



DIGITAL TRADE IN AFRICA: A RESEARCH AGENDA

edited by
Martina F. Ferracane and Hildegunn Kyvik Nordås

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Abstract

Africa's digital economy is poised for significant growth, driven by initiatives like the recently adopted Digital Trade Protocol under the African Continental Free Trade Area (AfCFTA), which aims to reduce trade barriers and enhance regional integration. However, persistent challenges – including infrastructure deficits, regulatory inconsistencies, and the digital divide between countries – must be addressed to promote digital trade in the African continent. This book seeks to identify key research gaps and shape a forward-looking research agenda to support the creation of a single digital market in Africa. It consists of four sections covering infrastructure, competitiveness, the implementation of the AfCFTA, and cross-cutting issues, and it is a scholarly resource for academics and practitioners examining digital trade in the African context, as well as for policy-makers engaged in the design and implementation of a continental digital area capable of catalysing Africa's economic growth.

Keywords:

Digital trade, Africa, AfCFTA, regional integration, regulation.

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List of Acronyms

ACBI	—	AfCFTA Country Business Index
ACHPR	—	African Charter on Human and Peoples' Rights
ADS	—	Automated Digital Services
ADCA	—	Africa Data Centres Association
AfCFTA	—	African Continental Free Trade Area
AfDB	—	African Development Bank
AI	—	Artificial Intelligence
ASEAN	—	Association of Southeast Asian Nations
AU	—	African Union
B2B	—	Business to Business
B2C	—	Business to Consumer
BaTiS	—	Balanced Trade in Services
BEPS	—	Base Erosion and Profit Shifting
BHRC	—	Business & Human Rights Resource Centre
C2B	—	Consumer to Business
C2C	—	Consumer to Consumer
CBDF	—	Cross-Border Data Flow
CBP	—	Cross-Border Payment
CDET	—	Customs Duties on Electronic Transmissions
CIS	—	Commonwealth of Independent States
CIT	—	Corporate Income Tax
CMO	—	Copyright Management Organisation
CoE	—	Council of Europe
CPTPP	—	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
DCCP	—	Connectivity and Cybersecurity Partnership
DDS	—	Digitally Deliverable Service
DEA	—	Digital Economy Agreement
DFS	—	Digital Financial Service

DIP — Digital Intermediation Service

DPA — Data Protection Authority

DPF — Data Policy Framework

DRM — Domestic Revenue Mobilisation

DSR — Digital Silk Road

DST — Digital Services Tax

DSTRI — Digital Services Trade Restrictiveness Index

DTA — Digital Trade Agreement

DTP — Digital Trade Protocol

EAC — East African Community

EAPS — East African Payment System

EAP — East Asia and the Pacific

EASSy — Eastern Africa Submarine Cable System

ECA — Europe and Central Asia

ECI — Economic Complexity Index

ECOWAS — Economic Community of West African States

ECTS — Electronic Cargo Tracking System

FAT — Firm Level Adoption of Technology

FCDO — Foreign, Commonwealth & Development Office

FDI — Foreign Direct Investment

FTA — Free Trade Agreement

GAN — Generative Adversarial Network

GATS — General Agreement on Trade in Services

GDP — Gross Domestic Product

GDPR — General Data Protection Regulation

GHG — Greenhouse Gas

GSMA — Global System for Mobile Communications Association

GST — Goods and Services Tax

GVC — Global Value Chain

HPC — High-Performance Computing

HS2 — Harmonized System, 2-Digit Product Level

ICC — International Chamber of Commerce

ICCPR — International Covenant on Civil and Political Rights

ICT — Information and Communication Technology

IEA — International Energy Agency

IFC — International Finance Corporation

IFPI — International Federation of the Phonographic Industry

IISD — International Institute for Sustainable Development

ILO — International Labor Organization

IMF — International Monetary Fund

IPCC — Intergovernmental Panel on Climate Change

IPR — Intellectual Property Rights

IRP — International Resource Panel

ISP — Internet Service Provider

ITU — International Telecommunication Union

ITPD-E — International Trade and Production Database for Estimation

ITPD-S — International Trade and Production Database for Simulation

JSI — Joint Statement Initiative

KPI — Key Performance Indicator

LAC — Latin America and the Caribbean

LCA — Life Cycle Assessment

LDC — Least Developed Country

MC — Ministerial Conference

MENA — Middle East and North Africa

MLETR — Model Law on Electronic Transferable Record

MNE — Multinational Enterprise

MRIO — Multi-Regional Input-Output

MSME — Micro, Small and Medium Enterprise

NSA — National Security Agency

NSW — National Single Window

OECD — Organisation for Economic Co-operation and Development

PAPSS — Pan-African Payment and Settlement System

PEGNet — Poverty Reduction, Equity and Growth Network

PTA — Preferential Trade Agreement

RCT — Randomised Control Trial

REC — Regional Economic Community

RCEP — Regional Comprehensive Economic Partnership

RIA — Research ICT Africa

RISA — Research Innovation Systems for Africa

RoO — Rule of Origin

RoW — Rest of the World

RTGS — Real-Time Gross Settlement

RURA — Rwanda Utilities Regulatory Authority

SAAIA — South African Artificial Intelligence Association

SADC — Southern African Development Community

SIIA — South African Institute of International Affairs

SDG — Sustainable Development Goal

SDT — Special and Differential Treatment

SMC — Submarine Cable

SME — Small and Medium Enterprise

SPS — Sanitary and Phytosanitary

SSA — Sub-Saharan Africa

TiSMoS — Trade in Services by Mode of Supply

TiVA — Trade in Value Added

TMA — Trademark Africa

UN — United Nations

UNCITRAL — United Nations Commission on International Trade Law

UNCTAD — United Nations Conference on Trade and Development

UN-DESA — United Nations Population Division Data Portal

UN-ECA — United Nations Economic Commission for Africa

UN-ECE — United Nations Economic Commission for Europe

UN-ECLAC — United Nations Economic Commission for Latin America and the Caribbean

UN-ESCAP — United Nations Economic and Social Commission for Asia and the Pacific

UN-ESCWA — United Nations Economic and Social Commission for Western Asia

UNESCO — United Nations Educational, Scientific and Cultural Organization

UNEP — United Nations Environment Programme

UN-OSAA — United Nations Office of the Special Adviser on Africa

UNITAR — United Nations Institute for Training and Research

UPU — Universal Postal Union

USITC — United States International Trade Commission

VAT — Value Added Tax

V-Dem — Varieties of Democracy

VoIP — Voice Over Internet Protocol

WB — World Bank

WBES — World Bank Enterprise Survey

WCO — World Customs Organization

WDI — World Development Indicators

WHO — World Health Organization

WIPO — World Intellectual Property Organization

WTO — World Trade Organization

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Introduction

Africa's digital economy is poised for significant growth, driven by initiatives like the recently adopted Digital Trade Protocol under the African Continental Free Trade Area (AfCFTA), which aims to reduce trade barriers and enhance regional integration. However, persistent challenges – including infrastructure deficits, regulatory inconsistencies, and the digital divide between countries – must be addressed to promote digital trade in the African continent. In fact, Africa still accounts for a small share of global digital trade, and the bulk of digital trade occurs with countries outside the continent. At the same time, beyond the Digital Trade Protocol, African countries have been largely absent from trade negotiations involving digital matters.

This book seeks to identify key research gaps and shape a forward-looking research agenda to support the creation of a single digital market in Africa. It consists of four sections covering infrastructure, competitiveness, the implementation of the AfCFTA, and cross-cutting issues. Several common themes emerge across these sections: strengthening Africa's agency as it transitions from policy-taking to policy-making and builds competitiveness in selected digital services; addressing barriers to the adoption and effective use of existing infrastructure and technologies; promoting sustainability and inclusion; and improving the collection of granular data to generate robust causal evidence. Across all chapters, the authors call for a pragmatic and coordinated research agenda that brings together stakeholders from academia and think tanks; national governments and regional economic commissions (RECs); the AfCFTA Secretariat; international organisations; the private sector, including technology providers, logistics companies, and financial institutions; and development partners.

We hope that this book will serve as a valuable scholarly resource for academics and practitioners examining digital trade in the African context, as well as for policy-makers engaged in the design and implementation of a continen-

tal digital area capable of catalysing Africa's economic growth.

Infrastructure-related research agenda

This section explores the role of physical, financial and legal infrastructure in supporting the digital services markets in Africa.

The volume opens with an analysis of the geopolitical framework within which Africa's infrastructure investments are made. Jili and Lauria examine how African actors engage with international investment in Africa's digital space, focusing on the influence of China, the EU, and the US. By exploring how African states navigate vendor lock-in and regulatory exports such as the EU's General Data Protection Regulation (GDPR), the authors argue that the path toward an African digital single market is defined by the continent's ability to multi-source technology and regulation, creating a regional layer of governance that buffers against global power asymmetries. The authors find the current research agenda dominated by descriptivism, which risks casting the continent as perpetually technologically backward. Therefore, future research needs to examine how digital systems integrate into the broader political economy of Africa and its regions, looking at the full digital vertical stack, from ICT infrastructure to software and applications.

Following the geopolitical framing, Chapter 2 examines the physical first mile of the digital economy: submarine fibre-optic cables. Cariolle and da Piedade provide empirical evidence that these cables have been transformative by significantly lowering costs and fostering export sophistication in Africa. However, they caution that while large, productive firms thrive under improved connectivity, smaller enterprises located in remote areas often face higher barriers to entry. Their findings underscore that physical infrastructure alone is not a panacea; it must be supported by last-mile investments and resilient networks. The authors call for a research agenda to investigate the distributional and sectoral effects of digital connectivity, assess the economic costs of infrastructure outages, and explore how improved connectivity reshapes value chains in goods and services.

In Chapter 3, González Ugarte and Nalwoga explore the economic costs of infrastructure outages, with a focus on the growing phenomenon of state-imposed internet shutdowns. They document a record spike in connectivity disruptions across 15 African nations in 2024, arguing that these measures erode digital trust and act as a massive non-tariff barrier. The authors quantify billions in lost e-commerce and mobile money revenue, highlighting a funda-

mental conflict between national security-driven blackouts and the AfCFTA's goal of seamless cross-border commerce. The authors argue that future research should estimate the effects of connectivity restrictions on transactional performance indicators and examine how repeated internet disruptions affect foreign direct investment, platform launches, and advertising expenditures.

Transitioning from the physical to financial infrastructure, Lippitsch and Womer examine the role of digital financial services in unlocking Africa's trade potential in Chapter 4. They show how payment interoperability across borders functions as a vital engine for the competitiveness of SMEs. The authors argue that harmonising payment systems – with regards to real-time gross settlements (RTGS), mobile money and payments on marketplaces – is a prerequisite for regional integration, turning fragmented markets into a cohesive digital ecosystem. While the potential appears vast, the existing literature lacks detailed insights into how African firms benefit from interoperable payment solutions, including impacts on import patterns, input sourcing, the composition of trade flows, and the distributional effects. Studies leveraging causal identification and examining firm and supply-chain effects linked to cross-border payments could inform policies and maximise benefits for local companies.

As digital trade moves into the era of Artificial Intelligence (AI)-enabled automation, Chapter 5 analyses the legal infrastructure supporting the African digital single market, taking into account other continental strategic priorities, including the need to promote inclusive digital development, safeguard regulatory autonomy, and assert agency in global norm-setting processes. By mapping the recent legal developments in the region, including the AU's 2024 Continental Artificial Intelligence Strategy, AfCFTA's Digital Trade Protocol, and the recent Africa Declaration on Artificial Intelligence, Sucker and Banga acknowledge the ongoing regulatory efforts to ensure that AI serves as a tool for inclusive growth rather than a new frontier of technological dependency. The authors identify five interlinked areas for future research: geopolitical dynamics and digital sovereignty, infrastructural and critical resource constraints, societal perceptions and public values, legal design and regulatory capacity, and the distributive impacts of algorithmic systems.

A research agenda on trade competitiveness

Trade competitiveness is a country's or firm's ability to produce goods and services that meet international market standards while maintaining or increas-

ing market share and national income. This section explores different aspects of competitiveness, including services trade performance, participation in global value chains and entrepreneurship.

Starting with policy-induced obstacles to competitiveness, Fiorini, Oliván García, and Valdez Quintero confront the paradox of Africa's services-led structural transformation in Chapter 6. While services have become the primary employer across the continent, this shift has largely occurred in low-productivity, informal sectors, while Africa remains a marginal player in global digitally-deliverable services. They argue that high barriers to digital trade stifle new entrants and lock in resources to less productive incumbents. To break this cycle, the authors call for an increase in firm-level data collection and a unified conceptual framework to identify the specific drivers of African services competitiveness.

In Chapter 7, Ariu, de Melo, and Solleder analyse Africa's position within Global Value Chains (GVCs), revealing a continent that is globally connected yet peripherally integrated. While Africa currently occupies an upstream position as a supplier of raw inputs, the authors argue that digitalisation offers a unique opportunity to leapfrog traditional manufacturing-led growth, expanding the opportunities both to embed services into goods exports and to export services directly. They argue that broadband connectivity, data-driven logistics, e-commerce, cloud services, and fintech can reduce coordination costs and loosen the ties between production and physical proximity, opening the door to African participation in GVCs. The authors propose three research areas: understanding services-led integration, exploring the mechanisms of change, and building the data foundations.

As in other regions, African start-ups face hurdles to scaling up. In Chapter 8, Walker and Windsor address the scale-up policy paradox: the prioritisation of startups in policy interventions, despite the general acknowledgement that scale-ups contribute disproportionately to job creation, innovation, and productivity. The authors list firm-level, national, and regional obstacles to growth, which often require African firms to internationalise early to survive fragmented domestic markets. They call for a practical research agenda that captures the realities of scaling in African contexts, complementing macroeconomic analysis with rigorous, data-driven ecosystem assessment, focusing on how African firms adapt, where bottlenecks occur, and what enables ventures to reach scale despite structural headwinds. This requires structured data on how African ventures scale: when they expand, how they adapt their models, and what barriers they face.

Atiyas further explores the microfoundations of digitalisation in the African services sector in Chapter 9. He focuses on the millions of microenterprises that account for over 80 per cent of the continent's employment and identifies a significant uptake gap: physical 4G coverage exists, but meaningful business adoption remains low. Leveraging survey data on African microenterprises, the author moves beyond the infrastructure-first narrative to show that digital enablers like smartphones are rarely used for business functions beyond basic payments. He argues that closing Africa's digital trade divide requires a demand-side revolution – targeting electricity access, prices of devices and data packages, education and skills – to move microenterprises from manual notebooks to the digital frontier. Future research must move beyond correlation, establish causality through longitudinal datasets, and truly understand the dynamics of digitalisation for Africa's smallest businesses.

The final chapter of this section demonstrates that Africa is also home to digital services success stories. In Chapter 10, Kyvik Nordås explores the creative industries as a high-growth engine for Africa's digital transformation. Beyond the global success of Afrobeats and Nollywood, the author identifies how AI-enabled software and blockchain-based rights management are revolutionising sectors like architecture and music licensing. Critically, Nordås flips the infrastructure narrative: rather than waiting for broadband to arrive, she argues that the demand for high-quality African creative content is a primary driver for the uptake of fixed broadband. This chapter underscores the need for the AfCFTA to harmonise intellectual property rights and data governance to turn local creative talent into a sustainable global competitive advantage. It agrees with previous chapters that data-driven research is warranted. The sound recording industry could be the starting point for the analysis because it is at the forefront of digital transformation, an early adopter of AI, an input to other creative services, a possible harbinger of other digitally tradable services, and a source of readily available data for rigorous analysis.

A research agenda to inform AfCFTA's implementation

AfCFTA, and in particular its Digital Trade Protocol (DTP), is in many ways a modern trade agreement fit for 21st century digital markets. Its impact on Africa's digital services trade and competitiveness depends on its implementation. This section highlights challenges and opportunities related to this agreement and its implementation.

Cross-border data flows (CBDFs) constitute the nervous system of in-



ternational digital markets. In Chapter 11, Ferracane and Sucker point out that although the AfCFTA's DTP articulates ambitious goals for building a trusted and integrated digital market, national divergence, weak enforcement, and infrastructural deficits continue to fragment the regulatory landscape. Their analysis highlights the need for a single data area in Africa that balances digital sovereignty and fiscal interests with the necessity of uninterrupted data flows for regional innovation. The authors call for more work on the political economy of regulatory choices and Africa's positioning in global negotiations; on whether restrictions achieve their stated objectives; on the enforcement and implementation of the AfCFTA's DTP framework; on how the costs and benefits of CBDF are distributed across firms, sectors, and states; and on the institutional feasibility of a continental single data area.

Africa is home to 32 of the 44 economies classified as least developed countries (LDCs). In Chapter 12, Ismail explores whether the current regulatory framework for digital trade can help addressing the inequalities faced by LDCs, with an analysis of the discussion at the WTO and within the AfCFTA. She provides a critical assessment of the DTP's innovative rules of origin for digital products, noting that while they can protect African startups, they may also impose significant compliance burdens on the continent's most vulnerable economies. The chapter thus explores at the macro level the scale-up problems discussed at the micro level in chapters 8 and 9. The author calls for a research agenda that prioritises enforceable technical assistance and explores the trade-offs between open digital borders and the fiscal needs of LDC governments.

Chapter 13 explores the link between digital rights and Africa's digital trade integration. As data drives the continent's digital economy, the protection of rights such as privacy, fairness, and freedom of expression becomes essential to building an inclusive single digital market. Musoni examines the Malabo Convention and the AfCFTA's DTP, noting that while both aim to harmonise digital trade and safeguard personal data, implementation gaps, weak enforcement, and contextual challenges remain significant. She highlights ongoing threats including surveillance, internet shutdowns, misuse of cybercrime laws, and structural inequalities in access. The author concludes that research must move beyond a narrow focus on privacy to examine data justice, digital labour rights, the threats connected to emerging technologies like AI and digital ID systems, enforcement gaps, and the broader relationship between digital rights and intra-African trade, advocating for a more Africa-centred and rights-based digital trade agenda.

In Chapter 14, Sirali shifts the focus to the practical wiring of the AfCFTA: the digitalisation of trade processes. He argues that the move from paper-based procedures to interconnected digital ecosystems – underpinned by National Single Windows, blockchain-based trade finance, and the Pan-African Payment and Settlement System (PAPSS) – can reduce Africa’s prohibitive transaction costs. Sirali identifies the digital spaghetti bowl of overlapping regional standards as a primary obstacle, calling for a pragmatic implementation process of the DTP’s commitments and the development of legal and semantic interoperability. The author also highlights the need for a research agenda that estimates the tangible impacts of digitalisation processes on trade volumes and costs and assesses their distributional effects and practical outcomes for various stakeholders, including SMEs.

Cross-cutting research agenda

This section addresses critical cross-cutting issues, including the environmental impact of digital trade, the challenge of taxing the digital economy, the gender dimension of the structural changes triggered by digital trade, and finally, the data needed for monitoring and analysing the impact of digital trade.

In Chapter 15, Rogaler challenges the notion that the virtual economy is weightless. He maps the life cycles of digital trade-related goods and infrastructure in Africa, revealing a structural asymmetry in which the continent bears the heavy environmental burdens at both ends of the digital supply chain. Africa features prominently in the production phase through critical mineral extraction and in the end-of-life phase as a global recipient of e-waste. At the same time, currently benefiting least from the use phase, where digital trade can offer environmental gains through the increased efficiency provided by digital services. The author calls for a research agenda that systematically explores the environmental effects of the digital transformation across the entire supply chain and identifies regional governance frameworks to mitigate potential negative effects, ensuring Africa’s digital future is both inclusive and sustainable.

In Chapter 16, Köhler-Suzuki and Tavengerwei examine the potential fiscal revenues from digital trade in Africa and the corresponding legal frameworks. As the global tax order faces uncertainty following the 2025 suspension of the US’s participation in the Base Erosion and Profit Shifting (BEPS) process, the authors provide a comparative analysis of digital taxation policies across 37 African countries, finding a fragmented landscape with inconsis-



ent interpretation and uneven administrative reach. They reveal a significant revenue gap, arguing that while corporate tax reallocation remains modest, the real fiscal prize lies in destination-based VAT on digitally-delivered services and the rapidly expanding – but largely untaxed – cross-border parcel trade. The chapter calls for a shift away from legacy physical presence tax rules toward a coordinated African framework that links taxing rights to the digital reality of where value is consumed.

The digital transformation of trade may reinforce or weaken existing gender bias in the African economy. In Chapter 17, Orkoh explores the intersection of gender, ICT skills and digital trade. The author demonstrates that structural, attitudinal and cultural barriers drive the gender digital divide, which extends beyond access and usage to include meaningful participation, such as tech entrepreneurship, online economic gains, and leadership roles. By calling for a shift from basic digital literacy to advanced digital skills, the author argues that the success of the African digital single market will ultimately depend on whether its regulatory frameworks and educational systems are designed to be gender-responsive and inclusive. Research should focus on identifying the root causes of gender disparities in ICT skills, investigating the impact of early intervention in the education system on educational and professional outcomes, and examining how digital trade impacts women differently from men. To do so, gender-disaggregated data and rigorous randomised control trials are needed.

In the final chapter, Shepherd and van der Marel confront the data challenge that shadows Africa's digital trade ambitions. They reveal a startling reality: nearly 99% of bilateral services trade data for Africa is missing from official records and must be imputed through statistical modelling. This paucity of observation makes it difficult for researchers to assess the actual impact of the AfCFTA and, more generally, digital trade. The authors argue for conducting pilot surveys across different modes of supply and engaging directly with firms to gain insights into the regional service supply chains, business practices, and how value is created through international transactions. Their chapter serves as both a warning and a call to action: without comprehensive datasets, disaggregated by sector and partner, empirical research on Africa's digital trade policies will remain a journey through uncharted territory.

Infrastructure-related research agenda

Wired asymmetries and contested futures: Digital trade and connectivity in Africa's global engagements

Bulelani Jili & Valeria Lauria

1. Introduction

Africa's digital trade landscape is evolving fast, reshaping how goods and services are produced, exchanged, and consumed. E-commerce volumes across the continent continue to rise, mobile money platforms have reached widespread adoption, and numerous African governments are investing in artificial intelligence (AI), digital ID systems, and data analytics to improve governance and generate new economic opportunities (Daniels *et al.*, 2022). Initiatives such as the African Continental Free Trade Area (AfCFTA) and the African Union (AU)'s Digital Transformation Strategy for Africa 2020-2030 underscore the continent's key commitment to leveraging digital trade for job creation, export diversification, and deeper regional integration (AU, 2018, 2020).

Central to this strategy is a robust digital connectivity infrastructure that goes beyond basic internet coverage. It calls for substantial investment in high-capacity fibre-optic corridors, energy-efficient data centres, next-generation mobile standards such as 5G, resilient electricity networks, and secure dig-

ital-payment rails. Physical hardware alone, however, is insufficient. It must be coupled with interoperable regulatory regimes that facilitate seamless cross-border transactions and ensure effective data governance as well as digital ecosystems that drive inclusive innovation, support diverse digital initiatives, and streamline service provision across sectors (Pollio & Cirolia, 2022).¹ Building and sustaining such an integrated system, however, requires considerable financial capital, specialised technical expertise, and sustained transnational collaboration (Agbebi *et al.*, 2021; Monyae, 2021). Recognising these needs, external actors, most notably China, the United States (US), and the European Union (EU), have intensified their involvement in Africa's digital sector through infrastructure financing, policy advice, and strategic partnerships.

Although many African states and stakeholders welcome such engagements, they also confront a series of structural dilemmas. The capital intensity of large-scale digital infrastructure can overextend public finances, heightening reliance on foreign lenders. Reliance on foreign technology stacks risks “vendor lock-in,” narrowing future strategic options. Meanwhile, the proliferation of mobile applications, biometric surveillance tools, data centres, and national digital-identity systems increases the stock of personal data, amplifying risks of privacy and governance. This contribution explores scholarly debates on international investment and diplomatic engagement in Africa's digital space, focusing on China, the EU, and the US and examines how African actors engage within these relationships. It then identifies key research gaps and outlines an agenda for further inquiry.

2. The state-of-the-art: External engagement and African ownership in the digital realm

In current scholarly debates, China's role looms especially large as it remains the predominant player in Africa through the Digital Silk Road (DSR) (Heeks *et al.*, 2024). Scholars typically divide into two main camps regarding China's influence. A “Sino-philic” strand underscores China's rapid financing and infrastructure-building efforts, highlighting how loans tied to specific Chinese telecom vendors help African governments bridge connectivity gaps and leverage Chinese technological capacity, thereby reducing costs and bolstering local digital ecosystems (Luo, 2019;

1 The digital ecosystem spans government-led smart city efforts, sector digitisation, business accelerators, diverse investment vehicles, technology start-ups, and sector organisations across domains like fintech, e-commerce, and healthcare (Pollio & Cirolia, 2022).

Gong *et al.*, 2019; Huang, 2019; Agbebi *et al.*, 2021). By contrast, a more critical line of thought frames the DSR as part of China's broader strategy to consolidate geopolitical and geoeconomic power (Cheney, 2019; Hemmings, 2020; Hillman, 2021). From this vantage point, China's vertically integrated approach generates few localised economic linkages, fostering dependency on a "Chinese technology stack" and potentially embedding authoritarian-leaning digital governance norms (Erie & Streinz, 2021; Gravett, 2020; Parkinson *et al.*, 2019).

Although much of the spotlight often falls on China, a growing body of literature emphasises the EU's expanding engagement in Africa's digital transformation (Daniels *et al.*, 2022; Djilo & Handy, 2021; Jones & Teevan, 2021). Recent studies highlight how the EU's drive for digital sovereignty centres on the export of stringent regulatory frameworks, notably the General Data Protection Regulation (GDPR) and the Digital Markets Act (DMA). These legal instruments emphasise individual rights and data privacy, reflecting what has been termed a "human-centric" model of digital governance that seeks to balance a regulated free market with robust consumer protections (Jones & Teevan, 2021). The EU's extraterritorial regulatory impact in this context illustrates the so-called "Brussels effect" (Bradford, 2020), wherein EU rules shape global business practices and standards far beyond European borders. However, several authors point out that compliance with high-level European regulations can be challenging for African states, given domestic capacity constraints, limited financial resources, and varying levels of administrative readiness (Ferracane *et al.*, 2025; Djilo & Handy, 2021; Jones & Teevan, 2021). Critics also note that these rules raise costs, which can disproportionately affect small and medium-sized African enterprises lacking the resources to comply, thereby exacerbating market entry barriers and limiting growth opportunities (Jones, 2022; Djilo & Handy, 2021; Jones & Teevan, 2021). Beyond establishing normative influence through regulations, the EU also seeks to advance its own global competitiveness and strategic autonomy. The Global Gateway,² the EU's strategy that commits EUR 150 billion to Africa for infrastructure, connectivity, and digital skills, supports the EU's broader de-risking agenda, aiming to diversify supply chains, support EU businesses, and bolster resilience amid escalating geopolitical tensions (Daniels *et al.*, 2022).

Research on US engagement in Africa's digital sphere often positions it within the broader context of intensifying US-China competition (Sheehan,

2 See European Commission (EC). (2021). *Global Gateway*. <https://commission.europa.eu/topics/international-partnerships/global-gateway_en>.

2018; Hillman, 2021). A key feature of this engagement is the market-driven involvement of major American tech corporations (Google, Amazon, Facebook, Apple, and Microsoft) alongside governmental entities like the National Security Agency (NSA) and government investment initiatives such as Prosper Africa, the Digital Connectivity and Cybersecurity Partnership (DCCP), and the Digital Transformation with Africa (DTA). Although these programmes emphasise establishing “open,” “secure,” and “democratic” digital ecosystems, critics point out that they are designed to offset China’s expanding tech presence and safeguard the interests of US-based platforms through what has been named “digital colonialism” (Nothias, 2025), “technocolonialism” (Madianou, 2019), or “algorithmic colonization” (Birhane, 2020). As suggested, this work speaks to the political life of technical systems within the afterlife of the colonial encounter.

A central thread in this literature underscores how foreign governments and global tech corporations may collect and monetise African data with minimal value returning to local stakeholders (Mackinnon, 2019; Truby, 2020). Scholars argue that a handful of powerful entities, often headquartered outside the continent and especially in the US and China, exert disproportionate influence over critical digital infrastructure, such as data centres, cloud services, and platforms (Kwet, 2019; Birhane, 2020; Feldstein, 2019). From a political economy standpoint, Kwet (2019) contends that US dominance over Africa’s software, hardware, and infrastructure in the digital realm amounts to a modern form of colonisation. An essential aspect of this critique is “extraction”, as highlighted by Coleman’s description of a “new scramble for Africa,” whereby global tech firms harvest, analyse, and leverage user data primarily for their own profit, offering limited benefits to those who supply that data (Coleman, 2019). Allegations that Chinese-backed systems enabled espionage in Uganda and Ethiopia, alongside controversies surrounding U.S.-financed telecommunications ventures such as Africell, reveal the complexities of cross-border data flows in regions where regulatory oversight may be underfunded or under-resourced (Mackinnon, 2019; Munga, 2023).

Recent scholarship offers an alternative perspective on how external engagements intersect with local agency in Africa’s digital development. Rather than portraying African actors as passive beneficiaries of foreign technologies and investments, a growing body of work underscores their capacity to actively shape these engagements (Lauria, 2022; Malena, 2021; Neilson, 2022; van der Lugt, 2021; Jili, 2023). For instance, Soulé (2024) observes that African stake-



holders often adopt a “neutral” stance amid great-power rivalry, strategically drawing on multiple external offers to advance national objectives. Governments may thus embrace China’s digital infrastructure rollouts while concurrently adopting EU-style privacy regulations or partnering with US platforms to broaden market access. Gagliardone’s (2020) study of Chinese technology provision reinforces this observation. Despite Beijing-linked firms supplying the backbone, day-to-day configuration and ultimate deployment choices reside with local authorities, underscoring African agency.

Extending this focus on local agency, growing evidence shows that Africa’s Regional Economic Communities (RECs) convert national preferences into shared regional rules and standards. A technical review by the International Telecommunication Union (ITU) of regional roaming schemes documents how the ECOWAS “Free Roaming” and SADC “Home and Away” initiatives operate as a middle layer of governance, softening the direct spill-over of foreign rules (ITU, 2023). In parallel, recent studies of South–South cooperation show increasing collaborations with other emerging economies. Gelb and Mukherjee (2019) analyse how India’s Aadhaar architecture is being promoted and adapted in African digital-ID pilots. Similarly, a CSIS study examines how, in 2023, Brazil held fifteen bilateral exchanges and shared lessons with the AU on its Gov.br e-government portal and Pix real-time payments system, helping to strengthen digitalisation projects in Africa and illustrating the diffusion of open-source solutions from the Global South (Bandura *et al.*, 2024). Together, these strands deepen the portrait of local agency, situating external engagements within regional governance frameworks.

3. Key research gap and future research agenda

Research on digital development in Africa has predominantly focused on supply-side dynamics, particularly emphasising Western and Beijing’s growing influence on the continent (Biryabarema, 2019; Feldstein, 2019; Greitens, 2020). While such perspectives importantly examine China’s diplomatic ambitions and corporate ventures in Africa, they often neglect the local drivers behind the procurement and adoption of digital technologies. More critically, the existing literature overlooks a key paradox: although African policymakers actively seek ICT tools to advance development goals and strengthen state capacity, this reliance on exogenous partners also risks deepening financial and technical dependency. What’s more, limited attention has been paid to the technology itself – how it functions, why it is in demand, and the ways it

reshapes or reinforces existing governance structures. The evolving relationship between digital technology and state capacity – and the tensions it introduces – remains a significant but underexplored area of study.

As much as African governments exhibit significant agency in navigating external actors, empirical evidence from the ground remains limited regarding how these engagements unfold at various levels of governance and society. This implies a need for more epistemologically grounded studies and fieldwork that carefully examine the material and figural (Larkin, 2013) consequences of Chinese- or Western-sourced digital technology. For instance, Beijing maintains extensive financial relationships with its firms to support digital trade in Africa. This line of inquiry draws attention to China's diplomatic ambitions and corporate expansion in African markets while potentially obscuring local features that drive the adoption of Chinese technology (e.g., outsourcing state operations to tech giants such as Huawei shapes modalities of governance). By the same token, while Europe's promotion of regulatory measures in line with the GDPR is evident, the exact costs remain understudied, potentially diverting resources from local priorities to European-inspired commitments (Ferracane *et al.*, 2025). In many discussions, both the African context and the technologies remain underexamined. Understanding these dynamics is crucial to appreciating how African states navigate global power relations and corporate influence while maintaining their agency in digital trade.

Much of the scholarship that highlights China's involvement in Africa frames Beijing's activities as uniquely expansive or authoritarian, often positing "China versus the West" conceptions that obfuscate the broader structural conditions. This analytical attention to China helps explicate its goals in diplomacy and technology investments, but it does not fully construe how Beijing's local tech projects in Africa fit into a broader capitalist framework. Without looking at the local and global vectors that shape its actions in Africa, this perspective makes China seem overly facile. This view decontextualises China by not addressing the local and global structural features that influence its activities in Africa, making China appear monolithic and more exceptional than it really is. This critique prompts a reevaluation – whether it is the structural features of neoliberalism, rather than China's exceptionalism and authoritarian ambitions, that shape its behaviour on the continent. Such an analysis invites us to see both Chinese and Western digital initiatives in Africa as inseparable from the latest iteration of capitalism. Understanding how these forms of capitalism and multi-sourced digital technology fit into the history of African po-



litical economy is crucial, as the continent's integration into supply chains that excluded added-value production marked its principal role in the global system before and after the colonial encounter. Without shedding light on some of these structural forces that shape Beijing or the West's current actions, research on digital trade runs the risk of overlooking the conditions that condition (Foucault, 1995, p. 190) Africa's position.

Critically, African digital trade scholarship must take seriously the unique advantages and challenges that US and Chinese technology companies face in expanding across the continent. However, engaging with the US and China's role in Africa should not reproduce Cold War-era narratives that cast the continent as a static object and passive observer of US-China geopolitical rivalry. Rather, it should serve as an invitation to examine how African political, institutional, and economic particularities actively mediate US-Chinese diplomatic and corporate ventures. This phenomenon raises critical questions about how we interpret African situational agency. While recognising the continent's structural dependency, it is equally important to account for the agency of African actors, highlighting both the systemic constraints they navigate and the strategic actions they undertake within these limits. For instance, epistemologically grounded studies that address the current neglect of domestic stakeholders open up critical lines of inquiry into how African start-ups, intergovernmental institutions, and civil society organisations actively shape the continent's ICT sectors, and, in turn, influence broader relationships with the EU, the US, and China. To ignore this agency altogether is to reduce African state and non-state actors to passive subjects in a revised Cold War narrative of great power conflict. Yet to assume it without critically examining the structural factors that mediate it risks romanticisation. A more nuanced account must hold both dimensions and tensions in view.

4. Conclusion

Ultimately, a form of descriptivism by and large continues to dominate studies of the African digital political economy. Descriptivism is neither a method nor a theoretical orientation; rather, it is a means of reading African societies that leans heavily on anecdotal evidence, policy statements, and statistical comparisons to illustrate what Africa lacks – often implicitly or explicitly – in relation to the West and, increasingly, China (Mbembe, 2021). Adebani (2017, p. 1), drawing on Guyer's (2014) critique of African development analytics, underscores this dynamic by citing the observation that “all the worst

values of every indicator meet in Africa”, as produced by international financial institutions. In this framing, Africa appears as a static object, permanently lagging behind Western and Chinese modalities of development. While such perspectives may seek to underscore Africa’s developmental challenges, uncritical application of this posture risks reinforcing pathologising narratives – casting the continent as perpetually lacking and technologically backward. Never telling us what Africa has and what it has systemically lost. Therefore, research needs to go beyond myopic views of African political economy to look at not just ICT infrastructure but the rest of the vertical stack, which includes software and applications. It is crucial to examine how these digital systems integrate into the broader political economy of Africa and its regions. A more historical and grounded approach, attuned to regional and global processes, is needed – one that is able to discern African digital trade while not losing sight of its historical uneven integration into local and global configurations of capitalism.

References

- Adebani, W. (Ed.). (2017). *The political economy of everyday life in Africa: Beyond the margins*. Boydell & Brewer. <https://doi.org/10.1017/9781787440517>
- African Union (AU). (2018). *Agreement establishing the African Continental Free Trade Area*. Retrieved from <https://au.int/en/treaties/agreement-establishing-african-continental-free-trade-area>
- African Union (AU). (2020). *The digital transformation strategy for Africa 2020–2030*. Retrieved from <https://au.int/sites/default/files/documents/38507-doc-dts-english.pdf>
- Agbebi, M., Xue, G., & Yu, Z. (2021). *China-powered ICT infrastructure: Lessons from Tanzania and Cambodia* (Policy Briefing No. 252). Johannesburg, South Africa: South African Institute of International Affairs. Retrieved from <https://saiia.org.za/wp-content/uploads/2021/12/Policy-Briefing-252-agbebi-xue-yu.pdf>
- Bandura, R., Mclean, M., & Smutny, C. (2024). *Approaches to Digital Public Infrastructure in the Global South*. Washington, DC: Center for Strategic and International Studies. Retrieved from https://csis-website-prod.s3.amazonaws.com/s3fs-public/2024-08/240820_Bandura_Digital_Infrastructure.pdf
- Birhane, A. (2020). Algorithmic Colonization of Africa. *SCRIPTed*, 17(2), 389–409. <https://doi.org/10.2966/scrip.170220.389>
- Biryabarema, E. (2019). *Uganda's cash-strapped cops spend \$126 million on CCTV from Huawei*. Reuters. Retrieved from <https://www.reuters.com/article/technology/ugandas-cash-strapped-cops-spend-126-million-on-cctv-from-huawei-idUSKCN1V50QL/>
- Bradford, A. (2020). *The Brussels effect: How the European Union rules the world*. New York, NY: Oxford University Press. <https://doi.org/10.1093/oso/9780190088583.001.0001>
- Cheney, C. (2019). *China's Digital Silk Road: Strategic Technological Competition and Exporting Political Illiberalism*. Pacific Forum. Retrieved from: https://pacforum.org/wp-content/uploads/2019/08/issuesinsights_Vol19-WP8FINAL.pdf
- Coleman, D. (2019). Digital Colonialism: The 21st Century Scramble for Africa through the Extraction and Control of User Data and the Limitations of Data Protection Laws. *Michigan Journal of Race & Law*, 24, 417–439. <https://doi.org/10.36643/mjrl.24.2.digital>
- Daniels, C., Erforth, B., & Teevan, C. (Eds.). (2022). *Africa–Europe Cooperation and Digital Transformation* (1st ed.). Routledge. <https://doi.org/10.4324/9781003274322>

- Djilo, F., & Handy, P.-S. (2021). *Unscrambling Subsidiarity in the African Union: From Competition to Collaboration* (Africa Report No. 37). Institute for Security Studies. Retrieved from <https://issafrica.s3.amazonaws.com/site/uploads/AR-37-Rev.pdf>
- Erie, M. S., & Streinz, T. (2021). The Beijing Effect: China's "Digital Silk Road" as Transnational Data Governance. *New York University Journal of International Law and Politics*, 54, 1–92. Retrieved from <https://ssrn.com/abstract=3810256>
- Feldstein, S. (2019). The Road to Digital Unfreedom: How Artificial Intelligence is Reshaping Repression. *Journal of Democracy*, 30(1), 40–52. Retrieved from <https://www.journalof-democracy.org/articles/the-road-to-digital-unfreedom-how-artificial-intelligence-is-res-shaping-repression/>
- Ferracane, M. F., González Ugarte, S., & van der Marel, E. (2025). The Brussels effect in Africa: Is it beneficial for intra-regional trade in digital services? *Journal of International Economic Law*, 28(1), 1–22. <https://doi.org/10.1093/jiel/jgae059>
- Foucault, M. (1995). *Discipline and Punish: The Birth of the Prison* (A. Sheridan, Trans.; 2nd Vintage Books ed.). Vintage Books.
- Gagliardone, I. (2020). *The Impact of Chinese Tech Provision on Civil Liberties in Africa* (Policy Insights No. 99). Johannesburg, South Africa: South African Institute of International Affairs. Retrieved from <https://saiia.org.za/wp-content/uploads/2020/12/Policy-Insights-99-gagliardone.pdf>
- Gelb, A., & Mukherjee, A. (2019). *Building on digital ID for inclusive services: Lessons from India*. Center for Global Development. Retrieved from <https://www.cgdev.org/publication/building-digital-id-inclusive-services-lessons-india>
- Gong, S., Gu, J., & Teng, F. (2019). *The Impact of the Belt and Road Initiative Investment in Digital Connectivity and Information and Communication Technologies on Achieving the SDGs* (K4D Emerging Issues Report). Brighton, UK: Institute of Development Studies. Retrieved from https://assets.publishing.service.gov.uk/media/5c86628940f0b6369b76a372/K4D_Emerging_Issues_-_BRI_Investment_Part_A_-_final.pdf
- Gravett, W. H. (2021). Digital Coloniser? China and Artificial Intelligence in Africa. In the International Institute for Strategic Studies (IISS) (Ed.), *Survival December 2020–January 2021: A World After Trump* (1st ed.). Routledge. <https://doi.org/10.4324/9781003421689-10>
- Greitens, S. C. (2020). *Dealing with demand for China's global surveillance exports*. Brookings Institution Global China Report. Retrieved from https://www.brookings.edu/wp-content/uploads/2020/04/FP_20200428_china_surveillance_greitens_v3.pdf
- Guyer, J. I. (2014). Percentages and per chance: archaic forms in the twenty-first century.

- Distinktion: Journal of Social Theory*, 15(2), 155–173. <https://doi.org/10.1080/1600910X.2014.920268>
- Heeks, R., Ospina, A. V., Foster, C., Gao, P., Han, X., Jepson, N., Schindler, S., & Zhou, Q. (2024). China's digital expansion in the Global South: Systematic literature review and future research agenda. *The Information Society*, 40(2), 69–95. <https://doi.org/10.1080/01972243.2024.2315875>
- Hemmings, J. (2020). Reconstructing Order: The Geopolitical Risks in China's Digital Silk Road. *Asia Policy*, 15(1), 5–22. <https://www.jstor.org/stable/26891385>
- Hillman, J. E. (2021). *The digital Silk Road: China's quest to wire the world and win the future*. New York, NY: Harper.
- Huang, Y. (2019). China-Africa Joint Endeavor on the Digital Silk Road: Opportunities, Challenges and Approaches. *China International Studies*, 78, 13–28. Retrieved from <https://heinonline.org/HOL/Page?handle=hein:journals/chintersd78&id=13&collection=journals&cindex=>
- International Telecommunication Union (ITU). (2023). *Regional roaming initiatives* (Technical Report ITU-T DSTR-ROAMREG). Geneva: ITU. Retrieved from https://www.itu.int/dms_pub/itu-t/opb/tut/T-TUT-ROAMING-2023-2-PDF-E.pdf
- Jili, B. (2023). The spread of Chinese surveillance tools in Africa: A focus on Ethiopia and Kenya. In C. Daniels, B. Erforth, & C. Teevan (Eds.), *Africa–Europe cooperation and digital transformation* (pp. 32–49). New York: Routledge. <https://doi.org/10.4324/9781003274322>
- Jones, A., & Teevan, C. (2021). *Team Europe: up to the challenge?* (Briefing Note No. 128). Maastricht, The Netherlands: European Centre for Development Policy Management (ECDPM). Retrieved from <https://ecdpm.org/application/files/5116/5546/8587/Team-Europe-Up-To-Challenge-ECDPM-Briefing-Note-128-January-2021.pdf>
- Jones, B. (2022). Is POPIA bad business for South Africa? Comparing the GDPR to POPIA and analyzing POPIA's impact on businesses in South Africa. *Penn State Journal of Law & International Affairs*, 10, 218–260. Retrieved from <https://insight.dickinsonlaw.psu.edu/jlia/vol10/iss1/11>
- Kwet, M. (2019). Digital colonialism: US empire and the new imperialism in the Global South. *Race & Class*, 60(4), 3–26. <https://doi.org/10.1177/0306396818823172>
- Larkin, B. (2013). The Politics and Poetics of Infrastructure. *Annual Review of Anthropology*, 42, 327–343. <https://doi.org/10.1146/annurev-anthro-092412-155522>
- Lauria, V. (2022). Chinese financing in Ethiopia's infrastructure sector: agency distribution

- within and outside the state. *Third World Quarterly*, 44(3), 595–611. <https://doi.org/10.1080/01436597.2022.2150609>
- Luo, X. (2019). Building China–Latin America Digital Silk Road: Challenges and roadmap. *China International Studies*, 77, 48–63. Retrieved from https://heinonline.org/HOL/Page?handle=hein.journals/chintersd77&div=8&g_sent=1&casa_token=&collection=journals
- Mackinnon, A. (2019). *For Africa, Chinese-built internet is better than no internet at all*. Foreign Policy. Retrieved from <https://foreignpolicy.com/2019/03/19/for-africa-chinese-built-internet-is-better-than-no-internet-at-all/>
- Madianou, M. (2019). Technocolonialism: Digital Innovation and Data Practices in the Humanitarian Response to Refugee Crises. *Social Media + Society*, 5(3). <https://doi.org/10.1177/2056305119863146>
- Malena, J. (2021, January 19). The Extension of the Digital Silk Road to Latin America: Advantages and Potential Risks. Council on Foreign Relations (Asia Unbound). Retrieved from <https://www.cfr.org/blog/extension-digital-silk-road-latin-america-advantages-and-potential-risks>
- Mbembe, A. (2021). *Out of the Dark Night: Essays on Decolonization*. Columbia University Press.
- Monyae, D. (2021). Africa's digital sovereignty a timely and relevant debate. *University of Johannesburg News*. Retrieved from <https://news.uj.ac.za/news/africas-digital-sovereignty-a-timely-and-relevant-debate-2/>
- Munga, J. (2023). *How the United States can effectively implement its new digital transformation with Africa initiative*. Carnegie Endowment for International Peace. Retrieved from https://carnegie-production-assets.s3.amazonaws.com/static/files/202305-Munga_US-Africa_Digital1.pdf
- Neilson, B. (2022). Working the Digital Silk Road: Alibaba's digital free trade zone in Malaysia. In M. Graham & F. Ferrari (Eds.), *Digital work in the planetary market* (pp. 117–136). Cambridge, MA: MIT Press. <https://doi.org/10.7551/mitpress/13835.003.0011>
- Nothias, T. (2025). An intellectual history of digital colonialism. *Journal of Communication*, 75(5), 385–397. <https://doi.org/10.1093/joc/jqaf003>
- Parkinson, J., Bariyo, N., & Chin, J. (2019). Huawei technicians helped African governments spy on political opponents. *The Wall Street Journal*. Retrieved from <https://www.wsj.com/articles/huawei-technicians-helped-african-governments-spy-on-political-opponents-11565793017>



- Pollio, A., & Cirolia, L. R. (2022). *Financing ICT and digitalisation in Africa: Current trends and key sustainability issues*. Cape Town: African Centre for Cities & Alfred Herrhausen Gesellschaft. Retrieved from https://www.africancentreforcities.net/wp-content/uploads/2022/05/220519_Paper2_ICT_Digitalisation_final.pdf
- Sheehan, M. (2018). How Google took on China—and lost. *MIT Technology Review*. Retrieved from <https://www.technologyreview.com/2018/12/19/138307/how-google-took-on-china-and-lost/>
- Soulé, F. (2024). *Negotiating Africa's Digital Partnerships amid Geopolitical Competition* (Special Report). Waterloo, ON, Canada: Centre for International Governance Innovation. Retrieved from https://www.cigionline.org/static/documents/Soule_Special_Report_AQF0kcU.pdf
- Truby, J. (2020). Governing Artificial Intelligence to benefit the UN Sustainable Development Goals. *Sustainable Development*, 28(4), 946-959. <https://doi.org/10.1002/sd.2048>
- Van der Lugt, S. (2021). Exploring the Political, Economic, and Social Implications of the Digital Silk Road into East Africa: The Case of Ethiopia. In F. Schneider (Ed.), *Global Perspectives on China's Belt and Road Initiative: Asserting Agency through Regional Connectivity*. London: Routledge. Retrieved from <https://doi.org/10.5117/9789463727853>

Submarine cable infrastructure and trade in Africa

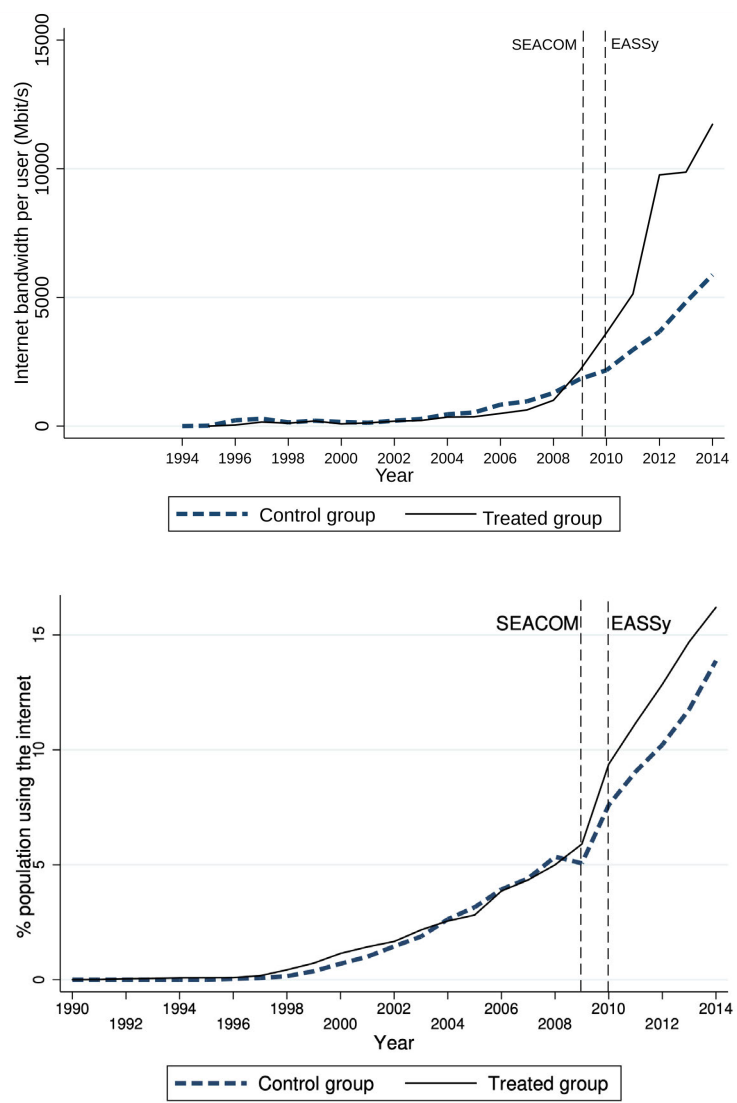
Joël Cariolle & Camille da Piedade

1. Introduction

Recent geopolitical tensions have drawn attention to the vulnerability of submarine cable (SMC) networks. Suspected sabotage incidents in the Baltic Sea and near Taiwan underscore how critical – and fragile – these undersea systems are to global communications. In Africa, the 2024 SEACOM cable disruption in the Red Sea severely impacted East Africa’s connectivity, further illustrating these vulnerabilities. Yet beyond such headline-grabbing events lies a more encouraging story: submarine cables have played a key role in supporting economic development across Sub-Saharan Africa (SSA).

