighting strategies aimed at enhancing local content and participation. The study explores how localization can strengthen supply chains and contribute to economic development within the context of the AfCFTA. The study points out a lack of comprehensive strategies and policies to effectively implement supply chain localization within African public procurement systems. Developing and enforcing policies that promote local content, alongside capacity-building initiatives for local suppliers, can enhance supply chain resilience and economic development under the AfCFTA framework

[15] explores the prospects and challenges for supply chain trade under the AfCFTA, analyzing how African firms can integrate into regional and global value chains. The authors discuss the potential benefits and obstacles that the AfCFTA presents for African businesses seeking to expand their reach. The study identifies a lack of empirical data on the specific challenges African firms face in integrating into value chains under the AfCFTA framework. Conducting empirical research to gather data on firm-level challenges and developing targeted support measures can facilitate the integration of African firms into regional and global value chains, maximizing the benefits of the AfCFTA

[16] conducted a study on The African Continental Free Trade Area (AfCFTA) in the Post-COVID-19 Era: Perspectives and Implications for Nigeria. The paper explores the impact of the AfCFTA on Nigeria's supply chains following the COVID-19 pandemic. The authors examine how the AfCFTA can assist Nigeria in overcoming pandemic-induced supply chain disruptions while strengthening trade relations with other African countries. The study underscores the importance of addressing Nigeria's internal challenges to maximize the benefits of the AfCFTA. The authors identify a gap in comprehensive analysis regarding how Nigeria can effectively mitigate internal supply chain issues to fully capitalize on the AfCFTA's opportunities. They recommend

that Nigeria adopt policies aimed at strengthening domestic supply chains, invest in infrastructure development, and improve trade facilitation measures to enhance participation in the AfCFTA.

[17] investigates how the AfCFTA can support the growth of Africa's manufacturing sector by addressing supply chain challenges. The authors analyze the potential advantages of the AfCFTA for manufacturing while highlighting obstacles that must be addressed to fully realize these benefits. The study stresses the need to enhance supply chain efficiency to improve manufacturing competitiveness across the continent. The authors identify a limited understanding of the specific supply chain constraints faced by African manufacturers under the AfCFTA framework. They suggest conducting in-depth, sector-specific analyses to pinpoint and resolve supply chain bottlenecks, enabling manufacturers to fully harness the benefits of the AfCFTA

[18] explored the potential impact of AfCFTA on cross-border trade and supply chains in the East African region. Using semi-structured interviews with supply chain professionals, customs officials, and trade consultants, the study revealed that while AfCFTA holds the promise of enhancing intra-regional trade, challenges such as insufficient transport infrastructure and complex customs procedures remain significant barriers to efficient supply chain operations. The study primarily focused on East Africa and did not adequately incorporate perspectives from other African regions, such as North and West Africa, which face unique challenges in supply chain management. Future research should adopt a pan-African approach by examining how various regional economic communities (RECs) integrate with AfCFTA, while analyzing both the similarities and differences in supply chain barriers.

The study explored interviews with infrastructure developers, government officials, and logistics providers across Sub-Saharan Africa. The study identified poor transport networks, inadequate warehousing facilities, and unreliable energy supply as key barriers to effective supply chain performance. It concluded that without significant infrastructure investment, the full benefits of AfCFTA for African supply chains might not be realized. However, the study did not explore the potential of regional collaborations, such as partnerships among African Union member states, in facilitating large-scale infrastructure projects. Further research should examine how regional collaborations, including public-private partnerships and cross-border infrastructure initiatives, can address supply chain infrastructure challenges under AfCFTA.

[19] conducted a study and explored the significance of localizing supply chains within African public procurement systems, emphasizing strategies to reduce import dependency and strengthen domestic economies. As African nations increasingly acknowledged the advantages of procurement localization, they faced challenges such as limited industrial capacity, infrastructural deficits, regulatory constraints, and insufficient financing for local businesses. Through case studies from South Africa, Nigeria, Ghana, and Ethiopia, the study illustrated how targeted policies, regulatory support, and capacity-building initiatives empowered local suppliers, supported small and medium enterprises (SMEs), and promoted economic resilience. The article underscored the necessity for clear regulatory frameworks and cross-border cooperation, particularly under the African Continental Free Trade Area (AfCFTA), to advance localization efforts. Key recommendations included 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. These insights aimed to assist African governments and stakeholders in implementing more effective localization strategies that could drive sustainable growth and economic self-reliance.

[20] explores the challenges associated with regional integration in Africa and examines how the AfCFTA Agreement could help address these issues. The study employs qualitative research methods, drawing on secondary data from scholarly publications, journal articles, reports from international organizations, and literature reviews, which were analyzed thematically. Findings indicate that key obstacles to African integration include economic disparities and variations in industrial capacities across nations, persistent trade barriers, non-tariff obstacles, weak institutional frameworks, sovereignty conflicts, and insufficient infrastructure. The research also highlights that the adoption of the AfCFTA Agreement in 2019 has led to greater collaboration among African countries in tackling these challenges and promoting deeper economic cooperation across the continent. The paper concludes that while the AfCFTA Agreement holds significant potential to drive regional integration and economic advancement in Africa, a continuous, pragmatic approach is necessary to effectively manage these challenges. It recommends promoting inclusive growth and economic diversification through targeted policies aimed at reducing economic inequalities among African countries. Furthermore, the inclusion of marginalised groups, such as small and medium-sized enterprises (SMEs) and informal traders, is crucial for maximising the AfCFTA's benefits and supporting sustainable economic development.