Since 2009, the rollout of broadband SMCs along the East African coast has contributed to expanding economic opportunities and improving livelihoods (Simione & Li, 2021). Research by Cariolle (2021) and Cariolle *et al.* (2024) shows that these fibre-optic networks have significantly lowered internet access costs and improved connectivity, accelerating access to both mobile and fixed broadband technologies. The SEACOM and EASSy cables, in particular, triggered substantial improvements in internet penetration – raising bandwidth capacity and access rates by 3 to 5 percentage points in recipient countries (Figure 1). Moreover, improved affordability of mobile broadband technologies, rather than fixed broadband, appears as a critical explanation for internet uptake in the region (Cariolle *et al.*, 2024).

Figure 1. SEACOM/EASSy laying and the digital economy's expansion in Eastern Africa.



Source: Cariolle (2021).

These gains, especially via affordable mobile broadband and access to new digital services,¹ have helped unlock productivity in multiple sectors beyond ICT – agriculture, trade, and services among them. With dozens of new cables

1 Such as e-commerce, logistic platforms or fintech.

being deployed each year globally,² this expanding infrastructure is increasingly seen as a catalyst for innovation, trade integration, and inclusive economic development. However, in low-income countries, these opportunities often remain confined to urban centres and are constrained by weak inland terrestrial infrastructure, high internet costs, and low digital skills. Despite these challenges, the export sector often remains a key beneficiary of first-mile connectivity, owing to its greater digital absorptive capacity and closer proximity to other infrastructures (Glaeser *et al.*, 1992; Farole & Winkler, 2012; Marsh *et al.*, 2017; Paunov & Rollo, 2016; Imbruno *et al.*, 2025; Cariolle & Le Goff, 2023).

This note provides an overview of selected studies on the trade impact of SMC infrastructure, with a focus on African economies. We show that, though SMCs' laying has promoted trade and export basket upgrading, there are winners and losers in the process (Section 2). We also discuss potential mechanisms explaining how connectivity has spurred export sophistication in the region and propose an agenda for future research (Section 3).

2. International connectivity and trade integration

2.1. Bilateral connectivity and service trade

SSA remains a marginal player in global trade, a position often attributed to high transaction costs, weak infrastructure, and geographical disadvantages. Despite notable growth over the past two decades, the region has not experienced the industrialisation needed to close income gaps (Rodrik, 2016). However, the rapid deployment of SMC infrastructure and the expansion of internet access are seen as potential game changers for the private sector, especially exporting firms (Hjort & Poulsen, 2019).

Digital infrastructure – such as the SMC network – improves the speed, density, and reliability of information exchange, enhancing market coordination and reducing trade costs through better partner matching, easier access to market and regulatory information, and fewer logistical inefficiencies (Goldfarb & Tucker, 2019). These gains are evident in increased bilateral service trade, particularly in digitally intensive sectors like IT, finance, and business process outsourcing (Haltenhof, 2019; El-Sahli, 2020). The rise in service trade also supports merchandise trade. Herman and Oliver (2023) find that Internet ex-

2 See TeleGeography (n.d.). Submarine Cable Map. <<https://www.submarinecablemap.com/>>.

pansion boosts both, with a slightly stronger impact on merchandise exports. Notably, the benefits of direct cable connections predate broadband – Fink *et al.* (2005) show that lower bilateral calling costs significantly increased merchandise trade, especially for differentiated goods, which require more information to be traded (Rauch, 1999).

More broadly, digital connectivity contributes to the “servicification” of merchandise exports, as services become increasingly embedded in goods trade (Baldwin & Freeman, 2022). SSA appears to be participating in this trend, as SMC connectivity facilitates trade expansion and greater integration into the global economy through digitally enabled channels.

2.2. Submarine cables, informational frictions, and export sophistication in Africa

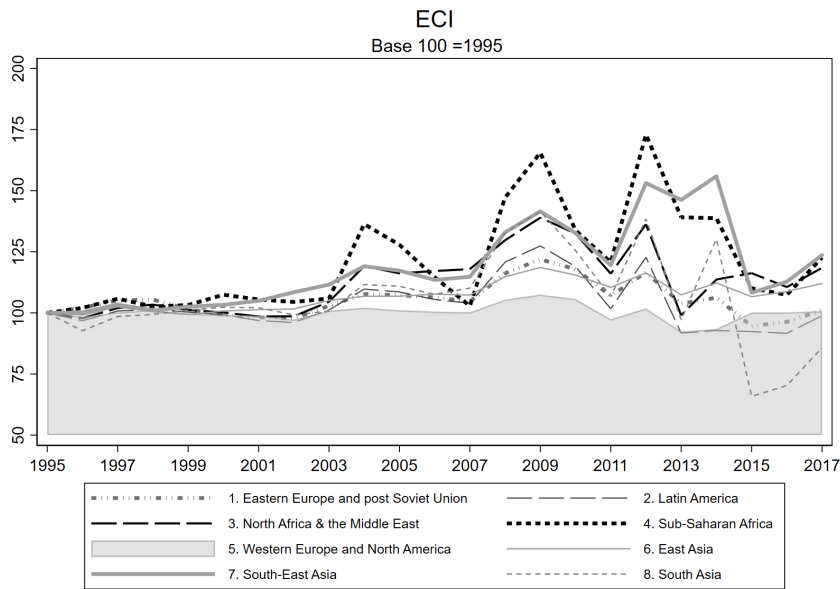
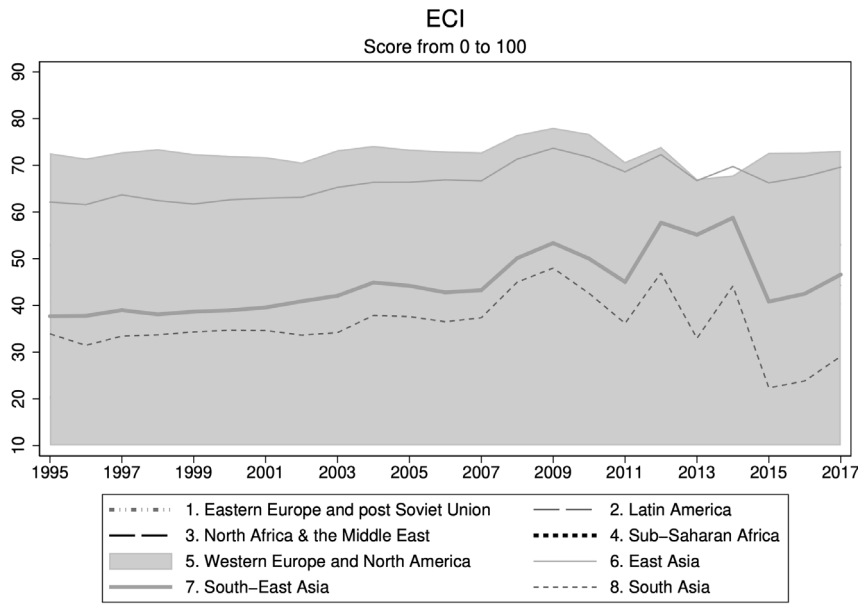
Empirical studies underline how improved access to global information and knowledge can reshape trade patterns, especially for remote low-income countries. Trade is often hindered by informational frictions, which tend to increase with time distance (Anderson & Van Wincoop, 2004; Stein & Daude, 2007; Tomasik, 2013; Christen, 2017) and geographic distance between partners (Rauch & Trindade, 2003; Bahar *et al.*, 2014; Akerman *et al.*, 2022). Information diffusion decreases sharply with distance, leading countries to trade with nearby partners and export similar products (Allen, 2014; Dasgupta & Mondria, 2018). Enhanced communication networks reduce these frictions, reducing information asymmetry between distant partners and expanding the pool of potential exporters and importers. Yet, the idea that digital connectivity contributes to the “death of distance” (Cairncross, 1997; Lendle *et al.*, 2015) has been increasingly challenged, as recent evidence suggests that the responsiveness of trade to digital improvements actually rises with geographic distance (Akerman *et al.*, 2022).

Better connectivity also supports intermediation in global value chains, encouraging diversification and export sophistication, including in SSA. Figure 2 illustrates the regional evolution of the Economic Complexity Index (ECI) applied to exports, which captures the diversity and sophistication of countries’ export baskets (Hidalgo & Hausmann, 2009).³ It shows that SSA’s average export basket has displayed the highest increase in complexity score, and also the greatest volatility, over the 1995-2017 period.

3 The index is often used as an indicator of productive capabilities and potential for structural transformation. The intuition behind ECI is that sophisticated economies are not only diversified, but they export products that are exported by few countries (Hidalgo, 2021).



Figure 2. ECI evolution by region, 1995-2017.



Source: Cariolle and da Piedade (2023).

To assess SMC infrastructure's contribution to export upgrading, Cariolle and da Piedade (2023) use a digital connectedness index – measuring a country's digital proximity to global markets via its access to world GDP through SMCs. This measure reflects not only connectivity, but also the ability to gather information from key import and export markets, on production technologies, regulatory environments, or supplier and consumer networks. The analysis shows a positive effect of digital connectedness on export complexity in SSA. A 10 percentage-point increase in digital connectedness corresponds to an 8.4-point rise in the ECI index between 2006 and 2015. This gain surpasses that of other developing regions, although SSA still lags behind advanced Asian economies. The result also holds when using alternative measures of export upgrading, such as global value chain participation, differentiated exports, or export sophistication.

Interestingly, the effect of digital connectedness in SSA differs from that in other regions. In most parts of the world, the benefits of connectedness decline with distance from world markets. In Africa, however, they appear stronger in more geographically distant countries. Additional tests suggest that maritime connectivity and digital absorptive capacities – such as internet penetration and basic education – are important drivers of this effect. A complementary explanation lies in the relatively low level of intra-African trade compared to other regions. As intra-African trade has risen over the past decade (UNCTAD, 2019), it has increased opportunities for export diversification and probably export upgrading across the continent (Freire & Slany, 2023).

2.3. Bilateral connectivity and heterogeneous exporters

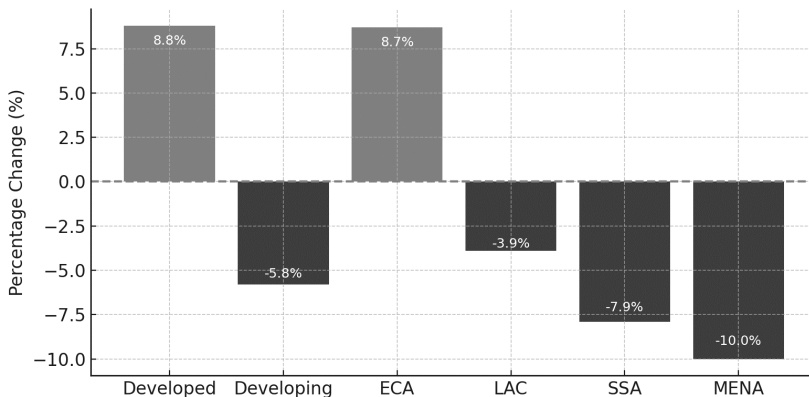
Digital ties enhance trade in goods sensitive to informational barriers, improving market access and business relationships (Rauch, 1999; Bailey *et al.*, 2021). As previously stated, improved connectivity also supports the “servicification” of trade – where services are embedded in manufactured and primary goods – by enabling coordination in complex value chains (Sturgeon *et al.*, 2017; Baldwin & Freeman, 2022). In fact, faster and more stable communication fosters exports of digital and ICT services, with spillover effects on non-digital services and merchandise trade (Loungani & Mishra, 2014; Hounghonon & Mothobi, 2025). Industries that are heavily export-oriented and logistics-intensive – such as mining, fishing, and basic manufacturing – are likely to benefit first from the laying of submarine cables. Because their operations are typically connected directly to ports and global shipping routes, they depend less on the last mile of connectivity, which often remains a bottleneck

in many developing economies. By contrast, smaller firms and inland industries are more constrained by missing last-mile infrastructure, leading to heterogeneous effects across sectors and firms.

Imbruno *et al.* (2025) examine which exporters gain or lose from digital interconnection, using a model that extends Melitz (2003) and Bustos (2011). The model predicts that bilateral SMC connections enhance digital productivity gains, favouring large or high-productivity firms. Developed countries, with greater digital capacities, see more small-sized firms entering foreign markets. In contrast, developing countries face higher adoption barriers, pushing small firms to exit export markets and limiting benefits to only the largest and most productive firms. Empirical evidence, based on a bilateral panel estimation framework, supports these theoretical predictions (Figure 3).

Bilateral SMC connections increase the number of exporters by 8.8 per cent when the origin country is developed, but reduce it by 5.8 per cent when the origin country is developing, reflecting the higher adoption barriers faced by firms in the latter. Regional analysis shows gains in Europe and Central Asia (ECA) (+8.7 per cent), but declines in Latin America and the Caribbean (LAC) (-3.9 per cent), SSA (-7.9 per cent), and the Middle East and North Africa (MENA) (-10 per cent). Furthermore, export values per firm increase in developing countries as smaller and less competitive firms exit, while they decline in developed ones as new, smaller exporters enter. These effects are strongest in digitally intensive sectors, highlighting the importance of digital infrastructure in shaping trade outcomes across firm types and country contexts.

Figure 3. Impact of bilateral SMC connections on the number of bilateral exporters.



Source: Authors based on estimates from Imbruno *et al.* (2025).

3. Research gaps and areas for future research

Many promising research avenues remain underexplored regarding SMC infrastructure. A key direction involves identifying which African sectors benefit most from improved digital connectivity and how structural transformations unfold post-deployment. Event-study approaches focused on export surges could reveal whether certain sectors are particularly responsive and what complementary investments – in physical infrastructure, logistics, or skills – are needed to amplify the benefits.

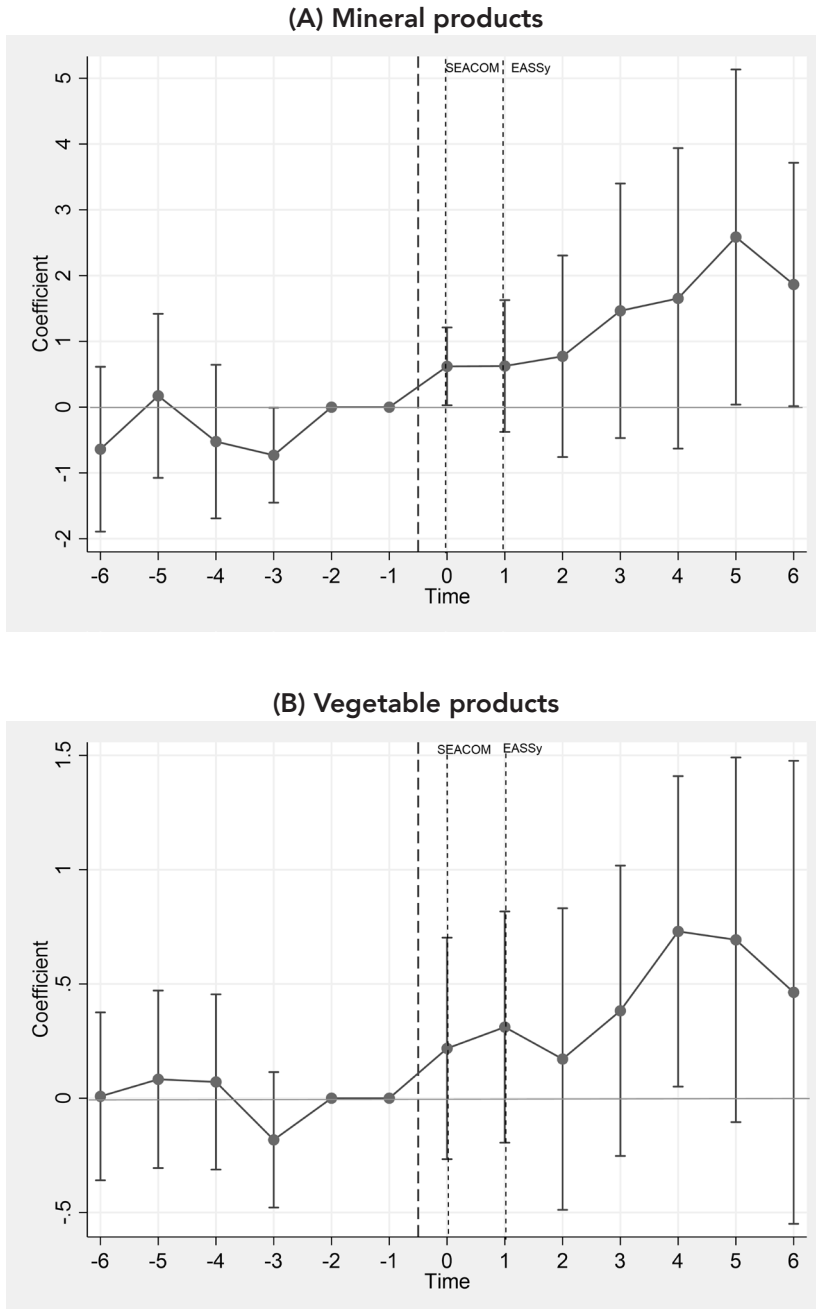
3.1. Connectivity and export upgrading: which products with which services?

Building on insights provided by Cariolle and Da Piedade (2023), Imbruno *et al.* (2025) and related literature (Akerman *et al.*, 2022; Herman & Oliver, 2023), future work could use bilateral country- or firm-level data to assess whether reduced informational frictions foster the production and export of more sophisticated goods. Does improved connectivity reduce commodity dependence by enabling diversification and sophistication? Or does it primarily promote upgrading and processing of resource-based products – many of which are intensive in logistics and transport services (Park, 2020)?

Digital intensive services – such as ICT, finance, transport, and logistics – are increasingly critical to trade, particularly in developing countries (Loungani *et al.*, 2017; Park, 2020; Hounghonon & Mothobi, 2025). These services underpin each stage of goods production and delivery and have grown in relevance amid COVID-19 and ongoing global supply chain disruptions. In Figure 4, we report that only mineral (HS2-25) and vegetable products (HS2-07) exhibited significant export increases after the SEACOM and EASSy cable deployments. This pattern aligns with their high logistics intensity scores in both 2000 and 2014, as documented by Park (2020).⁴ While this illustrative evidence does not assess product upgrading, nor exclude the role of demand from importing markets in explaining these patterns, it could yet be indicative of logistical efficiency gains.

⁴ Mineral products fall under the “Other Mining and Quarrying” and “Other Non-Metallic Mineral Products” ISIC categories, which recorded the highest logistics intensity scores in 2000 (8.23 and 6.95, respectively) and 2014 (6.53 and 6.10), according to Park (2020). Vegetable products, by contrast, associated to the “Food, Beverages, and “Tobacco” ISIC category, also ranks among the highest in logistics intensity, with scores of 4.51 in 2000 and a striking 4.46 in 2014.

Figure 4. Exports of minerals and vegetable products (HS2) after SEACOM/ EASSy arrival in Africa, dynamic effects.



Source: Authors. Note: Local projection DID estimator from Dube *et al.* (2023). Controls include a country-time trend, GDP (log), population (log), total exports (% GDP) and the lagged first-difference of the dependent variable.



Thus, rising complexity in exported goods may stem from the growing embeddedness of digital services in the value of merchandise exports. In addition, to identify which products could be subject to this process, future research could map shifts in export composition within the product space and extend this framework to services, using, for instance, the multidimensional economic complexity index developed by Stojkoski *et al.* (2023).

Another promising avenue is to explore infrastructure-regulatory complementarities, including competition policy. For example, infrastructure-sharing obligations, cross-border data policies, or restrictions on ICT goods and online services (Ferracane *et al.*, 2020, 2025) may all mediate the extent to which digital connectivity translates into broader trade benefits. In particular, competition policy is likely to be critical for ensuring that the benefits of SMC deployment and digital infrastructure are broadly shared across firms, rather than captured by a handful of incumbents.

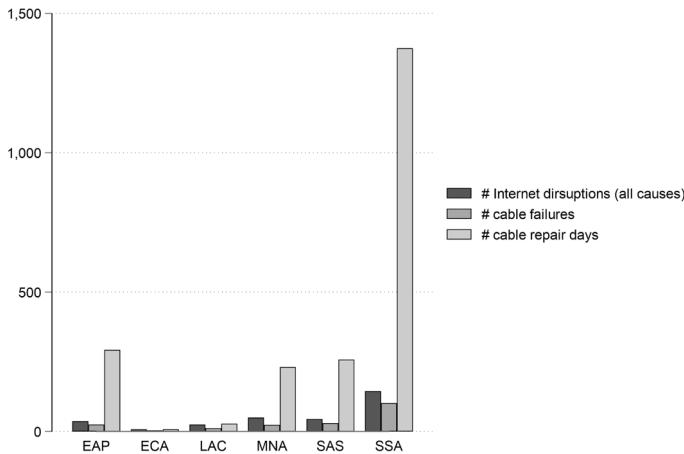
3.2. Infrastructure vulnerability and trade

While digital infrastructure has fuelled trade expansion in SSA and become integral to global trade networks, little is known about the consequences of infrastructure failures on domestic and trade activity. SMCs are increasingly vulnerable to disruptions – from anchors and seismic activity to sabotage – posing critical risks, especially in Africa, where cable networks are sparse and redundancy is limited.

Using data on Internet outages and associated repair time⁵ between 2008 and 2020 across the world, Figure 5 shows that SSA – followed by East Asia and the Pacific (EAP) – experienced the highest frequency of cable failures and longest repair durations. We examine the dynamic effects of such disruptions on fixed broadband prices in Figure 6. This preliminary analysis suggests that SMC exposure leads to persistent increases in broadband prices, potentially hampering digital adoption and trade competitiveness.

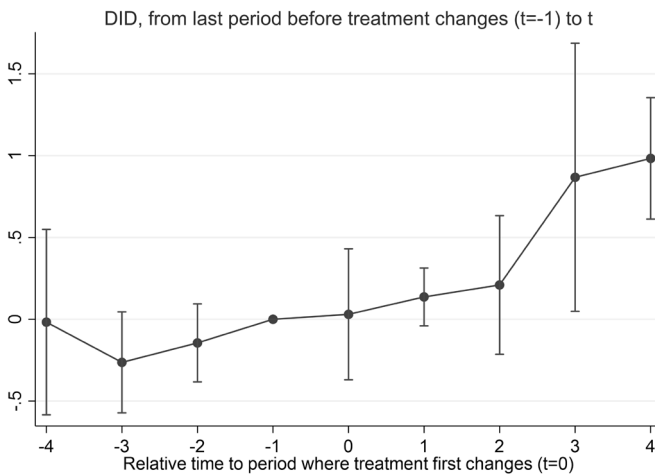
5 Causes of internet disruptions include SMC breaks/outages/maintenance, other telecom infrastructure (e.g. data centre) breaks/outages/maintenance, network outages and routing issues, cyber-attacks, electricity outages, satellite failures, conflicts between operators, government shutdowns, and social unrest. This hand-collected dataset could be matched and cross-checked with data on internet shutdowns from the Digital Trade Integration database (Ferracane *et al.*, 2025).

Figure 5. Number of SMC-related internet shutdowns and associated cumulated repair days, by region, 2008-2020.



Source: Authors' compilation. Data drawn from SubTel Forum, Cable Faults & Maintenance Archives, retrieved 30 January 2026 from <https://subtelforum.com/category/cable-faults-maintenance/>; Akamai Technologies' State of the Internet quarterly reports (2008–2017), retrieved 30 January 2026 from <https://www.akamai.com/security-research/the-state-of-the-internet>; and supplemented with manual internet searches. Note: EAP: East Asia and Pacific; ECA: Europe and Central Asia; LAC: Latin America and the Caribbean; MNA: Middle East and North Africa; SAS: South Asia; SSA: Sub-Saharan Africa.

Figure 6. Cable breaks and fixed broadband prices.



Source: Authors. Note: De Chaisemartin and D'Haultfœuille (2022, 2023) staggered DID estimator. Treated countries are those that have experienced at least one disruption of the Internet. Note: Relative time to period where treatment first changes ($t = 0$).



Beyond the price effects of digital shocks, improving our understanding of the direct impact of trade disruptions remains an important area for future research. Analysing the trade consequences of internet disruptions – while distinguishing between their underlying causes such as natural hazards, maritime accidents, or government interventions – can yield interesting and useful insights for both economic resilience appraisal and policy design. Each type of shock may have distinct implications for recovery time, policy responses, and long-term consequences for the private sector. Additionally, Internet disruptions may also erode digital trust among citizens and small businesses transitioning from traditional to digital forms of trade. In such contexts, disturbance in Internet access, especially one that prevents transactions, can significantly undermine trust in digital tools and may lead small enterprises to revert to informal or analogue transaction modes.

Moreover, the emergence of a new generation of single-owner SMC systems (e.g. Equiano or 2Africa Pearls) along African coasts introduces additional risks. These cables concentrate control in the hands of a few powerful firms, increasing the market power of these actors and exposing recipient countries to the risk of strategic behaviours, including price increases, access restrictions, or regulatory capture, thereby heightening vulnerability to externally induced shocks.

Therefore, estimating the economic costs resulting from SMC faults and other infrastructure failures could inform policies to bolster resilience among states and digital service providers. Identifying successful policies aimed at mitigating these costs, such as investing in additional SMCs or in satellite connectivity, or promoting multi-stakeholder ownership – and measuring their impact on service continuity, cost stability, and trade resilience – is also an important and promising area of research.

4. Conclusion

SMC infrastructure has become a vital driver of economic transformation in SSA, significantly reducing connectivity costs, enhancing digital access, and supporting the region's growing participation in global trade. Evidence shows that improved digital connectedness fosters export sophistication and services integration, particularly in logistics-intensive and digitally-enabled sectors. However, not all firms or countries benefit equally, highlighting the need for complementary policies and investments to take full advantage of this infrastructure.

Future research should further investigate the distributional and sectoral effects of digital connectivity, assess the economic costs of infrastructure outages, and explore how improved connectivity reshapes value chains in goods and services. Advancing this agenda will require multidisciplinary partnerships and data-sharing across public and private actors.

References

- Akerman, A., Leuven, E., & Mogstad, M. (2022). Information Frictions, Internet, and the Relationship between Distance and Trade. *American Economic Journal: Applied Economics*, 14(1), 133–163. <https://doi.org/10.1257/app.20190589>
- Allen, T. (2014). Information Frictions in Trade. *Econometrica*, 82(6), 2041–2083. <https://doi.org/10.3982/ecta10984>
- Anderson, J. E., & van Wincoop, E. (2004). Trade Costs. *Journal of Economic Literature*, 42(3), 691–751. <https://doi.org/10.1257/0022051042177649>
- Bahar, D., Hausmann, R., & Hidalgo, C. A. (2014). Neighbors and the evolution of the comparative advantage of nations: Evidence of international knowledge diffusion? *Journal of International Economics*, 92(1), 111–123. <https://doi.org/10.1016/j.jinteco.2013.11.001>
- Bailey, M., Gupta, A., Hillenbrand, S., Kuchler, T., Richmond, R., & Stroebel, J. (2021). International trade and social connectedness. *Journal of International Economics*, 129, 103418. <https://doi.org/10.1016/j.jinteco.2020.103418>
- Baldwin, R., & Freeman, R. (2022). Risks and Global Supply Chains: What We Know and What We Need to Know. *Annual Review of Economics*, 14, 153–180. <https://doi.org/10.1146/annurev-economics-051420-113737>
- Bustos, P. (2011). Trade Liberalization, Exports, and Technology Upgrading: Evidence on the Impact of MERCOSUR on Argentinian Firms. *American Economic Review*, 101(1), 304–340. <https://doi.org/10.1257/aer.101.1.304>
- Cairncross, F. (1997). *The Death of Distance: How the Communications Revolution Will Change Our Lives*. Harvard Business School Press.
- Cariolle, J. (2021). International Connectivity and the Digital Divide in Sub-Saharan Africa. *Information Economics & Policy*, 55, 100901. <https://doi.org/10.1016/j.infoeco-pol.2020.100901>
- Cariolle, J., & Da Piedade, C. (2023). Digital Connectedness and Exports Upgrading: Is Sub-Saharan Africa Catching Up? *The World Economy*. <https://doi.org/10.1111/twec.13501>
- Cariolle, J., & le Goff, M. (2023). Spatial Internet Spillovers in Manufacturing. *The Journal of Development Studies*, 59(8), 1163–1186. <https://doi.org/10.1080/00220388.2023.2204177>
- Cariolle, J., Hounghonon, G. V., Silue, T. A. H., & Strusani, D. (2025). *The Impact of Subma-*

- rine Cables on Internet Access Price, and the Role of Competition and Regulation* (FERDI Working Paper No. 357). Ferdi. Retrieved from <https://ferdi.fr/dl/df-1Xf5zQ9SQK-KYtU2LE4VLtvfR/ferdi-wp357-the-impact-of-submarine-cables-on-internet-access-price-and-the.pdf>
- Christen, E. (2017). Time zones matter: The impact of distance and time zones on services trade. *The World Economy*, 40(3), 612–631. <https://doi.org/10.1111/twec.12326>
- Dasgupta, K., & Mondria, J. (2018). Inattentive importers. *Journal of International Economics*, 112, 150–165. <https://doi.org/10.1016/j.jinteco.2018.03.002>
- de Chaisemartin, C., & D'Haultfoeuille, X. (2022). *Difference-in-Differences Estimators of Intertemporal Treatment Effects* (NBER Working Paper No. 29873). National Bureau of Economic Research. <https://doi.org/10.3386/w29873>
- de Chaisemartin, C., & D'Haultfoeuille, X. (2023). Two-way fixed effects and differences-in-differences with heterogeneous treatment effects: a survey. *The Econometrics Journal*, 26(3), C1–C30. <https://doi.org/10.1093/ectj/utac017>
- Dube, A., Girardi, D., Jordà, Ò., & Taylor, A. M. (2023). *A local projections approach to difference-in-differences event studies* (NBER Working Paper No. 31184). Cambridge, MA: National Bureau of Economic Research. <https://doi.org/10.3386/w31184>
- El-Sahli, Z. (2020). *Submarine cables, the internet backbone and the trade in services* (GEP Research Paper No. 2020/05). University of Nottingham, Globalisation and Economic Policy (GEP). Retrieved from <https://www.nottingham.ac.uk/gep/documents/papers/2020/2020-05.pdf>
- Farole, T., & Winkler, D. (2012). *Foreign Firm Characteristics, Absorptive Capacity and the Institutional Framework: The Role of Mediating Factors for FDI Spillovers in Low- and Middle-Income Countries* (Policy Research Working Paper No. 6265). Washington, DC: World Bank. Retrieved from <https://openknowledge.worldbank.org/server/api/core/bitstreams/ef539b9a-2b59-5d49-ba39-465c1ea6f1be/content>
- Ferracane, M. F., González Ugarte, S., & Rogaler, T. (Eds.). (2025). *Digital Trade Integration Database*. European University Institute. <https://dti.eui.eu/database/>
- Ferracane, M. F., Kren, J., & van der Marel, E. (2020). Do data policy restrictions impact the productivity performance of firms and industries? *Review of International Economics*, 28(3), 676–722. <https://doi.org/10.1111/roie.12467>
- Fink, C., Mattoo, A., & Neagu, I. C. (2005). Assessing the impact of communication costs on international trade. *Journal of International Economics*, 67(2), 428–445. <https://doi.org/10.1016/j.jinteco.2004.09.006>

- Freire, C., & Slany, A. (2023). *Realizing product diversification for structural change in African countries* (UNCTAD Working Paper No. 5; UNCTAD/WP/2023/4). United Nations Conference on Trade and Development. Retrieved from https://unctad.org/system/files/official-document/wp-2023d4-no5_en.pdf
- Glaeser, E. L., Kallal, H. D., Scheinkman, J. A., & Shleifer, A. (1992). Growth in cities. *Journal of Political Economy*, 100(6), 1126–1152. <https://doi.org/10.1086/261856>
- Goldfarb, A., & Tucker, C. (2019). Digital Economics. *Journal of Economic Literature*, 57(1), 3–43. <https://doi.org/10.1257/jel.20171452>
- Haltenhof, S. (2019). *Services Trade and Internet Connectivity* (RSIE Discussion Paper No. 668). University of Michigan, Research Seminar in International Economics. Retrieved from <https://rsie.econ.lsa.umich.edu/workingpapers/Papers651-675/r668.pdf>
- Herman, P. R., & Oliver, S. (2023). Trade, policy, and economic development in the digital economy. *Journal of Development Economics*, 164, 103135. <https://doi.org/10.1016/j.jdeveco.2023.103135>
- Hidalgo, C. A. (2021). Economic complexity theory and applications. *Nature Reviews Physics*, 3, 92–113. <https://doi.org/10.1038/s42254-020-00275-1>
- Hidalgo, C. A., & Hausmann, R. (2009). The building blocks of economic complexity. *Proceedings of the national academy of sciences*, 106(26), 10570–10575. <https://doi.org/10.1073/pnas.0900943106>
- Hjort, J., & Poulsen, J. (2019). The Arrival of Fast Internet and Employment in Africa. *American Economic Review*, 109(3), 1032–1079. <https://doi.org/10.1257/aer.20161385>
- Houngbonon, G. V., & Mothobi, O. (2025). *Digital Trade and Development* (GW Competition & Innovation Lab Working Paper Series No. 2025/06). Washington, DC: The George Washington University. Retrieved from <https://competitionlab.gwu.edu/sites/g/files/zaxdzs6711/files/2025-03/GW202506.pdf>
- Imbruno, M., Cariolle, J., & de Melo, J. (2025). Digital connectivity and firm participation in foreign markets: An exporter-based bilateral analysis. *Journal of Development Economics*, 177, 103551. <https://doi.org/10.1016/j.jdeveco.2025.103551>
- Lendle, A., Olarreaga, M., Schropp, S., & Vézina, P. L. (2015). There goes gravity: eBay and the death of distance. *The Economic Journal*, 126(591), 406–441. <https://doi.org/10.1111/econj.12286>
- Loungani, P., & Mishra, S. (2014). Not Your Father's Service Sector. *Finance & Development*, 51(2). <https://doi.org/10.5089/9781475535037.022>

- Loungani, P., Mishra, S., Papageorgiou, C., & Wang, K. (2017). *World Trade in Services: Evidence from a New Dataset* (IMF Working Paper No. 17/77). <https://doi.org/10.5089/9781475589887.001>
- Marsh, I. W., Rincon-Aznar, A., Vecchi, M., & Venturini, F. (2017). We see ICT spillovers everywhere but in the econometric evidence: A reassessment. *Industrial and Corporate Change*, 26(6), 1067–1088. <https://doi.org/10.1093/icc/dtx008>
- Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, 71(6), 1695–1725. <https://doi.org/10.1111/1468-0262.00467>
- Park, S. (2020). Quality of transport infrastructure and logistics as source of comparative advantage. *Transport Policy*, 99, 54–62. <https://doi.org/10.1016/j.tranpol.2020.07.016>
- Paunov, C., & Rollo, V. (2016). Has the internet fostered inclusive innovation in the developing world? *World Development*, 78, 587–609. <https://doi.org/10.1016/j.worlddev.2015.10.029>
- Rauch, J. E. (1999). Networks versus markets in international trade. *Journal of International Economics*, 48(1), 7–35. [https://doi.org/10.1016/S0022-1996\(98\)00009-9](https://doi.org/10.1016/S0022-1996(98)00009-9)
- Rauch, J. E., & Trindade, V. (2003). Information, International Substitutability, and Globalization. *American Economic Review*, 93(3), 775–791. <https://doi.org/10.1257/000282803322157089>
- Rodrik, D. (2016). Premature deindustrialization. *Journal of Economic Growth*, 21, 1–33. <https://doi.org/10.1007/s10887-015-9122-3>
- Simione, F., & Li, Y. (2021). *The Macroeconomic Impacts of Digitalization in Sub-Saharan Africa: Evidence from Submarine Cables* (IMF Working Paper No. WP/21/110). Retrieved from <https://ssrn.com/abstract=4026284>
- Stein, E., & Daude, C. (2007). Longitude matters: Time zones and the location of foreign direct investment. *Journal of International Economics*, 71(1), 96–112. <https://doi.org/10.1016/j.jinteco.2006.01.003>
- Stojkoski, V., Koch, P., & Hidalgo, C. A. (2023). Multidimensional economic complexity and inclusive green growth. *Communications Earth & Environment*, 4, 130. <https://doi.org/10.1038/s43247-023-00770-0>
- Sturgeon, T. J., Farole, T., Ortega Moncada, L., & Pietrobelli, C. (2017). Scale, Distance, and Remoteness in Global Value Chains. In J. Keane & R. Baimbill-Johnson (Eds.), *Future Fragmentation Processes: Effectively Engaging with the Ascendancy of Global Value Chains*. Commonwealth Secretariat. <https://doi.org/10.14217/9781848599604-en>



Tomasik, R. (2013). Time zone-related continuity and synchronization effects on bilateral trade flows. *Review of World Economics*, 149, 321–342. <https://doi.org/10.1007/s10290-013-0147-4>

United Nations Conference on Trade and Development (UNCTAD). (2019). *Facts & Figures* [Press release]. <https://unctad.org/press-material/facts-figures-0>

Switching off the marketplace: How government-imposed Internet shutdowns and commercial web blocking undermine digital trade in Africa

Simón González Ugarte & Lillian Nalwoga

1. Introduction

Africa's plan to establish a unified digital market under the African Continental Free Trade Area (AfCFTA) relies on uninterrupted and reliable connectivity. The Protocol on Digital Trade (DTP), adopted in February 2024, aims to harmonise rules for cross-border e-commerce, digital payments, and data flows, enabling firms – particularly micro, small, and medium enterprises (MSMEs) – to transact seamlessly across borders (AU, 2024). The stakes are substantial: mobile technologies and services contributed USD 140 billion (around seven per cent of GDP) to Sub-Saharan Africa in 2023 and are projected to reach USD 170 billion by 2030, reflecting the centrality of mobile internet, platforms, and fintech to growth and trade (GSMA, 2024).

Against this backdrop, Internet connectivity restrictions have shifted from rare exceptions to a recurring instrument of governance across Africa, posing a threat to this trajectory. Governments employ an array of measures often justified on grounds of public order, national security, or exam integrity (Access Now, 2025; CIPESA, 2023). These include nationwide blackouts and curfew-style mobile data cuts (meaning turning off mobile internet during specific hours, like a nightly curfew), network throttling (deliberately slowing down connection speeds) and targeted blocks on social media, VoIP, or news websites.

Access Now (2016) defines an Internet shutdown as an intentional disruption of the Internet or electronic communications, rendering them inaccessible or effectively unusable, for a specific population or within a location, often to control the flow of information. Internet shutdowns can be imposed by both government and private actors (Access Now, 2024a) and manifest in various forms, ranging from full disruptions to throttling (slowing down internet speeds), including also platform blocking (blocking/restricting access to an entire website or platform) and filtering content within allowed sites such as content considered hateful in some political and social settings (Internet Society, 2025). Internet shutdowns disrupt the digital infrastructure that underpins Africa's commerce, undermining the stability of Africa's digital economy and threatening progress under initiatives like the AfCFTA (Shwehdy, 2025a, 2025b).

Government-imposed internet shutdowns are often driven by concerns related to political and national interests. Access Now's #KeepItOn coalition documented 21 government-imposed shutdowns across 15 African countries in 2024, the highest annual figure ever recorded for the region, with many occurring during elections, protests, or conflict (Access Now, 2025). On the other hand, data from the Varieties of Democracy (V-Dem) database shows that 27 African countries experienced shutdowns in 2024.¹ The data from the V-Dem database also shows that internet shutdowns are more common in Africa compared to other regions of the world.

The economic consequences are substantial. Independent estimates suggest that Sub-Saharan Africa lost approximately USD 1.1 billion due to shutdowns in 2025, reflecting foregone e-commerce, stalled mobile-money flows, and

1 Varieties of Democracy (V-Dem). (2024). Variable graph. Retrieved from <https://v-dem.net/data_analysis/VariableGraph/>. The relevant variable of the V-Dem database is “7.2.4 Government Internet Shutdown in Practice (C) (v2smgovshut)”, and the associated question is: “How often does the government shut down domestic access to the Internet?”.

broad productivity shocks (Migliano, 2026). Internet shutdowns also hinder democratic participation, particularly during elections and protests, and harm civic engagement, exacerbating existing inequalities in digital access (Anthonio, 2022).

This chapter examines how such practices undermine digital trade integration. It synthesises the state-of-the-art of academic and policy research on shutdowns and content blocking in Africa and their effects. It also identifies key research gaps in theory, data, and methods, and outlines a future research agenda to align digital connectivity governance with the AfCFTA's digital trade ambitions.

2. The state-of-the-art

2.1 Key academic and policy research

A growing body of academic and policy-oriented research has sought to systematically document and analyse the multifaceted impacts of internet shutdowns. Notable initiatives include those spearheaded by the Collaboration on International ICT Policy for East and Southern Africa (CIPESA),² which has developed frameworks for assessing the socio-economic consequences of network disruptions. Similarly, the Internet Society's Internet Pulse³ and NetBlocks⁴ provide real-time monitoring and empirical evidence on the economic costs associated with shutdowns, offering critical insights into their broader developmental implications (Tagat *et al.*, 2024).

Complementing these efforts, Access Now's #KeepItOn campaign maintains a comprehensive mapping of shutdown trends, triggers, and justifications, thereby contributing to global advocacy and accountability mechanisms. In parallel, the Digital Trade Integration (DTI) database maps, among other indicators, also the presence of Internet shutdowns and commercial web blocking for over 150 countries, including all African economies (Ferracane *et al.*, 2025). Collectively, these initiatives underscore the intersection of digital rights, economic governance, and international policy, highlighting the urgent need for evidence-based strategies to mitigate the adverse effects of internet shutdowns.

2 For access to information and materials on the CIPESA initiative, see <<https://cipesa.org/>>.

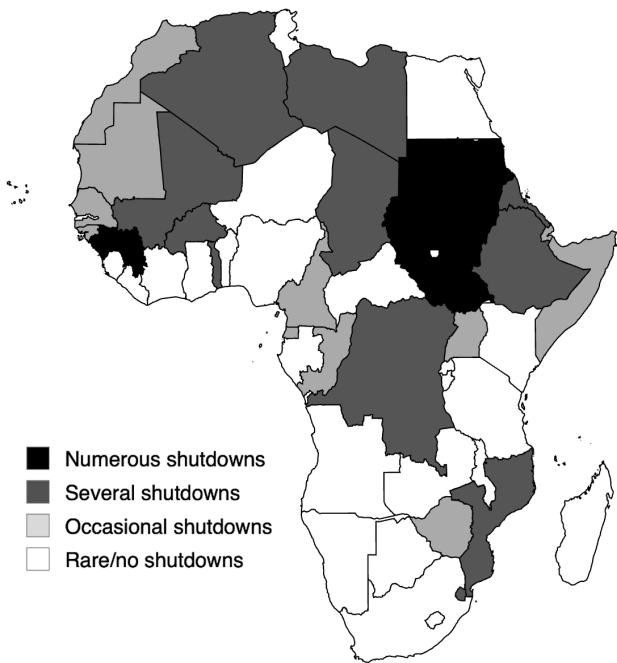
3 For access to the Internet Society's Pulse platform, see <<https://pulse.internetsociety.org/>>.

4 For access to the NetBlocks Internet Observatory, see <<https://netblocks.org/>>.

2.2 Overview of developments

Figure 1 summarises the frequency of internet shutdowns in Africa in 2024, highlighting that the practice is particularly concentrated in specific regions and countries. Notably, Guinea, South Sudan, and Sudan experienced especially frequent disruptions to internet access throughout 2024.

Figure 1: Presence of internet shutdowns in 2024.



Source: Authors based on V-Dem “v2smgovshut” variable and DTI database indicator 9.2 for the year 2024. Note: In black: the government shut down domestic internet access numerous times this year. In dark grey: the government shut down domestic internet access several times this year. In light grey: there have been a few occasions throughout the year when the government shut down domestic internet access. In white: the government does not typically interfere with domestic internet access.

Country cases illustrate how shutdowns map onto critical activities. In Sudan, both the Rapid Support Forces (RSF) and the Sudanese Armed Forces (SAF) weaponised connectivity during the civil war: in February 2024, the RSF’s seizure of ISP data centres in Khartoum precipitated a nationwide blackout, taking MTN and Sudatel (two telecom providers) largely offline until gradual restoration by May 2024 (Access Now, 2024b; Freedom House, 2024a).

In Guinea, broad connectivity restrictions imposed in November 2023 were officially attributed to a “security problem” and lifted in February 2024 following domestic pressure, illustrating the macro-uncertainty these measures generate for digital businesses (Andisile Mayalo, 2024; Gachuhi, 2024).

Beyond total outages, the blocking of commercial web content is also widespread. The DTI database records that 18 African countries (one third of the countries in the region) restricted access to commercial web content in 2024, with social media and online news the most frequently affected (Figure 2).

Figure 2: Blocking of commercial web content in 2024.



Source: Authors based on DTI database indicator 9.1 for the year 2024. In black: countries where commercial services have been blocked in 2024.

Examples include Mauritius’s telecommunications regulator instructing ISPs to suspend social media on 1 November 2024 under the Information and Communication Technologies Act. Although the measure was lifted on the next day, this action constrained communication and online trade via social media during an electoral period (Internet Society, 2024a; Business Mega, 2024). Another example can be found in Burkina Faso, where in April 2024 the authorities blocked the websites of major international outlets, including BBC Africa, Voice of America, TV5Monde, Deutsche Welle, The Guardian,

Le Monde, and Ouest-France. These instances highlight the breadth of content controls and their potential implications for advertising markets and information-intensive services (VOA News, 2024; Hairsine, 2024).

2.3 Economic implications of Internet connectivity restrictions and recent legal developments

Africa's digital economy is expanding at a pace that surpasses the continent's overall economic growth, with e-commerce alone projected to reach a market value of USD 1.33 trillion by 2033 (Nanda, 2025). This rapid growth, alongside recent legal and policy developments, underscores the continent's potential to leverage digital technologies for socio-economic transformation. However, this trajectory faces significant challenges, particularly the recurrent phenomenon of internet shutdowns, which threaten to undermine progress.

Internet shutdowns have severe and far-reaching economic consequences, disrupting commerce, threatening livelihoods, and impeding access to essential services such as healthcare, education, and emergency communication (CIPESA, 2017). These disruptions undermine economic stability and erode trust in digital systems, which is fundamental for a thriving digital economy (OECD, 2022). Blocking orders often lack clear legal bases, proportionality tests, or time limits; transparent ex ante economic impact assessments are rare, and ex post accountability is limited.

In 2024, African nations collectively incurred an estimated economic loss of approximately USD 1.6 billion due to internet shutdowns (Migliano, 2025). Sudan was the most severely affected in 2024, with losses totalling USD 1.12 billion, while Ethiopia experienced losses of around USD 211 million, significantly impacting small enterprises and daily transactions. In Uganda, a 692-hour shutdown in 2021 resulted in an economic cost of approximately USD 109.7 million (Migliano & Woodhams, 2022). Even short-term disruptions have measurable impacts. For example, Mauritius recorded a GDP (PPP) loss of USD 618.2 million following the one-day social media block in November 2024 (Internet Society, 2024a, 2024b).

Other cases illustrate similar patterns. Zimbabwe's 2019 blackout caused daily losses of up to USD 5.7 million (Chimhangwa, 2019), while Cameroon's 2017 shutdown resulted in approximately USD 1.39 million in daily losses (The East African, 2017). Senegal's 2023 internet shutdown caused a 1.3 percentage point decline in GDP, equating to approximately USD 76.8 million over one month, with service sectors losing USD 5.26 million and the stock

market suffering a decline of USD 1.43 billion in value (Sallick & Tagat, 2024). Additionally, Nigeria's seven-month Twitter ban is estimated to have cost the economy USD 26.1 billion, significantly affecting local businesses (Kedem, 2022). These figures underscore the harm inflicted on populations reliant on connectivity, exacerbating inequalities and impeding socio-economic progress.

Mobile money platforms and app-based logistics are essential for enabling seamless domestic and cross-border transactions, promoting financial inclusion, and sustaining trust-based exchanges. When connectivity is interrupted, these systems often become inaccessible, causing transaction failures, liquidity shortages, and financial exclusion for traders and consumers reliant on digital financial services. For example, Sudan's 2019 blackout disrupted remittance flows and ATM networks, while Zimbabwe's shutdown prevented the government from using its mobile payroll system to remunerate civil servants (Al Jazeera, 2019). Such interruptions can erode confidence in digital financial services, thereby constraining democratic governance and economic vitality.

Stable internet access is no longer a luxury but a prerequisite for modern economic activity. Industries such as fintech, e-commerce, and digital infrastructure are particularly vulnerable, as they depend on regulatory certainty and uninterrupted connectivity (UNCTAD, 2025). Investors, both foreign and domestic, require assurance of reliable digital infrastructure to justify their ventures. Internet shutdowns, by signalling political instability and regulatory unpredictability, deter investment and redirect capital to more stable markets. This practice not only results in immediate financial losses but also threatens Africa's long-term digital growth by discouraging innovation, weakening competitiveness, and deterring sustained investment (Shwehdy, 2025a).

Africa's burgeoning tech startup ecosystem is among the fastest-growing globally, attracting both local and foreign investment (Pilling, 2022). Venture capital funding for African startups reached USD 2.21 billion in 2024, with Kenya, Nigeria, Egypt, and South Africa emerging as key destinations (Agwaibor, 2025). These startups play a pivotal role in advancing digital trade by enhancing e-commerce platforms, improving digital payment systems, and strengthening logistical infrastructure, thereby increasing consumer access to goods and services. However, the ability of startups to innovate and scale depends heavily on uninterrupted access to global digital tools and collaboration networks. Internet shutdowns disrupt this growth trajectory, jeopardising not only individual enterprises but also the broader ecosystem that underpins technological advancement, economic development, and employment generation.

However, recent legal and policy developments offer grounds for optimism. In May 2025, the Economic Community of West African States (ECOWAS) Court of Justice declared Senegal's internet shutdown unlawful and in violation of user rights (Columbia University, 2025). Similarly, the High Court of Kenya ruled internet shutdowns unconstitutional, ordering the government to refrain from future disruptions (Kiplagat, 2025). At the continental level, the African Commission on Human and Peoples' Rights (ACHPR) adopted Resolution 580 in 2024, urging member states to guarantee open and secure internet access before, during, and after electoral processes, and to abstain from implementing shutdowns during democratic exercises (ACHPR, 2024). These measures represent critical steps towards institutionalising digital rights and fostering an enabling environment for Africa's digital economy. By reinforcing digital trust and ensuring regulatory stability, such initiatives can mitigate the risks associated with shutdowns, attract investment, and sustain the continent's digital transformation.

3. Key Research gaps and future research agenda

Empirical research on Internet shutdowns remains limited. Existing studies tend to estimate macroeconomic losses from shutdowns but rarely capture transaction-level or firm-level impacts, particularly in resource-constrained settings where mobile money and digital platforms dominate trade (Tagat *et al.*, 2024). Evidence is also scarce on how shutdowns affect startups and innovation hubs that drive digital trade, leaving policymakers and businesses without the insights needed to design contingency protocols and strengthen systemic resilience (Tagat, 2022). Addressing these gaps is critical for safeguarding Africa's digital economy against political or regulatory shocks and ensuring sustainable growth.

Much of the existing literature has concentrated on the human rights dimension of shutdowns, framing them as violations of freedom of expression and access to information (see e.g., Access Now, 2024a). These studies highlight how connectivity restrictions undermine democratic participation, limit civic engagement, and exacerbate social inequalities. While this perspective is essential, it has overshadowed the economic and trade-related consequences of shutdowns, particularly their impact on cross-border digital commerce. This imbalance in research priorities leaves policymakers with an incomplete understanding of the full spectrum of risks associated with connectivity disruptions.

As shown in the previous section, shutdowns have been shown to disrupt e-commerce, paralyse mobile money transactions, and stall cross-border payments, imposing significant costs on businesses and national economies. Further research should estimate the effects of connectivity restrictions on transactional performance indicators, including order volumes, payment authorisations, cart conversions, delivery lead times, and refund rates. Generating this evidence will require cooperation with platforms, payment service providers, and logistics firms to access transaction-level data essential for policy design. Social media platforms like Meta (Facebook, Instagram), TikTok, YouTube, and X provide API access for researchers; however, this access is often restricted and subject to frequent changes (Davidson *et al.*, 2023). API access can assist in analysing the impact of internet shutdowns on digital trade by providing valuable, real-time data and insights.

Similarly, future work could quantify how repeated internet disruptions influence foreign direct investment (FDI) announcements, platform launches, and advertising expenditure.

Comparative case studies are also needed to explore contexts where, despite content controls, there is significant growth in the domestic digital market. Rwanda illustrates this paradox: despite ranking “not free” on Freedom on the Net (Freedom House, 2024b) and facing surveillance and content controls, the country has achieved remarkable progress in digital finance, with digital payments reaching 300 per cent of GDP and service usage rising to 73 per cent in 2024 (Bermeo & Santoro, 2025).⁵ Understanding how such growth occurs under restrictive conditions and its vulnerability to future disruptions should be a priority for scholars examining the interplay between internet governance and digital trade resilience.

4. Conclusion

Government-imposed internet shutdowns and content restrictions in Africa present a profound obstacle to the growth of digital trade and broader economic development. These disruptions undermine business continuity, erode investor confidence, and limit opportunities for innovation across the continent. Addressing this challenge requires the implementation of robust policies and legal frameworks, together with the development of resilient digital infrastructure that guarantees uninterrupted connectivity.

5 It is also worth mentioning that Rwanda has not experienced Internet shutdowns based on data in the V-Dem database.



Strategic investment in expanding internet access and improving network reliability is essential to strengthening resilience against future shutdowns. Such measures would enable businesses and individuals to maintain communication and sustain digital trade even during periods of disruption. In addition, fostering innovation within Africa's technology ecosystem through decentralised applications and local data centres can reduce dependence on centralised networks and mitigate vulnerability to state-imposed restrictions.

Ultimately, realising Africa's digital trade potential depends on a collaborative approach involving regulators, courts, private firms, platforms, and researchers. Connectivity governance must be integrated into trade policy as a core economic priority rather than treated as a peripheral rights issue. Only through such coordinated efforts can Africa secure a sustainable and inclusive digital economy.

References

- Access Now. (2016). No More Internet Shutdowns! Let's #KeepItOn. Retrieved from <https://www.accessnow.org/no-internet-shutdowns-lets-keepiton/>
- Access Now. (2024a). *The State of Internet Shutdowns*. Retrieved from <https://www.accessnow.org/internet-shutdowns-2023/>
- Access Now. (2024b). #KeepItOn in times of war: Sudan's communications shutdown must be reversed urgently. Retrieved from <https://www.accessnow.org/press-release/keepiton-sudan-shutdown/>
- Access Now. (2025). The worst year in shutdowns: a blow to democracy and human rights in Africa (Press release). Retrieved from <https://www.accessnow.org/press-release/africa-keepiton-internet-shutdowns-2024/>
- African Commission on Human and Peoples' Rights (ACHPR). (2024). *Resolution on Internet Shutdowns and Elections in Africa - ACHPR/Res.580 (LXXVIII)2024*. Retrieved from <https://achpr.au.int/en/adopted-resolutions/580-internet-shutdowns-elections-africa-achprres580-lxxviii>
- African Union (AU). (2024). *Protocol to the Agreement Establishing the African Continental Free Trade Area on Digital Trade*. Retrieved from https://au.int/sites/default/files/treaties/45079-treaty-EN_AfCFTA_Protocol_on_Digital_Trade.pdf
- Agwaibor, S. (2025). State of African Tech in 2024: Key Trends and 2025 Outlook. TechCabal Insights. Retrieved from <https://insights.techcabal.com/state-of-african-tech-in-2024-key-trends-and-2025-outlook/>
- Al Jazeera. (2019). Zimbabwe imposes internet shutdown amid crackdown on protests. *Al Jazeera*. Retrieved from <https://www.aljazeera.com/news/2019/1/18/zimbabwe-imposes-internet-shutdown-amid-crackdown-on-protests>
- Andisile Mayalo, M. (2024). Guinea's junta lifts internet restrictions. *IOL*. Retrieved from <https://www.iol.co.za/news/africa/guineas-junta-lifts-internet-restrictions-56906236-d747-4a75-9384-f9accf424c65>
- Antonio, F. (2022). *The Kill Switch: How Internet Shutdowns Threaten Fundamental Human Rights in Africa and Beyond* (Digital Future Whitepaper Series). Yale Law School, Information Society Project. Retrieved from https://law.yale.edu/sites/default/files/area-center/isp/documents/antonio_kill-switch.pdf
- Bermeo, E., & Santoro, L. B. (2025). *Bridging the divide: Rwanda's quest for equitable digital*

- governance*. Global Dev. Retrieved from <https://globaldev.blog/bridging-the-divide-rwanda-quest-for-equitable-digital-governance/>
- Business Mega. (2024). ICTA backtracks and announces lift of social media ban. *Business Mega*. Retrieved from <https://business.mega.mu/2024/11/02/icta-backtracks-and-announces-lift-of-social-media-ban/>
- Chimhangwa, K. (2019). Zimbabwe's internet crackdown shows the 'economic sabotage' of shutdowns. *The World*. Retrieved from <https://theworld.org/stories/2019/02/11/zimbabwes-internet-shutdown-economic-sabotage-costing-millions>
- Collaboration on International ICT Policy for East and Southern Africa (CIPESA). (2017). *A Framework for Calculating the Economic Impact of Internet Disruptions in Sub-Saharan Africa*. Retrieved from https://cipesa.org/wp-content/files/reports/Full-Report_Calculating-the-Economic-Impact-of-Internet-Disruptions-in-Sub-Saharan-Africa_September-29.pdf
- Collaboration on International ICT Policy for East and Southern Africa (CIPESA). (2023). *State of Internet Freedom in Africa 2023: A decade of internet freedom in Africa: Recounting the past, shaping the future*. Retrieved from <https://internetfreedom.africa/wp-content/uploads/2023/10/SIFA23-Report.pdf>
- Columbia University. (2025). *ASUTIC v. Senegal*. <https://globalfreedomofexpression.columbia.edu/cases/asutic-v-senegal/>
- Davidson, B. I., Wischerath, D., Racek, D., Parry, D. A., Godwin, E., Hinds, J., van der Linden, D., Roscoe, J. F., Ayravainen, L., & Cork, A. G. (2023). Platform-controlled social media APIs threaten open science. *Nature Human Behaviour*, 7(12), 2054–2057. <https://doi.org/10.1038/s41562-023-01750-2>
- Ferracane, M. F., González Ugarte, S., & Rogaler, T. (Eds.). (2025). *Digital Trade Integration Database*. European University Institute. <https://dti.eui.eu/database>
- Freedom House. (2024a). *Freedom on the Net 2024: Sudan*. Retrieved from <https://freedomhouse.org/country/sudan/freedom-net/2024>
- Freedom House. (2024b). *Freedom on the Net 2024: Rwanda*. Retrieved from <https://freedomhouse.org/country/rwanda/freedom-net/2024>
- Gachuhi, M. (2024). Guinea's government lifts internet curbs. *CGTN Africa*. Retrieved from <https://africa.cgtn.com/guineas-government-lifts-internet-curbs/>
- GSMA. (2024). *The Mobile Economy: Sub-Saharan Africa 2024*. Retrieved from https://event-assets.gsma.com/pdf/GSMA_ME_SSA_2024_Web.pdf

- Hairsine, K. (2024). Why Burkina Faso is muzzling foreign media. *DW*. Retrieved from <https://www.dw.com/en/why-burkina-faso-is-muzzling-foreign-media/a-68952181>
- Internet Society. (2024a). Service blocking, Mauritius. Retrieved from <https://pulse.internetsociety.org/en/shutdowns/mauritius-orders-blocking-of-social-media-sites-in-advance-of-election/>
- Internet Society. (2024b). NetLoss Calculator (Mauritius, service blocking, 1 November 2024–2 November 2024). Retrieved from https://pulse.internetsociety.org/en/net-loss/?country_code=MU&start_date=2024-11-01&end_date=2024-11-02&shutdown_type=blocking
- Internet Society. (2025). *Policy Brief: Perspectives on Internet Content Blocking*. Retrieved from <https://www.internetsociety.org/wp-content/uploads/2025/09/Policy-Brief-Perspectives-on-Internet-Content-Blocking.pdf>
- Kedem, S. (2022). *Nigeria Lost \$26bn to Twitter ban, Businesses Say*. African Business. Retrieved from <https://perma.cc/9QBT-JXCC>
- Kiplagat, S. (2025). High Court blocks State from shutting down internet services. *Business Daily Africa*. Retrieved from <https://www.businessdailyafrica.com/bd/economy/high-court-blocks-state-from-shutting-down-internet-services-5041358>
- Migliano, S. (2025). *The Cost of Internet Shutdowns in 2024*. Top10VPN. Retrieved from <https://www.top10vpn.com/research/cost-of-internet-shutdowns/2024/>
- Migliano, S. (2026). *The Cost of Internet Shutdowns in 2025*. Top10VPN. Retrieved from <https://www.top10vpn.com/research/cost-of-internet-shutdowns/#cost-of-internet-shutdowns-2024-report>
- Nanda, B. (2025). *Africa's Digital Marketplace Revolution: The Future of E-commerce Unfolding*. CSM Tech. Retrieved from <https://www.csm.tech/blog-details/africas-digital-marketplace-revolution-the-future-of-e-commerce-unfolding>
- Organisation for Economic Co-operation and Development (OECD). (2022). *Rights in the digital age: Challenges and ways forward* (OECD Digital Economy Papers, No. 347). Paris, France: OECD Publishing. <https://doi.org/10.1787/deb707a8-en>
- Pilling, D. (2022). FT Ranking: Africa's Fastest Growing Companies 2022. *Financial Times*. Retrieved from <https://www.ft.com/africas-fastest-growing-companies>
- Sallick, S., & Tagat, A. (2024). *The Price of Disruption: Evaluating the Economic Impact of Senegal's 2023 Internet Shutdowns*. Internews. Retrieved from <https://internews.org/wp-content/uploads/2024/12/The-Price-of-Disruption-Internews-December-2024-English.pdf>



- Shwehdy, A. B. (2025a). *How internet shutdowns silently drain Africa's economy*. World Economic Forum. Retrieved from <https://www.weforum.org/stories/2025/06/how-internet-shutdowns-drain-african-economies/>
- Shwehdy, A. B. (2025b). Africa's Digital Economy Can't Afford Shutdowns. Retrieved from <https://pulse.internetsociety.org/blog/africas-digital-economy-cant-afford-shutdowns>
- Tagat, A. (2022). How Internet Shutdowns Impact Startups. Retrieved from <https://pulse.internetsociety.org/blog/how-internet-shutdowns-impact-startups>
- Tagat, A., Phokeer, A., & Kreitem, H. M. (2024). Net loss: An econometric method to measure the impact of Internet shutdowns. *ACM Journal on Computing and Sustainable Societies*, 2(2), Article 25, 1–22. <https://doi.org/10.1145/3659466>
- The East African. (2017). Internet Shutdown Costs Cameroon \$1.39m. *The East African*. Retrieved from <https://www.theeastafrican.co.ke/tea/business-tech/internet-shutdown-costs-cameroon-1-39m-1362036>
- United Nations Conference on Trade and Development (UNCTAD). (2025). *World Investment Report 2025: International investment in the digital economy*. Geneva, Switzerland: UNCTAD. Retrieved from https://unctad.org/system/files/official-document/wir2025_en.pdf
- VOA News. (2024). Burkina Faso suspends more foreign media over HRW report. *Voice of America*. Retrieved from <https://www.voanews.com/a/burkina-faso-suspends-more-foreign-media-over-hrw-report/7588551.html>
- Woodhams, S., & Migliano, S. (2022). *Government Internet Shutdowns Cost \$5.6 Billion in 2021*. Top10VPN. Retrieved from <https://www.top10vpn.com/research/cost-of-internet-shutdowns/2021/>

Payments without borders: Interoperability, e-commerce, and Africa's trade upside

Christian Lippitsch & Andrew Womer

1. Introduction

Africa's digital trade – spanning e-commerce, digital financial services, and cross-border data flows – offers significant potential for enhancing economic growth and integration. Despite its low digitisation levels across several measures – connectivity, digital infrastructure, access to digital payments – Africa's digital economy is estimated to reach 5.2 per cent of GDP by 2025 (Google & IFC, 2020). In part, this reflects the internet's destruction of distance: digital platforms connect buyers and suppliers across borders, enable firms and consumers to access larger markets, and create entirely new products and services.

Digital financial services (DFS) – from mobile money to digital marketplaces – enable digital trade by, among other things, bridging information asymmetries, reducing payment frictions, strengthening buyer-supplier networks, integrating supply chains and expanding credit to the unbanked. There is a growing literature on how DFS, particularly mobile money, affects domestic and international trade. In this chapter, we examine two strands of this nascent literature, identify knowledge gaps, and suggest future lines of research on the trade effects of digital payments technology adoption and digital finance as an enabler of firm participation in e-commerce.

2. Digital payments adoption and trade

Empirical work on how digital payment adoption impacts trade in Africa remains limited, yet the topic is highly policy relevant: Africa has the highest transaction costs for cross-border payments (CBP) of any region in the world, while having the lowest rates and volumes of CBP, digital payments adoption, financial inclusion and trade integration (Christianson, 2025; Baldini, 2024).

Digital payment technologies can boost trade through two main channels. First, digital payments reduce transaction and search costs by streamlining cross-border payments and lowering the time and uncertainty involved in finding commercial partners and arranging terms. Second, they connect firms and households to the formal financial system, giving them access to financial tools that support trade participation. Different digital payment technologies are geared towards different market segments; here, we will discuss two that are relevant to the African trade context: real-time gross settlement systems and mobile money.

2.1 Real-time gross settlement

Real-time gross settlement (RTGS) is a central bank payment technology and infrastructure that lets large-value payments settle instantly and irreversibly on the central bank's books. Most African countries have RTGS systems set up for domestic transactions, but wholesale CBP for trade are still primarily routed through USD-denominated correspondent banking chains, which drives up costs and payment execution times. Cross-border RTGS schemes in Africa have emerged as an alternative to the predominant correspondent banking system to reduce transaction costs and foster greater trade integration. Many, such as the East African Community's (EAC) East African Payment System (EAPS) and the continent-wide Pan-African Payments and Settlements System (PAPSS), are fledgling, but some, such as the Southern Africa Development Community real-time gross settlement (SADC-RTGS), are more mature, the latter dating back to 2013.

The literature on RTGS systems has primarily focused on domestic implementations outside the context of trade, examining their adoption across central banks (Bech & Hobijn, 2006), analysing intraday liquidity-saving mechanisms and payment-timing incentives (Bech & Garratt, 2003), and more recently, developing machine-learning frameworks to detect fraud and anomalies in high-value payment streams (Desai *et al.*, 2024). In the African context,

D'Andrea and Limodio (2024) demonstrate that high-speed internet from fibre-optic submarine cables significantly facilitated domestic RTGS adoption, which subsequently increased firms' access to loans, extended loan maturities, and expanded sales, with effects most pronounced in countries with weak pre-existing interbank markets.

Moving beyond domestic systems, Cortes *et al.* (2024) provide rare evidence on the cross-border impact of RTGS by studying the staggered rollout of the SADC-RTGS system across 14 SADC countries. Using administrative data on South African exporters, they find that firms increased both export volumes and transaction numbers to participating countries relative to non-participating ones. Crucially, these gains represent trade creation rather than diversion. The benefits concentrate among firms dependent on trade credit, suggesting that faster payment settlement helps alleviate financing constraints (Barrot & Nanda, 2020), though effects are smaller for countries already financially connected to South Africa through existing bank branch networks.

These findings provide compelling evidence for regulatory efforts to increase payments integration at the regional and continental levels through cross-border RTGS frameworks, such as the EAPS and PAPSS, currently under development. The acceleration of payment settlement appears particularly valuable for credit-constrained firms, as it reduces working capital requirements between shipment and payment receipt. When payments clear in hours rather than days or weeks, suppliers face shorter cash conversion cycles, reducing their need for expensive trade credit or bank financing.

2.2 Mobile money

While RTGS systems handle large B2B transactions, mobile money has emerged as Africa's dominant digital payment technology for smaller-scale and informal commerce, reaching marginal and rural areas beyond the formal banking system. A large body of empirical work has demonstrated that mobile money significantly reduces domestic transaction costs and delivers measurable welfare gains, including improved consumption smoothing¹ and poverty reduction for rural households (Aker & Mbiti, 2010; Jack & Suri, 2014; Suri & Jack, 2016). Yet, despite mobile money's extensive domestic impact, its role in facilitating cross-border trade remains underexplored.

1 Consumption smoothing refers to households' ability to maintain stable levels of consumption in the face of income volatility or shocks. Evidence shows that mobile money improves consumption smoothing by easing access to remittances and strengthening informal risk-sharing networks, allowing households to better absorb shocks.

Surveys and policy work suggest mobile money is increasingly used for cross-border transactions, though primarily through workarounds. Musa (2024) documents that traders in the Ethiopia-Somalia border region maintain accounts in both countries or exploit cellular network spillovers to access foreign mobile money systems. Similarly, surveys in East Africa show travelers and traders managing multiple national accounts for regional transactions (BFA, 2017). International payment platforms like Flutterwave and PawaPay have also integrated mobile money, enabling direct cross-border retail and small B2B payments.

The existing literature on mobile money's trade impacts relies heavily on cross-country panel analyses using binary adoption indicators (Kere & Zongo, 2023; Sawadogo & Wandaogo, 2021). While these studies find positive trade effects, they suffer from significant limitations: binary country-level measures miss variation in usage volumes, geographic coverage, and user demographics. Moreover, as Aron (2018) notes, these studies inadequately address the endogeneity of mobile money adoption, which correlates with telecom infrastructure quality, regulatory environments, and financial market development. Understanding whether mobile money causally drives trade – and through which channels – requires more granular data and rigorous identification strategies.

3. E-commerce, digital finance and trade

E-commerce C2C, C2B, and B2B marketplaces have been driving the domestic and international trade of goods and services at an increasing rate. These digital platforms address longstanding barriers that have constrained African trade, including high transaction costs, information asymmetries, and limited market access (Lemma *et al.*, 2022). For small and medium enterprises (SMEs) in particular, digital marketplaces offer new pathways to compete, integrate into value chains, and increase employment opportunities (Wanyoike *et al.*, 2012; Tempest, 2020). The growth of e-commerce platforms is enabled by access to DFS among firms and households, especially mobile payments. We discuss recent findings of three strands of DFS's impact on firms and trade through e-commerce: the link between general digital payment channels and trade on e-commerce platforms, newly developed DFS (often directly embedded in e-commerce), as well as the emergence of more specialised trade-finance solutions.

The spread of DFS in Africa is helping to unlock the potential of e-com-

merce by addressing longstanding challenges in payments, trust, and financial access. As discussed earlier, digital payments reduce transaction and search costs in payment executions, and this is especially true with e-commerce. Digital payments are a more cost-effective way of using e-commerce platforms compared to cash-on-delivery, increasing the appeal of using e-commerce platforms among consumers and businesses (UNCTAD, 2020; Amofah & Chai, 2022; Liang *et al.*, 2024). Consistent with the properties of a network, the more adoption there is among consumers, the more appealing adoption is among sellers, and vice versa. As mobile money is increasingly linked to these e-commerce platforms (in addition to cards), consumers can more easily access new sellers across borders.

Beyond payment processing, DFS technologies in e-commerce are addressing fundamental trust issues that have limited e-commerce adoption, often complemented by third-party offerings. Escrow services – where a trusted third party holds payment until delivery is confirmed – integrated with mobile wallets are replacing traditional cash-in-advance arrangements, which created buyer hesitancy, providing greater transparency and protection for both parties (Banga *et al.*, 2021; Coffie *et al.*, 2021; Ibam *et al.*, 2018). Moreover, an expanding range of payment modalities, such as *buy-now-pay-later* (BNPL), is helping to mitigate cash-flow constraints and motivate consumers to shop online (Beck *et al.*, 2018; Gosavi, 2018; Amofah & Chai, 2022). Some African e-commerce intermediaries also extend short-term credit to sellers, underwritten by analysis of their real-time sales data. For instance, JUMO leverages mobile money transaction histories to deliver rapid microloans to small businesses.

Africa's persistent trade finance gap has long constrained SME participation in import-export operations, where credit access often depends on established trust and reputation networks (Bastos & Pinado, 2013). Emerging DFS innovations leveraged through e-commerce platforms – such as digitised letters of credit, blockchain-based settlement, and alternative credit scoring derived from mobile money transactions or online behavioural data – hold potential for reducing both the cost, the intricacies, as well as information asymmetries of general access to finance (Chioda *et al.*, 2024) and conventional trade finance (Olalekan *et al.*, 2024; Rühmann *et al.*, 2020; Abdulai & Issahaku, 2024). Moreover, Tetteh *et al.* (2025) find that mobile money use increases access to trade credit for informal firms, driven partly by suppliers' own improved access to trade credit from their suppliers, pointing to how the effects of mobile money can spread through the entire value chain.



4. Knowledge gaps and a future research agenda

4.1 Methodological

Most existing studies that estimate the impact of DFS mediated through digital marketplaces do not provide strong *causal* evidence. Current research often relies on cross-sectional small-scale surveys or panel estimators, which is a serious limitation given that DFS adoption is typically non-random, as users who adopt digital payment methods may differ systematically from non-adopters in ways that independently affect their economic outcomes. Studies would benefit from larger sample sizes than those typically available in secondary data sources, such as the World Bank Enterprise Survey. Access to more granular data (see, e.g. earlier studies by Mbiti & Weil, 2011; Jack & Suri, 2011) and, in particular, transaction-level data from platforms or mobile operators would enable more targeted micro-econometric research, revealing how specific DFS mechanisms influence trade through digital marketplaces.

A stronger focus on causal inference using experimental and quasi-experimental methods would strengthen the evidence base. An example of a paper with strong causal inference in this literature that leverages transaction data, albeit from outside Africa, is provided by Bai *et al.* (2022). The authors conduct a randomised experiment on the Chinese e-commerce platform AliExpress to study how market congestion and information frictions affect firm performance by generating exogenous shocks to both order flow and reputational ratings by randomly assigning low-visibility listings to receive either a purchase alone or the same purchase plus a five-star review, isolating the causal effects of incremental demand and enhanced reputation on sales.

4.2 Digital payments technologies and trade

Analysing existing cross-border RTGS systems using administrative firm-level and bank-level data could help policymakers understand why some systems struggle with adoption (e.g. PAPSS) while others stall in implementation (e.g. EAPS). Such analysis could identify the institutional conditions, interoperability models and design features that drive successful trade integration (Boar *et al.*, 2021). Future work could examine bilateral or multilateral trade effects rather than focusing solely on exporters from one country as in Cortes *et al.* (2024), including impacts on import patterns, input sourcing, and the composition of trade flows. Moreover, the distributional effects – e.g. by firm size and sector – also merit the attention of research.

With respect to the financial sector, the literature suggests that domestic RTGS adoption increases banking competition while cross-border RTGS participation facilitates trade between countries, particularly between countries with limited pre-existing bank branch connections. Hence, research could examine through which channels RTGS drives trade – i.e. through reduced information asymmetries, lower transaction costs, or increased market competition. Similarly, if cross-border RTGS systems alleviate credit constraints for trade-dependent firms, how do trade credit markets and debt instruments evolve in participating countries? Future research could also explore how faster payments affect supply chain relationships and bargaining power between buyers and suppliers.

With respect to the study of mobile money adoption, future research could draw on identification strategies used in similar work. Natural experiments – including mobile money tax implementations (Silue, 2021), staggered rollouts of interoperability laws (Brunnermeier *et al.*, 2023), and differential access to broadband infrastructure (D'Andrea *et al.*, 2024) – could provide identification strategies that generate exogenous variation in mobile money access or usage. Mobile money tax implementations provide sharp discontinuities in usage costs. Spadavecchia *et al.* (2024), for example, used the introduction of a mobile money tax in Uganda to study the substitution between mobile money and other forms of money, finding a dramatic outflow from mobile money into bank deposits and cash via ATM withdrawals. Future research could build on this by examining how the substitution out of mobile money impacted trade (or trade credit) in areas with varied financial depth and cash usage.

Brunnermeier *et al.* (2023), on the other hand, exploit the staggered rollout of laws across Africa between 2010 and 2020, which mandated MoMo payments interoperability using 2G data coverage data from GSMA and reconstructing historic MoMo fee structures from the Wayback Machine, an archive of websites. The authors find that these laws have a dual effect: while interoperability requirements dramatically reduce in- and out-of-network fees, they tend to shrink coverage in marginal and rural areas because of reduced investment in cell tower expansion. This approach could be instructive for future research in two ways. Firstly, the authors identified that interoperability laws decrease 2G coverage, which mobile money primarily depends on in rural and marginal areas, potentially providing exogenous variation in coverage that could be used to explore regional variation in trade using administrative and customs data. Second, research could examine border discontinuities where one country has

implemented interoperability while its neighbour has not, testing whether the changes in fee structures have altered the trade composition – e.g. Tanzania implemented mobile money interoperability in 2015 and Kenya in 2018. There is also room to explore how the relatively new cross-border mobile money corridors (e.g. M-Pesa-Vodacom corridor in Kenya and Tanzania) impact trade, transaction costs and competition.

4.3 The impact of DFS on firms, markets and trade through e-commerce

There is a sizable literature on the determinants of DFS adoption and its link to e-commerce at a broader level (e.g. Lemma *et al.*, 2022; Coffie *et al.*, 2021). However, microeconomic links between digital payments, firm-level constraints, and trade through e-commerce platforms remain underexplored. We know little about the relationship between DFS, e-commerce platforms and *specific* firm dynamics – for example, whether DFS help existing businesses simply scale or facilitate market access and whether DFS usage fosters lasting export survival and sustained e-commerce growth.

Further research could shed light on the impact of different DFS, such as escrow services and loan products, for various user groups (e.g. those with lower digital literacy or limited access to credit) in their access to and engagement on digital platforms. Two studies in this regard are Riley (2024) and Heath and Riley (2024), which find that loans delivered through MoMo give women entrepreneurs more control over finances, increasing investment. This could be expanded with studies on how various emerging technologies complement DFS. These include Biometric Verification Systems and blockchain technology, which have the potential to mitigate crucial trust issues with digital payment systems. Similarly, Hornuf *et al.* (2025), in a systematic literature review, find that research on the supply-side of fintech adoption and e-commerce platforms is dominated by a few settings and actors, with very little evidence across other markets, especially in developing countries.

Further, more research is needed on market-level effects of DFS-enabled e-commerce, like price impacts, consumer welfare and network dynamics. Lower transaction costs should theoretically reduce prices and generate network externalities, while Bai *et al.* (2022) also find effects on congestion and information externalities in Chinese e-commerce. Another example is given by the *Billion Prices Project* (Cavallo & Rigobon, 2016), in which the authors collect price information at large scale from online platforms to study links to

macroeconomic variables and dynamics. But more in-depth empirical evidence with a focus on the African context remains thin. A stronger microevidence base would inform subsequent macro studies, for instance, through strong parameter identification used in general equilibrium models. These models could then capture dynamic distributional and price effects.

4.4 Policies to increase trust, uptake and trade integration

In addition to providing the necessary physical infrastructure (e.g. reliable electricity and mobile networks), governments play a significant role in driving the adoption and efficient use of DFS and e-commerce platforms with open, transparent and therefore trade-enabling regulation (see e.g. Yermack, 2018; Kelikume, 2021; Lemma *et al.*, 2022). Yet, modern and comprehensive regulatory frameworks remain concentrated in developed countries (Jaller *et al.*, 2020) but gain increasing importance with the growing volume of e-commerce as well as the blurring distinction between goods and services.

Existing research emphasises the importance of regulatory factors in digital payments and DFS adoption, which includes questions on the optimal design of consumer protection and data privacy, which could inform the coordination of the setting of rules and regulations at the regional level, given a current lack of harmonised rules and taxation across African markets and on regional e-commerce platforms. Lack of reliable online payment solutions remains a key obstacle for intra-regional e-commerce (Banga *et al.*, 2021). Research on consumer protection regarding DFS and e-commerce is limited: issues with local payment provider integration, differences in or absence of fintech regulations, payment standards, e-documentation frameworks, consumer protection, as well as their enforcement, across and within African countries, make it complex to scale DFS continent-wide. We still lack clear evidence on whether stronger e-money safeguards or disclosure laws drive greater adoption of online payments, in particular on e-commerce platforms.

5. Conclusion

Digital trade holds vast potential for African economies – domestically, within Africa, and towards international market integration – and digital finance has been a key enabler. The digitalisation of financial flows through mobile money and integrated international payments has facilitated trade and increased volumes. However, we know too little about the mechanisms and heterogeneous impacts. More research is needed on designing and integrating



payment systems to maximise emerging digital technologies.

E-commerce is reshaping trade through integrated payments, digital credit that overcomes information frictions, and new trade finance solutions. While the potential appears vast, we lack insights into how firms interact with digital marketplaces and each other. Studies leveraging causal identification and examining firm and supply-chain effects could inform policies to maximise benefits through better marketplace access, security measures, and international harmonisation.

References

- Abdulai, M. G., & Issahaku, H. (2024). The effect of financial development and legal institutions on financial inclusion in Sub-Saharan Africa. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(1), 100255. <https://doi.org/10.1016/j.joitmc.2024.100255>
- Aker, J. C., & Mbiti, I. (2010). Mobile phones and economic development in Africa. *Journal of Economic Perspectives*, 24(3), 207–232. <https://doi.org/10.1257/jep.24.3.207>
- Amofah, D. O., & Chai, J. (2022). Sustaining consumer e-commerce adoption in Sub-Saharan Africa: Do trust and payment method matter? *Sustainability*, 14(14), 8466. <https://doi.org/10.3390/su14148466>
- Aron, J. (2018). Mobile money and the economy: A review of the evidence. *The World Bank Research Observer*, 33(2), 135–188. <https://doi.org/10.1596/33272>
- Bai, J., Chen, M. X., Liu, J., Mu, X., & Xu, D. Y. (2022). *Stand Out from the Millions: Market Congestion and Information Friction on Global E-Commerce Platforms* (Working paper). Retrieved from https://www.wto.org/english/res_e/reser_e/gtdw_e/wkshop22_e/prof_jie_bai_paper.pdf
- Banga, K., Gharib, M., Mendez-Parra, M., & Macleod, J. (2021). *E-commerce in preferential trade agreements: Implications for African firms and the AfCFTA* (Report). London: ODI. Retrieved from https://media.odi.org/documents/e-commerce_in_preferential_trade_agreements_report.pdf
- Barrot, J.-N., & Nanda, R. (2020). The employment effects of faster payment: Evidence from the federal QuickPay reform. *Journal of Finance*, 75(6), 3139–3173. <https://doi.org/10.1111/jofi.12955>
- Bastos, R., & Pindado, J. (2013). Trade credit during a financial crisis: A panel data analysis. *Journal of Business Research*, 66(5), 614–620. <https://doi.org/10.1016/j.jbusres.2012.03.015>
- Bech, M. L., & Garratt, R. (2003). The intraday liquidity management game. *Journal of Economic Theory*, 109(2), 198–219. [https://doi.org/10.1016/S0022-0531\(03\)00016-4](https://doi.org/10.1016/S0022-0531(03)00016-4)
- Bech, M. L., & Hobijn, B. (2006). *Technology Diffusion within Central Banking: The Case of Real-Time Gross Settlement* (Staff Report No. 260). Federal Reserve Bank of New York. Retrieved from https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr260.pdf

- Beck, T., Pamuk, H., Ramrattan, R., & Uras, B. R. (2018). Payment instruments, finance and development. *Journal of Development Economics*, 133, 162–186. <https://doi.org/10.1016/j.jdeveco.2018.01.005>
- Boar, C., Claessens, S., Kosse, A., Leckow, R., & Rice, T. (2021). *Interoperability between payment systems across borders* (BIS Bulletin No. 49). Bank for International Settlements. Retrieved from <https://www.bis.org/publ/bisbull49.pdf>
- Brunnermeier, M. K., Limodio, N., & Spadavecchia, L. (2023). *Mobile money, interoperability, and financial inclusion* (NBER Working Paper No. 31696). National Bureau of Economic Research. <https://doi.org/10.3386/w31696>
- Cavallo, A., & Rigobon, R. (2016). The billion prices project: Using online prices for measurement and research. *Journal of Economic Perspectives*, 30(2), 151–178. <https://doi.org/10.1257/jep.30.2.151>
- BFA. (2017). *East Africa Mobile Money Cross Payments: Market demand Side*. Retrieved from https://www.findevgateway.org/sites/default/files/publications/files/east_africa_interoperability_study_ppt_21sep2017_wdisclaimer.pdf
- Coffie, C. P. K., Hongjiang, Z., Mensah, I. A., Kiconco, R., & Simon, A. E. O. (2021). Determinants of FinTech payment services diffusion by SMEs in Sub-Saharan Africa: Evidence from Ghana. *Information Technology for Development*, 27(3), 539–560. <https://doi.org/10.1080/02681102.2020.1840324>
- Cortes, G., Mariani, L. A., & Sant'Anna, V. P. (2024). *Unleashing international trade through financial integration: Evidence from a cross-border payment system* (ERSA Working Paper Series). <https://doi.org/10.71587/n0kg7w36>
- Chioda, L., Gertler, P., Higgins, S., & Medina, P. C. (2024). *FinTech lending to borrowers with no credit history* (NBER Working Paper No. 33208). National Bureau of Economic Research. <https://doi.org/10.3386/w33208>
- Christianson, D. (2025). *Africa's remittance costs are coming down, but very slowly?*. Tralac (Trade Law Centre). Retrieved from <https://www.tralac.org/blog/article/16753-africa-s-remittance-costs-are-coming-down-but-very-slowly.html>
- D'Andrea, A., & Limodio, N. (2024). High-speed internet, financial technology, and banking. *Management Science*, 70(2), 773–798. <https://doi.org/10.1287/mnsc.2023.4703>
- D'Andrea, A., Hitayezu, P., Kpodar, K. R., Limodio, N., & Presbitero, A. F. (2024). *Mobile Internet, collateral, and banking* (IMF Working Paper No. WP/24/070). International Monetary Fund. <https://doi.org/10.5089/9798400270734.001>

- Desai, A., Kosse, A., & Sharples, J. (2024). *Finding a needle in a haystack: A machine learning framework for anomaly detection in payment systems* (BIS Working Papers No. 1188). Bank for International Settlements. Retrieved from <https://www.bis.org/publ/work1188.pdf>
- Baldini, A. (2024). Digital financial services in Africa. In European Investment Bank, *Finance in Africa: Unlocking investment in an era of digital transformation and climate transition* (pp. 117–132). European Investment Bank. <https://doi.org/10.2867/134596>
- Gosavi, A. (2018). Can mobile money help firms mitigate the problem of access to finance in Eastern sub-Saharan Africa? *Journal of African Business*, 19(3), 343–360. <https://doi.org/10.1080/15228916.2017.1396791>
- Heath, R., & Riley, E. (2024). *Digital financial services and women's empowerment: Experimental evidence from Tanzania* (Working Paper Series No. WPS-243). Center for Effective Global Action, University of California, Berkeley. <https://doi.org/10.26085/C3ZC7D>
- Hornuf, L., Safari, K., & Voshaar, J. (2025). Mobile fintech adoption in Sub-Saharan Africa: A systematic literature review and meta-analysis. *Research in International Business and Finance*, 73, 102529. <https://doi.org/10.1016/j.ribaf.2024.102529>
- Ibam, E. O., Boyinbode, O. K., & Afolabi, M. O. (2018). E-commerce in Africa: The case of Nigeria. *EAI Endorsed Transactions on Serious Games*, 4(15), e153536. <http://dx.doi.org/10.4108/eai.5-1-2018.153536>
- Google & International Finance Corporation (IFC). (2020). *e-Conomy Africa 2020: Africa's \$180 billion Internet economy future*. Retrieved from <https://www.ifc.org/content/dam/ifc/doc/mgrt/e-conomy-africa-2020.pdf>
- Jack, W., & Suri, T. (2011). *Mobile money: The economics of M-PESA* (NBER Working Paper No. 16721). National Bureau of Economic Research. <https://doi.org/10.3386/w16721>
- Jack, W., & Suri, T. (2014). Risk sharing and transactions costs: Evidence from Kenya's mobile money revolution. *American Economic Review*, 104(1), 183–223. <https://doi.org/10.1257/aer.104.1.183>
- Jaller, D., Gaillard, L., & Molinuevo, M. (2020). *The regulation of digital trade: Key policies and international trends*. World Bank. <https://doi.org/10.1596/33164>
- Kelikume, I. (2021). Digital financial inclusion, informal economy and poverty reduction in Africa. *Journal of Enterprising Communities: People and Places in the Global Economy*, 15(4), 626–640. <https://doi.org/10.1108/JEC-06-2020-0124>
- Kere, S., & Zongo, A. (2023). Digital technologies and intra-African trade. *International Economics*, 173, 359–383. <https://doi.org/10.1016/j.inteco.2023.01.005>

- Lemma, A., Mendez-Parra, M., & Naliaka, L. (2022). *The AfCFTA: Unlocking the potential of the digital economy in Africa* (ODI Report). ODI. Retrieved from https://media.odi.org/documents/Digital_trade_report_AfCFTA.pdf
- Liang, J. S., Mundy, R. S., & Jagwayan, S. (2024). *E-Commerce in Africa: Divergent Impacts on Rural and Urban Economies*. Cornell University. <https://doi.org/10.48550/arXiv.2412.03879>
- Mbiti, I., & Weil, D. N. (2011). *Mobile banking: The impact of M-Pesa in Kenya* (NBER Working Paper No. 17129). National Bureau of Economic Research. <https://doi.org/10.3386/w17129>
- Musa, A. M. (2024). *Transborder mobile money platforms in the greater Somali economic space*. Rift Valley Institute. Retrieved from https://riftvalley.net/wp-content/uploads/2024/06/Transborder-Mobile-Money_FINAL-2.pdf
- Olalekan, O. O., Adeleye, D. O., & Srivastava, V. K. (2024). The surge of cross-border payment firms in Africa: Implications for entrepreneurship and SMEs. *International Journal of Science and Research Archive*, 13(1), 684–696. <https://doi.org/10.30574/ijjsra.2024.13.1.1728>
- Riley, E. (2024). Resisting social pressure in the household using mobile money: Experimental evidence on microenterprise investment in Uganda. *American Economic Review*, 114(5), 1415–1447. <https://doi.org/10.1257/aer.20220717>
- Rühmann, F., Aashirvad Konda, S., Horrocks, P., Taka, N. (2020). *Can blockchain technology reduce the cost of remittances?* (OECD Development Co-operation Working Papers No. 73). OECD Publishing. <https://doi.org/10.1787/d4d6ac8f-en>
- Sawadogo, F., & Wandaogo, A. A. (2021). Does mobile money services adoption foster intra-African goods trade? *Economics Letters*, 199, 109681. <https://doi.org/10.1016/j.econlet.2020.109681>
- Silue, T. (2021). *E-money, financial inclusion and mobile money tax in Sub-Saharan African mobile networks* (Études et Documents No. 22). CERDI (Centre d'Études et de Recherches sur le Développement International), Université Clermont Auvergne. Retrieved from <https://uca.hal.science/hal-03281898/document>
- Spadavecchia, L. (2024). *Back to bank: Digital currency, deposits' substitution and credit* (Working paper). Retrieved from https://lorenzospadavecchiaeconomics.github.io/docs/Back_to_bank_noBoU.pdf
- Suri, T., & Jack, W. (2016). The long-run poverty and gender impacts of mobile money. *Science*, 354(6317), 1288–1292. <https://doi.org/10.1126/science.aah5309>

- Tempest, A. (2020). *The Digital Economy and Ecommerce in Africa – Drivers of the African Free Trade Area?* (Special Report). South African Institute of International Affairs. Retrieved from https://saiaa.org.za/wp-content/uploads/2020/05/The-digital-economy-and-ecommerce-in-Africa_Special-Report.pdf
- Tetteh, G. K., Goedhuys, M., Konte, M., & Mohnen, P. (2025). Mobile money use and entrepreneurs' access to trade credit in the informal sector. *Review of Development Economics*. <https://doi.org/10.1111/rode.13223>
- United Nations Conference on Trade and Development (UNCTAD). (2020). *COVID-19 and e-commerce: Impact on businesses and policy responses* (UNCTAD/DTL/STICT/2020/12). Retrieved from https://unctad.org/system/files/official-document/dtlstict2020d12_en.pdf
- Wanyoike, D. M., Mukulu, E., & Waititu, A. G. (2012). ICT attributes as determinants of e-commerce adoption by formal small enterprises in urban Kenya. *International Journal of Business and Social Science*, 3(23), 65–74. Retrieved from https://ijbss.thebrpi.org/journals/Vol_3_No_23_December_2012/7.pdf
- Yermack, D. (2018). *FinTech in Sub-Saharan Africa: What has worked well, and what hasn't* (NBER Working Paper No. 25007). National Bureau of Economic Research. Retrieved from <https://doi.org/10.3386/w25007>

AI in African digital trade regulation: Legal and political economy perspectives

Franziska Sucker & Karishma Banga

1. Introduction

Artificial intelligence (AI) is reshaping digital trade governance, intensifying existing regulatory challenges while introducing new risks and asymmetries. For African countries, this transformation intersects with longstanding structural constraints and strategic priorities, including the need to promote inclusive digital development, safeguard regulatory autonomy, and assert agency in global norm-setting processes.