Conceptual Integration: The Institutional–Stakeholder–Resilience (ISR) Model

The intersection of these three theories forms the basis of the Institutional–Stakeholder–Resilience (ISR) Model, proposed in this study to explain the systemic factors shaping AfCFTA's supply chain performance. The ISR Model posits that: Institutional Alignment (regulatory coherence, policy harmonization, and governance quality) provides the structural foundation for efficient trade facilitation; Stakeholder Collaboration (engagement of government agencies, private firms, and civil society) mediates institutional reforms by translating policies into operational efficiency and Supply Chain Resilience (adaptability, digital readiness, and sustainability) emerges as the outcome of institutional stability and stakeholder synergy.

This framework suggests that resilient continental supply chains depend on how well institutions enable stakeholders to co-create adaptive and technology-driven solutions. For instance, coordinated customs reforms across East African states have improved clearance times, whereas fragmented procedures in parts of West Africa continue to constrain efficiency. Similarly, Southern

Africa's PPP-led corridor projects exemplify how institutional cooperation and stakeholder engagement can produce scalable resilience outcomes.

Comparative Regional Perspectives

Empirical evidence from across Africa reveals significant contextual variation in AfCFTA implementation. East Africa (Rwanda, Kenya): Notable for integrating digital trade technologies such as e-customs and single-window platforms, resulting in improved trade documentation efficiency [21] West Africa (Nigeria, Ghana): Continues to struggle with infrastructure bottlenecks, complex tariffs, and inconsistent policy enforcement, limiting the scalability of regional value chains. Southern Africa (South Africa, Botswana): Demonstrates stronger logistics performance due to institutionalized PPPs and corridor-based logistics integration (Afreximbank, 2024). These differences underscore the need for differentiated policy approaches under AfCFTA, where digitalization, institutional capacity, and stakeholder inclusivity are tailored to regional readiness levels.

Conceptual Framework for AfCFTA Supply Chain Resilience

Building on the ISR Model, this study conceptualizes AfCFTA's supply chain effectiveness as an interactive system comprising institutional, stakeholder, and resilience dimensions (see Figure 1). Institutional mechanisms define the regulatory and infrastructural context; stakeholder interactions operationalize these mechanisms through collaboration and capacity-building; and resilience reflects the system's ability to sustain trade performance amid disruptions. Digital technologies such as blockchain-enabled trade documentation, electronic logistics tracking, and AI-driven customs systems serve as cross-cutting enablers that reinforce all three dimensions.



Figure 1: Institutional–Stakeholder–Resilience (ISR) Framework for AfCFTA Supply Chain Performance

This integrated framework offers a novel lens for assessing AfCFTA's implementation challenges and opportunities. By aligning institutional reforms, stakeholder engagement, and technological adoption, African economies can advance toward a more cohesive, inclusive, and resilient continental trade system.

The ISR framework illustrates the dynamic relationships between institutional alignment, stakeholder collaboration, and supply chain resilience within the AfCFTA ecosystem. Institutional alignment encompassing harmonized trade regulations, governance structures, and policy enforcement establishes the foundation for an enabling environment. Stakeholder collaboration functions as the mediating layer where public institutions, private sector actors, and civil society interact to operationalize trade policies. Supply chain resilience represents the outcome dimension, reflecting adaptability, continuity, and efficiency in cross-border trade flows.

Digital trade technologies (e.g., e-customs, blockchain documentation, and logistics analytics) serve as transversal enablers reinforcing each component, ensuring feedback and learning across the system.

IV. Methodology

This study adopted a quantitative research approach, utilizing a survey method to collect data from key stakeholders involved in supply chain activities under the African Continental Free Trade Agreement (AfCFTA). In order to gather information from important parties engaged in supply chain operations under the African Continental Free Trade Agreement (AfCFTA), this study used a quantitative research methodology and a survey method. Since it is a mere exploratory study, there was no need to go into a more rigorous analysis such as structural equation modelling and the like.

Customs officials, supply chain professionals (trade associations and researchers), senior officers of supply chain units of logistics companies and SMEs, and external stakeholders (such as the World Bank and AfDB) made up the target population. To guarantee the selection of respondents with pertinent experience in supply chain operations and trade facilitation under the AfCFTA, a purposive sample technique was used across selected African foreign embassies in Nigeria such as Angola, Benin, Botswana, Burkina Faso, Burundi, Central African Republic, Chad, Congo, Egypt, Eritrea, Ethiopia, Gambia, Ghana, Kenya, Morocco, South Africa and Senegal.

A systematic questionnaire intended to gauge stakeholders' opinions on supply chain possibilities and problems within the AfCFTA was used to gather primary data. There were fifteen topics on the survey that addressed different aspects of trade logistics.

To present stakeholder representation, descriptive statistics (frequency, percentage distributions) were used to assess the gathered responses. To evaluate the internal consistency of the survey instrument and ensure its acceptable reliability, reliability analysis was performed using Cronbach's Alpha (0.733). This methodological approach ensured that the study captured accurate and relevant insights from key stakeholders, facilitating a data-driven understanding of supply chain issues within AfCFTA.

Table 1: Stakeholders Survey Data

Stakeholders	Freq.	%	Cum. %
Custom officials	5	13.9	13.9
External stakeholders, e.g., World Bank, African Development Bank, etc.	2	5.6	19.4
Senior officers of Supply Chain Units (Logistics firms and SMEs	18	50.0	69.4
Senior officers of Supply Chain Units (Logistics firms and SMES	1	2.8	72.2
Supply Chain Professionals (Trade Associations)/Researchers	10	27.8	100.0
Total	36	100.0	

Source: Authors' Computation (2025)

Table 1 provides a breakdown of stakeholders' responses regarding supply chain issues under the African Continental Free Trade Agreement (AfCFTA). The respondents include:

- (i) Custom Officials (13.9%) – Likely involved in border and tariff regulations affecting trade.
- (ii) External Stakeholders (5.6%) – Representing global institutions like the World Bank and the African Development Bank, which provide policy guidance and financial support.
- (iii) Senior Officers of Supply Chain Units in Logistics Firms & SMEs (52.8%) – The largest group, indicating a major concern from logistics and SME perspectives.
- (iv) Supply Chain Professionals (27.8%) – including trade associations and researchers, who analyze trends and challenges in AfCFTA implementation.