AI-driven digitalisation in Africa unfolds against a backdrop of infrastructural inequality, fragmented governance, and growing geopolitical pressures. African economies are not only sites of digital experimentation but also key suppliers of critical inputs to the global AI economy. At the same time, institutional and legal frameworks across the continent remain uneven, and regulatory debates are often shaped by external models that pay insufficient attention to regional contexts and developmental imperatives.

The recent adoption of the Protocol on Digital Trade (DTP) to the African Continental Free Trade Area (AfCFTA), alongside the African Union's (AU) 2024 Continental Artificial Intelligence Strategy and the 2025 Africa Decla-

ration on Artificial Intelligence, marks a turning point in continental efforts to coordinate AI and data governance. These initiatives make it essential to examine how African legal and policy frameworks are addressing the challenges of AI-powered digital trade.

In this chapter, we map these evolving frameworks and identify five priority areas for future research. We highlight conceptual, legal, infrastructural, and distributive gaps, and outline a forward-looking agenda grounded in African governance frameworks, regulatory needs, and the realities of the political economy. In doing so, we aim to inform scholarship and policymaking that reinforce African agency in shaping digital futures and ensure that AI governance aligns with the continent's development priorities.

2. Mapping AI-related digital trade regulation in Africa

2.1 AI's implications for digital trade regulation

AI technologies are reshaping the foundations of digital trade regulation. They intensify existing challenges in areas such as the classification of digital trade items within established trade law categories (services, goods, intellectual property), the application of non-discrimination disciplines to algorithmic processes, the governance of data flows, and the regulation of competition in highly concentrated markets. At the same time, they introduce new forms of opacity, scale, and risk that strain current legal frameworks. These developments call for a reconsideration of how digital trade rules can support innovation and inclusion without undermining regulatory autonomy.

First, the role of data in an AI-driven economy differs markedly from its function in earlier phases of digitalisation. Rather than serving merely as a raw material to be refined into value, data in AI systems acts as a dynamic input that enables learning, adaptation, and predictive decision-making (Zhou *et al.*, 2017; Jordan & Mitchell, 2015). Deep learning models, including generative adversarial networks (GANs), rely not only on vast volumes of data but on data that is highly structured, relevant, and of high quality. This shift recasts data as the fuel of AI, placing greater emphasis on how it is curated, governed, and controlled. Digital firms increasingly treat data as a core economic resource, central to processes of accumulation and competitive advantage (Srnicsek, 2017). In this context, control over data flows and infrastructures contributes to new forms of global asymmetry, reinforcing the dominance of firms and states that

are already technologically advanced. This raises normative and distributional questions about ownership, access, and the design of regulatory frameworks in AI-driven economies.

Second, AI's dependence on large-scale datasets intensifies the relevance of cross-border data flows (CBDFs) and highlights the tensions between openness and inequality.¹ On the one hand, decentralised AI training and data-sharing models are often seen to require minimal restrictions on data flows to support model accuracy, efficiency, and innovation (Law, 2024; Goldfarb & Trefler, 2018). On the other hand, the global digital landscape is characterised by stark disparities in AI capabilities and infrastructure. A small number of economies, including the United States (US), the European Union (EU) member states, the United Kingdom (UK), and China, continue to dominate AI development and data infrastructure. In this context, unrestricted CBDFs risk entrenching existing asymmetries by facilitating one-way data extraction from African economies, without commensurate gains in value generation, technological capacity, or regulatory leverage. Moreover, the scale and scope of AI-related data flows, including structured, semi-structured, and unstructured data, such as behavioural profiles and social media content, give rise to growing concerns around data privacy, informed consent, and the re-identification of individuals (Mühlhoff, 2023; Ganne *et al.*, 2024; Xu *et al.*, 2025). These risks are particularly pronounced in jurisdictions with limited data protection laws and enforcement mechanisms.

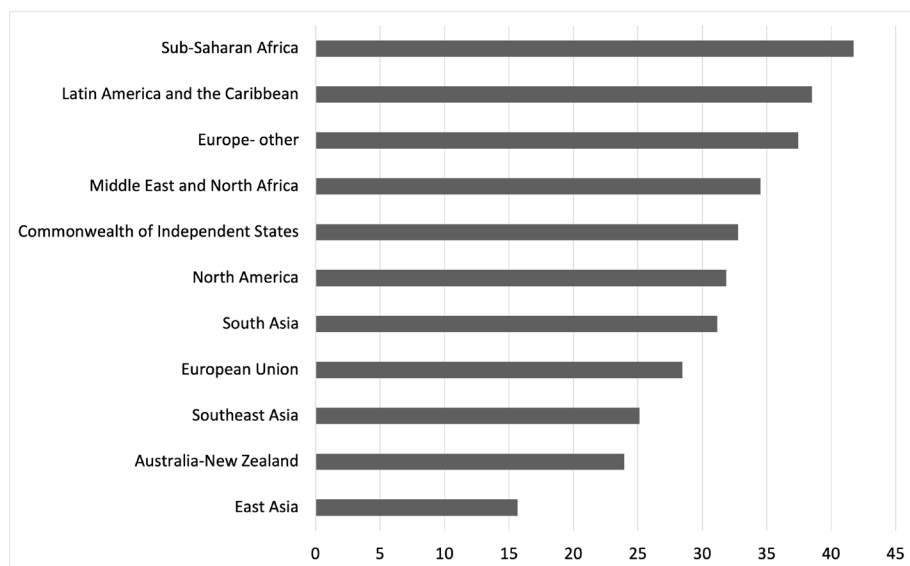
Recent empirical evidence reinforces this picture. Data from Lloyd's World Risk Poll suggests that over 40 per cent of the population in Sub-Saharan Africa perceives AI as a potential harm over the coming two decades, a figure significantly higher than in South or East Asia (Figure 1). Banga and Mehta find that digital risks around AI and data are associated with more restrictive approaches to digital trade governance. Combining data from the Lloyd's World Risk Poll and the OECD's Digital Services Trade Restrictiveness Index (DSTRI), they find that developed countries tend to respond to rising digital risks by becoming more restrictive in their digital services trade, while this pattern is not observed among developing countries (Banga & Mehta, 2025).² Their analysis also suggests that, although countries increasingly participate in digital

1 For a detailed analysis on CBDFs, see Chapter 11 of this book.

2 Banga and Mehta (2025) state that the relationship between perceptions of digital risks and digital regulations is likely to be two-way, with one affecting the other. They make no assumption on causation but find a positive correlation between the two variables.

trade agreements (DTAs), many continue to preserve domestic policy space on CDBFs.

Figure 1: Percentage of population that perceives AI as a harm over the next 20 years, 2021.



Source: Authors' illustration, based on Lloyd's Register Foundation (2024). World Risk Poll Data. Retrieved from <<https://www.lrfoundation.org.uk/wrp/world-risk-poll-data>>.

Third, the opaque and often unpredictable nature of AI systems creates new challenges for trade-related regulation. AI models are often described as operating in a 'black box', where the rationale behind algorithmic outputs is not readily observable or understandable, even to their developers. This opacity introduces governance risks, particularly with respect to algorithmic bias, discrimination, and accountability. Evidence from major platforms demonstrates that AI-based systems can reinforce, and in some instances exacerbate, existing inequalities (Lund *et al.*, 2023). For instance, Amazon's buy-box algorithm and Facebook's advertising algorithm have both been shown to disadvantage women and female workers (Banga & Faith, 2021). In an increasingly automated digital trade environment, the need for regulatory oversight of algorithmic decision-making becomes pressing. Yet most trade agreements lack provisions that address these concerns. Few include enforceable mechanisms to audit or evaluate the accountability, transparency, or discriminatory impact of algorithms. This regulatory gap disproportionately affects those already at the



margins of the digital economy and creates risks for countries with limited enforcement capacity.

Fourth, the question of access to source code³ and related technical components of AI systems has emerged as a central legal concern. Many recent DTAs include provisions that prohibit governments from requiring the disclosure of source code or algorithms, citing the need to protect intellectual property and commercial confidentiality (Vasquez Callo-Müller, 2026). These provisions have been increasingly standardised since proposals such as the US submission to the WTO's e-commerce discussions in 2016, which, in a 'non-paper', argued against compelled technology transfers and disclosure obligations (WTO, 2016). While some agreements include exceptions for legitimate public policy purposes, these carve-outs are often narrowly drafted and may not accommodate the emerging need for algorithmic transparency and accountability (Peng, 2024, pp. 163-181). This legal framing might restrict the scope for meaningful regulatory oversight of AI, particularly where issues of bias, competition, or public safety arise (Jones *et al.*, 2024; Jones, 2023). However, the AfCFTA DTP includes broad exceptions in its Annex on Criteria for Determining the Legitimate and Legal Public Interest Reasons for Disclosure of Source Code (Annex on Source Code), but questions remain regarding the scope and enforceability of these provisions, especially as they relate to training data, algorithmic parameters, and application programming interfaces (Jones *et al.*, 2024).⁴

Finally, a further dimension of AI's distributive impact in the African context emerges in the regulation of digital identity systems. Digital ID systems are increasingly central to public sector digital transformation, financial inclusion, and access to cross-border services, yet their deployment raises serious legal and ethical questions. These include concerns over data protection, surveillance, exclusion, and the opaque functioning of AI-based identity verification processes. When integrated into digital trade ecosystems, these systems shape who can participate in the digital economy and under what terms. The legal implications of AI-powered digital ID infrastructure, especially when combined with trade rules that limit state control over data or technology transfer, have not been addressed in most trade agreements. However, the AfCFTA DTP includes an Annex on Digital Identities, signalling initial efforts to engage with these issues at the continental level.

3 Source code is the actual programming language instructions that implement an algorithm.

4 In some agreements, such as the USMCA, "an algorithm expressed in that source code" is explicitly covered.

Taken together, these five dimensions illustrate the multifaceted ways in which AI is transforming digital trade regulation. They also underscore the need for regulatory frameworks that are sensitive to local contexts and capable of safeguarding both domestic policy space and broader public interest objectives. In the African context, this requires recognising the uneven distribution of risks, capacities, and opportunities, and resisting one-size-fits-all models that overlook structural inequalities in the global digital economy.

2.2 Continental, regional, and national regulatory frameworks

Efforts to develop more context-sensitive and inclusive approaches to AI regulation in Africa are increasingly reflected in evolving legal and policy frameworks at the continental, regional, and national levels. These layered initiatives demonstrate growing recognition of the need to govern AI technologies in ways that support regional integration, promote innovation, and safeguard development priorities, while navigating structural constraints and global regulatory asymmetries.

At the continental level, three developments stand out. First, the AU's 2024 Continental Artificial Intelligence Strategy outlines a shared vision for ethical, inclusive, and development-oriented AI aligned with Agenda 2063 (AU, n.d., 2024b). It stresses principles such as transparency, human rights, and responsible innovation, while identifying key enablers like digital infrastructure, capacity building, and regional collaboration. Second, the April 2025 Africa Declaration on Artificial Intelligence reaffirms this vision, calling for collective action to promote African talent development, ensure equitable access to computing resources, and strengthen regulatory cooperation across borders (C4IR Rwanda, 2025). Third, the adoption of the AfCFTA DTP in February 2024 introduces obligations on digital trade regulation,⁵ including provisions directly relevant to AI, such as on cross-border data transfers (including restrictions on data localisation requirements),⁶ source code protection,⁷ other online trust issues,⁸ and digital identities⁹ (Sucker, 2025).

While dedicated regional strategies on AI have not yet emerged, the expe-

5 To review the full Protocol, see AU (2024a). The consolidated annexes adopted on 17 February 2025 are available in AU (2025).

6 DTP, Articles 20 & 22, and CBDT Annex.

7 DTP, Article 24, and Source Code Annex.

8 DTP, part V and Annex on Online Safety and Security.

9 DTP, Article 14 and Annex on Digital Identities.

rience with the Regional Economic Communities (RECs) model laws and policy frameworks,¹⁰ which have shaped national regulation and contributed to regulatory coherence despite uneven implementation, indicates the potential to advance alignment in areas such as data governance, algorithmic oversight, and digital identity.

At the national level, several African countries have begun to develop more targeted policies on AI governance. Rwanda's National AI Policy, adopted in 2023, sets out ambitions to establish the country as a regional hub for responsible AI, with a focus on digital infrastructure, AI-enabled public services, and ecosystem development.¹¹ Kenya's Digital Economy Blueprint and platforms such as Irembo¹² illustrate efforts to use data-driven innovation to transform public administration and expand service delivery.¹³ Elsewhere, South Africa's participation in the South Africa-Dubai AI Hub, launched in April 2025, highlights emerging international partnerships aimed at boosting technical capacity and policy dialogue (SAAIA, 2025). These national efforts are often shaped by resource constraints and external partnerships, and remain uneven in scope and maturity across the continent.

Despite this growing momentum, African countries continue to face well-known governance challenges. Limited access to high-performance computing, fragmented digital infrastructure, and underdeveloped data ecosystems constrain the effective implementation of AI governance frameworks. Many states also face institutional coordination difficulties, and technical expertise may be lacking within legislative, regulatory, and judicial bodies. These material and institutional limitations affect not only the pace of AI adoption, but also the capacity to regulate emerging technologies in a way that addresses public interest and developmental objectives.

10 An example of a REC model law can be found in ITU (2013).

11 Ministry of ICT and Innovation (MINICT) & Rwanda Utilities Regulatory Authority (RURA). (2023). The National AI Policy: To leverage AI to power economic growth, improve quality of life and position Rwanda as a global innovator for responsible and inclusive AI. <https://www.ictworks.org/wp-content/uploads/2023/12/Rwanda_Artificial_Intelligence_Policy.pdf>.

12 For complete access to information about Irembo, see: <https://irembo.gov.rw/home/citizen/all_services>.

13 Ministry of Information, Communications and the Digital Economy (MICDE). (2019). Digital economy blueprint: Powering Kenya's transformation. <<https://repository.kippira.or.ke/server/api/core/bitstreams/2f95cd55-9cec-4801-906b-2ef6f00cb540/content>>.

Nevertheless, these efforts reflect a growing recognition across the continent of the opportunity to shape AI regulation in ways that promote inclusive innovation, support regional integration, and assert Africa's regulatory agency in a fast-changing global environment. The layered initiatives at the continental, regional, and national levels show that African actors are not merely policy takers but are beginning to define distinct regulatory approaches tailored to local contexts and developmental imperatives. Their effectiveness, however, will ultimately depend not only on legal design but also on sustained investment in institutional capacity, infrastructural improvement, and regional co-operation.

2.3 African institutions and civil society

Beyond state-led processes, African institutions and civil society actors help shape normative frameworks for AI governance grounded in rights, inclusion, and public accountability. These actors contribute technical expertise, foster public engagement, and advocate for regulatory approaches that reflect social and ethical priorities.

Among emerging institutional efforts, the Global Centre on AI Governance (GCG) stands out as the first Africa-based think tank dedicated to this issue.¹⁴ Its initiatives include the African Observatory on Responsible AI, a platform for research, public engagement, and dialogue on the ethical and social dimensions of AI. This work complements the efforts of the Smart Africa Alliance, which promotes harmonised digital policies across member states,¹⁵ and the UN-ECA Centre of Excellence on Digital Identity, Trade and Economy, which engages directly with questions of digital trade and regulatory capacity.¹⁶

Civil society organisations have also been instrumental in advancing AI and data governance discourse. Groups such as Paradigm Initiative,¹⁷ the Collaboration on International ICT Policy for East and Southern Africa (CIPESA), and Media Rights Agenda advocate for digital rights, transparency, and accountability, particularly with respect to algorithmic harms, surveillance prac-

14 For access to information and materials on the Global Centre on AI Governance initiative, see <<https://www.globalcenter.ai/>>.

15 For access to information and materials on Smart Africa, see <<https://smartafrica.org/>>.

16 For access to information and materials on the UN-ECA Centre of Excellence on Digital Identity, Trade and Economy, see <<https://www.uneca.org/dite-africa>>.

17 For access to information and materials on Paradigm Initiative, see <<https://paradigmhq.org/>>.



tices, and exclusion from digital services. Their work helps foreground the distributive consequences of AI technologies and brings public interest concerns into national and regional policy spaces.

While these initiatives signal a growing ecosystem of actors invested in AI governance, challenges remain. Engagement is often concentrated in a few subregions, and many organisations face funding, access, and coordination barriers. Nonetheless, their contributions are critical to ensuring that African AI regulation is not only technically robust and regionally coherent but also responsive to broader concerns around justice, rights, and accountability.

3. Research gaps and priorities in AI-related digital trade regulation in Africa

Despite growing policy momentum, several critical research gaps remain in understanding and supporting Africa's approach to AI within digital trade regulation.

3.1 Geopolitical dynamics and digital sovereignty

There is limited research on how rising geopolitical tensions, including the global race for AI dominance, trade disputes over semiconductors, and the securitisation of critical minerals, are shaping digital trade and AI strategies in African economies. While Africa is increasingly positioned as a supplier of critical inputs to the global digital economy, its strategic agency in shaping related governance structures remains underexplored. Little empirical or conceptual work examines how such dynamics are unfolding across African contexts, or how they influence national and regional approaches to digital sovereignty, infrastructure policy, or alignment with global trade rules. Many critical minerals, such as cobalt, lithium, and rare earth elements, are sourced from African countries, yet Africa's strategic role in these global supply chains remains underanalyzed. Similarly, Africa's positioning in data and computing capacity, whether in terms of cross-border data flows, access to high-performance computing, or control over digital infrastructure, raises critical questions about leverage, dependency, and the prospects for autonomous digital development.

Future research must clarify Africa's role in global digital geopolitics, including the implications of export controls, technological alliances, and the securitisation of critical minerals and digital infrastructure. Particular attention

should be paid to how geopolitical pressures shape or constrain African policy choices on data governance, infrastructure strategy, and regulatory cooperation. Comparative case studies from other regions could shed light on how DTAs, investment partnerships, or regional frameworks can be used to assert strategic agency and build resilience. For Africa, such research can help identify strategies for engaging in multilateral forums, such as the WTO, G7, BRICS, or the Global Partnership on AI (GPAI), in ways that strengthen regulatory autonomy and promote inclusive digital development.

3.2 Infrastructure and critical resource constraints

The material foundations of AI and digital trade remain under-analysed in African contexts. Regulatory ambitions are often curtailed by infrastructural constraints such as limited high-performance computing (HPC) capacity, scarce data storage facilities, and weak cross-border connectivity (CIPIT, 2025). These limitations not only restrict the pace of AI adoption but also affect countries' ability to implement, monitor, and enforce digital trade frameworks effectively. A growing dependency on foreign-owned technology and infrastructure providers compounds these challenges. The increasing centralisation of data processing and cloud services among a small number of global firms raises concerns about vendor lock-in, jurisdictional control, and regulatory autonomy (Srnicsek, 2017). Monopolisation trends in AI, where a few actors dominate access to advanced models, computing power, and large-scale data sets, further constrain options for African countries to shape independent regulatory approaches or pursue inclusive digital development strategies.

AI ecosystems across Africa also evolve unevenly (CIPIT, 2025): while countries like Kenya, Nigeria, South Africa, and Ghana have incorporated AI into national digital strategies and invested in data infrastructure, many regions, especially in Central Africa, continue to face major constraints in infrastructure, skills, and institutional coordination. Therefore, future research must develop governance strategies that respond directly to Africa's infrastructural and resource realities. Rather than restating capacity limitations, it must explore practical pathways for digital self-determination, including investment in sovereign digital infrastructure, adoption of interoperability standards, and regional initiatives for shared cloud or HPC capacity. Research must also investigate how to mitigate strategic dependencies on foreign technology providers, and how regulatory frameworks can support resilient, contextually grounded governance models across diverse national contexts.



3.3 Societal perceptions and their influence on regulation

There is limited research on how African publics perceive AI and its regulation, particularly in the context of digital trade. While some international datasets provide indicative figures on perceived risks, they offer only partial and externally framed perspectives. There remains a lack of granular, context-specific evidence on how perceptions vary across African countries or social groups, and how these views shape public support for regulatory measures such as algorithmic oversight and regulation of AI platforms.

This knowledge gap hampers the design of inclusive legal and policy frameworks. Without grounded insights into how AI-related risks and opportunities are understood or contested, regulatory initiatives may fail to engage key concerns around exclusion, trust, and accountability.

Future research must therefore investigate how societal perceptions shape responses to AI in digital trade in Africa. Understanding how different communities interpret AI-related risks, benefits, and trade-offs is critical for designing legal and policy frameworks that are both contextually grounded and democratically accountable. Participatory and empirical approaches, including surveys, focus groups, ethnographic work, and citizen deliberation, can reveal how trust in institutions, experiences of digital exclusion, and normative expectations influence the reception and effectiveness of regulatory measures. Further research must also examine the role of civil society actors, professional associations, and media in shaping public discourse and influencing regulatory agendas, including how they frame key issues, challenge dominant narratives, and shape norms around rights, access, and accountability. By integrating public values into governance design, future research can help develop frameworks that are not only technically sound but also socially responsive and resilient.

3.4 Legal design, regulatory capacity, and conceptual gaps

Significant research gaps remain regarding the legal implications and enforceability of emerging AI-related provisions in digital trade governance frameworks in Africa. Some comparative legal scholarship has begun mapping AI governance across African countries, focusing on themes such as constitutional rights, human oversight, and legal safeguards (Ncube *et al.*, 2023), but more focused research is needed on how these principles intersect with digital trade law, institutional implementation, and enforceability. In part, the limited research to date can be attributed to the recent adoption of the DTP and

the fact that national implementation has yet to begin in earnest. Provisions in the AfCFTA DTP that are directly relevant to AI, such as rules on source code, cross-border data flows, and digital identity (Sucker, 2025), have yet to be substantively explored. In particular, there is little sustained engagement with how digital trade rules may support or constrain algorithmic accountability, including states' ability to audit AI-based systems or require transparency from platform providers, and with the compatibility of such obligations with domestic constitutional provisions, regulatory autonomy, and plural legal systems. Likewise, while digital sovereignty has been identified as an emerging concern (Kugler & Tavengerwei, 2024), its legal dimensions, including enforcement capacity, rights-based governance, and the role of the state in digital infrastructure management, remain underexplored.

The legal implications of AI-powered digital identity systems are similarly underdeveloped. As these systems become increasingly central to access, authentication, and service delivery within digital trade ecosystems, they raise critical but largely unanswered questions about exclusion, remedies, and the limits of state control, especially where trade rules constrain domestic discretion over data or technology transfer. While some scholars have begun to explore the intersection of AI, data governance, and human rights in African electoral contexts (Effoduh, 2024), broader theoretical work remains limited. Comparative insights from other regions, such as emerging Indo-Pacific initiatives, may offer useful lessons on regulatory coherence and regional coordination in the AI-digital trade nexus (Neuwirth, 2025). Moreover, practical approaches such as model laws, regulatory sandboxes, capacity-building for digital regulators, and judicial guidance may be explored for their potential to support effective implementation across diverse African legal systems.

Therefore, future research must strengthen the understanding of legal design and regulatory capacity in Africa's digital trade regulation. This includes analysing how provisions in the AfCFTA DTP that are directly relevant to AI, such as rules on source code, CBDFs, and digital identity, align with or diverge from comparable commitments in other regional or multilateral DTAs, and how they affect countries' ability to audit AI-based systems, require algorithmic transparency from platform providers, and reconcile international obligations with domestic constitutional provisions, regulatory autonomy, and plural legal systems. Moreover, further research is needed on how legal and constitutional principles, such as regulatory sovereignty, the right to development, and digital solidarity, can inform more context-sensitive governance frameworks.



This includes analysing how African countries interpret and apply digital trade provisions in light of their constitutional protections, and how judicial, parliamentary, and regulatory institutions engage with emerging digital rulemaking. Investigating the coherence between international trade rules and domestic legal orders will be essential for ensuring that digital trade regulation remains accountable, equitable, and democratically grounded. Further research must also examine the legal dimensions of digital sovereignty, particularly enforcement capacity, rights-based governance, and the role of the state in managing digital infrastructure.

Additionally, the growing influence of corporate lobbying in shaping AI governance frameworks globally remains largely unexamined in African contexts. Data from Open Secrets shows that sectors such as finance, pharmaceuticals, and education have seen intensified lobbying efforts in the US that risk entrenching corporate priorities over public interest regulation. Research is needed to examine how such lobbying affects trade negotiations, regulatory design, and the implementation of accountability safeguards in African countries.

3.5 Distributional impacts and algorithmic bias

Despite growing policy interest, the distributional consequences of AI adoption and digital trade regulation remain under-researched in African contexts. AI systems and algorithmic processes often reflect and reproduce existing socio-economic inequalities, yet there is limited empirical analysis of how algorithmic bias affects marginalised groups such as women-led businesses, informal workers, or low-income users, who make up a significant share of the African digital economy.

Early research on generative AI in low-resource settings highlights its potential to address developmental challenges, such as supporting frontline healthcare or enabling personalised education, while also stressing the importance of safeguards to prevent harm to individuals and communities (Junck *et al.*, 2025). Prototypes are being tested across the Global South, offering insights into what technical and institutional protections are feasible and necessary in such contexts. However, systematic analysis remains limited on their actual distributive impacts and long-term governance implications. Similarly, there is scant research on the legal and institutional safeguards needed to mitigate algorithmic discrimination or promote equitable access to digital markets. Broader normative frameworks for understanding distributive justice in the context

of AI and digital trade regulation are also underdeveloped, especially those grounded in African perspectives on inclusion, rights, and social justice.

Future research must prioritise the development of normative and institutional frameworks that address the distributive impacts of AI and digital trade regulation. This includes examining how algorithmic systems affect access to economic opportunities, public services, and digital markets, particularly for marginalised or structurally disadvantaged groups. Empirical research is needed to assess the extent to which algorithmic bias reproduces existing inequalities, and to identify safeguards that can be embedded in trade and regulatory frameworks to mitigate discriminatory outcomes. This entails not only evaluating the effectiveness of mechanisms, such as non-discrimination clauses or public interest exceptions, but also exploring how African countries can design or interpret such provisions in ways that enhance accountability and social inclusion.

Another key priority is to assess whether AfCFTA DTP provisions aimed at promoting inclusion, such as those supporting MSMEs and underrepresented groups, are translating into enforceable obligations or concrete support at the national level. Research must evaluate the legal form, institutional arrangements, and policy instruments required to make these provisions meaningful in practice.

Moreover, the development of context-sensitive models for algorithmic accountability and distributive justice is needed, drawing on African political, legal, and social thought. Such frameworks could offer more grounded approaches to defining fairness, transparency, and redress, while supporting regulatory strategies that prioritise inclusion and rights protection in digital trade regulation.

4. Conclusion

This chapter has examined how AI is reshaping digital trade regulation in Africa and identified five interlinked areas that require further scholarly attention: geopolitical dynamics and sovereignty; infrastructural and resource constraints; societal perceptions and public values; legal design and regulatory capacity; and the distributive impacts of algorithmic systems. Together, these themes reveal how AI intensifies long-standing challenges of regulatory fragmentation and dependency while also introducing novel pressures around algorithmic accountability, digital identity, and market concentration.



The analysis highlights that African responses are emerging within distinctive institutional contexts, including the AfCFTA DTP and AU strategies, but that their effectiveness will depend on sustained engagement with local realities, uneven capacities, and broader structural inequalities in the global digital economy. Attention to constitutional principles, regulatory sovereignty, and the influence of lobbying and external models is especially important in assessing how digital trade rules are likely to shape AI governance across the continent.

In this light, Africa's experience with AI and digital trade regulation cannot be seen simply as a matter of 'catching up' with external frameworks but as an opportunity to articulate approaches that reflect regional priorities and developmental imperatives. By foregrounding the interplay of law, politics, and distributional outcomes, scholarship can contribute to understanding how African actors negotiate the tensions between openness and autonomy, inclusion and risk, and experimentation and constraint in the evolving digital economy.

References

- African Union (AU). (n.d.). *Agenda 2063: The Africa We Want*. Retrieved from https://au.int/sites/default/files/documents/33126-doc-06_the_vision.pdf
- African Union (AU). (2024a). *Protocol to the Agreement Establishing the African Continental Free Trade Area on Digital Trade*. Retrieved from https://au-afcfta.org/wp-content/uploads/2024/11/EN_-PROTOCOL-ON-DIGITAL-TRADE-clean.pdf
- African Union (AU). (2024b). *Continental Artificial Intelligence Strategy: Harnessing AI for Africa's Development and Prosperity*. Retrieved from https://au.int/sites/default/files/documents/44004-doc-EN-_Continental_AI_Strategy_July_2024.pdf
- African Union (AU). (2025). *Compiled Annexes to the African Continental Free Trade Area Protocol on Digital Trade*. Retrieved from https://au.int/sites/default/files/treaties/44963-ax-ENG_Circulation_Digital_Trade_Compiled_Certified_Legal_Instruments_38thAssembly_Feb_2025_27_May2025.pdf
- Banga, K., & Faith, B. (2021). *For Better or Worse? How Digitally Restructured Value Chains Are Reshaping Labor Futures for Women in the Global South*. IT for Change. Retrieved from <https://itforchange.net/index.php/how-digitally-restructured-value-chains-are-reshaping-labor-futures-for-women-global-south>
- Banga, K., & Mehta, D. (2025). *Rising risks and digital trade policy in Southeast Asia* (Policy brief). IfM Engage, Institute for Manufacturing (IfM), University of Cambridge. Retrieved from <https://www.ciip.group.cam.ac.uk/wp-content/uploads/2025/10/Rising-risks-and-digital-trade-policy-in-Southeast-Asia.pdf>
- Centre for Intellectual Property and Information Technology Law (CIPIT). (2025). *The State of AI in Africa Report*. Strathmore University. Retrieved from <https://aiconference.cipit.org/documents/the-state-of-ai-in-africa-report.pdf>
- Centre for the Fourth Industrial Revolution (C4IR) Rwanda. (2025). *The Africa Declaration on Artificial Intelligence*. Retrieved from <https://c4ir.rw/docs/Africa-Declaration-on-Artificial-Intelligence.pdf>
- Effoduh, J. O. (2024). *The role and potential of artificial intelligence in extremist fuelled election misinformation in Africa*. Global Network on Extremism & Technology. Retrieved from <https://gnet-research.org/2024/03/08/the-role-and-potential-of-artificial-intelligence-in-extremist-fuelled-election-misinformation-in-africa>

- Ganne, E., Locks, L., & Xu, A. (2024). *Trading with intelligence: How AI shapes and is shaped by international trade*. World Trade Organization. Retrieved from https://www.wto.org/english/res_e/booksp_e/trading_with_intelligence_e.pdf
- Goldfarb, A., & Treffer, D. (2018). *AI and international trade* (NBER Working Paper No. 24254). National Bureau of Economic Research. <https://doi.org/10.3386/w24254>.
- International Telecommunication Union (ITU). (2013). *Data Protection: Southern African Development Community (SADC) Model Law* (HIPSSA, Harmonization of ICT Policies in Sub-Saharan Africa). Retrieved from https://www.itu.int/en/ITU-D/Projects/ITU-EC-ACP/HIPSSA/Documents/FINAL%20DOCUMENTS/FINAL%20DOCS%20ENGLISH/sadc_model_law_data_protection.pdf
- Jones, E. (2023). Digital disruption: Artificial intelligence and international trade policy. *Oxford Review of Economic Policy*, 39(1), 70–84. <https://doi.org/10.1093/oxrep/grac049>
- Jones, E., Collins, P., Grosse Ruse-Khan, H., Sanchez-Graells, A., Irion, K., Dorobantu, C., Kilic, B., & Onitui, D. (2024). *AI governance and the future of digital trade policy* (Policy brief). University of Oxford Blavatnik School of Government. <http://dx.doi.org/10.2139/ssrn.4987769>
- Jordan, M. I., & Mitchell, T. M. (2015). Machine learning: Trends, perspectives, and prospects. *Science*, 349(6245), 255–260. <https://doi.org/10.1126/science.aaa8415>
- Junk, L., Adeleke, F., & Adams, R. (2025). Generative AI as a modality of interdependencies: Imagining tech futures in majority world settings. In P. Hacker, A. Engel, S. Hammer, & B. Mittelstadt (Eds.), *The Oxford handbook of the foundations and regulation of generative AI* (online ed.). Oxford University Press. <https://doi.org/10.1093/oxfordhob/9780198940272.013.0012>
- Kugler, K., & Tavengerwei, R. (2024). Navigating digital sovereignty: Implications for African countries. *Global Trade and Customs Journal*, 19(7/8), 471–483. <https://doi.org/10.54648/gtcj2024058>
- Law, M. (2024). The new era of AI and its impact on data centres. *Technology Magazine*. Retrieved from <https://technologymagazine.com/articles/the-new-era-of-ai-and-its-impact-on-data-centres>
- Lund, B. D., Wang, T., Mannuru, N. R., Nie, B., Shimray, S., & Wang, Z. (2023). ChatGPT and a new academic reality: Artificial intelligence-written research papers and the ethics of the large language models in scholarly publishing. *Journal of the Association for Information Science and Technology*, 74(5), 570–581. <https://doi.org/10.1002/asi.24750>

- Mühlhoff, R. (2023). Predictive privacy: Collective data protection in the context of artificial intelligence and big data. *Big Data & Society*, 10(1). <https://doi.org/10.1177/20539517231166886>
- Ncube, C. B., Oriakhogba, D. O., Schonwetter, T., & Rutenberg, I. (Eds.). (2023). *Artificial intelligence and the law in Africa*. Durban, South Africa: LexisNexis.
- Neuwirth, R. J. (2025). Artificial intelligence in the digital economy: Multilateral and regional legal challenges from the perspective of the Indo-Pacific. *The Journal of World Investment & Trade*, 26(4), 712–748. <https://doi.org/10.1163/22119000-12340374>
- Peng, S. (2024). *International economic law in the era of datafication*. Cambridge, England: Cambridge University Press.
- South African Artificial Intelligence Association (SAAIA). (2025). Dubai joins South Africa AI Association initiative to launch global AI trade & investment hub. Retrieved from <https://saaiassociation.co.za/dubai-joins-south-africa-ai-association-initiative-to-launch-global-ai-trade-investment-hub/>
- Srnicek, N. (2017). *Platform capitalism*. Cambridge, England: Polity Press.
- Sucker, F. (2025). *The AfCFTA Protocol on Digital Trade*. SSRN. Retrieved from <http://dx.doi.org/10.2139/ssrn.5386851>
- Vásquez Callo-Müller, M. (2026). *International intellectual property law in the age of AI: Data, copyright and trade secrets*. Cheltenham, UK: Edward Elgar Publishing.
- World Trade Organization (WTO). (2016). *Work programme on electronic commerce: Non-paper from the United States* (JOB/GC/94). Retrieved from <https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/Jobs/GC/94.pdf&Open=True>
- Xu, W., Wang, S., & Zuo, X. (2025). Whose victory? A perspective on shifts in US-China cross-border data flow rules in the AI era. *The Pacific Review*, 38(6), 963–989. <https://doi.org/10.1080/09512748.2025.2462239>
- Zhou, L., Pan, S., Wang, J., & Vasilakos, A. V. (2017). Machine learning on big data: Opportunities and challenges. *Neurocomputing*, 237, 350–361. <https://doi.org/10.1016/j.neucom.2017.01.026>

A research agenda on trade competitiveness

Services export competitiveness in Africa and the role of digital trade-related policies

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1. Introduction

Services export competitiveness – the ability to achieve and sustain market shares in international services markets – is an important ingredient for economic success, contributing to higher living standards. What is the state of services export competitiveness in Africa? What are its drivers, and what role can digital trade-related policies play in strategies to enhance it? This chapter provides a brief review of key findings from the existing literature on these questions and proposes avenues to address knowledge gaps in this area.

These research questions are particularly salient for the African region. Services export competitiveness may offer a partial alternative to manufacturing-led growth, particularly in light of ongoing technological and demograph-

¹ The opinions expressed and arguments employed herein are those of the authors and do not necessarily reflect the official views of OECD member countries.

ic shifts (Dihel & Goswami, 2016; Nayyar *et al.*, 2021; Roy & Sauvé, 2023).² At the same time, the expansion of digital trade raises new questions about how policies governing connectivity, cross-border data flows, digital payments, and platform access may influence services export performance (International Monetary Fund *et al.*, 2023). Compared to other drivers of services export competitiveness – such as skills, institutions, or access to finance – digital trade-related policies may be more economically feasible to adjust in the short term and could, in some cases, generate positive spillovers by stimulating demand for complementary capabilities and reforms.

2. Some key facts about services export competitiveness in Africa

What do we already know about services export competitiveness in Africa? In this section, we present – clustered around three points – some of the main facts that have emerged from recent work in this area. We do so by taking productivity and export performance as key indicators of services export competitiveness.

2.1 Aggregate patterns of services export competitiveness seem to contrast with the backdrop of structural transformation in Africa

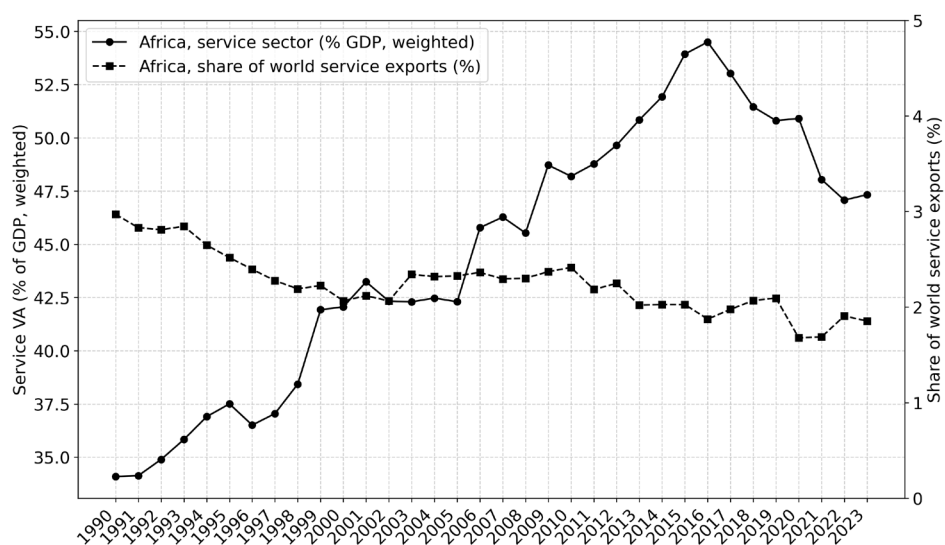
Services have become central to structural transformation in Africa. As manufacturing-led growth has stalled or bypassed many countries, employment has shifted directly from agriculture into services – especially into sectors such as retail, transport, and construction. These sectors are typically characterised by low productivity, informality, and limited potential for dynamic upgrading (Nayyar *et al.*, 2021; Rodrik & Sandhu, 2025). Nevertheless, they have absorbed much of the continent’s growing labour force and are now critical to livelihoods and economic inclusion.

Despite services’ increasing economic weight in Africa, the continent remains a small player in services exports (see Figure 1). Africa accounted for just 2 per cent of global services exports in 2022, with more than two-thirds concentrated in travel and transport sectors that are labour-intensive but offer relatively limited scope for productivity gains. Digitally deliverable services, includ-

2 Attention to the potential of services exports as an engine for growth characterises recent work by the European Bank for Reconstruction and Development in the context of Eastern Europe and Central Asia (Guzmán *et al.*, 2024).

ing many knowledge intensive services used as intermediate inputs upstream along supply chains (e.g. computer, telecommunication, financial and business services), represent a growing share of global trade, but Africa's participation in this segment is still marginal: the region accounted for less than 1 per cent of global digitally delivered services exports in 2022 (UNCTAD, 2022; Were & Odongo, 2023). At the macro level, this suggests that services trade has yet to become a strong driver of economic upgrading in the region.

Figure 1: Services in Africa's structural transformation and in export: evolving in two different directions.



Sources: World Bank World Development Indicators (WDI), retrieved on 15 April 2025 from <<https://datatopics.worldbank.org/world-development-indicators/>>. Note: The figure plots (dashed line with dot markers) the weighted average share of the services sector value added over GDP across African countries, with weights based on each country's share of total GDP in the continent. Africa's share of global services exports (solid line, square markers) is calculated as the sum of services exports from all African countries divided by total world services exports. Services exports are measured according to the Balance of Payments framework and primarily reflect exports via modes 1, 2, and 4. The patterns remain robust when the sample is restricted to the 20 largest African economies (by GDP), consistently observed over the entire period.

2.2 Export performance and productivity are highly heterogeneous across individual services sectors, and they do not align

While services trade in Africa is still dominated by traditional sectors, there are signs of diversification in a few countries. South Africa, Mauritius, Kenya, Nigeria and Ghana, for example, have developed modest export capacities in

business services, finance, and ICT (Nayyar *et al.*, 2021; Ariu & Ogliari, 2023; Were & Odongo, 2023). These sectors are generally more upstream in global value chains, more skill-intensive,³ and more closely associated with productivity spillovers.⁴ However, their overall contribution remains small and highly concentrated among a limited number of exporters (Ariu & Ogliari, 2023).

Across sectors, productivity in services is highly uneven. High-skill services that allow for digital delivery (e.g. professional and technical services) are far more productive than sectors like tourism, retail, or personal services. Ariu and Ogliari (2023) show that African services exports are heavily skewed toward sectors closer to final demand, whereas more upstream services – those typically associated with higher value-added – remain underdeveloped. Over time, there are signs of modest increases in the “upstreamness” of African services exports in a few countries (e.g. Guinea, Angola, Tanzania, in addition to the previously listed examples of modest performance in business, financial and ICT services), suggesting that some upgrading is underway. Firm-level data also point to significant within-sector heterogeneity, showing that larger firms, and those engaged in both importing and exporting, tend to be more productive (Hoekman *et al.*, 2024).

2.3 Data on policy barriers to digital trade exist and show that restrictions are high

A range of structural and policy-related factors can influence services export performance in Africa. These include access to skills and finance, the availability and quality of infrastructure (particularly digital infrastructure), and the broader regulatory and institutional environment. Among these, digital trade-related policies are increasingly seen as a promising entry point for reform – particularly for enabling Mode 1 (cross-border digital) trade.

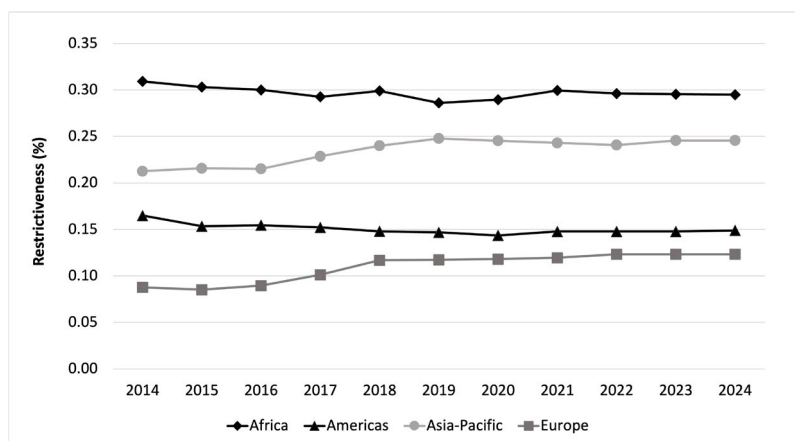
Various data collection efforts are contributing to building new and complementary tools to measure digital trade-related policies, including in the African

3 See Baccini *et al.* (2023) for an empirical assessment of the skill intensity of services sectors in Africa, based on a comprehensive collection of labour force survey data.

4 Beverelli *et al.* (2017) and Fiorini *et al.* (2022) show the existence potential positive productivity spillovers from lower policy barriers to the importation of producer services (including finance, telecommunications, professional services) to manufacturing sectors downstream the supply chain in samples focused on or including African countries.

continent (Ferracane *et al.*, 2018; Ferencz, 2019; Ferracane *et al.*, 2025).⁵ One of these tools is the OECD Digital Services Trade Restrictiveness Index (DSTRI) that collects, in a comparable manner, information on applied regulation restricting the capacity of foreign providers to provide services in a country. Since 2020, the OECD and the UN Economic Commission for Africa (UN-ECA) have joined efforts to increase the information and transparency on regulation in Africa related to digital trade. This has been done by collecting information on applied domestic regulation following the DSTRI methodology (Ferencz, 2019; OECD *et al.*, 2022). One of the main findings from this exercise is that the regulatory environment regarding digital trade in Africa is more restrictive than that in other regions, and that, while this has evolved over time, it has remained quite steadily restrictive (Figure 2). The dispersion of the indices per country is also particularly high in Africa, showcasing the space to bridge regulation between countries.

Figure 2: The policy environment for digital trade is more restrictive in Africa than in other regions.



Sources: Organisation for Economic Co-operation and Development (OECD). (2024). OECD Digital Services Trade Restrictiveness Index. Retrieved on 15 April 2025 from <<https://goingdigital.oecd.org/en/indicator/73>>. Note: The DSTRI index ranges from 0 to 1, where 0 indicates full openness to digital services trade and 1 represents the highest level of restrictiveness.

2.4 Taking stock

⁵ Building on these data collection efforts a growing number of empirical works investigates the effect of digital trade related policies, including on services trade (see for instance van der Marel and Ferracane (2021) and López González *et al.* (2023).

While the three stylised facts discussed above are significant in their own right, it is worth considering possible explanations that link them, and which may offer strategic insights to enhance services export competitiveness. These findings, the limited role of exports alongside the growth of the services sector, wide productivity gaps across industries within the sector, and persistent barriers to digital trade, together echo findings documented throughout the developing world. Although empirical evidence remains sparse, especially at the firm level, this similarity between African and other developing economies suggests an important role for structural factors (Banerjee & Duflo, 2005).

One such factor may be the regulatory framework and its uneven impact across sectors and firms. Poorly designed policies can increase firms' operating costs, making it difficult for small firms to grow or for potential new firms to enter the market. This may lead to a suboptimal allocation of labour and capital across the economy, with resources being allocated to sectors and firms not because of their expected contribution to economic development but because they benefit from their specific regulatory framework. In the African context, high barriers to digital trade may be especially detrimental to entrant firms and to underdeveloped sectors, whereas incumbents and well-established industries may be better able to navigate or even benefit from regulations that are less conducive to digital trade. As a result, opportunities to reallocate resources toward higher-productivity, high-skill-intensive services may go unrealised (Banerjee & Duflo, 2005; Restuccia & Rogerson, 2008; Hsieh & Klenow, 2009).

Moreover, legacy firms in well-established sectors may also be better positioned to engage with policymakers and advocate for their interests. In contrast, newer firms and emerging sectors may struggle to gain visibility, contributing to regulatory inertia that limits their ability to grow and access export markets (Banerjee & Duflo, 2005; Dixit *et al.*, 1997; Grossman & Helpman, 1994). In this context, committing to lower barriers to digital services trade via trade agreements could help trigger a reallocation of resources toward services firms and sectors with greater potential for export growth (Maggi & Rodríguez-Clare, 1998; Maggi & Rodríguez-Clare, 2007).

Although this hypothesis merits further scrutiny, it is unlikely to be the full story. Constraints such as low educational attainment, macroeconomic volatility, and infrastructure gaps continue to shape the region's export performance.

3. Research gaps and future agenda

What do we not know about services export competitiveness in Africa? What research agenda(s) could help fill the main knowledge gaps? This section offers some reflections on these questions.

3.1 A missing unified and updated conceptual framework

While several theoretical contributions on services trade exist, there is no unified, updated conceptual framework to assess what makes an economy – or its firms – competitive in international services markets. This limitation is particularly relevant for African countries, where structural transformation is occurring outside the conventional manufacturing-led path. In a context where services can become a key driver of growth, a framework that helps identify the signals, drivers, and implications of services export competitiveness – while accounting for the specific characteristics of services production and trade – is urgently needed.⁶ Recent work has made progress by adopting multidimensional empirical approaches and exploring institutional and regulatory influences. Yet a coherent, services-specific framework that connects productivity, trade, and policy dimensions – and can be tailored to Africa's diverse economic contexts – is still lacking (Delgado *et al.*, 2012; Falciola *et al.*, 2020).

3.2 Incomplete and/or imprecise knowledge about outcomes and drivers of services export competitiveness in Africa

A second major gap concerns the limited availability of firm-level data on services production and trade in African countries.⁷ Unlike studies in high-income economies, which provide detailed portraits of firms within the services sector,⁸ there is currently no comprehensive and easily accessible body of evidence for Africa. Researchers have little underlying data needed to generate stylised facts on firm size, productivity, sectoral specialisation, input intensity, or ownership. Information is also scarce on how services are exported together

6 Key features of services trade include, among others: the varying degrees of tradability (and its determinants) across modes of supply (Francois & Hoekman, 2010; Benz *et al.*, 2022); the implications of these differences for the relationship between patterns of comparative advantage, export specialisation, and welfare (Deardorff, 1985, pp. 39-71; Melvin, 1989; Muñoz, 2023); and the evolving cross-border tradability of services sectors in response to shocks and technological progress (Baldwin & Forslid, 2023).

7 See also Chapter 18 of the book on the data challenge in Africa.

8 See for instance Breinlich and Criscuolo (2011).

with goods, or how firms combine different modes of supply in their exporting strategies. These data gaps constrain our understanding of which firms are driving services productivity growth, exports, and competitiveness – and of what constraints they face. In this context, it is essential to make the most of the limited sources that are available.

A third related gap concerns the limited empirical evidence testing the role of potential drivers of services export competitiveness in Africa, particularly the role of digital trade policies and regulations. Relevant hypotheses on the complementarity between the open policy regimes for digital trade and other potential drivers, such as the availability of skills, infrastructure, and access to finance, as well as state capacity and quality of institutions, remain underexplored in the African context. Future research should therefore exploit existing firm- and sector-level datasets, such as enterprise surveys, to document more systematically the productivity-upstreamness gradient within African services sectors and to examine its interaction with digital-trade policies.

3.3 Theory, case studies and continued data collection as next steps

The knowledge gaps outlined above suggest that the time is not yet ripe for large-scale, theory-driven estimations capable of delivering conclusive, generalisable results on services export competitiveness in Africa – or on the effectiveness of digital trade policies as drivers of competitiveness in the region.

Instead, three broad workstreams could help move this agenda forward. First, researchers could synthesise and adapt the existing body of theoretical work on services trade to develop a conceptual framework specific to services export competitiveness – one that can help identify relevant signals, drivers, and potential welfare implications. Second, targeted qualitative research could fill immediate evidence gaps by generating case studies of African firms that export services. Interviews or qualitative surveys could provide insight into the barriers and enablers of competitiveness as experienced by firms on the ground.

Third, more systematic efforts to build and refine relevant datasets should follow, guided by conceptual and qualitative findings. These efforts include developing firm-level datasets on services exports in African countries and improving the growing body of data on digital trade-related policies. For instance, coverage of relevant databases could be expanded. The DSTRI, for example, currently includes a limited number of African countries, though expansion is underway through the OECD-ECA initiative. Methodological improvements could also be pursued. The DSTRI is currently based on existing regulation,

which may not capture on-the-ground realities, such as regulatory capacity to implement legal requirements or informal restrictions-factors that could be particularly relevant in the African context. Integrating firm-level surveys and private sector consultations would help bridge this gap.

4. Conclusion

This chapter has outlined key facts and critical gaps in our understanding of services export competitiveness in Africa, with particular attention to the role of digital trade-related policies. Realising the potential of services-led development will require a stronger evidence base and targeted research across diverse African contexts. Advancing this agenda calls for collaboration among academic institutions, international organisations, think tanks, development agencies, and government stakeholders. The recent WTO-World Bank Trade in Services for Development Initiative,⁹ which includes an interactive Competitiveness Diagnostic Dashboard with a rich set of metrics to assess countries' strengths and weaknesses in services trade, provides a useful example of such a collaborative framework. As potential next steps, this chapter highlights the need for theoretical work to develop unified, up-to-date conceptual frameworks, qualitative analysis at the firm level, and continued data collection to generate evidence on the outcomes and drivers of services export competitiveness.

9 See World Bank & World Trade Organization (WTO). (2025). *Trade in Services for Development (TS4D) Platform*. <https://www.wto.org/english/tratop_e/ts4d_e/ts4d_e.htm>.

References

- Ariu, A., & Ogliari, L. (2023). Services' trade in Africa: Structure and growth. *The World Economy*, 46(11), 3345–3366. <https://doi.org/10.1111/twec.13499>
- Baccini, L., Fiorini, M., Hoekman, B., & Sanfilippo, M. (2023). Services, jobs, and economic development in Africa. *The World Bank Research Observer*, 38(1), 147–178. <https://doi.org/10.1093/wbro/lkac006>
- Baldwin, R., & Forslid, R. (2023). Globotics and development: When manufacturing is jobless and services are tradeable. *World Trade Review*, 22(3–4), 302–311. <https://doi.org/10.1017/S1474745623000241>
- Banerjee, A., & Duflo, E. (2005). Growth theory through the lens of development economics. In P. Aghion & S. N. Durlauf (Eds.), *Handbook of economic growth* (Vol. 1A, pp. 473–552). Elsevier. [https://doi.org/10.1016/S1574-0684\(05\)01007-5](https://doi.org/10.1016/S1574-0684(05)01007-5)
- Benz, S., Jaax, A., & Yotov, Y. (2022). *Shedding light on the drivers of services tradability over two decades* (OECD Trade Policy Papers No. 264). OECD Publishing. <https://doi.org/10.1787/d5f3c149-en>
- Beverelli, C., Fiorini, M., & Hoekman, B. (2017). Services trade policy and manufacturing productivity: The role of institutions. *Journal of International Economics*, 104, 166–182. <https://doi.org/10.1016/j.jinteco.2016.11.001>
- Breinlich, H., & Criscuolo, C. (2011). International trade in services: A portrait of importers and exporters. *Journal of International Economics*, 84(2), 188–206. <https://doi.org/10.1016/j.jinteco.2011.03.006>
- Deardorff, A. V. (1985). *Comparative Advantage and International Trade and Investment in Services* (RSIE Post-Print Paper No. 5). Research Seminar in International Economics, Gerald R. Ford School of Public Policy, University of Michigan. Retrieved from <https://rsie.econ.lsa.umich.edu/workingpapers/PPP1-25/ppp5.pdf>
- Delgado, M., Ketels, C., Porter, M. E., & Stern, S. (2012). *The determinants of national competitiveness* (NBER Working Paper No. 18249). National Bureau of Economic Research. <https://doi.org/10.3386/w18249>
- Dihel, N., & Grover, A. (2016). *The unexplored potential of trade in services in Africa: From hair stylists and teachers to accountants and doctors*. Washington, DC: World Bank. <https://doi.org/10.1596/24968>

- Dixit, A., Grossman, G., & Helpman, E. (1997). Common agency and coordination: General theory and application to government policy making. *Journal of Political Economy*, 105(4), 752–769. <https://doi.org/10.1086/262092>
- Falciola, J., Jansen, M., & Rollo, V. (2020). Defining firm competitiveness: A multidimensional framework. *World Development*, 129, 104857. <https://doi.org/10.1016/j.worlddev.2019.104857>
- Ferencz, J. (2019). *The OECD Digital Services Trade Restrictiveness Index* (OECD Trade Policy Papers No. 221). OECD Publishing. <https://doi.org/10.1787/16ed2d78-en>
- Ferracane, M. F., González Ugarte, S., & Rogaler, T. (Eds.). (2025). *Digital Trade Integration Database*. European University Institute. <https://dti.eui.eu/database/>
- Ferracane, M. F., Lee-Makiyama, H., & van der Marel, E. (2018). *Digital trade restrictiveness index*. European Centre for International Political Economy (ECIPE). Retrieved from https://ecipe.org/wp-content/uploads/2018/05/DTRI_FINAL.pdf
- Fiorini, M., Hoekman, B., & Quinn, D. (2022). Services trade policy and industry performance in African economies. *The World Economy*, 46(2), 382–395. <https://doi.org/10.1111/twec.13361>
- Francois, J., & Hoekman, B. (2010). Services trade and policy. *Journal of Economic Literature*, 48(3), 642–692. <https://doi.org/10.1257/jel.48.3.642>
- García Guzmán, P., Grahed, A., Javorcik, B., & Schweiger, H. (2024). *The rise of services exports: New pathways for growth*. VoxEU (CEPR). Retrieved from <https://cepr.org/voxeu/columns/rise-services-exports-new-pathways-growth>
- Grossman, G. M., & Helpman, E. (1994). Protection for sale. *The American Economic Review*, 84(4), 833–850. Retrieved from <https://www.jstor.org/stable/2118033>
- Hoekman, B., Sanfilippo, M., Santi, F., & Ticku, R. (2024). Trade, productivity, and services input intensity. *Review of World Economics*. <https://doi.org/10.1007/s10290-024-00548-2>
- Hsieh, C. T., & Klenow, P. J. (2009). Misallocation and manufacturing TFP in China and India. *The Quarterly Journal of Economics*, 124(4), 1403–1448. <https://doi.org/10.1162/qjec.2009.124.4.1403>
- International Monetary Fund (IMF), Organisation for Economic Co-operation and Development (OECD), United Nations Conference on Trade and Development (UNCTAD), World Bank, & World Trade Organization (WTO). (2023). *Digital Trade for Development*. Retrieved from https://www.wto.org/english/res_e/booksp_e/dtd2023_e.pdf

- López González, J., Sorescu, S., & Kaynak, P. (2023). *Of bytes and trade: Quantifying the impact of digitalisation on trade* (OECD Trade Policy Papers No. 273). OECD Publishing. <https://doi.org/10.1787/11889f2a-en>
- Maggi, G., & Rodríguez-Clare, A. (1998). The value of trade agreements in the presence of political pressures. *Journal of Political Economy*, 106(3), 574–601. <https://doi.org/10.1086/250022>
- Maggi, G., & Rodríguez-Clare, A. (2007). A political-economy theory of trade agreements. *American Economic Review*, 97(4), 1374–1406. <https://doi.org/10.1257/aer.97.4.1374>
- Melvin, J. (1989). Trade in producer services: A Heckscher-Ohlin approach. *Journal of Political Economy*, 97(5), 1180–1196. <https://doi.org/10.1086/261648>
- Muñoz, M. (2023). Trading nontradables: The implications of Europe's job-posting policy. *The Quarterly Journal of Economics*, 139(1), 235–304. <https://doi.org/10.1093/qje/qjad032>
- Nayyar, G., Hallward-Driemeier, M., & Davies, E. (2021). *At your service? The promise of services-led development* (Overview booklet ed.). Washington, DC: World Bank. Retrieved from <https://elibrary.acbfpact.org/acbf/collect/acbf/index/assoc/HASH4111/34f4be97/cd9ca720/86.dir/At%20Your%20Service%20The%20Promise%20of%20Services-Led%20Development.pdf>
- Organisation for Economic Co-operation and Development (OECD), United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP), United Nations Economic Commission for Africa (UN-ECA), & United Nations Economic Commission for Latin America and the Caribbean (UN-ECLAC). (2022). *Shedding new light on the evolving regulatory framework for digital services trade* (Trade policy brief). Retrieved from <https://dtri.uneca.org/assets/data/publications/shedding-new-light-en.pdf>
- Restuccia, D., & Rogerson, R. (2008). Policy distortions and aggregate productivity with heterogeneous establishments. *Review of Economic Dynamics*, 11(4), 707–720. <https://doi.org/10.1016/j.red.2008.05.002>
- Rodrik, D., & Sandhu, R. (2025). Servicing Development: Productive Upgrading of Labor-Absorbing Services in Developing Economies. *Global Policy*, 16(2), 306–318. <https://doi.org/10.1111/1758-5899.70003>
- Roy, M., & Sauvé, P. (2023). *Trade in services for development: Fostering sustainable growth and economic diversification*. World Bank & World Trade Organization. Retrieved from https://www.wto.org/english/res_e/booksp_e/trade_in_services_and_development_e.pdf

- United Nations Conference on Trade and Development (UNCTAD). (2022). Trade in services: A niche for export diversification in Africa. In *Economic development in Africa report 2022: Rethinking the foundations of export diversification in Africa: The catalytic role of business and financial services* (pp. 71–99) (UNCTAD/ALDC/AFRICA/2022). Retrieved from https://unctad.org/system/files/official-document/aldcafrica2022_en.pdf
- van der Marel, E., & Ferracane, M. F. (2021). Do data policy restrictions inhibit trade in services? *Review of World Economics*, 157(4), 727–776. <https://doi.org/10.1007/s10290-021-00417-2>
- Were, M., & Odongo, M. (2023). Competitiveness and diversification of services exports in Sub-Saharan Africa. *World Economy*, 46(2), 363–381. <https://doi.org/10.1111/twec.13367>

GVCs, digitalisation and services in Africa: What we know and what we would like to know

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1. Introduction

Participation in global value chains (GVCs) has become a defining feature of contemporary trade, enabling countries to specialise in discrete tasks rather than entire industries. For developing economies, GVCs promise access to technology, managerial know-how, and export markets. Yet Africa's integration remains limited and mainly upstream: many economies export primary commodities or resource-based goods with modest domestic value addition. Manufacturing-led development, which characterised several Asian success stories, has proven difficult to replicate in Africa due to premature deindustrialisation, labour-saving technical change, and increasingly uncertain geopolitics that complicate "made in the world" production (Rodrik, 2018; Cadot *et al.*, 2016).

Digital transformation could alter this trajectory. Broadband connectivity, data-driven logistics, e-commerce, cloud services, and fintech reduce coordination costs and loosen the ties between production and physical proximity. These technologies expand opportunities both to embed services into goods exports and to export services directly. For Africa, where traditional manu-

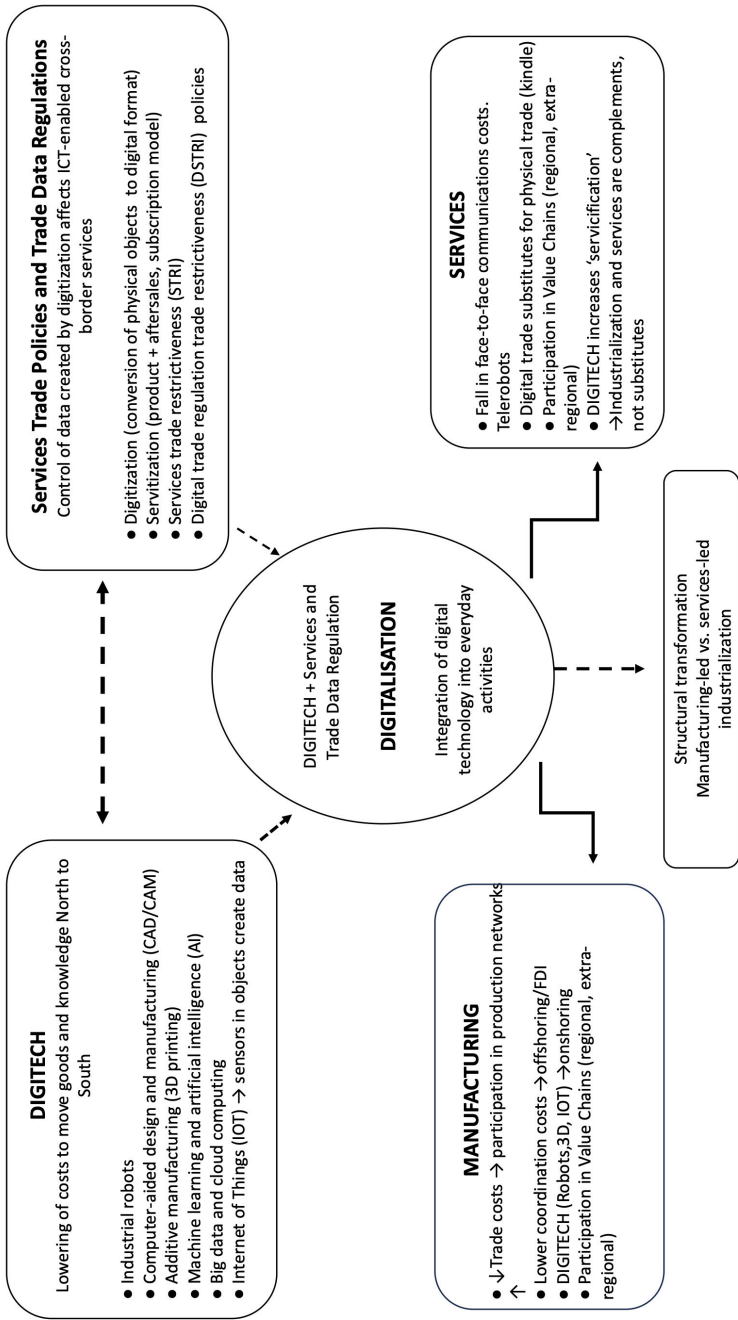
facturing footholds are uneven, digitalisation may open additional paths for specialisation – particularly in tradable services that rely more on skills and connectivity than on heavy infrastructure. However, opportunities are heterogeneous and contingent on local capabilities, regulatory quality, and the depth of regional markets.

Figure 1 summarises the channels through which digitalisation affects manufacturing and services sectors, as discussed in the empirical literature. On the left-hand side, digital technologies (DIGITECH) – including automation, robotics, and advanced connectivity – lower production and transport costs. Robotisation, by reducing the importance of economies of scale, may foster reshoring in advanced economies and erode Africa’s comparative advantage in labour-intensive goods. On the right-hand side, digital connectivity reduces trade costs across goods and services, especially for digitally deliverable services, and these effects are magnified in countries with open and predictable digital-trade regulations (Bellucci *et al.*, 2025).¹

This chapter takes stock of what we know about Africa’s engagement with GVCs, with particular attention to the roles of digitalisation and services. We synthesise evidence from multi-regional input-output databases (e.g., WIOD, EORA) and firm-level sources (e.g., WBES), as well as the emerging literature on infrastructure, institutions, and digital policy. We then identify key research gaps and outline a forward-looking agenda for academic and policy work.

1 Notably, few – if any – African countries are included in the empirical samples examined in Bellucci *et al.* (2025), underscoring the need for region-specific evidence.

Figure 1: Digitalisation towards structural transformation.



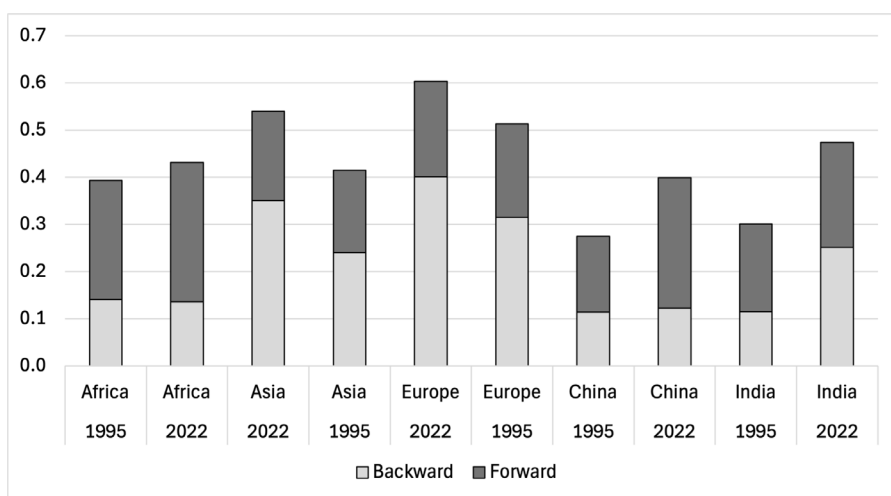
Source: Authors. Note: A trade flow is a part of a value chain if it crosses at least two borders before reaching the final consumer.

2. The state-of-the-art

2.1 Patterns of GVC participation

Over the last quarter-century, Africa's participation in GVCs has increased in absolute terms but remains comparatively shallow. Figure 2 decomposes gross exports into foreign and domestic value added, showing that Africa's exports embody relatively little foreign value added – low backward participation – while a comparatively large share of its gross exports is re-exported by partners – high forward participation (Borin *et al.*, 2021; Foster-McGregor *et al.*, 2015). In other words, Africa is typically upstream in global production, supplying primary or low-processed inputs that are transformed elsewhere.

Figure 2: Decomposition of GVC participation, 1995 and 2022.



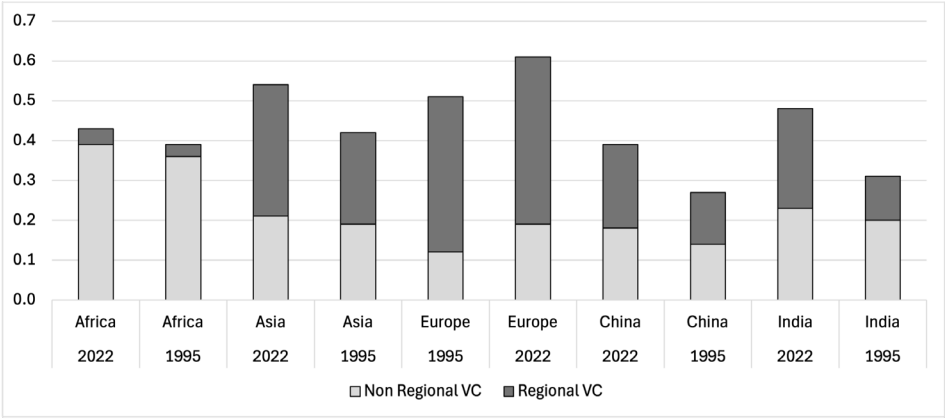
Source: Authors' calculations from Eora Database (Lenzen *et al.*, 2012; Lenzen *et al.*, 2013). Note: classification of regions follows the UN. China and India are excluded from Asia. Backward and forward measures as defined by Borin and Mancini (2023).

This upstream orientation is closely linked to continued reliance on resource-based exports. Numerous studies document how such specialisation constrains domestic learning and limits the diffusion of foreign technology and managerial practices into local production systems, thereby slowing movement along the “smile curve” (Asche & Grimm, 2017). Recent research also connects limited GVC depth to weak spillovers and innovation: Eissa & Zaki (2023) find that shallow participation inhibits knowledge diffusion and upgrading.

Recent work also highlights the role of infrastructure in enabling deeper integration. Ketu & Wirajing (2024) show that investments in transport, energy, and telecommunications are strongly correlated with both forward and backward GVC participation. The role of services as enablers of goods exports has likewise gained prominence: logistics, ICT, and finance are increasingly recognised as essential for competitiveness, yet these linkages remain underexplored relative to goods and with evidence largely limited to developed countries (e.g., Crozet & Milet, 2017; Ariu *et al.*, 2020).

Geography of linkages matters as well. Figure 3 compares regional and extra-regional participation, highlighting that intra-African production networks remain thin and regional hubs underdeveloped. Much of the continent’s participation occurs through extra-regional partners – historically Europe and increasingly Asia – rather than within African regional economic communities. In contrast, Asia has deepened dense intra-regional webs (“Factory Asia”), while Europe entered the period already highly integrated. Building “Made-in-Africa” supply chains is a central aspiration of the African Continental Free Trade Area (AfCFTA), but realising it will require progress on trade facilitation, standards, and connectivity (UNCTAD, 2021; de Melo & Solleder, 2025).

Figure 3: Regional vs. non-regional participation, 1995 and 2022.



Source: Authors’ calculations from Eora Database (Lenzen *et al.*, 2012; Lenzen *et al.*, 2013). Note: The classification of regions follows the UN. China and India are excluded from Asia. Regional means value chains trade inside the same region. Non-regional means value chain trade outside the region.

2.2 Determinants: Infrastructure, institutions, market size, and export composition

Multiple constraints shape Africa's GVC position. First, infrastructure gaps in transport, energy, and telecommunications elevate trade costs and fragment markets. Empirically, infrastructure improvements are strongly correlated with both forward and backward participation (Ketu & Wirajing, 2024). Second, regulatory and institutional frictions – burdensome procedures, weak contract enforcement, and policy uncertainty – discourage the investments and coordination needed for cross-border production (Ge *et al.*, 2020; Hammoudeh *et al.*, 2023). Third, limited market size reduces economies of scale and the incentive for multinationals to establish regional production platforms; by contrast, large markets such as China and India combine high backward shares with deepening vertical integration, illustrating the role of scale.

Export structure also matters. Enclave-type extractive sectors often generate limited domestic linkages, while diversified manufacturing and knowledge-intensive services create richer backward and forward connections. Evidence from firm-level sources suggests that participation is associated with higher innovation propensity and productivity, although results vary by sector and country (Avenyo *et al.*, 2022). Foreign direct investment (FDI) can catalyse upgrading but does not automatically strengthen local supplier linkages; outcomes hinge on absorptive capacity and policy design (Hoekman & Sanfilippo, 2023).

2.3 Services as enablers and as independent export domains

Services are pervasive within GVCs. Logistics, transport, ICT, finance, design, engineering, and professional services are embedded throughout production stages and often account for a substantial share of value added in goods exports (World Bank, 2020). In Africa, however, services' direct participation has historically been modest, and many services remain domestically oriented. Even so, the picture is evolving. The share of services in Africa's gross exports has remained broadly stable, whereas it has increased sharply in Asia and Europe. Digitally deliverable services – ICT, business and professional services, and certain financial-intermediation activities – have become increasingly tradable. The literature documents the rising role of these services in competitiveness and export performance (Ariu & Ogliari, 2023; Ariu, 2025).

Digitalisation is the key mechanism behind this shift. Lower coordination costs, cloud computing, online marketplaces, and digital payments reduce barriers to cross-border delivery. Baldwin and Forslid (2023) argue that “glo-

botics” make many services tradable, potentially enabling services-led development, while Mayer (2018, 2021) emphasises complementarities between digitalisation and manufacturing. At the same time, restrictive data policies can inhibit digitally-delivered services (Ferracane & van der Marel, 2021). The degree to which African firms can harness these opportunities depends on connectivity, skills, and governance (Srinivasan *et al.*, 2021).

2.4 Evidence bases and measurement approaches

Two complementary data traditions underpin this literature. Multi-regional input-output (MRIO) databases such as WIOD and EORA enable cross-country comparisons of backward and forward participation over time, though with substantial sectoral aggregation and, for Africa, frequent estimation or interpolation (Lenzen *et al.*, 2013). Firm-level sources such as the World Bank Enterprise Surveys (WBES) capture microeconomic behaviour – use of imported inputs, export status, innovation, constraints – but are sparser in coverage and rarely identify related-party (intra-firm) transactions. Combining MRIO and firm-level evidence yields the most informative picture but still leaves substantial data gaps for many African economies.

Taken together, these strands of research reveal a continent that is globally connected yet peripherally integrated: participation has increased but remains dominated by upstream, resource-based activities, with limited domestic value addition. Digitalisation and services have begun to open new possibilities, but the depth and sustainability of this transformation are still uncertain.

3. Key Research Gaps

3.1 An overwhelming focus on goods – with an underexplored services frontier

A striking feature of the literature on African integration in GVCs is how heavily it is skewed toward goods sectors – manufacturing, extractives, and agriculture. This choice is understandable: data are more available, input-output tables are more developed for goods sectors, and established methods are already tailored to tracing manufacturing linkages. Yet this emphasis comes at a cost: it leaves the services dimension underexplored (Anderson *et al.*, 2018) and under-theorised (Ghani & O'Donnell, 2016; Baldwin & Forslid, 2023; Mayer, 2021). We often treat services as a residual or enabler for manufacturing, rather than as a domain of trade and value capture in its own right.

This gap is problematic for several reasons. First, services such as finance, ICT, professional and business services are increasingly important drivers of economic growth and competitiveness in Africa. They not only enable goods exports (through logistics, accounting, communications) but also have the potential to become stand-alone export sectors. Second, many modern services are digitally tradable – meaning that the supplier and client need not co-locate – lowering the barriers that geography and infrastructure create. If we do not sufficiently probe how these services sectors evolve, we risk missing a central engine of transformation in many African economies.

3.2 Evidence of emerging service integration – Ghana as a case study

Although the literature is thin, some recent work suggests that change is underway. Ariu (2025) documents a dramatic surge in Ghana's exports of business services (the skill-intensive subset of service trade). From around USD 300 million annually during 2000-2014, Ghana's business services exports reportedly soared to about USD 5 billion per year during 2015-2022, a nearly sixteen-fold increase, an exceptional performance by any comparison, especially across Africa. Ariu documents that this boom seems to derive primarily from supply-side capacity improvements – e.g. new firms, multinationals entering Ghana, ICT and institutional environment improvements – rather than from shifts in external demand.

Interestingly, Ghana did not contemporaneously adopt substantial service trade liberalisation in that period, which suggests that internal dynamics (e.g. firm entry, FDI, digital infrastructure) may be primary drivers. This case is powerful: it provides concrete evidence that, under certain conditions, African countries can break into high-skilled, tradable service exports. However, Ghana remains one of the very few documented cases in Africa. The challenge is that such cases are exceptions, not well-mapped patterns. We simply lack enough comparative evidence across countries and time to know whether Ghana's experience is idiosyncratic or indicative of a broader transition.

3.3 Possible roots of emerging change

To move forward, research must explore the mechanisms that might underlie service-led GVC integration. While causal evidence is limited, several candidate channels appear promising, notably those related to FDI and multinational entry, taxation, regulation, and the business environment, as well as digitalisation, ICT infrastructure, and tradability.

3.3.1 Foreign direct investment (FDI) and multinational entry

FDI in service sectors can serve as a conduit for knowledge transfer, network embedding, and increased demand for complementary local services (legal, accounting, software). Recent work on greenfield FDI in Africa finds that new investment is significantly associated with value chain integration outcomes, especially in services sectors (Agarwal & Shingal, 2025). The idea is that multinationals can act as “anchor buyers” for local suppliers, but the strength of the spillovers depends on policy, absorptive capacity, and the institutional environment.

Yet not all FDI leads to positive domestic outcomes. Hoekman and Sanfilippo (2023) show that the benefits from foreign investment are highly uneven: while large, export-oriented firms tend to gain the most from integration with foreign investors, smaller local suppliers often remain excluded from backward linkages. As a result, the overall impact of FDI on domestic value capture – relative to a situation with limited or no linkages to foreign firms – is ambiguous and depends critically on how inclusive the investment is in engaging domestic firms within production networks.

3.3.2 Taxation, regulation, and business environment

Even with capable firms and favourable demand, regulatory regimes and fiscal policies play a decisive role in shaping the competitiveness of service exporters. While complex registration procedures, licensing fees, rigid labour rules, and unpredictable taxation can raise the fixed costs of doing business, well-designed reforms have the potential to do the opposite: lower entry barriers, attract investment, and stimulate exports.

In Sub-Saharan Africa, evidence suggests that business regulation and institutional quality are strongly correlated with GVC participation, with excessive regulatory burdens constraining participation in both upstream and downstream segments (Hammoude *et al.*, 2023). This highlights the scope for proactive policies. Simplifying procedures, ensuring transparent taxation, and improving contract enforcement can reduce uncertainty for service providers and increase their ability to engage internationally.

Moreover, targeted tax incentives can serve as powerful tools to foster service exports. For example, reduced corporate tax rates for firms that demonstrate export growth, tax credits for digital infrastructure investment, or exemptions for firms providing training and skills development can directly support knowledge-intensive services and act as implicit export subsidies. In addition,

fiscal measures that reward firms for adopting internationally recognised data protection and cybersecurity standards could enhance trust and credibility in cross-border transactions.

Such approaches would not only lower costs but also signal policy commitment to service-led growth, thereby encouraging both domestic entrepreneurs and foreign investors. In this way, taxation and regulation should not be seen merely as constraints, but as levers for governments to actively shape the incentives facing firms and to accelerate Africa's integration into services value chains.

3.3.3 Digitalisation, ICT infrastructure, and tradability

Perhaps the most compelling driver is digitalisation. Many service tasks – analytics, consulting, software development, and financial intermediation can be delivered online. As connectivity improves (higher broadband penetration, lower latency, more affordable data), the geography constraint weakens. This creates the potential for new entrants from Africa to supply global markets. Ariu and Ogliari (2023) emphasise the role of digital delivery and intangibility in expanding service trade.

3.4 Data, methodological, and conceptual obstacles

However, digitalisation also creates its own challenges: regulatory harmonisation (cross-border data rules), cybersecurity, digital skills, and last-mile infrastructure can still be major bottlenecks. Thus, the benefits of digital tradability may not be fully realised in many African contexts without complementary policies.

Even as theories suggest plausible mechanisms, operationalising them remains difficult due to several gaps. First, disaggregated service data are sparse. Input–output tables and multi-region IO databases that cover African countries (EORA is the only one that does) are extensively manipulated when updated (Lenzen *et al.*, 2013). These tables often aggregate services broadly, making it difficult to isolate finance, ICT, professional services, or business services. Second, firm-level trade data for services are largely missing. Enterprise surveys and customs databases rarely record service exports with sufficient detail to link them to firm productivity, ownership, and network positions. Third, tracing value-added in services poses methodological challenges. Traditional value-added decomposition techniques are better suited to goods and intermediate inputs; applying them to intangible, modular services is far more

complex (for instance, due to substitutability between digital and physical trade, see Shepherd (2020)). Fourth, cross-sectoral interactions remain under-explored. We still know little about how services and goods sectors interact in African economies – whether stronger services enable better performance in goods through lower costs, improved financing, or upgraded logistics. Fifth, issues of causality and dynamics persist, as much of the literature is correlational. Establishing causal links – from, say, broadband rollout to increased service exports – remains rare. Finally, questions of heterogeneity and generalizability also arise: even if Ghana’s business services boom is well documented, its drivers may not be replicable across countries with different institutional, linguistic, and geographic contexts. Taken together, these gaps underline that while we have begun to map Africa’s GVC engagement, we still lack a full grasp of how services are evolving within that framework.

4. Proposed key areas for a future research agenda

The evidence reviewed in Section 2 and the gaps highlighted in Section 3 point to the need for a more targeted research agenda. Rather than dispersing effort across too many questions, the focus should be on three areas that appear especially urgent: understanding how African services integrate into global value chains, unpacking the mechanisms driving these changes, and improving the data systems that underpin analysis and policymaking.

4.1 *Understanding services-led integration*

The first priority is to deepen knowledge of services as a domain of GVC participation in its own right. The Ghana case (Ariu, 2025) demonstrates that African economies can develop competitive niches in business services exports, achieving rapid growth even in the absence of sweeping trade liberalisation. Yet Ghana remains an exception across Africa and in the literature. It is unclear whether its boom reflects unique country conditions or whether it is the tip of a broader shift toward services-led integration across Africa.

Future research should therefore move beyond anecdotal evidence to provide systematic assessments of African service sectors and of their success stories that could inspire virtuous circles. This involves identifying which sub-sectors – finance, ICT, transport, professional services – are most dynamic, how they connect with global networks, and how their expansion interacts with goods exports. Particular attention should be given to the digital trade-

bility of services, which could allow African countries to bypass some of the constraints that have hampered goods-based industrialisation, such as poor physical infrastructure or geographic remoteness. At stake is not only a more accurate picture of current trade but also a clearer sense of the pathways for structural transformation.

4.2 Exploring the mechanisms of change

The second priority is to unpack the drivers of emerging service integration. Three candidates stand out: FDI, regulatory and fiscal regimes, and digitalisation.

FDI can act as a catalyst for service exports by bringing capital, knowledge, and global networks. But spillovers to local firms are not automatic. Hoekman and Sanfilippo (2023) caution that without adequate absorptive capacity, FDI may benefit only foreign affiliates and large exporters, leaving domestic suppliers marginalised. More research is needed to understand under what conditions FDI stimulates local learning and linkages, and when it simply reinforces dualistic market structures.

Regulatory and tax frameworks also shape incentives. Hammoudeh *et al.* (2023) show that burdensome business regulations can constrain GVC participation in sub-Saharan Africa. This may be particularly acute for services, where intangible assets, intellectual property, and contract enforcement play outsized roles. Comparative work could clarify which types of reforms – simplified registration, tax incentives, data governance regimes – are most effective in enabling service firms to export.

Digitalisation arguably represents the most transformative force. By reducing the importance of distance, it creates entirely new opportunities for service exports, from fintech and e-commerce to online consulting and software development. Yet the benefits of digitalisation are uneven: countries differ in broadband penetration, affordability, and regulatory frameworks for cross-border data (see the data infrastructure maturity ladder in Srinivasan *et al.*, 2021, figure 2). Understanding how digital connectivity translates into sustained GVC participation, and how it interacts with skills and institutional quality, is a research frontier with immediate policy relevance.

4.3 Building the data foundations

None of these research priorities can be pursued without better data. Of the current multi-region input-output databases (OECD TiVA, WIOD), only

EORA covers Africa, lumping services into broad aggregates. National statistical agencies struggle to produce updated, disaggregated supply-use tables, while firm-level surveys rarely capture services trade systematically. The result is that much of the debate relies on fragmentary or anecdotal evidence.

A research agenda must therefore include a strong emphasis on improving data infrastructure. This involves expanding the coverage and granularity of African input-output tables, linking customs and enterprise surveys to capture service exports, and experimenting with new data sources such as digital platform records or mobile payment systems. Methodologically, scholars need to adapt value-added decomposition techniques to capture services, which are less tangible and modular than goods. Without these improvements, both academic debates and policy design will remain constrained.

5. Conclusion

Africa's participation in global value chains has grown but remains predominantly upstream, with limited domestic value capture. The continent's future integration will hinge on whether it can deepen backward linkages, develop regional supply networks, and scale tradable services. Digital technologies offer concrete avenues to reduce coordination costs and expand cross-border delivery, but harnessing them requires complementary investments in infrastructure, institutions, and skills.

The literature to date shows that infrastructure quality, governance, and market size are central correlates of participation. Yet major blind spots persist: standard GVC measures undercount intangibles, services data are sparse, and causal evidence on digital reforms is limited. Advancing knowledge will require a coordinated push on theory and measurement, new data that connect firm behaviour to sectoral positions, and interdisciplinary work that links trade to digital governance and competition policy.

The AfCFTA provides a timely platform for experimentation and evidence. As countries implement protocols on services and digital trade, researchers and policymakers can co-design evaluations that inform scaling. Collaboration among African universities, statistical agencies, international organisations, and private-sector partners is essential to build the data infrastructure and analytical capacity needed. With such partnerships, Africa can better leverage digitalisation to move from upstream participation to more diversified, resilient, and inclusive value-chain integration.

References

- Agarwal, P., & Shingal, A. (2025). *Can FDI lead to GVC integration? Evidence from African economies* (STEG Project Policy Brief No. PB034; SRG 2326). Structural Transformation and Economic Growth (STEG). Retrieved from https://hub.cepr.org/civicrm/file?id=247707&filename=PB034_Agarwal_Shingal_SRG_2326_f0b8489de97b68d-1607f7215b658018f.pdf&mime-type=application%2Fpdf
- Anderson, J. E., Borchert, I., Mattoo, A., & Yotov, Y. V. (2018). Dark costs, missing data: Shedding some light on services trade. *European Economic Review*, 105, 193–214. <https://doi.org/10.1016/j.euroecorev.2018.03.015>
- Ariu, A. (2025). Trade in business services' booms: The case of Ghana. *International Economics*, 175, 123–140. <https://doi.org/10.1016/j.inteco.2025.100598>
- Ariu, A., & Ogliari, L. (2023). Services' trade in Africa: Structure and growth. *The World Economy*, 46(11), 3345–3366. <https://doi.org/10.1111/twec.13499>
- Ariu, A., Mayneris, F., & Parenti, M. (2020). One way to the top: How services boost the demand for goods. *Journal of International Economics*, 123, 103278. <https://doi.org/10.1016/j.inteco.2019.103278>
- Asche, H., & Grimm, M. (2017). *Industrialisation in Africa: Challenges and opportunities* (PEGNet Policy Brief No. 8/2017). Kiel, Germany: Poverty Reduction, Equity and Growth Network (PEGNet). Retrieved from https://www.kielinstitut.de/fileadmin/Dateiverwaltung/IfW-Publications/fis-import/ba0ab654-854d-47a1-b377-799bd-6c2d1f2-PEGNet_Policy_Brief-8_2017.pdf
- Avenyo, E. K., Mensah, E. B., Ndubuisi, G., & Sakyi, D. (2022). *Global value chain participation and innovation: Firm-level evidence from Africa* (AERC Working Paper GVC-012). Nairobi, Kenya: African Economic Research Consortium. Retrieved from <https://publication.aercafricallibrary.org/bitstreams/9150016e-9de4-4003-a630-e075ca0e2c05/download>
- Baldwin, R., & Forslid, R. (2023). Globotics and development: When manufacturing is jobless and services are tradeable. *World Trade Review*, 22(3–4), 302–311. <https://doi.org/10.1017/S1474745623000241>
- Bellucci, C., Rubínová, S., & Piermartini, R. (2025). Better together: How digital connectivity and regulation reduce trade costs. *Review of International Economics*, 33(3), 796–814. <https://doi.org/10.1111/roie.12807>
- Borin, A., & Mancini, M. (2023). Measuring what matters in value-added trade. *Economic Systems Research*, 35(4), 586–613. <https://doi.org/10.1080/09535314.2022.2153221>

- Borin, A., Mancini, M., & Taglioni, D. (2021). *Economic consequences of trade and global value chain integration: A measurement perspective* (Policy Research Working Paper No. 9785). World Bank. <https://doi.org/10.1596/1813-9450-9785>
- Cadot, O., de Melo, J., Plane, P., Wagner, L., & Woldemichael, M.-T. (2016). Industrialisation et transformation structurelle : l'Afrique subsaharienne peut-elle se développer sans usines ? *Revue d'économie du développement*, 24(2), 19–49. <https://doi.org/10.3917/edd.302.0019>
- Crozet, M., & Milet, E. (2017). Should everybody be in services? The effect of servitization on manufacturing firm performance. *Journal of Economics & Management Strategy*, 26(4), 820–841. <https://doi.org/10.1111/jems.12211>
- Eissa, Y., & Zaki, C. (2023). On GVC and innovation: The moderating role of policy. *Journal of Industrial and Business Economics*, 50(1), 49–71. <https://doi.org/10.1007/s40812-022-00255-9>
- Ferracane, M. F., & van der Marel, E. (2021). Do data policy restrictions inhibit trade in services? *Review of World Economics*, 157(4), 727–776. <https://doi.org/10.1007/s10290-021-00417-2>
- Foster-McGregor, N., Kaulich, F., & Stehrer, R. (2015). *Global value chains in Africa* (Inclusive and Sustainable Industrial Development Working Paper Series, Working Paper No. 4/2015). Vienna, Austria: United Nations Industrial Development Organization. Retrieved from <https://downloads.unido.org/ot/99/28/9928077/WP4.pdf>
- Ge, Y., Dollar, D., & Yu, X. (2020). Institutions and participation in global value chains: Evidence from belt and road initiative. *China Economic Review*, 61, 101447. <https://doi.org/10.1016/j.chieco.2020.101447>
- Ghani, E., & O'Connell, S.-D. (2016). Can services be a growth escalator in low-income countries? *Revue d'économie du développement*, 24(2), 143–173. <https://doi.org/10.3917/edd.302.0143>
- Hammoudeh, S., Tiwari, A. K., Abakah, E. J. A., & Adeabah, D. (2023). Global value chains in sub-Saharan Africa: The role of business regulations, policies and institutions. *Emerging Markets Review*, 57, 101072. <https://doi.org/10.1016/j.ememar.2023.101072>
- Hoekman, B., & Sanfilippo, M. (2023). Trade and value chain participation: Domestic firms and FDI spillovers in Africa. *The World Economy*, 46(11), 3367–3391. <https://doi.org/10.1111/twec.13505>
- Ketu, I., & Wirajing, M. A. K. (2024). Towards promoting African participation in global value chains: Does infrastructure development matter? *Research in Globalization*, 8,

100217. <https://doi.org/10.1016/j.resglo.2024.100217>
- Lenzen, M., Kanemoto, K., Moran, D., & Geschke, A. (2012). Mapping the structure of the world economy. *Environmental Science & Technology*, 46(15), 8374–8381. <https://doi.org/10.1021/es300171x>
- Lenzen, M., Moran, D., Kanemoto, K., & Geschke, A. (2013). Building Eora: A global multi-regional input-output database at high country and sector resolution. *Economic Systems Research*, 25(1), 20–49. <https://doi.org/10.1080/09535314.2013.769938>
- Mayer, J. (2018). *Digitalization and industrialization: friends or foes?* (UNCTAD Research Paper No. 25; UNCTAD/SER.RP/2018/7). United Nations Conference on Trade and Development. Retrieved from https://unctad.org/system/files/official-document/ser-rp-2018d7_en.pdf
- Mayer, J. (2021). Development strategies for middle-income countries in a digital world – Insights from modern trade economics. *The World Economy*, 44(9), 2515–2546. <https://doi.org/10.1111/twec.13158>
- de Melo, J., & Solleder, J. M. (2025). How can the African Continental Free Trade Area (AfCFTA) help develop regional value chains across Africa? An exploration. *Review of World Economics*, 161(1), 121–149. <https://doi.org/10.1007/s10290-024-00574-0>
- Rodrik, D. (2018). *New technologies, global value chains, and developing economies* (NBER Working Paper No. 25164). National Bureau of Economic Research. <https://doi.org/10.3386/w25164>
- Shepherd, B. (2020). *Death by digital? Evidence from the global book market* (Working Paper DTC-2020-1). Developing Trade Consultants. Retrieved from <https://developing-trade.com/wp-content/uploads/2020/01/Working-Paper-DTC-2020-1-1.pdf>
- Srinivasan, S., Comini, N., & Minges, M. (2021). *The Importance of National Data Infrastructure for Low and Middle-Income Countries* (TPRC49: The 49th Research Conference on Communication, Information and Internet Policy). <https://doi.org/10.2139/ssrn.3898094>
- United Nations Conference on Trade and Development (UNCTAD). (2021). *Economic development in Africa report 2021: Reaping the potential benefits of the African Continental Free Trade Area for inclusive growth* (UNCTAD/ALDC/AFRICA/2021). UNCTAD. Retrieved from https://unctad.org/system/files/official-document/aldcafrica2021_en.pdf
- World Bank. (2020). *World Development Report 2020: Trading for development in the age of global value chains*. World Bank. <https://doi.org/10.1596/978-1-4648-1457-0>

Unlocking Africa's growth: Scaling ventures and expanding digital trade

Scott Walker & George Windsor

1. Introduction

Africa stands at a critical juncture in its development. The continent's potential to scale high-growth ventures and expand digital trade is immense, but continues to be constrained by systemic barriers that limit its realisation. Structural challenges, fragmented markets, and limited institutional capacity have held back ventures from transitioning to scale, even as digital connectivity improves. Digital trade presents a major opportunity to transform African economies, but achieving this potential demands a more integrated understanding of entrepreneurial ecosystems – one that links macroeconomic conditions with the lived experiences of firms.

Entrepreneurial ecosystems in Africa are shaped by the interplay of diverse actors – entrepreneurs, investors, regulators, support organisations, and universities. The sum of these parts, and their interactions, determine whether ventures thrive or stall. Yet our understanding of these dynamics remains partial. Too often, policy relies on high-level indicators like GDP, mobile penetration, or investment inflows, while overlooking the firm-level patterns that drive – or inhibit – venture scaling. By venture scaling, we mean the process by

which young firms move beyond survival and early growth to achieve rapid, sustained expansion - increasing revenues, employment, and market reach. This disconnect weakens the design of interventions and leaves policymakers without the evidence or tools to act more effectively.

Underlying economic fundamentals further shape the very possibility of scaling. Sub-Saharan Africa's per capita GDP growth continues to lag behind global averages, and the income gap with the rest of the world is widening. While some smaller and medium-sized emerging economies – like Rwanda, Ethiopia, and Côte d'Ivoire – have posted stronger rebounds post-COVID, the region's largest economies, such as South Africa and Nigeria, remain sluggish (IMF, 2024; AfDB, 2024). Critically, Africa's middle class – often seen as the engine of consumption – is both overstated and unstable, with households frequently slipping in and out of vulnerability. This volatility means that strategies premised on steady domestic consumption are insufficient. To identify realistic pathways for growth, we must therefore complement macroeconomic analysis with rigorous, data-driven ecosystem assessment – focusing on how firms adapt, where bottlenecks occur, and what enables ventures to reach scale despite structural headwinds.