From this, it is evident that logistics firms and SMEs are the most engaged in discussions on supply chain issues, reflecting their critical role in intra-African trade.

V. Results and Analysis

Test of Reliability of Survey Data

The reliability of a survey instrument measures how consistently it captures the intended data. In the context of the African Continental Free Trade Agreement (AfCFTA) and its supply chain issues, a reliable survey ensures that responses reflect genuine stakeholder perceptions rather than random variations. The provided Reliability Statistics indicate that the survey instrument used had: Cronbach's Alpha = 0.733 and Number of Items = 15

Cronbach's Alpha (α) is the most commonly used statistic for assessing internal consistency, with the following interpretation:

Table 2: The reliability of a survey instrument

Cronbach's Alpha Value	Interpretation
≥ 0.9	Excellent
0.8 – 0.89	Good
0.7 – 0.79	Acceptable
0.6 – 0.69	Questionable
< 0.6	Poor

Source: Authors' Computation (2025)

With $\alpha = 0.733$, the survey instrument falls within the "Acceptable" reliability range, indicating a moderate to good level of internal consistency.

Analysis of supply chain challenges affecting the implementation of AfCFTA in Africa

The African Continental Free Trade Agreement (AfCFTA) aims to promote intra-African trade by addressing key supply chain challenges. However, various logistical, regulatory, and infrastructural barriers continue to hinder its full implementation. Using Friedman's test statistics, we can analyze the severity of different challenges based on stakeholder perceptions. The mean ranks provide insights into which issues are the most pressing. Friedman's test ranks the most critical supply chain challenges affecting AfCFTA implementation. The rankings are shown in Table 3.

Table 3: Supply chain challenges affecting AfCFTA implementation

Code	Supply Chain Challenge	Mean Rank
SCCD	Weak regulatory frameworks impede trade facilitation under AfCFTA	4.26
SCCE	Inconsistent customs procedures create bottlenecks in cross-border trade	3.22
SCCC	Inadequate logistics networks impede supply chains	2.96
SCCA	Significant infrastructural deficits hinder AfCFTA implementation	2.88
SCCB	Tariffs and non-tariff barriers affect the free flow of goods and services	1.68

Source: Authors' Computation (2025)

From the ranking, weak regulatory frameworks (SCCD) and customs inconsistencies (SCCE) are perceived as the biggest barriers, while tariff and non-tariff barriers (SCCB) are ranked the least problematic.

Weak Regulatory Frameworks (Mean Rank: 4.26)

AfCFTA aims to create a harmonized trade environment, but weak regulatory structures across member states have significantly slowed progress. The key issues include:

- (i) Lack of Unified Trade Laws: Differences in trade laws across African nations create uncertainty for businesses.
- (ii) Weak Trade Facilitation Policies: Inefficiencies in licensing, documentation, and dispute resolution discourage cross-border trade.
- (iii) Enforcement Challenges: Even where policies exist, many nations struggle with weak enforcement mechanisms.

AfCFTA must prioritize policy harmonization, capacity-building for regulators, and stronger enforcement of trade agreements.

Inconsistent Customs Procedures (Mean Rank: 3.22)

Customs-related inefficiencies are a major obstacle to seamless trade under AfCFTA. Common problems include:

- (i) Variation in Tariff Classification and Valuation: Different countries apply inconsistent tariff schedules, leading to unpredictable trade costs.
- (ii) Excessive Bureaucracy: Lengthy clearance times due to manual documentation, bribery, and lack of automation.
- (iii) Poor Interoperability of Customs Systems: Different digital platforms across borders hinder data exchange and shipment tracking.

AfCFTA members should standardize customs documentation, adopt digital systems, and improve inter-country cooperation.

Inadequate Logistics Networks (Mean Rank: 2.96)

Efficient logistics are vital for supply chain performance, but Africa faces:

- (i) **Poor Road and Rail Infrastructure:** Many trade corridors lack paved roads and efficient rail connections.
- (ii) **High Transportation Costs:** Logistics costs in Africa are among the highest in the world, limiting trade competitiveness.
- (iii) **Limited Warehousing and Cold Chain Facilities:** Many African countries lack storage and temperature-controlled logistics, affecting perishable goods.

African nations should invest in transport infrastructure, create trade hubs, and promote private sector involvement in logistics solutions.

Significant Infrastructure Deficits (Mean Rank: 2.88)

Infrastructure is fundamental to AfCFTA's success, yet the continent still suffers from:

- (i) **Underdeveloped Transport Corridors:** Many key trade routes remain poorly connected, causing long transit times.
- (ii) **Limited ICT Infrastructure:** Digital trade platforms, e-commerce, and logistics tracking remain underdeveloped.
- (iii) **Energy Deficiencies:** Power shortages affect manufacturing and supply chain operations.

While ranked slightly lower than logistics challenges, infrastructure deficits remain a major long-term barrier. Governments must prioritize large-scale infrastructure projects and attract foreign direct investment (FDI) for development.

Tariff and Non-Tariff Barriers (Mean Rank: 1.68) Although tariff barriers have historically hindered African trade, AfCFTA has led to gradual reductions. However, non-tariff barriers (NTBs) still exist:

- (i) **Complex Licensing and Certification Requirements.**
- (ii) **Sanitary and Phytosanitary (SPS) Measures on Agricultural Products.**
- (iii) **Discriminatory Local Content Rules Favoring Domestic Industries.**

While this challenge is ranked the lowest, non-tariff barriers remain a significant concern. AfCFTA must work towards simplifying trade regulations and reducing hidden costs associated with NTBs.

Friedman's test highlights that weak regulatory frameworks and customs inefficiencies are the most severe challenges to AfCFTA's implementation. While tariff reductions are progressing, logistical and infrastructural barriers still need urgent attention. The following recommendations are necessary for overcoming supply chain challenges:

- (i) **Strengthen Trade Regulations & Policy Harmonization:** Develop a unified regulatory framework across AfCFTA member states and establish a continental trade dispute resolution mechanism.
- (ii) **Improve Customs Efficiency:** Implement digital customs clearance to reduce delays and train customs officials to ensure standardized procedures.
- (iii) **Invest in Logistics and Infrastructure Development:** expand and modernize road, rail, and port networks and support public-private partnerships (PPPs) to fund logistics projects.
- (iv) **Reduce Non-Tariff Barriers (NTBs):** streamline import/export licensing requirements and create an NTB reporting system to resolve trade restrictions.
- (v) **Enhance Cross-Border Trade Transparency:** promote real-time tracking systems for trade shipments and encourage greater use of digital payments and e-commerce platforms.

By addressing these regulatory, logistical, and infrastructural bottlenecks, AfCFTA can unlock Africa's full trade potential and create a seamless continental supply chain network.

Analysis of the perceptions of key Stakeholders regarding the effectiveness of AfCFTA in addressing supply chain management challenges

The African Continental Free Trade Agreement (AfCFTA) seeks to enhance intra-African trade by addressing various supply chain challenges, such as tariff barriers, regulatory harmonization, and trade inefficiencies. However, the effectiveness of AfCFTA is subject to the perceptions of key stakeholders. Using Friedman's test, we can evaluate how different stakeholders rank AfCFTA's effectiveness in achieving its objectives. The mean ranks provide insight into the perceived impact of AfCFTA on trade facilitation and supply chain efficiency. Friedman's test ranks different perceptions of AfCFTA's effectiveness. The following table presents the mean ranks:

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Table 4: Friedman’s test ranks different perceptions of AfCFTA’s effectiveness

Code	Perception Statement	Mean Rank
PSKC	AfCFTA is a tool for harmonizing trade regulations across member states	4.54
PSKD	AfCFTA supports capacity-building in supply chain management	3.96
PKSA	AfCFTA is effective in reducing tariff barriers among member states	2.29
PSKE	AfCFTA has enhanced transparency and accountability in cross-border trade	2.13
PSKB	AfCFTA has improved cooperation among African countries in supply chain management	2.08

Source: Authors’ Computation (2025)

From this ranking, harmonizing trade regulations (PSKC) and capacity-building (PSKD) are perceived as the most effective aspects of AfCFTA, whereas cooperation among African countries (PSKB) and transparency/accountability (PSKE) are ranked the lowest.

AfCFTA as a Tool for Harmonizing Trade Regulations (Mean Rank: 4.54) – The Most Highly Ranked Perception

One of AfCFTA’s primary goals is to create a uniform regulatory framework for trade across Africa. This is seen as its most effective contribution because:

- (i) Standardized Trade Policies: Reduce confusion and delays caused by inconsistent regulations.
- (ii) Simplified Customs Procedures: Eases cross-border trade by reducing bureaucratic hurdles.
- (iii) Increased Investor Confidence: A harmonized regulatory environment attracts both local and foreign investors.

Despite these benefits, implementation challenges persist, including slow policy adoption, lack of enforcement mechanisms, and varying levels of commitment among member states.

AfCFTA’s Role in Capacity-Building for Supply Chain Management (Mean Rank: 3.96)

Capacity-building is crucial for enhancing trade efficiency under AfCFTA. This includes:

- (i) Training Trade Officers: Improving skills in trade facilitation, logistics, and digital systems.
- (ii) Empowering SMEs: Providing access to trade information, financial resources, and logistics support.
- (iii) Strengthening Institutional Capacities: Helping customs agencies and regulatory bodies adapt to AfCFTA protocols.

However, challenges include limited funding, slow policy rollout, and resistance to new practices among supply chain professionals.

AfCFTA’s Effectiveness in Reducing Tariff Barriers (Mean Rank: 2.29)

While AfCFTA aims to eliminate tariffs, stakeholders rank this lower than expected due to:

- (i) Slow Tariff Implementation: Some countries delay tariff reductions due to fears of revenue loss.
- (ii) Non-Tariff Barriers (NTBs): While tariffs are reducing, bureaucratic red tape, licensing requirements, and technical standards continue to obstruct trade.
- (iii) Smuggling & Informal Trade: Despite tariff reductions, many businesses still prefer informal cross-border trade to bypass inefficiencies.

Addressing these issues requires stronger policy enforcement, NTB reduction, and better monitoring mechanisms.

AfCFTA’s Role in Enhancing Transparency and Accountability (Mean Rank: 2.13). Stakeholders perceive AfCFTA’s impact on transparency as relatively low due to:

- (i) Corruption at Border Posts: Many traders still face bribery and favoritism, which distorts trade fairness.
- (ii) Limited Trade Data Accessibility: Information asymmetry makes it hard for businesses to comply with regulations.
- (iii) Weak Monitoring & Evaluation Frameworks: Some AfCFTA policies lack proper enforcement mechanisms.

To improve this, AfCFTA needs anti-corruption measures, digital customs systems, and stronger accountability frameworks.

AfCFTA's Impact on Cooperation among African Countries (Mean Rank: 2.08) – The Lowest-Ranked Perception

Despite its goal to unify African economies, stakeholders do not yet see significant improvements in cooperation, due to:

- (i) Political Differences: Some countries prioritize national interests over regional cooperation.
- (ii) Economic Disparities: Wealthier nations may have different trade priorities compared to smaller economies.
- (iii) Lack of Coordinated Infrastructure Development: Transport and logistics remain fragmented, slowing trade integration.