To narrow this gap, we must move beyond high-level indicators and build a data-driven understanding of how entrepreneurial ecosystems function in practice. This involves combining macroeconomic data with granular information on firm growth trajectories, financing access, regulatory frictions, and talent flows. Comparative benchmarking across diverse African economies can surface patterns, enable mutual learning, and help governments adapt strategies that reflect both shared constraints and local specificities.

The importance of accessible, well-structured data cannot be overstated. Platforms like the Startup Ecosystem data portals of Kenya, Rwanda, and Ethiopia, supported by the technology provider Dealroom, provide open-access data and insights into how firms are growing – tracking valuations, jobs created, and trends within specific sectors.¹ For instance, Kenya's total startup enterprise value surpassed USD 29 billion in 2024, with SMEs employing over 158,000 people - evidence of scale-up potential beyond anecdote (GrowthAfrica & Systemic Innovation, 2024a). Ethiopia's ecosystem, though younger,

1 Kenya's startup ecosystem dashboard can be accessed at <<https://kenya.dealroom.co/dashboard>>, Rwanda's startup ecosystem dashboard can be accessed at <<https://rwanda.dealroom.co/dashboard>>, and Ethiopia's startup ecosystem dashboard can be accessed at <<https://ethiopia.dealroom.co/dashboard>>.

shows rapid valuation growth among firms founded between 2020 and 2025, suggesting early capacity and emerging potential for venture scaling.²

This chapter draws on the authors' direct involvement in ecosystem diagnostics and strategy development across Kenya, Ethiopia, and Rwanda under the UK government (FCDO) sponsored Research Innovation Systems for Africa (RISA) Fund, as well as broader applied research on scaling in African markets.

2. The state of play: Scaling ventures and digital trade in Africa

2.1 Overview

Scaleups – that is, ventures that achieve sustained high growth – are proven engines of economic transformation. Globally, they account for the majority of new job creation, drive innovation, and act as anchor firms in entrepreneurial ecosystems. In Africa, these firms are even more vital: they not only generate employment and investment but also signal the possibility of viable, scalable business models in challenging environments.

Yet scaling remains elusive. African startups face systemic barriers that prevent them from evolving into scaleups. Domestic markets, though often large in population, are fragmented and low in purchasing power. Infrastructure gaps, inconsistent regulation, and limited institutional support make sustained growth difficult. As a result, many ventures must internationalise early – often before achieving product-market fit at home. Unlike in other markets where firms sequentially scale from local to regional and then international markets, many African startups must reach beyond borders from the outset to secure viable customer volumes and revenue.

Market diversification acts as a hedge against regulatory volatility, currency instability, and uneven demand. As one founder interviewed by the authors put it: “It’s a way of building antifragility into the business.” But expansion introduces complexity – higher operational costs, multi-jurisdictional compliance, and market-level adaptation requirements – that many early-stage firms are ill-equipped to handle. Without adaptive capabilities or institutional learning, these risks often outweigh the rewards.

2 For a comparative analysis, see Systemic Innovation (2025).

The persistence of these obstacles is underscored by the fact that many of Africa's most successful founders still choose to incorporate their companies in Delaware or other foreign jurisdictions to gain investor confidence and regulatory predictability. The recent launch of Itana – a USD 100 million digital free zone in Nigeria spearheaded by serial Founder, Iyinoluwa Aboyeji – seeks to create an Africa-first alternative (Amonimo, 2025). Its very existence illustrates the institutional gaps that continue to push firms offshore, while also signalling the scale of ambition required to overcome them.

Understanding these dynamics requires more than anecdotes. It requires structured data on how African ventures scale: when they expand, how they adapt their models, and what barriers they face. Such evidence is still in short supply, but it is critical for informing interventions that move beyond broad policy rhetoric toward measures that are data-driven, targeted, and tailored to distinct segments of the ecosystem.

2.2 Challenges and opportunities for scale

Digital ventures in Africa are uniquely positioned to overcome long-standing barriers – such as limited physical infrastructure. Mobile connectivity, digital payments, and platform-based services allow them to reach customers and markets that traditional firms cannot.

Scaling in Africa is shaped by barriers that operate at different levels. Some challenges arise inside firms themselves, others are rooted in national contexts, and still others stem from regional dynamics under the African Continental Free Trade Area (AfCFTA). Distinguishing these levels is essential for understanding both the nature of the obstacles and the kinds of interventions that can address them (Table 1).

These barriers rarely act in isolation. Instead, they interact and compound across levels, amplifying the difficulty of sustaining firm growth.

At the firm level, many African startups struggle with internal capability gaps. Founders are often first-generation entrepreneurs without experienced management teams, robust organisational systems, or mentors who have scaled firms before. As a result, critical elements of “scale-readiness” – such as strategic planning, adaptive leadership, and operational discipline – are frequently weak. Our diagnostic assessments across Kenya, Ethiopia, and Rwanda confirm this picture: most ventures scored poorly on “scale potential”, measured across four dimensions, namely market attractiveness, the ability to build a competi-

tive edge, the scalability of the business model, and the capacity to consistently delight customers in ways that sustain demand (GrowthAfrica, & Systemic Innovation, 2023). Limited venture capital finance also matters significantly.

Table 1: Barriers to scaling in Africa.

Level	Examples of obstacles	Interventions
Firm-level	Leadership capacity; governance systems; limited ability to absorb growth capital; weak organisational processes; risk perception.	Mentorship, leadership development, scale-readiness diagnostics, tailored finance.
National-level	Infrastructure gaps (broadband, energy, logistics); domestic regulatory uncertainty; shallow capital markets.	Infrastructure investment, regulatory reform, domestic finance instruments.
Regional/ AfCFTA	Fragmented cross-border rules; non-tariff barriers; lack of payment interoperability; divergent digital standards.	Harmonisation, interoperability frameworks, regional financing and trade facilitation.

Source: Authors.

These weaknesses are compounded by systemic barriers at the national level. Regulatory fragmentation – with differing standards, licensing regimes, and data policies – makes cross-border expansion costly and inefficient. Infrastructure gaps, from limited broadband to unreliable electricity and weak logistics, undermine the delivery of digital services. Market concentration allows dominant incumbents to stifle innovation and raise barriers for new entrants. And policy volatility, marked by sudden regulatory shifts and weak enforcement, deters long-term investment. Together, these challenges create a fragile environment where scaling remains the exception rather than the norm.

Beyond the national level, regional dynamics also shape the prospects for scale. Under the AfCFTA, digital ventures should, in principle, benefit from a continent-wide market, but progress remains slow. Firms still face fragmented cross-border rules, divergent data standards, and limited payment interoperability. Non-tariff barriers and inconsistent customs procedures add costs

and uncertainty, often making it easier to trade with partners outside Africa than with neighbouring markets.³ Until these regional frictions are reduced – through interoperability frameworks, mutual recognition, or streamlined trade facilitation – the promise of AfCFTA as a platform for scale will remain only partially realised.

Cross-country evidence illustrates how these constraints interact. In Kenya, scale-ups often stall once they reach the USD 5-50 million valuation range, as infrastructure, capital, and regulatory bottlenecks intensify beyond the startup stage. Ethiopia has a handful of ventures in this category, but as more firms approach the USD 5-10 million range in the coming years, this is likely to represent an important turning point due to the nature of ecosystem recycling – the extent to which founders, talent, and capital re-enter to fuel new ventures. This is where targeted support and systemic reform become critical to enable and sustain success (GrowthAfrica & Systemic Innovation, 2024a, 2024c; Windsor *et al.*, 2025).

Many existing policy responses remain overly focused on startups, with limited differentiation for scaleups. However, the needs of firms looking to grow across markets – such as harmonised taxation, streamlined customs procedures, or regional payment interoperability – are significantly different. Without dedicated policies for scaling, many promising ventures plateau and will continue to do so.

Designing better interventions requires a stronger evidence base that integrates firm-level data – on customer acquisition, expansion strategy, and operational constraints – with macro-level indicators of infrastructure readiness, market demand, and policy alignment. Platforms like Dealroom, ecosystem benchmarking indices, and startup observatories provide a starting point, but adoption remains limited. Unless such data systems are broadened and connected, policymakers will lack the insights needed to act effectively.

This misalignment underpins what we call the “scale-up policy paradox” (Walker & Bowling, 2022). Policymakers and donors acknowledge that scale-ups contribute disproportionately to job creation, innovation, and productivity. Yet interventions continue to prioritise startups at the expense of firms entering the scale phase. This “a little help for everyone” approach fails to address the distinctive needs of firms managing cross-border compliance, attracting growth-stage capital, and building formalised operational systems. Ad-

3 For a review of restrictions applied to digital trade in the region, see Ferracane *et al.* (2025).

addressing this paradox requires interventions that reflect the strategic complexity of scaling, rather than treating the scaleup phase as an afterthought.

2.3 Recent research on ecosystem dynamics

Academic and policy research increasingly recognises the importance of ecosystem dynamics in enabling digital scale. Studies highlight the role of support institutions, investor networks, regulatory quality, and infrastructure in shaping firm outcomes. Entrepreneurial ecosystem mapping has helped surface bottlenecks and inform policy design in countries such as South Africa, Ethiopia, and Rwanda, and beyond (see, e.g., Stam *et al.*, 2025).

Yet the gap between aspiration and execution remains pronounced. AfCFTA's vision for a continental digital market has not yet translated into day-to-day operational improvements for most firms. Persistent frictions – such as fragmented digital standards, inconsistent data flow rules, and inefficient border processes – continue to inhibit cross-border trade. As one founder noted in an interview: “African countries trade more with Europe than they trade with their neighbours – the disincentive is simply massive.” These operational barriers, also reflected in private-sector responses captured through the AfCFTA Country Business Index (UN-ECA, 2022), risk turning AfCFTA into a paper framework unless implementation accelerates.

Comparative work on digital trade frameworks – particularly under the AfCFTA – is beginning to map where regulatory alignment is emerging and where significant divergence persists. This divergence has direct implications for firm behaviour: rather than scaling sequentially within a single national market, many African ventures internationalise early to navigate fragmented regulations, diversify risk, and access customer volumes unavailable at home. Examples such as Flutterwave, Andela, Wave, and mPharma illustrate these “born-regional” or diaspora-global strategies, showing how firms adapt their growth pathways to volatile and under-integrated markets.

Much of the existing literature on African entrepreneurship remains descriptive. Frameworks imported from developed economies rarely capture the realities of scaling in African contexts, and longitudinal studies of firm growth are very scarce. Few datasets systematically link firm behaviour to ecosystem dynamics. GrowthAfrica, & Systemic Innovation (2023; 2024b) seek to address this firm-level evidence gap. Drawing on ScaleUp Nation's Art of

Scaling framework,⁴ the authors apply a structured diagnostic tool to ventures across East Africa, identifying 20 success factors that distinguish scale-ups from “stall-ups”. Among the most critical are the capacity to take strategic leaps into new markets or products, and ambidextrous (adaptive) leadership – the ability to balance exploration and innovation with the operational discipline needed for sustained growth. These findings highlight the need to move beyond start-up-centric support toward deliberate scale-readiness interventions.

But firm-level readiness alone is not enough. Even well-intentioned support mechanisms fall short when they ignore the systemic barriers that ventures encounter as they grow. While it seeks to clarify licensing, certification, and tariff processes, it leaves untouched the deeper obstacles of fragmented regulation, inconsistent digital standards, and limited interoperability across borders. Such tools may help firms tick boxes, but without being embedded in broader policy and infrastructure reforms, they risk becoming checklists rather than genuine enablers of scale.

3. Key research gaps

Despite the growing interest in Africa's digital economy, the frameworks and methods used to study scaling ventures remain incomplete and, in some cases, misaligned with on-the-ground realities. Existing knowledge gaps hinder both academic understanding and policy effectiveness. Closing these gaps requires theoretical innovation, methodological reform, and a more interdisciplinary research ethos.

3.1 *Theoretical and conceptual limitations*

Dominant theories of venture growth and digital trade have been largely imported from high-income contexts, where firms operate in relatively stable regulatory, financial, and infrastructural environments. These models often fail to account for the ways African entrepreneurs scale through necessity, not sequence – navigating fragmented markets, informal systems, and high regulatory uncertainty.

As a result, key features of African scaling journeys – such as early cross-border expansion, mobile-first adoption, and reliance on informal networks – are often treated as outliers rather than integral parts of the story (Walker &

4 For more information about the framework, see van Dijk and Terzi (2020).

Bowling, 2022). There is an urgent need to develop conceptual models that recognise these strategies not as deviations from a norm, but as legitimate, data-worthy pathways to growth.

Future research must broaden the understanding of what it means to scale in Africa by recognising and measuring the channels that ventures actually rely on in resource-constrained environments. Trust-based distribution networks, diaspora financing and remittance routes, and informal or improvisational scaling strategies should be treated as central – not peripheral – mechanisms. Incorporating these into analysis, using firm-level datasets and geospatial proxies such as mobile-money transactions or remittance flows, can help quantify their value. This shift requires theoretical frameworks that account for dynamic adaptation, systemic resilience, and the ability of firms to navigate inconsistent policy environments.

3.2 Methodological challenges

A central difficulty in studying African scaleups is the lack of systematic evidence that connects ecosystem barriers to firm-level behaviour. Many constraints – from regulatory fragmentation to infrastructure gaps – are well documented, but how they actually shape the decisions and trajectories of firms remains poorly understood. For example, while broadband coverage is expanding, the absence of localised infrastructure data makes it difficult to see where connectivity translates into firm-level growth. Similarly, although AfCFTA provides a framework for digital integration, little is known about how scaling firms navigate its trade protocols or adapt to shifting regulatory requirements. Without this level of evidence, interventions risk being designed around generalised assumptions rather than the lived realities of firms.

Robust evidence is the cornerstone of effective ecosystem design, yet methodological gaps remain acute. Most African countries lack standardised, accessible, and longitudinal data on firm growth – from founding to scaling and, in some cases, to failure or exit. The existing data is often incomplete, inconsistently defined, or locked within proprietary systems.

This is particularly problematic for tracking informal or semi-formal digital trade, which constitutes a significant share of cross-border commercial activity in Africa. Without better visibility into how digital goods and services flow between neighbouring markets – outside of major e-commerce platforms – policy interventions risk missing their mark.

Kenya's and Ethiopia's startup platforms have begun integrating valuation, employment, and Sustainable Development Goal (SDG)-linked investment data.⁵ However, few systems combine this with procurement or customs records. A clear opportunity exists to create shared data infrastructures that link administrative and regulatory data with firm performance indicators.

Early efforts – such as the African Entrepreneurship Ecosystem Index⁶ – are beginning to create a more harmonised system for benchmarking ecosystem performance across African economies. This enables some level of comparative analysis and the ability to track the impact of reforms. However, greater interoperability is still needed between macroeconomic indicators, regulatory data, and firm-level metrics to produce a truly integrated and actionable view of ecosystem health.

Addressing these issues will require substantial investment in a shared, integrated data infrastructure. This includes not only digitising and standardising firm-level reporting but also building platforms that connect this data to ecosystem metrics – enabling researchers and policymakers to generate insights that are both granular and scalable.

3.3 Interdisciplinary perspectives

Scaling digital ventures is a multifaceted challenge that transcends any single domain. Yet, research efforts often remain locked within disciplinary silos. Economists may study digital growth metrics, while legal scholars analyse regulatory harmonisation, and technologists examine platform adoption – rarely connecting these strands into a coherent picture.

There is a particular underutilisation of behavioural insights in understanding how entrepreneurs make decisions under uncertainty, and how their perceptions of risk, opportunity, and institutional trust affect their scaling trajectories. Similarly, research on digital finance rarely intersects with studies of trade facilitation or innovation systems, even though these domains are deeply interdependent in practice.

Efforts like the Argidius Foundation's SCALE framework (Argidius Foun-

5 Kenya's startup ecosystem dashboard can be accessed at <<https://kenya.dealroom.co/dashboard>> and Ethiopia's startup ecosystem dashboard can be accessed at <<https://ethiopia.dealroom.co/dashboard>>.

6 See Innovation for Policy Foundation (i4Policy). The Africa Entrepreneurial Ecosystem Index. <<https://africa.ecosystem.build/>>

dition, 2021) and the Research Innovation Systems for Africa (RISA)-funded data projects across Kenya, Ethiopia, and Rwanda⁷ illustrate how behavioural science, leadership diagnostics, and macroeconomic analysis can be layered. These approaches reveal the structural and strategic gaps in leadership, scalability, and capital access that hold back ventures at the tipping point of growth.

Furthermore, there is an urban bias in current literature. Much of the research is centred on high-visibility startup hubs like Nairobi, Lagos, and Cape Town,⁸ while rural and peri-urban ecosystems - where infrastructure challenges are more acute but digital adoption is rapidly growing - receive little attention. These areas may offer insights into alternative scaling strategies that are more inclusive, distributed, and adapted to local constraints.

To support scale and digital trade effectively, a stronger and more integrated evidence base is essential. Advancing understanding of Africa's digital economy requires urgent attention in several areas. Research must map friction points within digital ecosystems across diverse markets, tracing how infrastructure, regulation, and firm behaviour combine to create barriers or opportunities. Greater focus is also needed on the internationalisation strategies of African ventures, identifying how they expand across borders and what enables successful scaling. At the same time, investor risk perceptions remain poorly understood, despite playing a decisive role in shaping capital flows and firm decision-making in volatile environments. Finally, new metrics must be developed that reflect the realities of scaling in data-scarce, high-volatility contexts and that provide benchmarks which inform decision-making at the firm, ecosystem, and policy levels.⁹

7 For more information on projects that include research funded by the RISA Fund, see <<https://www.yumpu.com/user/systemicinnovation>>.

8 The Scaling in Africa research (African Scalecraft) documents the hub-centric nature of existing ecosystem data and highlights the need for deeper analysis of distributed, rural, and peri-urban entrepreneurial systems (Walker & Bowling, 2022). This pattern of urban concentration is also reflected in other major evidence bases, including the Aspen Network of Development Entrepreneurs (ANDE) Research and Knowledge Hub.

9 Methodological work on this has begun but more cross-country comparative work is necessary. See Windsor *et al.* (2025).

4. Proposed research agenda and policy action

4.1 *Priorities for academic and policy research*

Enabling African digital ventures to scale requires a research agenda grounded in the realities of fragmented markets, nascent infrastructure, and investor hesitancy. Four priorities stand out as particularly urgent for advancing evidence-based policymaking.

The first concerns regulation and standards. While the AfCFTA offers a historic opportunity to integrate digital markets, full regulatory harmonisation remains a distant goal. More feasible pathways lie in interoperability, mutual recognition, and equivalence agreements that can reduce friction without requiring identical frameworks. Comparative research is needed to identify where partial alignment – in mobile money systems, data protection rules, or licensing regimes – can deliver the greatest impact, and how scaling firms actually experience these differences in practice. Understanding the lived reality of firms navigating fragmented digital regimes is essential if AfCFTA is to shift from aspiration to implementation.

The second priority is infrastructure, which must be treated not as a static backdrop but as a dynamic enabler of business model innovation. Scaling firms rely on digital identity systems, mobile payments, and broadband to expand into new markets, yet they continue to adapt creatively to persistent gaps. Research should examine how infrastructure thresholds shape firm behaviour: when does broadband penetration begin to unlock platform models, or how does the availability of EV charging networks drive uptake in emerging e-mobility sectors? Ethiopia's nascent e-mobility and training industries show how targeted infrastructure can catalyse entirely new growth nodes. A clearer understanding of these linkages will help governments align infrastructure investment with firm-level opportunities.

The third area is investor confidence. The so-called “Africa discount” (Walker & Bowling, 2022) continues to constrain access to capital, particularly for ventures seeking to scale across borders. Investors often apply lower valuations and higher risk premiums to African firms, even when fundamentals are strong, reflecting concerns over political instability, currency volatility, shallow exit markets, and weak regulatory harmonisation. These perceived risks are compounded by fragmented regional markets and high transaction costs, reinforcing caution among investors. Yet little is understood about how

such risks are actually assessed, which signals help reduce perceived uncertainty, or which categories of firms are consistently overlooked. Research that unpacks these dynamics – examining, for example, the influence of transparent governance, traction data, or ecosystem partnerships on investor decision-making – can help both policymakers and firms position ventures more effectively. By demystifying the drivers of investor confidence, African ecosystems can begin to attract and mobilise the levels of growth capital required for scale.

Finally, data integration remains both a research challenge and a policy imperative. Current systems are highly siloed: firm-level performance data on customers, revenues, and employment rarely connects with regulatory data on licensing and tax compliance, or infrastructure data on broadband and logistics rollout. The result is a fragmented evidence base that cannot reveal how policies, infrastructure, and firm strategies interact. Research must focus on building integrated data systems that link these domains in ways that support real-time monitoring and smarter interventions. Governments and regional bodies should provide the enabling frameworks, while donors and ecosystem actors can play a catalytic role in financing and operationalising shared platforms. Without such integration, interventions will remain blind to the dynamics of scale and risk missing their intended impact.

Across all four areas, researchers, governments, and ecosystem actors need to move from parallel efforts to coordinated approaches – co-creating frameworks that reflect the realities of African firms navigating complex, volatile markets. Only through this collaborative, evidence-based model can the continent build an innovation ecosystem capable of driving sustainable digital growth at scale.

4.2 From insight to impact: Practical solutions

Bridging research and practice requires institutional investment in shared data infrastructure and applied experimentation. Governments should fund real-time monitoring tools and open data ecosystem dashboards. Accelerators and innovation hubs must evolve to support compliance, internationalisation, and capital readiness - not just startup launches.

The consequences of overlooking local context are exemplified in M-PESA's failed expansion into South Africa. Despite its dominance in East Africa, the mobile money service M-PESA struggled to gain traction in South Africa due to fundamental differences in financial infrastructure, consumer behaviour, and regulatory frameworks. South Africa's higher banking penetration, strict

compliance environment, and a misaligned partnership with Nedbank (which primarily serves high-income clients) resulted in poor uptake. This case underscores the need for grounded, localised scaling strategies.

Investors and donors can support blended finance models that absorb early scale risk and unlock follow-on funding, while regionally structured venture funds and milestone-based disbursements can help de-risk expansion. For ventures themselves, success depends on four core principles. First, market intelligence is essential, requiring detailed, data-informed analysis of market fit, infrastructure, and regulatory exposure. Second, expansion should be sequenced and pursued through focused, phased internationalisation strategies that prioritise cultural and economic proximity. Third, strategic partnerships with local corporates, telcos, and platforms can reduce costs and open market access. Finally, institutional memory is critical: codifying lessons, playbooks, and expansion frameworks enables firms to scale more efficiently over time.

5. Conclusion: Linking data to digital growth

Digital trade is a key opportunity for African economies, but its success hinges on the ability of ventures to scale. Without clear, evidence-based support systems, many firms will remain trapped in an early-stage survival mode. Policymakers, investors, and ecosystem actors must align efforts around data-informed strategies. The core challenge is systems integration. Macroeconomic trends, firm behaviour, infrastructure, and policy interventions must be viewed not in isolation but as part of a dynamic system.

Building a new data infrastructure that links firm-level trajectories with broader economic signals is critical. This will enable smarter, more adaptive decisions – not just reactive policy or one-off investments, but continuous learning, timely interventions, and targeted resource allocation that reflect the real-time needs of high-potential firms and sectors. In short, better data infrastructure is the foundation for better decisions – and better outcomes.

Driving inclusive, scalable innovation in Africa's digital economy requires a fundamental shift toward data-centric collaboration. Academic institutions should take the lead in developing tools that connect macroeconomic trends with firm-level dynamics, enabling deeper, more actionable insights into how innovation ecosystems evolve. Governments must go beyond isolated reforms and invest in the sustained collection, sharing, and use of data through open platforms that shape long-term strategy. Meanwhile, investors and donors need

to prioritise the foundational infrastructure that enables real-time ecosystem intelligence. When data becomes the shared language of innovation-used not just to report but to coordinate – Africa can move from fragmented growth to a more coherent, responsive, and inclusive digital future.

This call for implementation is echoed in a recent report by the Tony Blair Institute for Global Change (2025), which argues that the success of the AfCFTA will hinge on coordinated delivery mechanisms - from trade facilitation at borders to interoperable digital infrastructure - that translate continental ambition into firm-level impact. Back in 2020, the International Finance Corporation (IFC) and Google (2020) projected that Africa's digital economy might expand to USD 180 billion by 2025. Yet that milestone has not been reached. The gap between promise and outcome underscores the need for systemic reforms that move beyond aspirational targets toward the practical realities of scaling firms. Looking further ahead, the same IFC report projects Africa's digital economy could reach USD 712 billion by 2050, but realising that potential will depend less on forecasts and more on building the institutional and market foundations that allow firms to grow at scale.

References

- African Development Bank (AfDB). (2024). *African Economic Outlook 2024: Chapter 1, Africa's economic performance and outlook*. Abidjan: AfDB. Retrieved from https://www.afdb.org/sites/default/files/2024/06/06/aeo_2024_-_chapter_1.pdf
- Amonimo, F. (2025). *ITANA: Iyinoluwa Aboyeji Reveals How His Million-Dollar Digital Zone Could Replace Delaware for African Startups*. Techsoma Africa. Retrieved from <https://techsoma.africa/itana-iyinoluwa-aboyeji-reveals-how-his-million-dollar-digital-zone-could-replace-delaware-for-african-startup/>
- Argidius Foundation. (2021). *How to fulfil the potential of business development services using SCALE*. Argidius Foundation. Retrieved from <https://www.porticus.com/media/4qklery0/2153-executive-summary-fulfilling-the-potential-of-bds.pdf>
- Ferracane, M. F., González Ugarte, S., & Rogaler, T. (Eds.). (2025). *Digital Trade Integration Database*. European University Institute. <https://dti.eui.eu/database/>
- Google & International Finance Corporation. (2020). *e-Conomy Africa 2020: Africa's \$180 billion Internet economy future*. International Finance Corporation (World Bank Group). Retrieved from <https://www.ifc.org/content/dam/ifc/doc/mgrt/e-conomy-africa-2020.pdf>
- GrowthAfrica & Systemic Innovation. (2023). *Scale diagnostics: High-growth firm performance dynamics in Kenya, Ethiopia and Rwanda* (RISA Fund Insight Report No. 7). London: Systemic Innovation / GrowthAfrica. Retrieved from <https://www.yumpu.com/en/document/view/68844050/scale-diagnostics-high-growth-firm-performance-dynamics-in-kenya-ethiopia-and-rwanda>
- GrowthAfrica & Systemic Innovation. (2024a). *Entrepreneurship and company growth in Kenya: Mapping enterprise valuations, investment, and employment*. Research and Innovation Systems for Africa (RISA) Fund, FCDO. Retrieved from <https://www.yumpu.com/en/document/view/69419667/entrepreneurship-growth-in-kenya-mapping-enterprise-valuations-investment-and-employment>
- GrowthAfrica & Systemic Innovation. (2024b). *Building a path to scale: Developing a growth framework for high-impact African ventures* (Insight report No. 8). Research and Innovation Systems for Africa (RISA) Fund. Retrieved from https://www.risa-fund.org/wp-content/uploads/2024/12/Building-a-Path-to-Scale_-_Developing-a-Growth-Framework-for-High-Impact-African-Ventures.pdf
- GrowthAfrica & Systemic Innovation. (2024c). *The state of startup innovation in Ethiopia: Mapping valuations, investment, and employment*. Research and Innovation Systems for Africa (RISA) Fund, FCDO. Retrieved from <https://www.risa-fund.org/wp-con->

[tent/uploads/2025/01/The-State-of-Startup-Innovation-in-Ethiopia_-Mapping-Valuations-Investment-and-Employment-.pdf](tent/uploads/2025/01/The-State-of-Startup-Innovation-in-Ethiopia_-Mapping-Valuations-Investment-and-Employment-.pdf)

International Monetary Fund (IMF). (2024). *Regional Economic Outlook: Sub-Saharan Africa*. Retrieved from <https://www.imf.org/-/media/files/publications/reo/afr/2024/april/english/text.pdf>

Stam, E., Nkontwana, P., McDonald, R., Murenzi, R., Addo, K. A., Bayuo, B., Baah, B., Riezebos, S., & Gelissen, T. (2025). *Measuring national entrepreneurial ecosystems in Africa*. SSRN. <https://doi.org/10.2139/ssrn.5254687>

Systemic Innovation. (2025). *Comparing innovation ecosystem performance and characteristics: Ethiopia, Rwanda, and Kenya*. Retrieved from <https://www.yumpu.com/en/document/read/70851437/comparing-innovation-ecosystem-performance-and-characteristics-ethiopia-rwanda-and-kenya/1>

Tony Blair Institute for Global Change. (2025). *The AfCFTA Imperative: From Vision to Impact*. Retrieved from <https://institute.global/insights/geopolitics-and-security/the-afcfta-imperative-from-vision-to-impact>

United Nations Economic Commission for Africa (UN-ECA). (2022). *The AfCFTA Country Business Index (ACBI): Report summary report for Angola, Côte d'Ivoire, Gabon, Kenya, Namibia, Nigeria, and South Africa*. Retrieved from <https://hdl.handle.net/10855/47540>

van Dijk, M., & Terzi, A. (2020). *The Art of Scaling* (Version Three). ScaleUpNation. Retrieved from <https://scaleupnation.com/wp-content/uploads/2020/11/The-Art-of-Scaling-3.0.pdf>

Walker, S., & Bowling, B. (2022). *Scaling in Africa: A critical systems examination of contexts, barriers, enablers and future pathways for scaling commercial ventures in sub-Saharan Africa*. Systemic Innovation. Retrieved from <https://www.africanscalecraft.com/>

Windsor, G., Walker, S., & Stam, E. (2025). *Ethiopian data foundations: Linking firm dynamics and entrepreneurial ecosystem conditions to inform systemic reform* (Working paper). Systemic Innovation & Utrecht University, supported by the International Growth Centre (Ethiopia). Retrieved from <https://www.yumpu.com/en/document/read/70844985/ethiopian-data-foundations>

Drivers of enterprise digitalisation in Sub-Saharan Africa with a focus on microenterprises

Izak Atiyas

1. Introduction

The increased use of digital technologies has become a key driver of productivity growth globally. Recent research has shown that digitalisation, and in particular, internet access, has a positive causal effect on several desirable economic outcomes such as increased productivity, reduced poverty, and job creation in developing countries in general and in Sub-Saharan Africa (SSA) in particular.¹ There is also a sizable literature on the positive impacts of mobile money (e.g. Suri & Jack, 2016; Kedir & Kouame, 2022; see also Bateman *et al.*, 2019 for a critical review) as well as on the use of scoring rules or algorithms based on records of users' transactions to allocate financial credit (Suri *et al.*, 2021).

Despite significant progress in the last few years, digital connectivity and more generally the use of digital technologies are still lagging in Africa. This is

1 See the literature review in Hjort and Tian (2025) and literature cited in Begazo *et al.* (2023).

especially true among microenterprises in SSA, which make up a large part of the business landscape. At the same time, with the advent of big data and artificial intelligence, the technology frontier is shifting very rapidly, leading to concerns of increasing technology and income divides both between developed and developing countries and within developing countries themselves.

Digitalisation is also a key intermediate step for participating in Africa-wide as well as global digital trade. Understanding key drivers of digitalisation, especially among microenterprises, can help the design of evidence-based policies to encourage and incentivise enterprises to participate in the digital economy and narrow down digital inequalities.

This chapter is organised as follows: Section 2 provides a summary of the current knowledge on the state of digitalisation and key drivers in the African context. Section 3 identifies knowledge gaps and offers suggestions for further research and policy. Section 4 concludes.

2. Evidence on the use and drivers of digital technologies in Africa

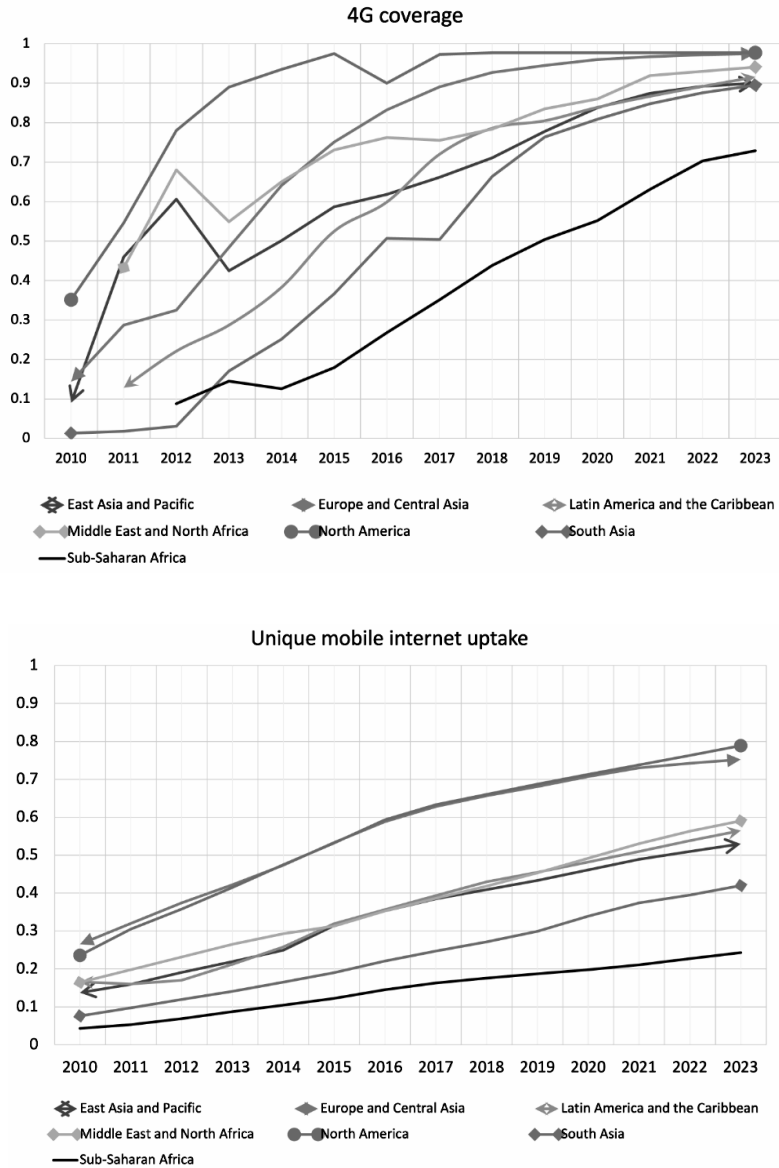
Recent research makes it possible to make a distinction between digital enablers and digital technologies used for business functions. Digital enablers include technologies that allow digital connectivity, including mobile phones, fixed-line internet access and computers. Digital technologies used for general business functions include technologies of various levels of sophistication used for diverse activities, such as accounting, sales, and payments. Having an enabler typically is a necessary but not a sufficient condition for the use of digital technologies. These points are discussed in further detail below.

2.1 Drivers of mobile internet uptake

Before discussing the adoption of digital technologies by businesses, it is useful to make some initial observations. First of all, both coverage of mobile networks (especially 4G and above) and mobile internet uptake² are lower in SSA relative to other regions (Figure 1).

2 Mobile internet uptake is measured by the variable “unique mobile internet subscribers” compiled by GSMA (Atiyas & Dutz, 2025). This variable corrects for the very widespread phenomenon of individuals holding multiple sim cards.

Figure 1: 4G coverage and unique mobile internet uptake across regions, 2010-2023.



Source: Global System for Mobile Communications Association (GSMA); Atiyas and Dutz (2025).
Note: 4G coverage is the percentage of the population that is covered by the 4G network. Unique mobile internet subscribers is the percentage of the population that has mobile internet subscriptions, avoiding double-counting because of multiple SIM cards.

Evidence suggests that the average income in a country is a key driver of how widespread the use of mobile internet is. Indeed, globally, variations in per capita income explain about half of variations in mobile internet uptake.³ However, Atiyas and Dutz (2025) show that mobile internet use in SSA is lower than what one would expect based on the average income of these countries.

A comparison of key drivers of mobile internet uptake across a group of SSA countries and non-SSA countries with similar levels of per capita GDP reveals that the key variables that explain variation cover skills and capabilities (such as literacy) and access to electricity. In particular, while in rural areas in SSA, less than 50 per cent of the population has access to electricity, this ratio is 90 per cent in non-SSA countries with similar levels of average per capita GDP.⁴

Moreover, it seems that the main problem is not necessarily on the supply side. To see this, it is useful to examine the “uptake gap”.⁵ This variable is equal to zero if all people covered by at least 3G network have a mobile internet subscription. The uptake gap is very high in SSA compared to other regions (74 per cent in SSA compared to 56 per cent in South Asia, the second largest regional share), meaning that an important part of the population has not adopted mobile internet even though it is available (Figure 2).

These observations suggest that, though important, extending digital infrastructure will not automatically result in the adoption of digital technologies. Demand-side factors are most likely as important. On the demand side, the likely candidates are (lack of) information about how digital technologies can be used to improve productivity and incomes, affordability (that is, prices of handsets, and internet, especially data services) and the existence of complementary assets (especially electricity and skills).⁶

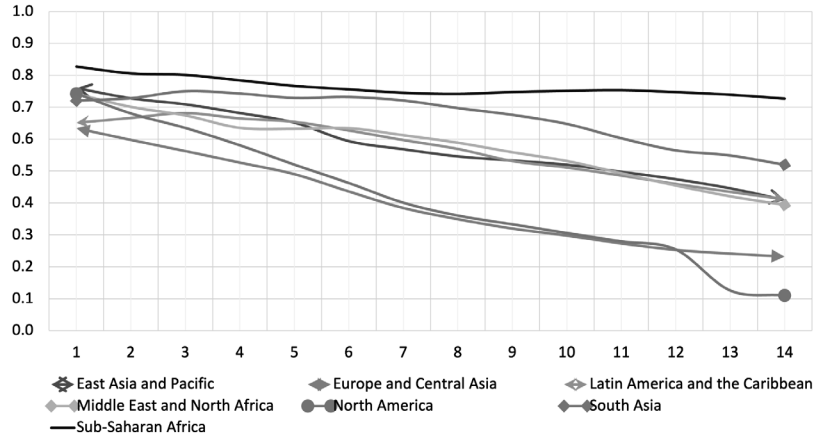
3 More explicitly, a pooled ordinary least squares regression of unique mobile internet uptake on per capita GDP (pcgdp), pcgdp squared and pcgdp cubed, one obtains an R-squared of about 50 per cent (Atiyas & Dutz, 2025).

4 Atiyas and Dutz (2025), Table 8.3. The comparison is based on SSA and non-SSA countries with 2023 per capita income (current USD) levels between 1,000 and 2,300.

5 The uptake gap is defined as $(1 - (\text{uptake}/\text{coverage}))$. Uptake is the share of population that has a mobile internet subscription. Coverage measures the share of the population that is covered by a mobile network that provides mobile internet services. Hence the uptake gap measures the share of the population that does not have a mobile internet subscription even though it is covered by a mobile network.

6 See, for example, Begazo *et al.* (2023) and references therein.

Figure 2: Uptake gap across regions, 2010-2023.



Source: GSMA; Atiyas and Dutz (2025).

2.2 Drivers of digital technology adoption by enterprises

Turning now to the issue of digital technology adoption by businesses, it will first be useful to have some idea about the size distribution of firms in Africa, if anything, to appreciate the importance of microenterprises.⁷ An important source of comparative statistics on the role of microenterprises is the International Labor Organization (ILO). According to ILO (2019), the employment share of self-employed enterprises and microenterprises (employing 2-9 persons) is about 84 per cent in SSA (Table 1). This ratio is close to South Asia (86 per cent) and substantially higher than other regions such as East Asia and the Pacific (35 per cent) and Latin America and the Caribbean (63 per cent).

⁷ The definition of microenterprises changes across sources. The ILO defines enterprises that do not employ anyone besides the owner as self-employed and those employing between 2-9 persons (in addition to the owner) as microenterprises (ILO, 2019). The Research ICT Africa (RIA) data set discussed below covers enterprises that employ 10 persons or less, including the self-employed. This chapter refers to those enterprises as microenterprises. The World Bank's Firm Level Adoption of Technology (FAT) data set, also discussed below, covers firms that employ 5 people or more.

Table 1: Employment distribution by size of economic unit, formality and economic activity (weighted average for each region).

Category	East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa
Self-employed	14.1	10.0	31.3	43.7	66.5	50.0
Micro (2-9 persons)	21.3	21.4	31.7	24.7	19.6	34.3
Small (10-49 persons)	18.6	25.8	11.1	11.5	5.3	6.5
Medium and large (50+ persons)	46.0	42.8	25.9	20.1	8.6	9.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: ILO (2019).

The Firm Level Adoption of Technology (FAT)⁸ survey conducted by the World Bank and survey data collected by Research ICT Africa (RIA) provide some granular evidence about the adoption of various types of digital technologies at the firm level. The FAT dataset covers enterprises that employ five people or more; so it does not include self-employment or own-account firms. The RIA microbusiness dataset covers enterprises that employ 10 people or fewer. The FAT dataset covers over 6’000 enterprises in six countries (Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, and Senegal). The RIA dataset covers about 3’900 firms in seven countries (South Africa, Nigeria, Uganda, Ethiopia, Kenya, Ghana, and Tanzania). Some key questions used in the RIA survey are very similar to those in the FAT survey.

Both the FAT and the RIA surveys ask questions about the adoption/use of digital enablers, such as mobile phones, computers and the internet. For the enablers, computers with internet connections are classified as “advanced enablers”. In addition, for a number of “general business functions”, namely administration (in the case of RIA, accounting), operation planning, procurement, marketing, sales, and payments, the survey collects information about the use of technologies with varying degrees of sophistication classified as manual, basic and advanced. More specifically, “manual” refers to the case where the

8 The FAT is discussed in detail in Cruz (2024).

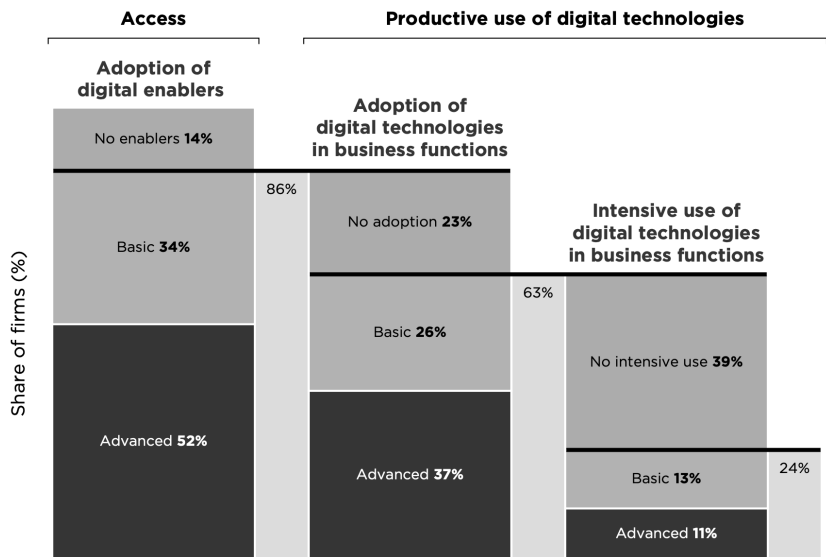
enterprise does not use any digital technologies (for example, accounting is carried out manually, using notebooks). “Basic” refers to general applications, such as standard software and e-mail, whereas “advanced” refers to integrated systems or specialised software designed to perform specific functions (e.g., enterprise resource planning). Data also allows a distinction between simple adoption (that is, the situation where the enterprise has used a technology at least once) and intensive use (where the technology in question is the most frequently used technology).⁹

Figure 3, taken from Cirera *et al.* (2024), presents some key findings from the FAT survey. The left column shows the share of enterprises that have adopted digital technology enablers (which, as stated before, include mobile phones, computers, and internet access). Only 14 per cent of the enterprises have not adopted any enablers, and 52 per cent have “advanced enablers”, that is, they have a computer with an internet connection. The second column provides the share of enterprises with digital enablers that use digital technologies in their basic business functions. The figure shows that 23 per cent of enterprises have adopted enablers but do not use digital technologies in any of their general business functions. A total of 37 per cent of enterprises use advanced digital technologies for general business functions. The right column shows the percentage of firms that use a digital technology “intensively”. According to the results, a large share of firms (39 per cent) have access to digital technologies and have used them at least once, but still, the most frequently used technologies are not digital but manual.

Overall, 37 per cent of all enterprises use at least one advanced digital technology for general business functions, but only 11 per cent use them intensively. One conclusion is that while there has been progress on the diffusion of digital technologies, with more than 60 per cent of firms using either a basic or advanced technology at least once, less progress has been made in terms of intensive use, with less than one quarter of firms using these technologies in an intensive manner.

9 An example can be given from the RIA questionnaire: for accounting, the survey first asks “which tools does the business use for accounting and bookkeeping”. The options are 1: offline, 2: mobile phone: communication, 3: computer: standard software, 4: mobile phone: apps and platforms, and 5: computer: specialized software. Option (1) is classified as “manual”, options (2) and (3) as “basic” and options 4 and 5 as “advanced”. Respondents may choose more than one option. Then the survey asks “Which one of these tools does the business use most frequently for its accounting or bookkeeping” and lists the same options.

Figure 3: Digital technology adoption in Africa.



Source: Cirera *et al.* (2024) based on data from the World Bank FAT Survey.

Some key findings for the case of microenterprises, based on the RIA dataset, are described by Atiyas *et al.* (forthcoming). They find that, while 80 per cent of enterprises have a mobile phone, the share of enterprises that have a smartphone is only 36 per cent. Enterprises that do have smartphones rarely use them for business purposes. Less than half use smartphones to access the internet; less than one quarter maintain a social media presence; less than 15 per cent use email to communicate with suppliers, customers, or workers; and about a quarter use search engines. Moreover, only 5 per cent of enterprises have a computer. Overall, the share of enterprises that use a phone or a computer to access the internet for business purposes is less than 20 per cent.

The use of even basic digital technologies for general business functions is very low. Most businesses use manual technologies for basic business functions: more than 87 per cent of enterprises have not used, even once, any non-manual technologies for accounting and planning. The ratio for sales and marketing is about 82 per cent. In the case of managing supplies, this ratio goes down to 74 per cent and further down to 66 per cent for payments, the latter reflecting the development of mobile payment tools in Africa, especially those that do not require access to the internet. The reader can remember that for the FAT dataset, the intensive use of technologies among FAT firms was also low; the ratio of firms that use either a basic or advanced digital technology intensively is

24 per cent overall. So the adoption of digital technologies for general business functions is much lower among microenterprises covered by the RIA survey compared to enterprises covered by the FAT survey.

With regard to intensive use, that is, whether basic or advanced digital technologies are the most frequently used technologies, the situation is even starker. The ratio of firms where the most frequently used technologies are manual is more than 90 per cent for all business functions except for managing supplies (84 per cent). For FAT firms, this share is 76 per cent. It seems that the real gap between RIA and FAT firms is not in intensive use (relatively low in both groups of firms) but in simple adoption.

It is clear that very low levels of adoption of digital technologies, including access to the internet, are a key barrier that prevents microenterprises from participating in the data economy in general and digital trade in particular. Understanding the key drivers of adoption may help in the design of policies to support the adoption of digital technologies among microenterprises.

2.3 Explaining the adoption gap

Econometric work done on the RIA dataset shows that adoption of basic enablers (that is, smartphone, computer, or using the internet for business) is correlated with the following variables: being in an urban area, female ownership (-), owner's schooling, number of areas where the enterprise had training, access to electricity, financial inclusion (having a bank account or using mobile money), quality of suppliers and customers,¹⁰ and, following at least one key performance indicator (KPI) associated with the performance of their enterprises, such as cost, sales, quality, energy, and inventories (Atiyas *et al.*, forthcoming).¹¹

As discussed in more detail below, it is not possible to make statements about causal effects due to a lack of data. For example, it could be that having a bank account increases the possibility of having a smartphone because it relaxes financial constraints and allows the owner to more easily finance the purchase of a smartphone. However, it could also be that having a smartphone facilitates opening a bank account. Or it could be that there is an omitted variable (say,

10 The variable "quality of suppliers and customers" is an index calculated as the sum of several binary variables, namely: suppliers not being local, suppliers being large and formal, customers being non-local, and customers being large and local.