To enhance cooperation, AfCFTA must strengthen diplomatic efforts, enhance regional trade hubs, and promote collaborative policy-making. The above highlights that harmonizing trade regulations and capacity-building are AfCFTA's most effective contributions. However, challenges remain in tariff reductions, transparency, and regional cooperation. The following recommendations are needed for improvement:

- (i) Accelerate Regulatory Harmonization: Establish a centralized regulatory database for trade rules and ensure uniform customs procedures across all member states.
- (ii) Invest in Capacity-Building: provide more training for customs officers and supply chain managers, and support SMEs with easier access to trade finance and logistics solutions.
- (iii) Strengthen Transparency and Accountability: Implement digital tracking systems to reduce corruption and promote real-time trade data sharing to improve compliance.
- (iv) Enhance Regional Cooperation: create regional trade hubs to streamline logistics and strengthen diplomatic efforts for joint trade initiatives.

Overall, while AfCFTA has made progress, further policy alignment, digital transformation, and stronger governance are needed to maximize its benefits.

Analysis of potential strategies for improving supply chain resilience and efficiency in the context of AfCFTA

The African Continental Free Trade Agreement (AfCFTA) aims to boost intra-African trade by addressing key supply chain challenges. However, efficient trade facilitation depends on overcoming logistical, infrastructural, and regulatory barriers. Friedman's test ranks various strategies based on their effectiveness in strengthening supply chain resilience and efficiency. Friedman's test is a non-parametric statistical method used to compare multiple strategies and determine their relative importance. In this case, the mean ranks indicate stakeholders' preferences for different interventions:

Table 5: Stakeholders' preferences for different interventions

Code	Strategy Description	Mean Rank
SCRE	Encouraging Public-Private Partnerships	3.44
SCRA	Strengthening Regional Infrastructure	3.20
SCRB	Developing a Unified Digital Trade Platform	3.01
SCRC	Capacity-Building for Trade Facilitation Officers	2.94
SCRD	Streamlining Customs Procedures via Digitalization	2.40

Source: Authors' Computation (2025)

The ranking suggests Public-Private Partnerships (PPP) and Regional Infrastructure as the most critical strategies, while Customs Digitalization is ranked the lowest.

Public-Private Partnerships (Mean Rank: 3.44) – The Highest-Ranked Strategy

Public-private partnerships (PPPs) are crucial for overcoming supply chain inefficiencies by pooling resources, expertise, and policy support from both governments and businesses. Key benefits include:

- (i) Increased Investment in Trade Infrastructure: PPPs can mobilize funding for transport, energy, and ICT infrastructure.
- (ii) Stronger Regulatory Frameworks: Collaboration ensures smoother policy implementation across different countries.
- (iii) Support for SMEs and Startups: PPPs can provide funding, mentorship, and market access for small businesses. [22] posits that Public Private Partnership (PPP) as a model for meeting gaps in infrastructural deficit should be given more attention. It has worked in other countries and should be able to work in Nigeria too. The fight against corruption should be intensified as this affects budgets meant for this sector and others immensely.
- (iv) However, challenges include bureaucratic delays, corruption risks, and policy inconsistencies across AfCFTA states.

Strengthening Regional Infrastructure (Mean Rank: 3.20)

Robust transport, energy, and digital infrastructure are essential for trade efficiency under AfCFTA. Key improvements include:

- (i) Upgrading Roads, Rail, and Ports: Reducing transit times and costs.
- (ii) Energy and ICT Development: Supporting e-commerce, digital payments, and automation in trade.
- (iii) Border Infrastructure Enhancement: Facilitating smoother cross-border movement of goods.

Despite its importance, regional infrastructure development is capital-intensive, requiring long-term investments.

Developing a Unified Digital Trade Platform (Mean Rank: 3.01)

A continent-wide digital trade platform can enhance supply chain efficiency through:

- (i) Automated Customs and Trade Documentation: Reducing paperwork and delays.
- (ii) Real-time Supply Chain Visibility: Improving coordination between traders, logistics providers, and regulators.
- (iii) Digital Payment Systems: Facilitating seamless intra-African transactions.

The main obstacles include technological disparities, cybersecurity concerns, and a lack of harmonized digital policies. According to [23], despite its advantages, ICT adoption faces obstacles such as high implementation costs, cybersecurity risks, and the need for ongoing training and system updates.

Capacity-Building for Trade Facilitation Officers (Mean Rank: 2.94)

Trade officers play a key role in AfCFTA implementation. Training programs can:

- (i) Improve Customs Efficiency: Reducing clearance time and ensuring compliance with AfCFTA rules.
- (ii) Enhance Risk Management: Preventing fraud and trade-related inefficiencies.
- (iii) Encourage Adoption of Digital Tools: Supporting digital transformation in trade facilitation.

However, high training costs, resistance to change, and political interference pose challenges.

Streamlining Customs Procedures via Digitalization (Mean Rank: 2.40) – The Lowest-Ranked Strategy Although ranked the lowest, customs digitalization remains vital for trade efficiency. Key advantages include:

- (i) Faster Clearance Times: Reducing trade bottlenecks at borders.
- (ii) Corruption Reduction: Digital systems minimize human interference.
- (iii) Enhanced Trade Data Collection: Supporting better policy decisions.

Challenges include a lack of funding, outdated legal frameworks, and inadequate technical expertise in many African nations.

Friedman's test highlights PPPs and infrastructure development as the most favored strategies, but all interventions are interdependent. A holistic approach is required, integrating policy reforms, technological advancements, and capacity-building to improve supply chain efficiency under AfCFTA.