11 The analysis is based on logit regressions.

a variable that reflects parents' wealth or income) that drives both smartphone adoption and financial inclusion. Still, the results above strongly suggest that skills (captured by education and training) as well as indicators that capture the degree of sophistication of the business (following KPI and quality of suppliers and customers), correlate with the adoption of digital enablers. Moreover, access to electricity also plays a critical role.

The study also explores which variables positively correlate with technology sophistication¹² and finds, through simple regressions, the following variables: being in an urban area, female ownership, owner's schooling, number of areas where the enterprise had training, access to electricity, financial inclusion (having a bank account or using mobile money), access to more sophisticated finance (bank loan or credit card), following at least one KPI.

With some small variations, the correlates of adoption of enablers are similar to those of technology sophistication. Access to electricity, education, skills, and financial access figure prominently in both. Technology sophistication is also correlated with access to more sophisticated finance, such as a bank loan or a credit card. The fact that "following KPIs" is correlated with both also suggests that better "management practices"¹³ could be an important driver of adoption and use of digital technologies. Another interesting finding is that female ownership is negatively correlated with the adoption of basic enablers but positively associated with technology sophistication.¹⁴

3. Key research gaps and recommendations for future research

This section identifies key gaps in our knowledge about digital technology use and its drivers, and proposes some questions and topics for future research.

3.1 The role of prices

Cruz *et al.* (2024) show that, in SSA, digital technologies are more expen-

12 Technology sophistication is measured as an index where manual technology is graded as 1, basic technology such as smartphone or basic software is graded as 2, and "advanced technology" such as specialized software is graded as 3, and then summed over 6 basic business functions of accounting, planning, managing supplies, sales, marketing and payments.

13 In the sense of Bloom *et al.* (2012).

14 See Chapter 17 for a research agenda that provides a gender perspective on digital trade in Africa.

sive than in other regions. Still, we do not have estimates of the extent to which handset prices or the prices of voice and data packages offered by mobile operators are key barriers to the adoption of technologies, relative to, for example, education and skills. Although the RIA dataset includes questions about expenditures on mobile voice and data packages, the information is highly incomplete.

3.2 Causality

Although the correlations presented in the previous section are highly suggestive, these do not establish causality. The issue of causality is even more important regarding the relation between access to finance and the adoption of technology. There is an emphasis in the literature that digital technologies may facilitate access to finance (e.g. Disse & Sommer, 2020). However, causality could be in the reverse direction. It could be that access to finance may facilitate the adoption of more sophisticated technologies, and a jump from mobile phones to, say, smartphones. In any case, to address issues of causality, one would need longitudinal datasets where enterprises are followed over time, which, to my best knowledge, are not available for microenterprises, *let alone* for business enterprises more generally.

3.3 The role of digital technologies in firm dynamics and survival

The key hope is that the availability of digital technologies would help micro firms avoid exit and grow into small and medium-sized firms. Again, we would need panel datasets to examine if these expectations are correct. More generally, data that allows examination of firm dynamics would allow researchers to explore the key question of whether the availability of digital technologies would allow firms in Africa to “leapfrog” in size, productivity and competitiveness.¹⁵

3.4 Data

The FAT, as well as enterprise surveys compiled by the World Bank, and the micro business surveys by RIA, are extremely valuable. In particular, the latter is the only source of systematic information on digital technology adoption and use by micro-enterprises. However, this dataset is not representative. Creating representative samples of microenterprises is admittedly very difficult, if anything, because many such enterprises are informal and some are not regis-

¹⁵ Though not covered in this note, a key and emerging subset of digital technologies, namely artificial intelligence (AI) tools, including large language models, are often claimed to present opportunities for jumps in competitiveness and productivity. See for example Cisco and Carnegie Mellon University Africa (2025).

tered. There is a need for a more concerted effort by statistical agencies and collaboration between statistical agencies and entities such as RIA to create more representative samples of microenterprises. In addition, efforts to build panel datasets, as emphasised in the previous point, are necessary to enable examination of dynamic aspects of microenterprise growth, and of causal relations between productivity, access to finance and adoption of digital technologies.

3.5 Contextual specificities, informal mechanisms of finance and case studies

Business activity often occurs outside formal digital and financial systems, sometimes with a high degree of success. Such examples draw attention both to contextual and cultural specificities, as well as the availability of informal mechanisms of finance. While structured surveys do try to capture some of these elements (e.g. by asking about sources of finance outside formal or digital channels), these examples also may be pointing to the value of in-depth individual case studies to capture some of these contextual elements and to construct hypotheses and lessons that can be replicated.

3.6 The question of skills

It is clear that education and skills are critical for digitalisation. However, turning this insight into policy requires much deeper and granular information. Some possible questions are: does improvement in skills require increasing the scope and effectiveness of traditional basic education, or can training programs outside the basic education system, perhaps with an emphasis on digital skills, be effective in addressing the gaps? To what extent can digital tools help reduce gaps in basic education systems?

3.7 Entrepreneurship programs and their evaluation

The findings reported above, in particular the gaps between adoption of technologies and their intensive use for business purposes, the role of skills and the role of business sophistication, suggest that systematic programs that support entrepreneurship may be an important policy area to explore going forward. Even though evidence on what kind of programs are more effective in supporting enterprise productivity and growth has been increasing, as emphasised by McKenzie (2025), there is still much to learn. Similarly, there is a plethora of efforts across Africa to develop support policies and systems for entrepreneurship, including for microenterprises, and support for digitalisation and digital trade. However, we do not have distilled information on which of

these efforts is more effective in which type of context. In particular, there is a need for explicit efforts to include the collection of data in the design of policies so their effects can be examined. An Africa-wide effort to document policies across different countries and contexts, to gather data and to develop mechanisms of exchange for key lessons would contribute to filling these gaps. A key concern in this context is that many programs may have a positive impact in the short run, but these impacts may dissipate in the medium- to long-term. It would be important to orient efforts towards designing programs that have lasting positive effects.

3.8 Support for locally useful and relevant apps

Part of the reason for the lack of adoption of digital technologies could be the absence of locally useful digital applications. The term “locally useful” refers both to languages as well as characteristics of applications that would be suitable for existing levels of skills and business needs. Research on how to design policies to support the development of such applications can bring significant benefits.

4. Conclusions

Microenterprises constitute the backbone of enterprises and employment in SSA, yet they remain significantly behind in the adoption and intensive use of digital technologies. Closing this digital gap is a fundamental prerequisite for inclusive economic growth and participation in the digital economy, including in digital trade. Addressing the key barriers – such as skills deficits, access to electricity, and affordability – requires targeted, evidence-based policies that move beyond infrastructure deployment to actively stimulate demand and support adoption of digital technologies. In turn, designing these effective interventions hinges on closing the significant data gap through the development of representative, longitudinal datasets. Future research must prioritise this data collection to move beyond correlation, establish causality, and truly understand the dynamics of digitalisation for Africa’s smallest businesses.

References

- Atiyas, I., & Dutz, M. (2025). Digitalization. In C. Goh (Ed.), *21st-century Africa: Governance and growth* (Chap. 8). World Bank. <https://doi.org/10.1596/978-1-4648-2186-8>
- Atiyas, I., Cruz, M., Dutz, M. A., Mensah, J., & Partridge, M. (forthcoming). *Digital technology choices among microenterprises in Africa*.
- Bateman, M., Duvendack, M., & Loubere, N. (2019). Is fintech the new panacea for poverty alleviation and local development? Contesting Suri and Jack's M-Pesa findings published in *Science*. *Review of African Political Economy*, 46(161), 480–497. <https://doi.org/10.1080/03056244.2019.1614552>
- Begazo, T., Blimpo, M., & Dutz, M. A. (2023). *Digital Africa: Technological transformation for jobs*. World Bank. <https://doi.org/10.1596/978-1-4648-1737-3>
- Bloom, N., Genakos, C., Sadun, R., & Van Reenen, J. (2012). Management practices across firms and countries. *Academy of Management Perspectives*, 26(1), 12–33. <https://doi.org/10.5465/amp.2011.0077>
- Cirera, C., Cruz, M., & Ortega, R. (2024). Making full use of digitalization: Where do businesses in Africa stand? In Cruz, M. (Ed.), *Digital opportunities in African businesses* (Chap. 1). World Bank. <http://hdl.handle.net/10986/41447>
- Cisco, & Carnegie Mellon University Africa. (2025). *AI and the workforce in Africa: Realizing the region's potential through public and private sector collaboration* (White paper). Retrieved from https://newsroom.cisco.com/c/dam/r/newsroom/pdfs/Cisco-CMU-White-paper_AI-and-the-Workforce-in-Africa.pdf
- Cruz, M. (Ed.). (2024). *Digital opportunities in African businesses*. Washington, DC: World Bank. Retrieved from <http://hdl.handle.net/10986/41447>
- Cruz, M., Djoumessi, Y., Edet, S., Konte, M., & Lang, M. (2024). Drivers of adoption and the cost of technology. In M. Cruz (Ed.), *Digital opportunities in African businesses* (Chap. 3). World Bank. Retrieved from <http://hdl.handle.net/10986/41447>
- Disse, S., & Sommer, C. (2020). *Digitalisation and its Impact on SME Finance in Sub-Saharan Africa: Reviewing the Hype and Actual Developments* (Discussion Paper 4/2020). Deutsches Institut für Entwicklungspolitik (DIE). <https://doi.org/10.23661/dp4.2020>
- Hjort, J., & Tian, L. (2025). The economic impact of internet connectivity in developing countries. *Annual Review of Economics*, 17, 99–124. <https://doi.org/10.1146/annurev-economics-081224-102352>

- International Labour Organization (ILO). (2019). *Small matters: Global evidence on the contribution to employment by the self-employed, micro-enterprises and SMEs*. Retrieved from https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@dcomm/@publ/documents/publication/wcms_723282.pdf
- Kedir, A., & Kouame, E. (2022). FinTech and women's entrepreneurship in Africa: The case of Burkina Faso and Cameroon. *Journal of Cultural Economy*, 15(4), 452–467. <https://doi.org/10.1080/17530350.2022.2041463>
- McKenzie, D. (2025). Is there still a role for direct government support to firms in developing countries?. *New Zealand Economic Papers*, 59(1), 24–29. <https://doi.org/10.1080/00779954.2023.2290484>
- Suri, T., & Jack, W. (2016). The long-run poverty and gender impacts of mobile money. *Science*, 354(6317), 1288–1292. <https://doi.org/10.1126/science.aah5309>
- Suri, T., Bharadwaj, P., & Jack, W. (2021). Fintech and household resilience to shocks: Evidence from digital loans in Kenya. *Journal of Development Economics*, 153, 102697. <https://doi.org/10.1016/j.jdeveco.2021.102697>

The creative sector: A driver of the digital transformation in Africa

Hildegunn Kyvik Nordås

1. Introduction

This chapter proposes a research agenda on AI-enabled digital transformation of the creative industries in Africa. What are the opportunities for African creative industries to thrive, innovate and grow in the digital economy? What are the comparative and competitive advantages of African music, film, design, video games and architecture?¹ How could domestic, regional, and global policies support an AI-enabled digital transition of African creative sectors? To what extent is the creative sector a catalyst for the digital transformation of the economy at large? For instance, does it play a role in the uptake of broadband, which in turn facilitates access to digital education and health services? Finally, what role do the creative industries play in branding Africa in global markets?

African music has inspired and shaped jazz, R&B, and rock music globally since the 1950s; African design has inspired fashion and interior decoration globally for decades, while African movies have gained traction in niche markets and film festivals around the world. Finally, African architects have developed “cool designs for a warming planet”, as the Economist put it (The Economist, 2025). However, until recently, few Africa-based artists and

1 Video games and computer games are used synonymously in the literature. I use video game in this chapter.

entrepreneurs have succeeded in international markets.

This changed drastically with the entry of global digital platforms and streaming services. All the global music streaming platforms offer Africa-centric playlists, while African artists feature prominently on global listings. Spotify's Afrobeats category increased by 34 per cent globally in 2024 alone, while Africa is the fastest-growing revenue base for the record labels.² Nigerian movies ("Nollywood") have evolved from home videos in the 1980s to feature films reaching a pan-African and international audience through screening on popular TV channels in Africa (e.g. South African cable television channel DSTv), Europe and China. Furthermore, airlines include African music and movies in their in-flight entertainment systems, while iROKOtv offers a catalogue of more than 5,000 Nigerian films and a large catalogue of African music.

Like music, African movies are now streamed over mainstream global platforms (Miller, 2012; Tella, 2021, p. 226; Krings & Simmert, 2020). African developers are also making their mark on the video games industry. From a low level, accounting for about 0.5 per cent of the global market in 2024, the African market is growing much faster than the global average.³ While the global gaming market is dominated by games made for consoles and PCs, about 90 per cent of African gaming revenue comes from smartphones. Finally, popular African games, often based on African stories and legends, have gained traction in international markets. Leti Arts is one of the most prominent African video games studios with a relatively long history of video games based on African stories (Bisschoff, 2017).

Both music and film have played an important role in promoting African fashion and design. Artists first worked with the major global fashion houses, displaying African fashion on stage, in music videos and movies. Over time, local African fashion brands have become more prominent. Tourism also benefits from creative services both directly through local film and music festivals and indirectly through branding of the African continent (Faidi, 2024; Tekena & Ochuba, 2022).

Finally, African vernacular architecture and building design offer technol-

2 Annual growth rates for revenues: 22.6 percent for sub-Saharan Africa, 22.8 percent for Middle East and North Africa (MENA) in 2024, compared to the global average of 4.8 percent (IFPI, 2025).

3 Data are not readily available for this industry, but according to a widely cited study (Carry1st, 2025), the African gaming market revenue was USD 1.8 billion in 2024, growing six times faster than the global average.

ogy that keeps buildings cool without air conditioning (e.g., Ajith Kumar *et al.*, 2021; Souza, 2024). These natural cooling systems are making their way into architecture schools around the world and are being promoted by innovative African architects, e.g., Kéré Architecture,⁴ Mariam Issoufou Architects⁵ and Oshinówò Studio.⁶ The founder of the former, Diebedo Francis Kere, won the Pritzker prize in 2022, one of the most prestigious prizes for architecture in the world. AI-enabled digital building design, virtual buildings and digital twin technology have facilitated the integration of vernacular architecture in modern buildings, opening new opportunities for African architects. In addition, climate change and rising energy costs have sparked interest in African architecture.

The chapter proposes a future research agenda that studies the digital transformation of African creative industries, with the objectives to inform the development and implementation of the African Continental Free Trade Area (AfCFTA) and the digital single African market.

2. The state-of-the-art on the digital transformation of the creative industries in Africa

The digital transformation and trade in creative services touch upon several areas of research. First, digital multi-sided platforms underpin arms-length trade in digital products. Second, creative digital products are non-rival. While the master file is produced using significant resources involving unique talent and creativity, it can be copied limitlessly at no extra cost. That brings us to the economics of markets with zero marginal costs. Third, market transactions in the creative sectors are about licensing intellectual property protected work, which is of a different nature than the exchange of ownership of a product. Fourth, trade in digital products relies on interoperable digital infrastructure such as telecommunications networks, software, payment systems and legal infrastructure. The latter entails interoperable copyright and related rights legislation and enforcement, as well as privacy, cybersecurity, and other data management regulations. Last, but not least, these topics need to be understood in an African context where an innovative entrepreneurial creative sector operates within a framework of weak physical and legal infrastructure.

4 For further information, see <<https://www.kerearchitecture.com/>>

5 For further information, see <<https://www.mariamissoufou.com/>>

6 For further information, see <<https://www.oshinowostudio.com/>>

Streaming platforms constitute multi-sided markets where different groups, or sides, engage in economic transactions. For example, a music streaming platform is a market where record labels or artists, advertisers and consumers interact directly with each other. There are strong indirect network effects as the value of the platform to advertisers is larger the more consumers use it. Consumers use it more the better the quality and variety of music, and advertisers therefore subsidise consumers. The labels, the platform itself, and the advertisers all benefit from the data that music streaming generates. In Africa, streaming platforms are typically part of media, technology or telecommunications enterprises (De Beukelaer & Eisenberg, 2020). Local movies and film streaming are mainly provided by television channels, while mobile telecommunications providers dominate music and video games.⁷ This reflects a relatively thin and fragmented advertising market combined with limited consumers' purchasing power (Madichie & Hinson, 2022).

Huge economies of scale, scope and network effects in the platform economy constitute a barrier to entry for start-up platforms (e.g., Tirole, 2023). Thus, African streaming platforms have been short-lived, lacking the ability to gain the scale needed to build a sufficient content catalogue (Adedeji & Röschenthaier, 2025). Although Africa may not provide the scale, depth, and infrastructure for hosting local platforms outside niche areas, there is ample evidence that local creative industries benefit from access to global platforms (Ahmed, 2025; Krings & Simmert, 2020).

Digital content such as music and film is non-rival. One consumer listening or watching does not prevent another from doing the same at the same time. Furthermore, after the master file has been created, the cost of copying or streaming its content to another consumer is close to zero. Such products would not be produced in competitive markets (Eaton & Kortum, 2018) as the music industry learned the hard way, as file sharing and outright piracy sent revenues into a tailspin in the early 2000s (Waldfoegel, 2012). There are several solutions to this problem. Protecting such products through the enforcement of intellectual property rights (IPR) works as long as the cost of excluding non-paying users is reasonable. The platforms have developed a model that seems to work – offering a product that consumers are willing to pay for with money (i.e. subscription) or attention and data (free with advertising) (Wald-

⁷ Television channels may also be partly funded by advertising, while smartphones can be platforms in their own right. Although the economics of platforms constitute a large and growing literature, an agreed upon definition does not exist (Sanchez-Cartas & Leon, 2021).

fogel, 2017). In Africa, mobile telephone operators appear to be in the best position to bundle streaming services with other sources of revenue to offer a viable business model (Eisenberg, 2025).

As noted, transactions in the creative industries involve the licensing of copyrighted material and the collection of royalties. Copyright management organisations (CMOs) are key to such rights management systems, particularly in the recorded music industry, where the number of rights holders and consumers is huge, and the size of each transaction is minuscule. The CMOs maintain a catalogue of copyrighted material and right owners, they license content to users such as streaming platforms, radio, and other media, accumulate metadata, and collect and distribute royalties. A network of national CMOs has ensured that royalties are collected and distributed across borders (Panda & Patel, 2012; WIPO, 2025).⁸

With the development of digital databases on rights holders, blockchain technology (Jing *et al.*, 2021) and AI-enabled tracking, rights management has become more effective and less costly (Kyvik Nordås, 2024). With these technologies, one would expect that the CMOs would become obsolete. As it turns out, their deep knowledge of the industry and their international networks have kept them in business. In Africa, however, CMOs are considered a drag on the music as well as movie industry (Ouma, 2004; Tella, 2021, p. 226). It is therefore conceivable that Africa will pioneer automated data exchange and blockchains for rights management in the music industry. Finally, there are also voices that argue that copyright protection has gone too far, particularly regarding the duration of protection.⁹ For instance, Parc *et al.* (2017) found that relatively weak copyright enforcement in Korea was an important factor behind the rapid growth of Korean creative industries and the success of K-pop.

In Africa, mobile technology completely dominates access to the Internet for both consumers and service providers. The literature suggests that the low density of fixed broadband will become a constraint on the development of markets for more bandwidth-intensive creative services such as online video games and architecture. On the other hand, the roll-out of fixed broadband is not only supply-driven. Demand also plays a role. There is, for instance, evidence that access to attractive content, such as music, film and video games, stimulates the adoption of the Internet and broadband also in developing countries (Viard & Economides, 2014).

⁸ CMOs are most common in the music industry but also exist in the movie industry.

⁹ For more information, see Varian (2005).

3. Key research gaps

A key research gap relates to viable business models in creative industries in the African context. Are advertising-based models viable? Under which circumstances? Why do mobile telecommunications providers dominate the platforms for creative content in the African context? Is this market structure a stepping stone or a legacy for future growth and internationalisation of creative services? Will the digital single African market provide sufficient scale for the platform economy to take off?

Existing studies provide a sound analytical framework for understanding the nature of the digital creative industry and its outputs, the role of digital platforms in creating markets for such products, and the digital and legal infrastructure that facilitates AI-enabled digital transformation of the sector. However, multisided markets where advertising constitutes one side are not well understood in the context of fragmented markets with low purchasing power. Furthermore, with the integration of AI into search engines and other platforms, the advertising model is under strain everywhere (e.g., Russell, 2025). AI-induced structural changes in the media and platform industries are evolving everywhere, and little is known about possible avenues for African creative industries to become early adopters of AI and what the legal and physical infrastructure and capacity requirements would be.

Despite the global nature of digital platforms, the trade dimension of their activities is mostly absent from the literature (McCalman, 2022; Sun & Treffer, 2022, 2023). Furthermore, studies that explicitly address digital trade in creative services from a development perspective are rare and mostly limited to case studies (UNCTAD, 2024).

Empirical research using state-of-the-art econometrics, data analytics and machine learning to explore the drivers, impediments and impact of AI-enabled digital trade will help fill this knowledge gap and inform the implementation of the AfCFTA and the digital single African market. Aguiar and Waldfoegel (2018), Broocks and Studnicka (2024), Park *et al.* (2025), Sun and Treffer (2022; 2023) and Way *et al.* (2020) demonstrate how API access to applications and streaming services can be used for rigorous empirical analysis of the drivers, impediments and impact of AI-enabled digital transformation of cultural industries. Furthermore, advances in deep learning and its applications in economics offer tools to analyse data obtained from APIs, and at best, establish causal effects to inform policy making (Dell, 2025).

4. Proposed key areas for a future research agenda

The creative industries, particularly sound recording, are especially interesting for analysing trade and trade policy dimensions of the digital platform economy. Thus, despite the fact that only 18 countries have committed to opening access to foreign sound recording in their GATS schedules, it is the poster child of a truly global services industry where artists reach a global audience instantly after the release of a new song.¹⁰ Music is also a key input in other cultural services, particularly movies and video games. Indeed, the music integrated into the soundtrack enhances the storyline and the consumer experience.¹¹

Recorded music is also at the forefront of AI-enabled transformation. However, music from the global south is largely absent from the training data for AI applications in music creation (Mehta *et al.*, 2024). Whether this is a problem or an opportunity for African music is not clear and should be explored.

Streaming of movies, as well as online video games, requires more bandwidth and less latency than music. So far, African movies have largely been screened on TV channels. Future research should study the African business models for movies and video games, how they differ from other developing and developed countries, what role telecommunications and internet services play in supporting the internationalisation of the industry and what role the industry can play in stimulating demand for broadband in Africa.

Connectivity and bandwidth are necessary, but not sufficient, for a thriving creative sector with a regional and global reach. In addition to physical infrastructure, a regulatory framework for data management that ensures privacy, cybersecurity and adequate protection of IPR is needed.

Africa is rich in cultural content, but poor in data and compute resources. AI-enabled digital transformation of the cultural sectors at scale will therefore rely on access to data, cloud services, and other compute resources from international suppliers. Interoperability of the regulatory framework within AfCFTA, as well as the adoption of international standards, where relevant,

10 For data on GATS commitments, see World Trade Organization (WTO) & World Bank Group. I-TIP Services. <<https://itip-services-worldbank.wto.org/Search.aspx>>

11 There is a (blurred) distinction between music and soundscapes in this area. Recorded music is frequently used in movies, while soundscapes are more frequently used in computer games.

would be essential. The regulatory framework for data governance in a regional and international context should hence constitute a cross-cutting topic for research.

Finally, architecture is a regulated profession in many countries, which implies that a predefined set of activities is reserved for locally licensed architects. With AI-enabled digital transformation, building projects typically involve multidisciplinary teams with a prominent role for software engineers. Reforms of the licensing regimes, including recognition of professional qualifications, are needed to facilitate multidisciplinary, international teams working together on digital platforms to design cool buildings in a hot climate.

Against this backdrop, future research on creative industries in Africa should address the following questions.

How have intra-African and international trade patterns in the creative industries evolved in recent years? UNCTAD provides data on the creative industries, but there are large gaps. Information can also be pieced together from streaming platforms, but much remains to be done to get a complete and consistent overview of trade patterns in these sectors.

What digital platform business models are observed in Africa, how do they manage cross-border streaming, and how do they differ from platforms in developed and other developing countries? As noted, TV, radio and mobile phone companies play a more prominent role for the distribution of film and music in Africa than elsewhere. The mobile telecoms suppliers' role is of particular interest since they are the major source of internet access in Africa. More research is needed on what drives these differences and how provisions in the AfCFTA could affect the channels through which creative digital services are distributed.

How is digital content related to other sides of the platforms in Africa? Of particular interest here is the relative importance of subscription versus advertising-funded content. Market size, trade, digital and legal infrastructure shape the business model of digital platforms offering streaming services. Understanding the way creative services are bundled with other services and paid for is of critical importance for the implementation of the digital African single market.

Finally, access to creative digital content could be a driver for the uptake of broadband in Africa. Indirect network effects are important for the uptake of digital platforms, but little is known about the role of creative content as a demand-side driver of internet subscriptions.

Understanding the platform economy in the African context is crucial for implementing the secure digital single African market envisioned by the African Union (AU). The sound recording industry could be the starting point of the analysis because it is at the frontier of digital transformation, an early adopter of AI, an input to other creative services, and a possible harbinger for other creative services and digitally tradable services in general (Krueger, 2019). Data for rigorous analyses are available from the streaming platforms, International Federation of the Phonographic Industry (IFPI) and World Intellectual Property Organization (WIPO).¹²

Having established a methodology, the analysis could then be extended to the film industry, video games, fashion and design, and explore the linkages between audiovisual services and design. Finally, exploratory work could be conducted on the potential for African architecture to contribute to sustainable and energy-efficient buildings and living environments both in Africa and in hot climates globally. Additional policy issues in this space are professional licensing and regulation. Case studies can be useful tools to start the analysis.

5. Conclusion

The creative industries are among the fastest-growing services in Africa and a showcase for African entrepreneurship. The AI-enabled digital transformation of these sectors opens new opportunities to leverage the comparative and competitive advantages presented in this chapter and drive growth in the regional as well as the global digital economy. The proposed research agenda aims at developing a knowledge base that can support the objectives of the AfCFTA, highlighting the opportunities and informing the implementation process towards a single African digital market.

12 The major music streaming services offer researchers and developers API access to data. See for instance Spotify's webpage <<https://creators.spotify.com/es-419/resources>>. Access to such data has generated a small but growing literature analysing such data. See for instance Aguiar and Waldfoegel (2021) or Pachali and Datta (2025). IFPI provides aggregate data on recorded music markets by country, distribution and revenues. Summaries are available for free, while comprehensive data are available for purchase, see <<https://www.ifpi.org/resources/>>. Finally, WIPO offers qualitative and practical information and training on copyright management in the music industry, see <https://www.wipo.int/en/web/copyright/creative_industries/music>.

References

- Adedeji, W., & Röschenhaler, U. (2025). Streaming services and brokerage in the music industry crisis in Nigeria. *Cultural Studies*, 39(2), 225–247. <https://doi.org/10.1080/09502386.2024.2437438>
- Aguiar, L., & Waldfogel, J. (2018). Netflix: Global hegemon or facilitator of frictionless digital trade? *Journal of Cultural Economics*, 42(3), 419–445. <https://doi.org/10.1007/s10824-017-9315-z>
- Aguiar, L., & Waldfogel, J. (2021). Platforms, power, and promotion: Evidence from Spotify playlists. *The Journal of Industrial Economics*, 69(3), 653–691. <https://doi.org/10.1111/joie.12263>
- Ahmed, F. Z. (2025). The globalization of African music through streaming platforms. *Journal of Research in Social Science and Humanities*, 4(1), 10–15. Retrieved from <https://www.pioneerpublisher.com/jrssh/article/view/1169>
- Ajith Kumar, G., Priyadharshini, S., Narayanan, M., & Kumari, S. R. (2021). Role of humanitarian architecture. *Journal of Architecture and Civil Engineering*, 6(10), 1–5. Retrieved from <https://www.questjournals.org/jace/papers/vol6-issue10/A06100105.pdf>.
- Bisschoff, L. (2017). The future is digital: An introduction to African digital arts. *Critical African Studies*, 9(3), 261–267. <https://doi.org/10.1080/21681392.2017.1376506>
- Brooks, A., & Studnicka, Z. (2024). Gravity and trade in video on demand services. *Review of World Economics*, 161, 571–609. <https://doi.org/10.1007/s10290-024-00561-5>
- Carry1st. (2025). *Africa's Gaming Market Reaches \$1.8bn; Sixfold Growth vs. ROW Driven by 32mn New Gamers in 2024*. Retrieved from <https://www.carry1st.com/press/africas-gaming-market-reaches-1-8bn-sixfold-growth-vs-row-driven-by-32mn-new-gamers-in-2024>
- De Beukelaer, C., & Eisenberg, A. J. (2020). Mobilising African music: How mobile telecommunications and technology firms are transforming African music sectors. *Journal of African Cultural Studies*, 32(2), 195–211. <https://doi.org/10.1080/13696815.2018.1546569>
- Dell, M. (2025). Deep learning for economists. *Journal of Economic Literature*, 63(1), 5–58. <https://doi.org/10.1257/jel.20241733>
- Eaton, J., & Kortum, S. (2018). Trade in goods and trade in services. In L. Y. Ing & M. Yu (Eds.), *World trade evolution: Growth, productivity and employment* (pp. 82–125). Routledge. <https://doi.org/10.4324/9781351061544>

- Eisenberg, A. J. (2025). Of artists and rightsholders: Platformization and the realities of musical property rights reform in Kenya. *Journal of Popular Music Studies*, 37(2), 30–49. <https://doi.org/10.1525/jpms.2025.37.2.30>
- Faidi, Z. (2024). *Cultural Flows: The Development and Global Influence of Nigeria's Creative Industries* (Policy Paper No. 09/24). Rabat, Morocco: Policy Center for the New South. Retrieved from https://www.policycenter.ma/sites/default/files/2024-06/PP_09-24%20%28Zineb%20Faidi%29.pdf
- International Federation of the Phonographic Industry (IFPI). (2025). *Global music report 2025*. Retrieved from https://www.ifpi.org/wp-content/uploads/2024/03/GMR2025_SOTI.pdf
- Jing, N., Liu, Q., & Sugumaran, V. (2021). A blockchain-based code copyright management system. *Information Processing & Management*, 58(3), 102518. <https://doi.org/10.1016/j.ipm.2021.102518>
- Krings, M., & Simmert, T. (2020). African popular culture enters the global mainstream. *Current History*, 119(817), 182–187. <https://doi.org/10.1525/curh.2020.119.817.182>
- Krueger, A. B. (2019). *Rockonomics: A Backstage Tour of What the Music Industry Can Teach Us about Economics and Life*. New York, NY: Crown Currency.
- Madichie, N. O., & Hinson, R. E. (2022). Africa in the age of digitalisation. In N. O. Madichie & R. E. Hinson, *The creative industries and international business development in Africa* (pp. 57–70). Emerald Publishing Limited. <https://doi.org/10.1108/9781800713024>
- McCalman, P. (2022). Trade policy with FANG's (aka trade policy and multi-sided platforms). *Journal of International Economics*, 138, 103655. <https://doi.org/10.1016/j.jinteco.2022.103655>
- Mehta, A., Chauhan, S., & Choudhury, M. (2024). *Missing melodies: AI music generation and its "nearly" complete omission of the Global South* (arXiv:2412.04100). arXiv. <https://doi.org/10.48550/arXiv.2412.04100>
- Miller, J. (2012). Global Nollywood: The Nigerian movie industry and alternative global networks in production and distribution. *Global Media and Communication*, 8(2), 117–133. <https://doi.org/10.1177/1742766512444340>
- Ouma, M. (2004). Copyright and the music industry in Africa. *Journal of World Intellectual Property*, 7(6), 919–937. <https://doi.org/10.1111/j.1747-1796.2004.tb00234.x>
- Pachali, M. J., & Datta, H. (2025). What drives demand for playlists on Spotify? *Marketing Science*, 44(1), 54–64. <https://doi.org/10.1287/mksc.2022.0273>

- Panda, A., & Patel, A. (2012). Role of Collective Management Organizations for Protection of Performers' Right in Music Industry: In the Era of Digitalization. *The Journal of World Intellectual Property*, 15(2), 155-170. <https://doi.org/10.1111/j.1747-1796.2012.00436.x>
- Parc, J., Messerlin, P., & Moon, H. C. (2017). The secret to the success of K-pop: The benefits of well-balanced copyrights. In B. Christiansen & F. Kasarci (Eds.), *Corporate espionage, geopolitics, and diplomacy issues in international business* (pp. 130–148). Hershey, PA: IGI Global. <https://doi.org/10.4018/978-1-5225-1031-4.ch008>
- Park, S., Park, S., You, T., & Yun, J. (2025). Social links vs. language barriers: Decoding the global spread of streaming content. *Humanities and Social Sciences Communications*, 12, 76. <https://doi.org/10.1057/s41599-025-04400-2>
- Russell, M. (2025). *AI will shape the future of marketing*. Harvard Division of Continuing Education, Professional & Executive Development. Retrieved from <https://professional.dce.harvard.edu/blog/ai-will-shape-the-future-of-marketing/#The-Current-State-of-AI-in-Marketing>
- Sanchez-Cartas, J. M., & León, G. (2021). Multisided platforms and markets: A survey of the theoretical literature. *Journal of Economic Surveys*, 35(2), 452–487. <https://doi.org/10.1111/joes.12409>
- Souza, E. (2024). *Reimagining air conditioning: Traditional cooling methods for the future*. ArchDaily. Retrieved from <https://www.archdaily.com/996595/reimagining-air-conditioning-traditional-cooling-methods-for-the-future>
- Sun, R., & Treffer, D. (2022). AI, trade, and creative destruction: A first look. In L. Y. Ing & G. M. Grossman (Eds.), *Robots and AI: A new economic era* (pp. 310–339). Abingdon, England: Routledge. <https://doi.org/10.4324/9781003275534>
- Sun, R., & Treffer, D. (2023). *The impact of AI and cross-border data regulation on international trade in digital services: A large language model* (NBER Working Paper No. 31925). National Bureau of Economic Research. <https://doi.org/10.3386/w31925>
- Tekena, M. G., & Ochuba, P. (2022). Fashion and music trends in the 21st century Nigeria. *Journal of Creative Arts, Communication and Media Studies*, 1(1), 58–90. <https://doi.org/10.33886/jccm.v1i1.303>
- Tella, O. (2021). *Africa's soft power: Philosophies, political values, foreign policies and cultural exports*. Abingdon, England: Taylor & Francis.
- The Economist. (2025). *African architects have cool designs for a warming planet*. Retrieved from <https://www.economist.com/culture/2025/06/05/african-architects-have-cool-designs-for-a-warming-planet>

- Tirole, J. (2023). Competition and the industrial challenge for the digital age. *Annual Review of Economics*, 15(1), 573–605. <https://doi.org/10.1146/annurev-economics-090622-024222>
- United Nations Conference on Trade and Development (UNCTAD). (2024). *Creative economy outlook 2024: Technical and statistical report* (UNCTAD/DITC/TSCE/2024/2). Geneva, Switzerland: United Nations. Retrieved from https://unctad.org/system/files/official-document/ditctsce2024d2_en.pdf
- Varian, H. R. (2005). Copying and copyright. *Journal of Economic Perspectives*, 19(2), 121–138. <https://doi.org/10.1257/0895330054048768>
- Viard, V. B., & Economides, N. (2015). The effect of content on global internet adoption and the global “digital divide”. *Management Science*, 61(3), 665–687. <https://doi.org/10.1287/mnsc.2013.1875>
- Waldfoegel, J. (2012). Copyright protection, technological change, and the quality of new products: Evidence from recorded music since Napster. *The Journal of Law and Economics*, 55(4), 715–740 <https://doi.org/10.1086/665824>
- Waldfoegel, J. (2017). How digitization has created a golden age of music, movies, books, and television. *Journal of Economic Perspectives*, 31(3), 195–214. <https://doi.org/10.1257/jep.31.3.195>
- Way, S. F., Garcia-Gathright, J., & Cramer, H. (2020). Local trends in global music streaming. *Proceedings of the International AAAI Conference on Web and Social Media*, 14(1), 705–714. <https://doi.org/10.1609/icwsm.v14i1.7336>
- World Intellectual Property Organization (WIPO). (2025). *WIPO Good Practice Toolkit for Collective Management Organizations (The Toolkit): A Bridge between Rightholders and Users*. Geneva, Switzerland. Retrieved from <https://www.wipo.int/publications/en/details.jsp?id=4773&plang=EN>

A research agenda to inform AfCFTA's implementation

An African Agenda on Cross-border Data Flows: Towards a Single Data Area in Africa

Martina F. Ferracane & Franziska Sucker

1. Introduction

Cross-border data flows (CBDFs) have become a cornerstone of the global digital economy. They enable digital trade, cloud services, artificial intelligence applications, financial transactions, and the operation of global value chains. For African economies, the capacity to transmit, access, and store data across borders is increasingly linked to competitiveness, innovation, and participation in international trade (Musoni *et al.*, 2024; AU, 2023).

African policymakers have recognised this importance. The African Union (AU) Digital Transformation Strategy (2020-2030) and the AU Data Policy Framework emphasise CBDFs as essential to building an integrated digital single market (AU, 2020; 2022). These frameworks highlight the need to ensure that data can move securely and efficiently across African borders while protecting fundamental rights, public interests, and digital sovereignty. The entry into force of the AU Convention on Cyber Security and Personal Data Protection (Malabo Convention) in 2023 and the adoption of the Protocol on Digital Trade (DTP) of the African Continental Free Trade Area (AfCFTA) in 2024 represent important milestones towards establishing coherent continental rules for data governance (Sucker & Beyleveld, 2025).

Despite these continental ambitions, national approaches remain fragmented. Most African states have introduced restrictions on CBDFs, ranging from conditional regimes to strict local processing requirements, often influenced by external models such as the EU's General Data Protection Regulation (GDPR) or China's control-based approach (Ferracane & González, 2025). Such divergence has increased the costs of conducting digital trade in the region and hindered regional integration. Yet, these policies are perceived as necessary to achieve economic and non-economic objectives and maintain sovereignty in the digital space.

Against this backdrop, the regulation of CBDFs is both an opportunity and a challenge for Africa. On the one hand, harmonised and predictable rules could lower transaction costs, support regional innovation ecosystems, and enhance Africa's collective bargaining power in global trade negotiations. On the other hand, tensions between economic integration, national security, privacy, and developmental objectives make CBDFs' governance deeply contested. This contribution situates CBDFs within these dynamics, reviews the current state of regulation and scholarship in Africa, identifies key research gaps, and outlines a forward-looking agenda for academic and policy inquiry.

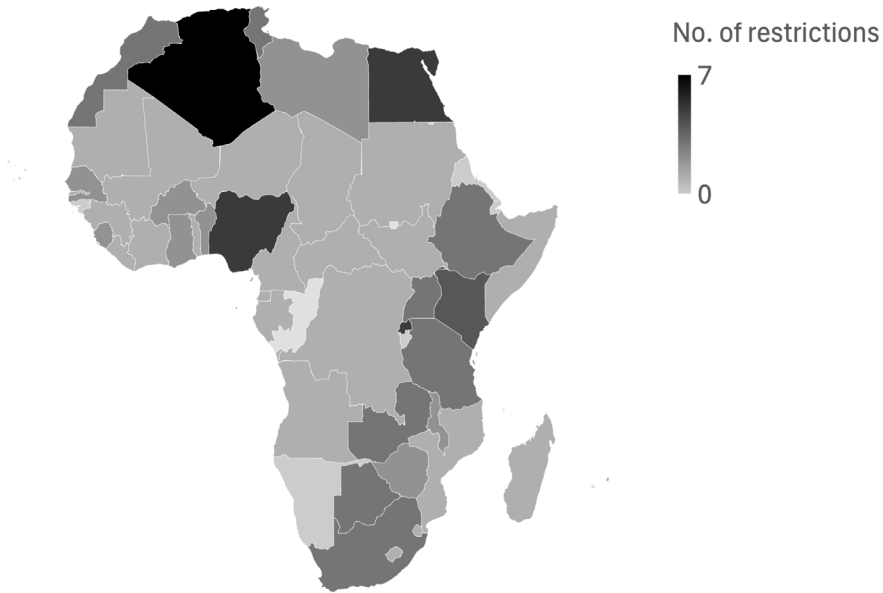
2. Data flows regulations in Africa

The regulation of CBDFs in Africa has expanded rapidly. Until the year 2000, there were no policies governing data transfers in the region (Ferracane & González, 2025). By 2024, 48 out of 54 African countries had introduced some restrictions, amounting to 95 distinct measures (Figure 1). These include: (i) conditional transfer regimes, typically modelled on the EU's GDPR, where transfers are permitted only if adequacy or other safeguards are satisfied; (ii) local storage requirements, which allow transfer abroad only if a copy is kept domestically; (iii) local processing requirements, mandate that data be processed within national borders unless there is an explicit authorisation by the relevant authority; and (iv) infrastructure requirements, which mandate the company to use (and in some cases also build) a specific data centre in the country in order to operate there (Ferracane, 2024).

Six countries in the region do not regulate cross-border data transfers. These are Burundi, Comoros, Djibouti, Eritrea, Guinea-Bissau, and Namibia. Except for Namibia, these are all least developed countries (LDCs), character-

ised by weak regulatory capacity.¹ On the other side of the spectrum, we find four countries that have implemented at least five restrictive policies on data transfers, which generally differ widely in scope. These are Algeria (7 policies), Egypt (5 policies), Nigeria (5 policies), and Rwanda (5 policies).

Figure 1: Number of restrictions on cross-border data transfers by country, 2024.



Source: Authors based on Ferracane and González (2025) and data from the Digital Trade Integration (DTI) database retrieved on 30 January 2026 (Ferracane *et al.*, 2025a).

Other policies restricting data flows can also be found in sub-regional agreements, such as the EAC E-Commerce Strategy, the SADC Model Law on Data Protection, and the ECOWAS Supplementary Act on Personal Data Protection, which all restrict data transfers outside their respective regional economic communities (RECs). These instruments have contributed to shaping national regulatory approaches and promoting a degree of regulatory coherence. However, their legal status varies, and their implementation across member states remains uneven. The overlapping national and subregional commitments, coupled with the fact that transposition and enforcement differ widely across states, reinforce fragmentation of data flows across the region (Rotich, 2023; Musoni *et al.*, 2024).

¹ See Chapter 12 of the book for a discussion on African LDCs and digital trade.

Two recent continental initiatives seek to address this fragmentation in the region and to promote a single data area. The Malabo Convention, in force since 2023, is the first binding AU treaty on personal data.² It establishes a continental framework for personal data protection and cybersecurity, and requires ratifying states to adopt national legislation that incorporates specific data protection principles and rights, and to establish an independent data protection authority with powers to supervise compliance, investigate infringements, and authorise certain forms of processing and transfers (Arts 8.1 & 11.1(a)).

On cross-border transfers, however, the Convention is considerably more limited. Its main substantive rule is Article 14 on sensitive personal data, which prohibits its collection and processing except under narrow conditions. Article 14(6) stipulates that transfers of personal data (not limited to sensitive categories) to non-AU countries are permissible only if the recipient state ensures an “adequate level” of privacy and fundamental rights protection, or where prior authorisation is granted by the national data protection authority. While this reference to data transfers outside the AU and silence on transfers to non-Convention parties imply that all AU Member States are treated as acceptable transfer destinations, the Convention does not expressly establish a principle of free intra-African data flows. This leaves ratifying states with wide discretion, and in practice, many national laws continue to impose conditions or localisation requirements even for intra-African transfers.

The result is that the Convention establishes minimum obligations with respect to domestic data protection laws and supervisory authorities, but only a partial and cautious framework for cross-border transfers. It signals a collective African commitment to personal data protection, while leaving significant discretion to member states and thus doing little to reduce the existing heterogeneity of transfer regimes across the continent.

Most recently, the AfCFTA’s DPT takes a qualitatively different approach. Adopted in 2024,³ the DTP regulates CBDFs under Part IV on “data governance” (Articles 20–23), supplemented by a detailed Cross-Border Data Transfer

2 The Convention entered into force in June 2023, following the 15th ratification by Mauritania in May 2023. As of January 2026, only 16 countries have ratified it. The latest status list, which was last updated in July 2024, can be accessed at <https://au.int/sites/default/files/treaties/29560-sl-AFRICAN_UNION_CONVENTION_ON_CYBER_SECURITY_AND_PERSONAL_DATA_PROTECTION.pdf>.

3 The Protocol will enter into force 30 days after the ratification process is completed, and State Parties will have a further five years to align their national laws with the new commitments.

Annex (CBDT-Annex) of thirty articles, adopted in February 2025.

Article 20 of the DTP establishes a general obligation to permit CBDFs for the conduct of digital trade by entities from State Parties. This principle is given effect by Part III of the CBDT-Annex, which prohibits measures that restrict or prohibit transfers, clarifies that such restrictions include any form of prohibition or condition, and requires States to adopt measures to ensure uninterrupted and secure data transfers. The Annex goes further by introducing non-discrimination obligations, extending national treatment and most-favoured nation principles explicitly to data, and by mandating that barriers to transfers be identified and removed.

Article 22 also prohibits requirements that computing facilities be located within a State's territory as a condition for conducting digital trade. At the same time, Article 22(3) mandates States to encourage and support the establishment of local infrastructure, reflecting a developmental compromise that promotes regional data centres and cloud facilities as enablers, rather than obstacles, to data mobility.

Articles 20(2) and 22(2) allow restrictions on transfers only for legitimate public policy objectives, subject to strict necessity and non-discrimination tests akin to WTO law. The CBDT-Annex further clarifies that restrictions may be imposed where the receiving State lacks a personal data protection law that meets AfCFTA standards, and may not be imposed where such standards are met. It also introduces granular provisions on sensitive data transfers that contrast sharply with the Malabo Convention, which merely prohibits sensitive data processing subject to exceptions and applies an adequacy test only to extra-African transfers.

In summary, whereas the Malabo Convention signals a collective commitment to personal data protection without mandating free intra-African flows, the DTP operationalises such flows within the AfCFTA, linking them directly to digital trade integration and regional development objectives.

While the inclusion of binding commitments on data flows has become common in recent FTAs (Burri *et al.*, 2024), African countries have been an exception, with no binding commitments undertaken by any African country as of January 2026. When ratified, the DTP will introduce for the first time binding obligations among African states and by any African country to remove restrictions on intra-African transfers. Moreover, Kenya is the only country that has signalled interest in undertaking data flows commitments

with countries outside Africa, namely the United States and the European Union.⁴ More broadly, African countries have been reluctant to engage in discussions on e-commerce and data flows at the WTO, which is a reflection of sensitivities around sovereignty, regulatory space, and distributional impacts (CIPIT, 2024).

In sum, the regulatory landscape is characterised by continental ambition, regional experimentation, and persistent national divergence, creating both opportunities and challenges for building a coherent single data area.

3. Key research on cross-border data flows in Africa

A growing body of research has examined CBDFs in Africa, reflecting the rising importance of data governance for trade, development, and integration. Together, this research has laid the groundwork: documenting policies, identifying economic effects, and assessing continental frameworks. Yet, as the next section shows, important research gaps persist.

3.1 Mapping of policies affecting CBDFs

Recent scholarship has provided systematic evidence of Africa's CBDF regimes. Ferracane & González (2025) classify 91 national data flows' regulations implemented by African countries into conditional transfers, local storage requirements, and local processing requirements, offering the first continent-wide baseline. The analysis leverages the information available in the Digital Trade Integration (DTI) Database, which includes digital trade-related regulation and practices applied in 160 countries, including 54 African countries.⁵ The DTI also maps policies more broadly related to data processing, including data protection frameworks, data retention requirements, policies on government access to personal data, and license requirements for data processing and data transfers, among a wider range of regulatory indicators on digital trade.