T-Test Statistics of AfCFTA and Supply Chain Issues in Africa

The one-sample t-test is a statistical method used to compare the mean of a sample to a predetermined value (in this case, Test Value = 3). This test helps determine whether stakeholders perceive various supply chain challenges, AfCFTA's effectiveness, and proposed strategies as significantly different from the neutral benchmark of 3. The key statistical outputs include:

- (a) T-value: Measures the difference between the sample mean and the test value.
- (b) p-value: Determines statistical significance (* $p < 0.05$ * suggests significant difference).
- (c) Mean Difference: The extent to which the sample mean deviates from 3.

Confidence Interval (CI): The range within which the true mean difference is expected to lie. The result of the t-test statistics is shown in Table 6 (see the appendix).

Major Supply Chain Challenges

- (i) Weak Regulatory Frameworks (SCCD) – Most Significant Issue ($t = 11.602$, $p < .001$). The highest mean difference (1.667) indicates that stakeholders strongly perceive weak regulatory policies as a major hindrance to AfCFTA implementation. This reflects inconsistencies in trade laws, bureaucracy, and enforcement gaps. African governments must accelerate policy harmonization and improve regulatory enforcement.

- (ii) Inadequate Logistics Networks (SCCC) ($t = 14.491$, $p < .001$). With a mean difference of 1.000, logistics inefficiencies (poor road networks, high transport costs, lack of trade hubs) remain a key obstacle to supply chain resilience. Investment in trade infrastructure and coordinated regional logistics plans.
- (iii) Customs Bottlenecks (SCCE) ($t = 3.136$, $p = .002$). The mean difference of 0.833 suggests that inconsistent customs procedures significantly delay trade. Digitalization of customs operations and training for border officials.
- (iv) Infrastructure Deficits (SCCA) ($t = 10.418$, $p < .001$). Infrastructure constraints (poor roads, unreliable energy, limited digital connectivity) were strongly rated as a barrier to trade efficiency. Public-private partnerships (PPPs) and AfCFTA-driven infrastructure projects.
- (v) Tariff & Non-Tariff Barriers (SCCB) ($t = -2.116$, $p = .042$). Negative mean difference (-0.389) indicates that while tariffs remain a concern, they are perceived as a lesser problem than infrastructure and regulatory challenges. Ongoing tariff reductions and standardizing non-tariff measures.

AfCFTA's Effectiveness Perceptions

- (i) AfCFTA as a Tool for Harmonizing Trade Regulations (PSKC) – Most Positive Perception ($t = 23.189$, $p < .001$). High significance and a mean difference of 1.083 show that stakeholders view AfCFTA as effective in policy unification. However, implementation gaps persist.
- (ii) AfCFTA's Impact on Capacity-Building (PSKD) ($t = 13.229$, $p < .001$). The mean difference (0.833) suggests AfCFTA is playing a role in skill development, but further investments are needed.

AfCFTA's Effectiveness in Reducing Tariff Barriers (PKSA) ($t = 2.646$, $p = .006$). Relatively lower mean difference (0.167) suggests progress in tariff elimination, but slower than expected.

Effectiveness of Proposed Strategies

- (i) Public-Private Partnerships (SCRE) – Most Supported Strategy ($t = 22.615$, $p < .001$). The highest mean difference (1.086) indicates that PPPs are perceived as a key driver of trade efficiency. Strengthen collaboration between governments and businesses.
- (ii) Strengthening Infrastructure (SCRA) ($t = 16.361$, $p < .001$). Stakeholders strongly support infrastructure investment as a strategy.
- (iii) Developing Digital Trade Platforms (SCRB) ($t = 19.621$, $p < .001$). Digital platforms can simplify customs, improve logistics tracking, and enhance trade coordination.

The one-sample t-test results highlight weak regulatory frameworks, logistics inefficiencies, and customs bottlenecks as the most severe challenges. Public-private partnerships, infrastructure investment, and digital trade platforms are seen as the most effective solutions. The following are key recommendations:

- (i) Regulatory Harmonization: Establish a continental trade policy framework to standardize regulations.
- (ii) Logistics & Infrastructure Investment: Develop regional transport corridors and digital trade systems.
- (iii) Customs Digitalization: Implement AI-driven trade facilitation systems to streamline border processes.
- (iv) Enhancing AfCFTA Governance: Strengthen trade monitoring mechanisms to ensure effective policy implementation.

By addressing these critical areas, AfCFTA can significantly boost supply chain efficiency and intra-African trade competitiveness.

VI. Discussion

The findings of this study reinforce the argument that the African Continental Free Trade Area (AfCFTA) can serve as a catalyst for continental economic transformation only if its institutional foundations, stakeholder dynamics, and digital capacities evolve simultaneously. The integration of the Institutional–Stakeholder–Resilience (ISR) framework offers a structured understanding of the complex interdependencies shaping AfCFTA's performance.

Institutional Realignment and Trade Performance

The results from the stakeholder survey reveal that *weak regulatory frameworks* and *inconsistent customs procedures* remain the most critical constraints to AfCFTA implementation. These findings align with [24] policy evaluation, which reports that over 65% of African countries still lack harmonized customs documentation and interoperable trade databases. Institutional realignment, therefore, emerges as the most urgent priority. Countries such as Ghana and Rwanda have introduced national AfCFTA implementation strategies that align domestic policies with regional standards, thereby reducing compliance time and improving transparency. Conversely, fragmented regulatory regimes in Nigeria and Cameroon exemplify how institutional misalignment hinders the translation of AfCFTA's policy commitments into operational efficiency.

Stakeholder Collaboration and Regional Variations

The analysis also underscores the central role of stakeholder collaboration as a mediating factor between institutional policy and trade outcomes. Regions that have fostered multi-actor partnerships, combining government, private sector, and regional organizations report superior outcomes in trade facilitation and supply chain efficiency. East Africa (notably Rwanda, Kenya, and Tanzania) demonstrates improved border clearance times through joint customs management and the implementation of the *Single Customs Territory (SCT)* under the East African Community framework. Southern Africa benefits from well-established public–private partnerships, such as the *Walvis Bay Corridor Group* and the *Maputo Development Corridor*, which exemplify how PPP-led infrastructure investment can reinforce AfCFTA’s objectives. In contrast, West and Central Africa exhibit slower progress, largely due to weak institutional collaboration, non-harmonized tariffs, and inadequate digital infrastructure. These contrasts affirm the ISR Model’s proposition that *stakeholder coordination mediates institutional efficiency and resilience outcomes*.

Digital Trade Technologies and AfCFTA’s Post-Implementation Performance

Since trading under AfCFTA officially commenced in 2021, digital trade technologies have become pivotal enablers of supply chain modernization. Platforms such as the *Pan-African Payment and Settlement System (PAPSS)*, *Trade Barriers Africa Portal*, and *AfCFTA e-Tariff Book* have begun to reshape trade facilitation across the continent. According to [21] digital customs automation has reduced border clearance times by an average of 35% in pilot countries, while e-payment integration under PAPSS has cut transaction costs by nearly 40% for cross-border SMEs.

Despite these gains, the digital divide remains a persistent obstacle. Many African states still lack the infrastructure and cybersecurity protocols necessary for effective trade digitalization. The [25] estimates that 48% of African customs offices still operate with paper-based systems, limiting AfCFTA’s ability to achieve full-scale interoperability. To address this, AfCFTA’s Secretariat has prioritized the creation of a *Digital Trade Protocol* (ratified in 2024) that promotes harmonized data governance, blockchain-based trade documentation, and real-time shipment tracking. These digital innovations not only enhance transparency but also strengthen the adaptive capacity of regional supply chains—one of the three pillars of resilience under the ISR framework.

Building Supply Chain Resilience through Institutional and Digital Synergy

The t-test results further highlight that stakeholders perceive public–private partnerships (PPPs) and infrastructure investment as the most effective strategies for improving AfCFTA’s performance. This perception is consistent with resilience theory, which stresses system redundancy and flexibility as prerequisites for shock absorption. Post-COVID-19 analyses [26] show that countries that had integrated digital customs and logistics monitoring such as Kenya and South Africa were able to recover supply chain operations faster than those reliant on manual systems. Resilience under AfCFTA therefore depends on a triadic relationship: Institutional Stability – ensuring coherent and enforceable regulations; Stakeholder Cooperation – enabling participatory policy design and private-sector investment; and Digital Integration – embedding technology as both infrastructure and governance tool. This interplay underscores the ISR model’s utility as both an analytical framework and a policy guide. Strengthening institutional capacity without corresponding digital readiness or stakeholder inclusivity will yield limited resilience outcomes.

VIII. Conclusion

The African Continental Free Trade Area (AfCFTA), established in 2018, marks a significant step in Africa's quest for economic integration and sustainable development. Its primary objective is to eliminate trade barriers, boost intra-African trade, and promote economic diversification and industrialization. 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. However, structural and infrastructural challenges continue to hinder its optimal performance. Despite the promises of AfCFTA to enhance intra-African trade and drive economic integration, supply chain inefficiencies remain a major impediment. Poor infrastructure, inconsistent trade policies, border bottlenecks, and limited technological adoption hinder seamless trade flows across member states. There is a paucity of research examining these issues qualitatively to understand the lived experiences and systemic barriers faced by supply chain actors, which this study seeks to address.

The study reveals that poor infrastructure, inconsistent trade policies, border bottlenecks, and limited technological adoption disrupt seamless trade flows across member states. While trading under the AfCFTA officially commenced on January 1, 2021, no substantial trade has occurred under the agreement, raising concerns about its effectiveness in resolving these challenges. The paper recommends a coordinated approach involving public-private partnerships, regional cooperation, harmonized legal and regulatory frameworks, and technology-driven solutions to enhance supply chain efficiency and reliability across Africa.

The African Continental Free Trade Area (AfCFTA) represents a transformative platform for reconfiguring Africa’s economic geography through the removal of tariff and non-tariff barriers, policy harmonization, and regional production linkages. Yet, the empirical and theoretical insights of this study reveal that the anticipated benefits of AfCFTA remain constrained by structural bottlenecks and uneven institutional capacities. Drawing upon the Institutional–Stakeholder–Resilience (ISR) framework, the study concludes that institutional alignment, stakeholder collaboration, and digital integration constitute the three interdependent pillars required to actualize AfCFTA’s objectives.

Firstly, institutional weaknesses manifested in regulatory inconsistencies, weak enforcement, and infrastructural deficits undermine policy coherence and trade efficiency. Secondly, the level of stakeholder inclusion across the public–private divide significantly determines implementation success. Regions that have cultivated active collaboration through public–private partnerships (PPPs),

trade associations, and regional logistics corridors demonstrate higher supply chain performance and policy compliance. Finally, the study identifies digital transformation as the catalyst that reinforces both institutional efficiency and stakeholder coordination, providing the technological backbone for transparent, adaptive, and data-driven trade systems.

The ISR framework therefore redefines AfCFTA implementation as an ecosystemic process, in which institutions establish the rules of engagement, stakeholders operationalize trade facilitation, and digital technologies ensure continuity and resilience. This integrated approach is not only theoretically robust but also pragmatically essential for Africa's transition from fragmented markets to a unified, competitive, and sustainable continental economy.

Recommendations

- 1. Institutional Harmonization and Governance Strengthening:** AfCFTA member states should prioritize the harmonization of trade regulations, customs codes, and documentation standards through a centralized continental digital portal. Establishing an AfCFTA Regulatory Harmonization Mechanism (ARM) similar to the EU's regulatory coherence framework would ensure consistent application of trade laws and minimize cross-border discrepancies. National governments must also strengthen legal enforcement, enhance anti-corruption mechanisms, and institutionalize performance monitoring systems to ensure compliance.
- 2. Deepening Stakeholder Collaboration and Multi-Level Governance:** Governments, regional economic communities (RECs), and private sector actors should institutionalize multi-stakeholder implementation councils to drive participatory policy execution. Such councils should include logistics associations, SMEs, women traders, and civil society groups to ensure inclusivity. Partnerships with financial institutions (e.g., Afreximbank, AfDB) should be leveraged to fund logistics infrastructure and capacity-building programmes, particularly in less industrialized regions.
- 3. Accelerating Digital Trade Integration:** The digitalization of trade facilitation processes must move beyond pilot stages. AfCFTA's newly adopted Digital Trade Protocol (2024) should be fully implemented across all member states, emphasizing interoperable systems for customs automation, blockchain-based documentation, and artificial intelligence in risk assessment. Priority should be given to integrating national systems into continental platforms such as the Pan-African Payment and Settlement System (PAPSS) to enhance transparency, transaction speed, and cost efficiency.
- 4. Enhancing Infrastructure and Regional Connectivity:** Physical infrastructure remains the backbone of trade logistics. African governments should adopt corridor-based infrastructure development strategies such as the Maputo and Abidjan–Lagos corridors to improve intermodal connectivity. Emphasis should be placed on modernizing transport, warehousing, and cold-chain systems through PPPs, with an explicit focus on resilience to climate-related disruptions.
- 5. Building Supply Chain Resilience through Capacity and Innovation:** To mitigate systemic vulnerabilities, African supply chains must embed resilience principles such as redundancy, flexibility, and adaptability into their operational models. National trade institutions should develop risk management frameworks and early-warning systems for disruptions, drawing lessons from pandemic-induced supply chain breakdowns. Continuous training for customs and logistics officers in digital trade systems and adaptive management is essential.
- 6. Continuous Monitoring and Evidence-Based Policymaking:** A continental AfCFTA Trade and Resilience Observatory should be established to collect, analyze, and disseminate real-time data on trade flows, infrastructure performance, and policy outcomes. Such a platform would provide empirical grounding for adaptive policymaking and academic research, ensuring that reforms are guided by evidence rather than political expediency.

Areas for further research

This study provides a valuable contribution to understanding the challenges African supply chains face in the context of AfCFTA. However, there remains a need for more integrated, regionally diverse research that examines the private sector's role, the impact of digital technologies, and infrastructure collaborations to further address the current gaps in knowledge. Additionally, there is a need to conduct country-by-country and sector-by-sector studies of AfCFTA implementation to gain a better understanding of the individual challenges faced by member states.

This study underscores the necessity of multi-theoretical and multi-scalar research to unpack AfCFTA's evolving impact on Africa's trade ecosystems. Future studies should: Conduct comparative analyses across regional economic communities (RECs) to assess how institutional maturity influences supply chain performance; explore the causal relationships between digital adoption, institutional quality, and trade resilience using longitudinal or panel data and investigate sector-specific dynamics such as agriculture, manufacturing, and e-commerce to understand how AfCFTA policies shape regional value chain participation. By extending the ISR framework into empirical modeling, scholars can generate predictive insights that guide policymakers toward achieving a truly integrated and resilient African trade architecture.

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Timothy Shirgba Aikor: Conceptualization, Formal analysis, Investigation, Resources, Writing - original draft, Visualization, and funding acquisition.

Ejem Agwu Ejem: Data Curation Methodology, Supervision, Writing - review & editing, Validation, Funding acquisition

Nnenna Nwoko: Investigation, Resources, Writing - review & editing, and funding acquisition.

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Appendix

Table 6: One-Sample T-Test Results of the AfCFTA and Supply Chain Issues in Africa

Code	Description of issues	t- Value	Sig. (p-value)	Mean Diff.	95%
SCCA	Infrastructure deficits hinder AfCFTA	10.418	.001	0.972	(0.78, 1.16)
SCCB	Tariffs & non-tariff barriers affect trade	-2.116	.042	-0.389	(-0.76, -0.02)
SCCC	Inadequate logistics networks impede	14.491	.001	1.000	(0.86, 1.14)
SCCD	Weak regulatory frameworks impede trade	11.602	.001	1.667	(1.38, 1.96)
SCCE	Inconsistent customs procedures create trade bottlenecks	3.136	.002	0.833	(0.29, 1.37)
PKSA	AfCFTA is effective in reducing tariff barriers	2.646	.006	0.167	(0.04, 0.29)
PSKB	AfCFTA has improved supply chain cooperation	1.784	.042	0.083	(-0.01, 0.18)
PSKC	AfCFTA harmonizes trade regulations	23.189	.001	1.083	(0.99, 1.18)
PSKD	AfCFTA supports capacity-building in the supply chain	13.229	.001	0.833	(0.71, 0.96)
PSKE	AfCFTA enhances transparency & accountability	1.784	.042	0.083	(-0.01, 0.18)
SCRA	Strengthening regional infrastructure enhances efficiency	16.361	.001	1.028	(0.90, 1.16)
SCRB	Digital trade platforms improve cross-border logistics	19.621	.001	0.917	(0.82, 1.01)
SCRC	Capacity-building for trade officers strengthens resilience	16.733	.001	0.889	(0.78, 1.00)
SCRD	Digitalized customs improve trade performance	2.409	.011	0.361	(0.06, 0.67)
SCRE	Public-private partnerships enhance supply chain strategies	22.615	.001	1.086	(0.99, 1.18)

Source: Authors' Computation 2025