4 See United States Department of Commerce (2024) and Privacy Laws & Business (2024).

5 The data was collected by the European University Institute (EUI) and the UN Economic Commission for Africa (UN-ECA), and it can be accessed at <<https://dti.eui.eu/database/>>. As of January 2026, the database contains 95 policies related to data flows implemented in the African continent, as shown in Figure 1 of this chapter. See Ferracane *et al.* (2025a).

3.2 AfCFTA Digital Trade Protocol and continental integration

Scholarly work has begun to analyse the AfCFTA's Annex on CBDF in depth. Sucker and Beyleveld (2025) analyse the AfCFTA DTP and its CB-DT-Annex through the lens of regulatory convergence, asking whether the new rules steer African frameworks toward alignment and under what conditions. They emphasise that convergence is not uniformity for its own sake, and that effectiveness will depend on how State Parties implement the DTP and balance legitimate public policy objectives with the commitment to free data flows. Sucker (2025) further examines its substantive obligations, exceptions, and novel provisions, situating the Annex in comparative perspective with global models and highlighting its legal ambiguities and structural weaknesses.

Sucker & Wambua (in press) analyse the related Annex on Rules of Origin (RoO Annex), demonstrating how the framework creates the unprecedented possibility of imposing customs duties on non-African digital products, while exposing risks of inconsistency and origin engineering that may undermine developmental aims. The DPT, in fact, links CBDFs with RoO for digital products (transmitted electronically). The RoO Annex conditions preferential treatment on African origin, creating the legal possibility of imposing customs duties on electronic transmissions (CDET) of non-African digital products. This design departs from global practice, where the WTO Moratorium on CDET has prohibited such charges since 1998. While all WTO members have observed the moratorium, its renewal in 2026 is uncertain, and AfCFTA State Parties remain divided on its continuation. The DTP's structure means that once the moratorium lapses, AfCFTA State Parties could impose duties on non-African digital products while ensuring duty-free treatment within Africa. Yet, these rules might conflict with the five-year moratorium on customs duties for electronic transmissions that six African countries have signalled to be willing to undertake as part of the stabilised text of the WTO Joint Statement Initiative (JSI) on e-Commerce.⁶

3.3 Taxation of data flows and fiscal sovereignty

As stated above, CBDF rules are not only about data governance but also relate to fiscal outcomes that can be highly significant for African economies.

⁶ The African countries within the group of countries that requested the incorporation of the JSI into Annex 4 of the WTO Agreement are: Benin, Burkina Faso, Cabo Verde, The Gambia, Kenya, and Mauritius (WTO, 2025). Three additional African countries that had previously signed the stabilised text of the JSI have not supported the request to include the Agreement into the Annex 4, namely Nigeria, Côte D'Ivoire, and Cameroon.

The fiscal implications of the multilateral moratorium have been a subject of significant debate in recent scholarship.⁷ Andrenelli and López-González (2023) find that the foregone revenue connected to the moratorium is around 0.68 per cent of customs revenue or 0.1 per cent of overall government revenue, and is largely offset by VAT/GST on digital services. They also highlight that lifting the moratorium would disproportionately harm low-income economies, with potential import declines of 32 per cent and export declines of 2.5 per cent, while effects on high-income countries would be negligible. Other contributions, such as Evenett (2021), examine the wider economic implications of the moratorium.

A more policy-oriented perspective is offered by Kaukab (2024), who frames the moratorium not merely as a technical trade issue but as one tied to development and sustainability. He highlights that many developing countries rely heavily on customs duties – sometimes accounting for more than half of total government revenue – and that VAT or GST cannot fully substitute for them due to informality and administrative weaknesses. The analysis also stresses that the moratorium disproportionately benefits OECD exporters of digital products, while constraining fiscal and industrial policy space for developing countries, and therefore calls for a more nuanced multilateral dialogue on its scope and revenue implications.

More generally, Banga *et al.* (2025) position CBDF regulation as part of a wider struggle over tax justice and developmental policy space in Africa, showing that trade rules designed to facilitate digital integration may also curtail the tools governments rely on to mobilise revenue. They show how trade rules on services, electronic transmissions and digital products affect the ability of African countries to tax their digital economies through corporate income tax, VAT, CDET, and digital services taxes (DST). They state that data localisation requirements can create a taxable nexus by compelling firms to establish a local presence, while free flow obligations may erode tax authorities' capacity to track transactions and assess value. Their case studies of Kenya, Rwanda and South Africa illustrate the stakes. Rwanda could raise an additional USD 11 million annually by applying VAT to imports of digital services, and potentially USD 14 million through CDET; South Africa could generate

⁷ Banga (2022) suggested that developing countries may have foregone up to USD 56 billion between 2017 and 2020. These figures have been influential in African debates, but they have also been strongly criticised for methodological flaws. Andrenelli and López-González (2023) argue that the calculations overstate potential losses. Academic commentators, including Evenett (2021) and Kaukab (2024), likewise caution that the figures are unreliable and risk distorting the policy debate.

around USD 714 million from VAT on imported digital services but lose an estimated USD 161 million in tariff revenue between 2017 and 2020 due to the moratorium. Kenya's experience with a DST further demonstrates how such measures interact with trade commitments and bilateral negotiations.

3.4 Economic impact of CBDFs' restrictions

Econometric studies show that restrictive CBDF policies and regulatory heterogeneity correlate with higher trade costs and lower digital services trade globally (Ferracane & van der Marel, 2021; Batikas *et al.*, 2020; Frey & Presidente, 2024). To date, Ferracane *et al.* (2025b) provide the only quantitative estimate of their impact in Africa. They find that lifting existing restrictions on data transfers could increase intra-regional African trade in digital services by up to 10 per cent, with the negative effects driven largely by GDPR-style policies, which appear to be especially costly for low-income economies.

Complementing the econometric findings, Ferracane and Rogaler (2025) provide qualitative insights from firm-level interviews, showing that GDPR-style rules raise compliance costs, particularly for MSMEs. In a similar vein, Banga and te Velde (2018) demonstrate how CBDF restrictions and related digital trade rules affect African MSMEs' ability to integrate into global value chains. By raising compliance costs and limiting access to digital inputs and markets, such policies risk reinforcing structural barriers to participation in international trade, particularly for smaller firms and low-income economies. These concerns are echoed in stakeholder consultations and case studies, which highlight how overlapping national and regional frameworks create legal uncertainty, duplication of compliance requirements, and disproportionate burdens on smaller firms (CIPIT, 2024; I&JPN, 2022).

3.5 Conceptual and normative contributions

A growing body of scholarship has examined the conceptual and normative underpinnings of CBDF regulation in Africa. This work situates debates not only in terms of efficiency or trade costs, but also through the lenses of political economy, sovereignty, rights, and community values.

Musoni *et al.* (2024) and the Internet & Jurisdiction Policy Network (I&JPN, 2022) situate African CBDF debates within broader political economy dynamics, highlighting tensions between continental ambitions and national realities shaped by limited capacity, external influences, and domestic political priorities. Other contributions connect CBDF governance to sover-

eignty and policy space. Ndemo *et al.* (2023a) argue that African data governance must balance data sovereignty with productivity and accountability and call for a pan-African data governance infrastructure to enable a “single market for data”, underscoring the need for convergence while protecting rights.

In a complementary way, Boshe (2024) questions the uncritical import of foreign regulatory templates (notably GDPR-style approaches) and urges re-imagining African data governance around local “data imaginaries” and collective values, foregrounding autonomy and policy space once more. Likewise, Kugler and Tavengerwei (2024) situate the DTP as a vehicle for asserting African digital sovereignty amid external pressures, showing how choices on CBDFs are inseparable from broader sovereignty concerns. The authors analyse how African countries experience external pressures from the US, China, and the EU, each exporting distinct models of digital sovereignty. They argue that African regulatory choices have been shaped by these competing paradigms, often through market dependence and externalisation of rules, while continental instruments such as the DTP represent attempts to assert African sovereignty in the digital sphere.

In a complementary vein, Mishra and Kugler (2024) show that African digital trade integration can be understood as an effort to constitute an international community in the digital economy, grounded in solidarity and Ubuntu.⁸ They highlight that provisions on CBDFs, data protection, and cybersecurity in the AfCFTA framework provide an opportunity to articulate African values of collective responsibility and inclusion, rather than simply replicating external models. Azmeh *et al.* (2020) similarly emphasise that global trade rules on e-commerce and data flows intersect with strategies for digital industrialisation in the Global South, including Africa. Their analysis positions CBDF regulation as a critical site where developmental objectives, sovereignty claims, and multilateral trade commitments converge.

Broader conceptual works similarly provide frameworks for an African approach to data governance, stressing the need to balance opportunity, rights, and sovereignty. The edited volumes *African Data Protection Laws* (Atuguba *et al.*, 2024) and *Data Governance and Policy in Africa* (Ndemo *et al.*, 2023b) collectively highlight the ambition of constructing a coherent African data governance regime while accommodating diversity among national systems. Read

8 Ubuntu is an African philosophy and ethical concept meaning “I am because we are”, emphasising shared humanity, community, and mutual care.

together, these contributions underscore that African approaches to CBDFs reflect both external dependencies and internal normative ambitions, navigating outside influence while seeking to cultivate a distinctly African digital community.

4. Key gaps and proposed areas for a future research agenda

Despite the proliferation of African and global scholarship on CBDFs, important gaps remain in conceptual framing, empirical evidence, and practical design. These gaps must be addressed to underpin the effective implementation of the AfCFTA's DTP and the AU's ambition of a continental single data area.

4.1 Objectives, design, and effectiveness of restrictions

Many African governments justify their policies on data flows in terms of privacy, security, or industrial policy. Yet there is little empirical evidence on whether such restrictions actually achieve their stated aims. Future research must test these claims, examining whether restricting data flows enhances cybersecurity, stimulates local data industries, or instead deters investment and reduces competitiveness in the continent. Comparative work is also needed on design choices that decisively shape outcomes but remain under-analysed: how data categories are defined (personal, sensitive, non-personal, mixed datasets), which transfer tools are available (adequacy findings, contractual clauses, onward transfer rules), the interaction between commitments taken across different agreements, and how exceptions are framed and applied with proportionality.

4.2 Public perceptions and legitimacy

Very little is known about how African citizens, businesses, and civil society perceive CBDF regulation. Legitimacy and trust are critical for compliance and for the sustainability of continental frameworks, yet empirical evidence is scarce. Surveys, interviews, and participatory research could illuminate how rules are understood on the ground, what levels of trust exist in regulators, and whether frameworks are perceived as externally imposed or locally owned. This research would help align CBDF governance with societal expectations and enhance its effectiveness.

4.3 Human rights and collective interests

CBDF frameworks in Africa have not been systematically analysed in relation to rights and collective interests. Questions of privacy, surveillance, freedom of expression, and access to redress remain underexplored. In addition, emerging debates about community or collective rights over data, including notions of “data commons”, lack empirical grounding in African contexts. Research should assess how CBDF regimes can integrate the protection of individual and collective rights, and whether African traditions of communal governance provide models for more inclusive data regulation.

4.4 Distributional effects

While existing research demonstrates that restrictive CBDF policies increase trade costs and reduce digital services flows, little is known about how costs and benefits are distributed. Future work must investigate which actors and sectors lose or gain, distinguishing, for example, between African MSMEs and global platforms, governments reliant on customs revenues and consumers who may face higher prices or reduced service quality.

Further research should also assess the fiscal implications of imposing CDET at the continental level. Existing studies do not provide conclusive evidence on the potential effects of customs duties on tariff revenues, distributional effects, and the long-term impact on the economy. A clearer picture is essential for informed decisions on whether and how to exercise the option provided by the DTP to impose these duties.

4.5 Complementary infrastructure and capabilities

Without adequate infrastructure and skills, even well-designed CBDF rules may remain ineffective. Empirical work is needed to identify key complementary factors, such as data centres, broadband networks, capital markets, cybersecurity skills, and regulatory independence. Research should further examine how infrastructural deficits interact with regulatory models, resulting in uneven CBDF outcomes across regions and sectors.

4.6 Political economy and digital sovereignty

Scholars have highlighted Africa’s fragmented regulatory landscape, but the drivers of regulatory choices remain poorly understood. Further research

must explore the political economy of CBDFs at the national and continental levels, including the role of domestic industry lobbying, the influence of external actors (e.g., the EU, the US, China, and international tech platforms), and mechanisms by which regulations diffuse across jurisdictions. This also raises broader questions of digital sovereignty with regards to how African states can collectively position themselves in global fora such as the WTO, and whether continental coordination can mitigate asymmetric dependencies and strengthen bargaining power.

4.7 Enforcement (and implementation) of the AfCFTA Digital Trade Protocol

The DTP and its Annex on CBDF will only be effective if they are implemented and enforceable. At present, little is known about how their provisions will interact with national enforcement bodies, continental institutions, and global norms. Research is needed on legal and practical implementation and enforcement mechanisms, including potential recourse to AfCFTA dispute settlement and the relationship with WTO commitments, especially in the context of the JSI on e-commerce.

While the AU Data Policy Framework calls for a continental single data area, which could be achieved with the implementation of the DTP, little research has been done on institutional design, scope of data categories, or governance models that could make this vision workable. Future work should explore federated and reciprocity-based approaches, lessons from other regions, and the balance between continental integration and national policy autonomy, while also taking into account the relation with international digital governance.

5. Conclusion

CBDFs are central to Africa's future in digital trade. Continental frameworks such as the AU Data Policy Framework and the AfCFTA's DTP articulate ambitious goals for building a trusted and integrated digital market. Yet, national divergence, weak enforcement, and infrastructural deficits continue to fragment the regulatory landscape. Existing scholarship has made important strides in mapping African CBDF regimes, analysing their economic impacts, and examining the doctrinal innovations of the AfCFTA.

At the same time, major gaps remain. More work is needed on the political economy of regulatory choices and Africa's positioning in global negotiations;

on whether restrictions achieve their stated objectives; on the enforcement and implementation of the AfCFTA framework; on how the costs and benefits of CBDF are distributed across firms, sectors, and states, also in relation to the possible end of the WTO moratorium on CDET; and on the institutional feasibility of a continental single data area. Equally pressing are questions of human rights, community interests, and public legitimacy, without which governance frameworks risk being technocratic and unsustainable.

Addressing these challenges requires collaboration across disciplines and stakeholders. Legal scholars, political economists, data scientists, and practitioners must jointly develop the evidence base and practical tools needed to design effective CBDF regimes. Regulators and policymakers can benefit from comparative research and capacity-building, while civil society and business communities bring essential perspectives on rights, trust, and market realities. Advancing such partnerships will be essential to shape an African agenda on CBDFs that safeguards rights, enables innovation, and secures more equitable participation in the global digital economy.

References

- African Union (AU). (2020). *The digital transformation strategy for Africa (2020–2030)*. Addis Ababa, Ethiopia. Retrieved from <https://au.int/en/documents/20200518/digital-transformation-strategy-africa-2020-2030>
- African Union (AU). (2022). *AU data policy framework*. Addis Ababa, Ethiopia. Retrieved from <https://au.int/sites/default/files/documents/42078-doc-DATA-POLICY-FRAMEWORKS-2024-ENG-V2.pdf>
- African Union (AU). (2023). *Guidelines for integrating data provisions in protocols on digital trade*. Addis Ababa, Ethiopia. Retrieved from https://au.int/sites/default/files/documents/44807-doc-Guidelines-Integrating-Data-Digital-Trade-ENG-V3_161.pdf
- Andrenelli, A., & Lopez Gonzalez, J. (2023). *Understanding the potential scope, definition and impact of the WTO e-commerce moratorium* (OECD Trade Policy Papers No. 275). Paris, France: OECD Publishing. <https://doi.org/10.1787/59ceace9-en>
- Atuguba Akongburo, R., Boshe, P., Dei-Tutu, S. A., & Hennemann, M. (Eds.). (2024). *African data protection laws: Regulation, policy, and practice*. Berlin, Germany: De Gruyter. <https://doi.org/10.1515/9783110797909>
- Azmeh, S., Foster, C., & Echavarri, J. (2020). The international trade regime and the quest for free digital trade. *International Studies Review*, 22(3), 671–692. <https://doi.org/10.1093/isr/viz033>
- Banga, K., & te Velde, D. W. (2018). *Digitalisation and the future of African manufacturing* (Briefing paper). London, England: Overseas Development Institute. Retrieved from https://set.odi.org/wp-content/uploads/2018/03/SET_Future-of-manufacturing-Brief_Final.pdf
- Banga, K., Beyleveld, A., & Munu, M. L. (2025). Trading away tax sovereignty? How trade rules shape taxation of the digital economy in Africa. *Journal of International Economic Law*, 28(1), 43–62. <https://doi.org/10.1093/jiel/jgaf004>
- Banga, R. (2022). *WTO moratorium on customs duties on electronic transmissions: How much tariff revenue have developing countries lost?* (South Centre Research Paper No. 157). Geneva, Switzerland: South Centre. Retrieved from https://www.southcentre.int/wp-content/uploads/2022/06/RP157_WTO-Moratorium-on-Customs-Duties-on-Electronic-Transmissions_EN.pdf
- Batikas, M., Bechtold, S., Kretschmer, T., & Peukert, C. (2020). *European privacy law and global markets for data* (Centre for Economic Policy Research Discussion Paper No.

- DP14475). Retrieved from <https://cepr.org/publications/dp14475>
- Boshe, P. (2024). An introduction, data governance in Africa: A change in narrative. In R. Atuguba Akongburo, P. Boshe, S. A. Dei-Tutu, & M. Hennemann (Eds.), *African data protection laws: Regulation, policy, and practice* (pp. 1–18). Berlin, Germany: De Gruyter. <https://doi.org/10.1515/9783110797909-003>
- Burri, M., Vázquez Callo-Müller, M., & Kugler, K. (2024). The evolution of digital trade law: Insights from TAPED. *World Trade Review*, 23(2), 190–207. <https://doi.org/10.1017/S1474745623000472>
- Centre for Intellectual Property and Information Technology (CIPIT). (2024). *Cross-border Data Flows in Africa: Exploring Legal Frameworks and Regional Importance*. Strathmore University. Retrieved from <https://cipit.org/wp-content/uploads/2024/11/Cross-Border-Data-Flows-in-Africa-Exploring-Legal-Frameworks-and-Regional-Importance-1-compressed.pdf>
- Frey, C. B., & Presidente, G. (2024). Privacy regulation and firm performance: Estimating the GDPR effect globally. *Economic Inquiry*, 62(3), 1074–1089. <https://doi.org/10.1111/ecin.13213>
- Evenett, S. J. (2021). *Is the World Trade Organization moratorium on customs duties on e-commerce depriving developing countries of much needed revenue?*. St. Gallen Endowment for Prosperity Through Trade. Retrieved from <https://static1.squarespace.com/static/5393d501e4b0643446abd228/t/6195aa9766fd8250876835c2/1637198488958/S.+Evenett+WTO+Moratorium+12+Nov+2021+finalised.pdf>
- Ferracane, M. F. (2024). Data localization. In K. Nadakavukaren Schefer & T. Cottier (Eds.), *Elgar Encyclopedia of International Economic Law* (2nd ed.). Cheltenham, England: Edward Elgar Publishing. <https://doi.org/10.4337/9781800882324.data.localization.nt>
- Ferracane, M. F., & González, S. (2025). *Data policies in Africa: An overview of the regulatory policies implemented in the continent* (Working paper). European University Institute (EUI). Retrieved from <https://hdl.handle.net/1814/94152>
- Ferracane, M. F., & Rogaler, T. (2025). *Digital trade: An assessment of regulations and practices in Rwanda and Uganda* (Project report). London, England: International Growth Centre. Retrieved from <https://www.theigc.org/publications/digital-trade-assessment-regulations-and-practices-rwanda-and-uganda>
- Ferracane, M. F., González Ugarte, S., & Rogaler, T. (Eds.). (2025a). *Digital Trade Integration Database*. <https://dti.eui.eu/database/>
- Ferracane, M. F., González Ugarte, S., & van der Marel, E. (2025b). The Brussels effect in

- Africa: Is it beneficial for intra-regional trade in digital services? *Journal of International Economic Law*, 28(1), 1–22. <https://doi.org/10.1093/jiel/jgae059>
- Ferracane, M. F., van der Marel, E. (2021). Do data policy restrictions inhibit trade in services? *Review of World Economics*, 157, 727–776. <https://doi.org/10.1007/s10290-021-00417-2>
- Internet & Jurisdiction Policy Network (I&JPN). (2022). *Framing, Mapping and Addressing Cross-Border Digital Policies in Africa: An Internet & Jurisdiction Policy Network Regional Status Report*. Paris, France: I&JPN. Retrieved from: <https://www.internetjurisdiction.net/uploads/pdfs/IJ-Report-Cross-border-Digital-Policies-in-Africa.pdf>
- Kaukab, R. S. (2024). *WTO moratorium on customs duties on electronic transmissions: Better understanding developing countries' concerns*. International Institute for Sustainable Development (IISD). Retrieved from <https://www.iisd.org/articles/policy-analysis/wto-moratorium-customs-duties-electronic-transmission>
- Kugler, K., & Tavengerwei, R. (2024). Navigating digital sovereignty: Implications for African countries. *Global Trade and Customs Journal*, 19(7–8), 328–339. <https://doi.org/10.54648/gtcj2024058>
- Mishra, N., & Kugler, K. (2024). International community in the global digital economy: A case study on the African Digital Trade Framework. *International and Comparative Law Quarterly*, 73(4), 853–889. <https://doi.org/10.1017/S0020589324000290>
- Musoni, M., Karkare, P., & Teevan, C. (2024). *Cross-border data flows in Africa: Continental ambitions and political realities* (ECDPM Discussion Paper No. 379). Maastricht, The Netherlands: European Centre for Development Policy Management (ECDPM). Retrieved from <https://ecdpm.org/application/files/8417/3202/4662/Cross-Border-Data-Flows-Africa-Continental-Ambitions-Political-Realities-ECDPM-Discussion-Paper-379-2024.pdf>
- Ndemo, B., Ndung'u, N., Odhiambo, S., Omolo, M., & Shimeles, A. (2023a). Conclusion. In B. Ndemo, N. Ndung'u, S. Odhiambo, & A. Shimeles (Eds.), *Data governance and policy in Africa*. Cham, Switzerland: Palgrave Macmillan. https://doi.org/10.1007/978-3-031-24498-8_9
- Ndemo, B., Ndung'u, N., Odhiambo, S., & Shimeles, A. (Eds.). (2023b). *Data governance and policy in Africa*. Cham, Switzerland: Palgrave Macmillan. <https://doi.org/10.1007/978-3-031-24498-8>
- Privacy Laws & Business. (2024). *EU Commission and Kenya close to agreeing a mutual adequacy agreement*. Retrieved from <https://www.privacylaws.com/news/eu-commission-and-kenya-close-to-agreeing-a-mutual-adequacy-agreement/>

- Rotich, N. (2023). *Examining Cross-Border Data Flows Provisions in Africa's Free Trade Agreements*. Strathmore University, Centre for Intellectual Property and Information Technology (CIPIT). Retrieved from <https://cipit.strathmore.edu/examining-cross-border-data-flows-provisions-in-africas-free-trade-agreements/>
- Sucker, F. (2025). *The AfCFTA Protocol on Digital Trade*. SSRN. <http://dx.doi.org/10.2139/ssrn.5386851>
- Sucker, F., & Beyleveld, A. (2025). African rules on cross-border data flows: The significance of regulatory convergence and the African Continental Free Trade Area's Digital Trade Protocol's potential contribution. In J. Drexel, M. Hennemann, P. Boshe, & K. Wiedemann (Eds.), *Comparative data law* (MPI Studies on Intellectual Property and Competition Law, Vol. 32, pp. 151–172). Cham, Switzerland: Springer. https://doi.org/10.1007/978-3-031-91401-0_8
- Sucker, F., & Wambua, M. (in press). Rules of origin for digital products in the African Continental Free Trade Area Digital Trade Protocol: Setting a precedent with legal loopholes. *Global Trade and Customs Journal*.
- U.S. Department of Commerce. (2024). *Joint statement on harnessing artificial intelligence, facilitating data flows and empowering digital upskilling between the United States Department of Commerce and the Kenyan Ministry of Information, Communication and the Digital Economy* (Press release). Retrieved from <https://www.commerce.gov/news/press-releases/2024/04/joint-statement-harnessing-artificial-intelligence-facilitating-data>
- World Trade Organization (WTO). (2025). *Incorporation of the Agreement on Electronic Commerce into Annex 4 of the WTO Agreement: Communication from the Members parties to the Agreement on Electronic Commerce* (WT/GC/W/963). Geneva, Switzerland. Retrieved from <https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=Q:/WT/GC/W963.pdf&Open=True>

A post-AfCFTA Digital Trade Protocol research agenda to address LDCs' challenges

Yasmin Ismail

1. Introduction

Spurred by advancing technological innovations and the digitalisation of economies, digital trade has significantly evolved over the past decade. However, it remains unequally distributed among countries and regions both in terms of practice and rulemaking. While report after report highlights the opportunities digitalisation offers to lower the threshold for participating in cross-border trade, enhance economic resilience and reduce persisting trade inequalities, the widening digital divide means that not all countries can equally unlock these benefits (Hoekman, 2022; UNCTAD, 2021a, 2022). The unequal distribution of digital trade and its potential benefits is particularly glaring in the least developed countries (LDCs).¹ The UN Trade and Development (UNCTAD) reports a significantly low LDCs' share of only 0.2 per cent of global digitally deliverable services exports, compared to 76 per cent for developed countries and 24 per cent for developing countries in 2022 (UNCTAD, 2023).² In fact,

1 The list of least developed countries is set by the United Nations and is reviewed every three years. Currently, there are 44 LDCs listed.

2 The share for developing countries drops to 19% when excluding China.

LDCs' share has remained almost stagnant at around 0.2 per cent since 2005, with a slight increase in the aftermath of the Covid-19 pandemic.³

LDCs' digital trade divide translates into marginal participation in digital trade rulemaking, which has been mainly driven by Preferential Trade Agreements (PTAs) and a new generation of digital economy agreements (DEAs), which deal solely with issues of the data economy. Together, PTAs and DEAs have been increasingly filling up the gap left by the World Trade Organisation (WTO), where Members' discussions under the Work Programme on Electronic Commerce, established in 1998, have made little progress towards initiating multilateral negotiations on rules that address digital challenges of trade (Hoekman *et al.*, 2021; Ismail, 2023). Of the 465 PTAs (including DEAs) entered into force between January 2000 and November 2024,⁴ 231 contain provisions relevant to digital trade, and 135 have dedicated electronic commerce chapters (Burri *et al.*, 2024).⁵ While parties negotiating digital trade rules have diversified in recent years, only 27 agreements include at least one LDC: nine are bilateral agreements⁶ and 18 consist of regional agreements concluded by Member States of the Association of Southeast Asian Nations (ASEAN), notably the ASEAN Agreement on Electronic Commerce and the Regional Comprehensive Economic Agreement (RCEP),⁷ in addition to the African Continental Free Trade Agreement (AfCFTA) and its Digital Trade Protocol (DTP), which however has not yet entered into force (AU, 2024).

Before adopting the AfCFTA DTP in February 2024, the African region was effectively not contributing to the shaping of digital trade law (Burri, *in press*). To date, the UN designates 32 LDCs in Africa, of which 29 have already

3 WTO. (2025). Digitally delivered services trade dataset. <https://www.wto.org/english/res_e/statis_e/gstdh_digital_services_e.htm>.

4 The number of valid agreements is 428, accounting for agreements that have been discontinued or replaced.

5 This analysis is based on a dataset of all digital trade relevant norms in trade agreements (TAPED). For all data, as well as updates of the dataset, see <<https://unilu.ch/taped>>.

6 Most of these bilateral agreements have insignificant relevance to e-commerce, except for two agreements by Cambodia, which have dedicated e-commerce chapters, namely the China-Cambodia Free Trade Agreement and the UAE-Cambodia Comprehensive Economic Partnership Agreement.

7 The ASEAN Agreement on Electronic Commerce entered into force on 3 December 2021, and the RCEP entered into force on 1 January 2022 for ten original parties (Australia, Brunei Darussalam, Cambodia, China, Japan, Laos, New Zealand, Singapore, Thailand and Vietnam) and at later dates for the Republic of Korea, Malaysia, Indonesia and the Philippines.

ratified the AfCFTA.⁸ Therefore, the Protocol can be considered an important milestone towards inclusive digital trade rulemaking and an opportunity to advance rules, narratives and frameworks that better cater to LDCs' specific needs and challenges, strengthen cooperation to address their gaps and enhance their capacity to engage in e-commerce rules negotiations with elevated collective bargaining power (Burri, 2024). However, given that over half of the Protocol's parties are LDCs, many of which face multiple obstacles to digital inclusion, a key concern is ensuring that the Protocol does not widen their digital divide by allowing better-prepared countries to advance more quickly on digital trade integration, leaving them unable to keep pace with the required digital readiness and regulatory reforms (Stuart, 2024).

Conceptually, this note considers development and inequality as intertwined and relating to the ability of LDCs to shape and participate in the digital economy and, in particular, in the evolving regulatory frameworks for digital trade.⁹

2. The Digital Trade Divide and LDCs' Structural and Regulatory Weaknesses

The United Nations established the LDC category in 1971 and currently defines it as “countries that have low levels of income and face severe structural impediments to sustainable development” (UN-DESA, 2024). The countries are categorized as LDCs based on three interrelated criteria and their relevant indicators and measurements: i) low gross national income per capita; ii) weak human assets index, measured by indicators related to health and education; and iii) low economic and environmental vulnerability index, which is a composite index accounting for remoteness and landlockedness, export concentration and instability, among other variables. The interaction of digital trade with these dimensions is complex. Digital trade may offer opportunities for improvement, such as promoting economic and export diversification, particularly by facilitating cross-border trade in services, and defying remoteness and allowing the reach of new markets (IMF *et al.*, 2023). On the other hand, each

8 The three African LDCs that have not yet ratified the AfCFTA Agreement are South Sudan, Somalia and Eritrea. The January 2026 ratification status is available in Tralac (2026).

9 For instance, sustainable development goals 8 and 10 refer to economic development and decreasing inequality, respectively, which is a recognition that addressing both is necessary to achieve sustainable development. See <<https://sdgs.un.org/goals>>. See also Callo-Müller and Kugler (2023).

of the LDC category criteria poses unique challenges and constraints for leveraging digital trade opportunities.

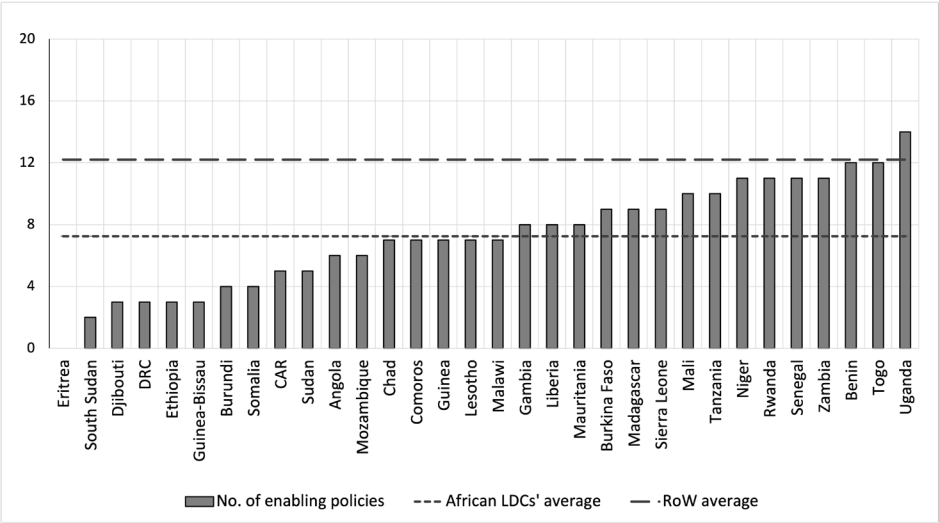
A key limitation faced by LDCs, particularly in Africa, is low human capital, which is translated into lower digital absorptive capacity in terms of lower penetration, adoption and use of the Internet. In other words, LDCs' populations and workforce disproportionately lack the skills and capacities allowing the use of digital connectivity for entering export markets (Cariolle & Piedade, 2023). A recent study shows that the expansion of global connectivity driven by the deployment of submarine cables (SMCs), has had uneven impacts on firms' export decisions encouraging more firms from high-income and developed countries to start exporting or enter new export markets, while leading some existing exporters from lower income countries, particularly from Sub-Saharan Africa, to withdraw from export markets (Imbruno *et al.*, 2025).

Structural vulnerabilities further impede LDCs' participation in digital trade. Many African LDCs are landlocked and distant from major markets. Although digitalisation can mitigate geographic isolation, countries without a reliable digital infrastructure risk deepening marginalisation. For digitalisation to open new markets for goods' exports, digital trade solutions should be accompanied by efficient transport, logistics, postal and energy infrastructure, which remain underdeveloped in many African LDCs (UNCTAD, 2021b, 2023). Not to mention the vulnerability of Africa's digital and economic infrastructure to the adverse impacts of climate change. For example, seismic activities have led to a cut in SMCs and led to a West African internet outage in March 2024 (Munga, 2025).

Another concern is the lack of enabling domestic regulatory frameworks. The Digital Trade Integration (DTI) database provides comparable information on digital trade regulatory policies across 160 countries, assessed based on two dimensions: i) enabling measures, which facilitate digital trade and enhance business and consumer trust, such as electronic transaction frameworks, electronic signatures and online consumer protection, and ii) restrictive measures, which may inhibit cross-border digital trade, such as data localisation mandates, and restrictions on online payments (Ferracane *et al.*, 2025). Data from the DTI database reveal sparse adoption of enabling measures by the 32 African LDCs, reporting an average of 7 measures compared to the rest of the world (RoW) average of 12 enabling measures for the year 2023 (see Figure 1). On the other hand, LDCs in Africa exhibit a significantly higher average number of restrictive measures, reaching 33 measures and approaching the RoW average at 36 measures (see Figure 2).

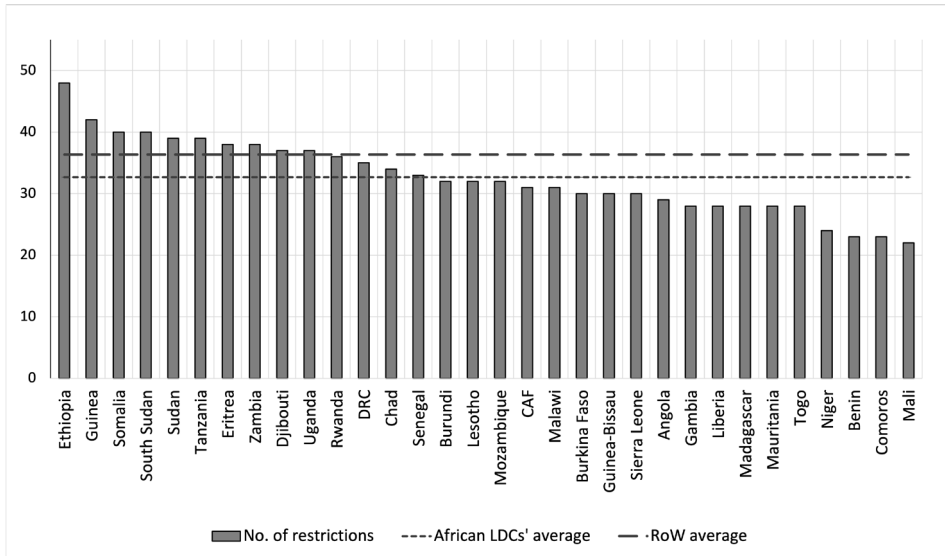
A closer look at the figures below and the DTI database also reveals considerable regulatory heterogeneity among African LDCs in terms of the number and substance of measures adopted, whether enabling or restrictive. One explanation for this heterogeneity could be the varying regulatory capacities among African LDCs, causing many of them, such as Eritrea, South Sudan, Djibouti, DRC, Ethiopia and Guinea-Bissau, to operate in a nearly regulatory vacuum when it comes to enabling measures. In fact, it is argued that the combined constraints of infrastructure, human capital, and regulatory capacity may be fueling government concerns that digital trade facilitation and participation in digital trade agreements could shrink their policy space during their digital catch-up process, adversely impact nascent digital businesses and enterprises, and result in the loss of tariff revenue (Bajaj, 2022). This argument logically explains African LDCs being more active and interested in adopting restrictive measures, as well as maintaining a significantly higher average of duties imposed on ICT goods compared to the world average, as revealed by the DTI database.

Figure 1: African LDCs and the RoW average number of digital trade-enabling measures, 2023.



Source: Author based on data retrieved from the DTI database on 30 January 2026 (Ferracane *et al.*, 2025a).

Figure 2: African LDCs and the RoW average number of digital restrictive measures, 2023.



Source: Author, based on data retrieved from the DTI database on 30 January 2026 (Ferracane *et al.*, 2025a).

Against this backdrop, the following section will delve into the state-of-the-art in digital trade law frameworks within the WTO and regional trade agreements, examining how they address inequalities and development, as well as recent developments in the AfCFTA DTP, involving the largest number of LDCs in digital trade rulemaking.

3. Digital trade law and development for LDCs: The state-of-the-art and developments in the AfCFTA Digital Trade Protocol

3.1 WTO issues

Digital trade, initially and interchangeably called “e-commerce”,¹⁰ was first recognised as an issue of trade law and global governance in the context of the WTO almost three decades ago (Ismail, 2020). In 1998, Members of the WTO agreed to establish a WTO Work Programme on Electronic Commerce, a non-negotiating forum of discussion involving WTO bodies to explore

¹⁰ For more on digital trade and e-commerce definitions and use, see Burri and Chander (2023).

trade-related issues of e-commerce, including the potential economic, financial and development implications for and needs of developing countries (WTO, 1998a, 1998b). They also agreed to impose a temporary moratorium on customs duties on electronic transmissions, which they have renewed to date (WTO, 1998a).

As discussions in the Work Programme have stalled and lacked any progress towards multilateral negotiations on e-commerce rules, PTAs were filling up the vacuum and driving digital trade rulemaking, led by developed and high-income economies, such as the United States, the European Union, Australia and Singapore, and resulting in regulatory templates that reflect their economic interests and do not necessarily strive to advance development (Burri, 2024). A subset of WTO Members launched the Joint Statement Initiative on Electronic Commerce (JSI) at the 11th Ministerial Conference (MC) in 2017 for exploratory talks towards future WTO negotiations. The JSI, later in 2019, turned into negotiations of WTO-extra rules, addressing issues of facilitation and data governance, influenced by existing PTAs' templates (Ismail, 2023).

Against this context, it is argued that the WTO Work Programme discussions remain important from a development perspective, especially that they have been recently intensifying to focus on development concerns (Ismail & Jose, 2024) and becoming a space for shedding more light on the digital divide and inequalities in the uptake of digital trade, particularly in the aftermath of the COVID-19 pandemic (Ismail & Mwangi, 2022). Submissions by the LDC Group in the Work Programme continue to point to the basic deficits of LDCs, i.e. connectivity and infrastructure in a broader sense that includes not only access to reliable and affordable internet and connecting devices, but also to emerging technologies and their digital trade enabling products and services; skilled and talented workforce that can navigate the increasingly complex digital environment in the rise of the data economy and its innovative applications; and upgraded national legal and regulatory frameworks (WTO, 2019, 2023, 2024).

Still in the multilateral framework of the WTO, and at a time when most of the PTAs' e-commerce chapters establish a permanent duty-free moratorium on electronic transmissions among their parties,¹¹ LDCs have been calling for support to conduct national studies on the financial and economic impact of

11 See, for example, US–Singapore FTA, Article 14.3(1); US–Chile FTA, Article 15.3 and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), Article 14.3.

the moratorium on customs duties on electronic transmissions (WTO, 2019, 2023, 2024). They emphasise in their submissions the need for studies that not only assess potential revenue gains from lifting the moratorium, but also reveal the possible costs that could be passed on to LDC entrepreneurs and consumers if duties or taxes were imposed. This is particularly important for their nascent digital businesses, which increasingly depend on digital platforms and services to access foreign markets.

Despite LDCs' request for further evidence on the impacts of the moratorium and the weakening support for the moratorium by some developing countries,¹² the AfCFTA DTP imposes a moratorium on customs duties on digital products transmitted electronically among its Parties, while stating that it will follow the scope of application set by the Annex on Rules of Origin as designated in Article 5 of the Protocol.¹³ Accustomed to determining the origin of traded goods, the rules of origin under the AfCFTA DTP focus on trade in digital products.¹⁴ The Annex, therefore, constitutes the “first of its kind” in international trade law (Tralac, 2024). It sets criteria for what forms an African-owned enterprise,¹⁵ an African digital platform,¹⁶ African content,¹⁷ and scope of digital products¹⁸ eligible for preferential customs duties treatment (Tralac, 2025). The Annex implies that in the case of a lifted moratorium in the WTO, AfCFTA member states will be able to impose duties on non-African originating transmitted digital products (Stuart, 2024). While the duties may generate tariff revenues, imported non-African digital products may be essential for digital start-ups to establish their businesses, which explains LDCs constantly calling for a cost-benefit analysis of the moratorium.

According to the Annex on Rules of Origin, African digital enterprises or

12 At 12th and 13th Ministerial Conferences, the scope and application of the moratorium were heavily contested, with India and South Africa, in particular, arguing against it; see, for example WTO (2021).

13 Article 6.1, AfCFTA DTP.

14 The AfCFTA DTP defines a digital product in Article 1(h) as “an electronic programme, text, video, image, sound recording, or any other product that is digitally encoded, that is produced for commercial sale or distribution, and that can be transmitted electronically except for a digitised representation of a financial instrument, including money”.

15 Article 4, AfCFTA DTP, Annex on Rules of Origin.

16 Article 5, AfCFTA DTP, Annex on Rules of Origin.

17 Article 6, AfCFTA DTP, Annex on Rules of Origin.

18 *Ibid.*

platforms that are registered under the laws of a member state, involve natural or legal persons of a member State owning or controlling more than 50 percent equity shares and maintaining substantial business operations¹⁹ in the territory of a member State, continue to enjoy free duty treatment even if the WTO moratorium is lifted. The Annex can be considered a legal innovation that sets a precedent for a text that promotes and supports native digital platforms and content. However, it can be complex to prove the origin of an intangible product (Kugler, 2024). Additionally, proving substantial business operations on a case-by-case basis, as defined in the AfCFTA Investment Protocol for digital and platform-based businesses, can be challenging and burdensome, especially for the nascent digital businesses of LDCs. While the Annex included a provision requiring member states to provide “favourable treatment” for “underrepresented groups” such as micro, small and medium enterprises (MSMEs), start-ups, women and youth, among others, the provision does not grant any clear differential treatment, exceptions or support to certify Rules of Origin under the Protocol.²⁰

It is clear that the text on Rules of Origin, as it stands, poses risks of unequal distribution of burdens and benefits between Member States, which may exacerbate inequalities among them and disadvantage LDCs.

3.2 WTO-extra issues

Moving to WTO-extra digital trade rules, these primarily comprise digital trade facilitation provisions developed through PTAs and DEAs. The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) is considered among the first PTAs to provide a comprehensive template of digital trade facilitation provisions. Given that they are primarily inspired by the UNCITRAL Model Laws, addressing the reduction of red tape and enabling digital transactions, they exhibit a high level of convergence among the various key players, with slight language differences (Burri, 2024). They include rules on paperless trading, electronic authentication, electronic signatures, consumer protection, spam control, net neutrality, electronic invoicing, express shipments, clearance times, logistics, and electronic payments.

19 The AfCFTA Annex on Rules of Origin clarifies that substantial business operations is assessed as per the definition in Article 1 of the AfCFTA Protocol on Investment.

20 Article 7(2), AfCFTA DTP, Annex on Rules of Origin.

While such provisions can be largely perceived as beneficial for development, some of these, like those relating to digital payments and electronic invoicing, assume infrastructure, regulatory and skills readiness that are likely not to be found in many LDCs (Hoekman, 2022). Hence, without effective special and differential treatment (SDT) provisions that allow for an extended period to meet commitments and provide binding technical assistance and capacity building, the development potential of these provisions can be compromised (Ismail & Tutay, 2023; Burri, 2024).

Another set of WTO-extra issues is related to data governance and the emerging data economy using frontier technologies. Data governance provisions in digital trade agreements are crucial for shaping the trajectory of the data-driven economy and its development potential. However, these provisions remain controversial among digital trade rulemaking front runners, with three divergent models, the liberal model (USA model) with limited exceptions for legitimate public policy objectives as found in the United States Mexico Canada Agreement, the conditional model (EU model) allowing data flows conditional to adequate data protection, and the security-based model (China model) allowing flexibility to impose restrictions on data flows based on national security concerns as found the RCEP (Gao, 2021). The AfCFTA DTP adopted a hybrid model with a binding commitment to allow cross-border flow of data for the purpose of conducting digital trade among the parties, along with a leeway for both legitimate public policy objectives and “essential security interests”. However, there is limited evidence on whether and how these exceptions can support development goals and the rise of the national data industry (Burri, 2024).

3.3 Development cooperation and provisions on special and differential treatment

As previously mentioned, digital trade chapters in PTAs lacked explicit developmental focus, but this began to change with newer DEAs and FTAs adopting provisions for cooperation on digital inclusion to support participation of women, rural populations, low socio-economic groups and indigenous peoples in the digital economy.²¹ Such inclusion provisions are mostly in soft law language to cooperate, share experiences, and support the listed disadvan-

21 See, e.g., Article 11.1 DEPA; Article 7.22 Chile–Paraguay FTA; Article 9.13(2)(a) India–UAE CEPA; Article 8.61-P Singapore–UK DEA; among others.

tagged communities to access digital trade opportunities.²² While similar provisions have been introduced in the e-commerce JSI negotiations, their scope have eventually been limited to allowing Parties to provide “more favourable treatment to Indigenous Peoples” in their territory to meet obligations of the agreement in the JSI stabilized text of the Agreement on Electronic Commerce, now comprising a group of 91 WTO Members involving five LDCs, three amongst them are African (Benin, Burkina Faso and the Gambia).

The AfCFTA DTP provides African-centric digital inclusion provisions that better reflect development issues of interest to LDCs. According to these provisions, Parties “shall” cooperate to support the inclusion of marginalised groups and MSMEs, and promote digital innovation, entrepreneurship and digital skills development.²³ The Protocol is also hailed for being the first, so far, to introduce an extensive provision on digital infrastructure,²⁴ covering not only physical and network infrastructure but also an enabling regulatory environment (Burri, 2024; Kugler, 2024). The Protocol recognises that such a transformative plan will require extensive and efficient technical assistance, capacity building, and cooperation. It stipulates that the Parties “shall” cooperate on digital trade-related matters, encompassing activities such as information exchange, joint research, training, peer learning, and the sharing of best practices and lists a broad scope of cooperation areas covering almost all sections or issues addressed in the Protocol.²⁵ Such cooperation is further emphasised and supported by specific cooperation and capacity-building provisions in some of the Agreement Annexes.

When it comes to Parties requiring assistance to meet their obligations, the Protocol stipulates that Parties “agree” to provide support to enable the implementation of the Protocol and its objectives.²⁶ However, it is noticeable that the Protocol does not establish an obligation to provide such assistance, nor does it differentiate between Parties at different stages of development by giving priority to LDCs. Mandated by the Protocol to coordinate the provision of

22 Article 15.20 New Zealand–UK FTA is a notable exception with hard language of commitment, including on supporting developing countries non-party to the agreement in bridging the digital divide.

23 Articles 30, 31, 32 and 33, AfCFTA DTP.

24 Article 18, AfCFTA DTP.

25 Article 43, AfCFTA DTP.

26 Article 42, AfCFTA DTP.

technical assistance and capacity building with State Parties and relevant stakeholders, the Secretariat can therefore be expected to play a role in bridging enforceability and differentiation gaps (Sucker, 2025).

The Protocol also does not accord SDT provisions that recognise the specific challenges faced by LDCs in meeting their obligations. Such provisions are usually represented in transitional periods or extended deadlines to meet certain obligations or for the entry into force of the agreement. In contrast to other RTAs, such as the ASEAN E-commerce Agreement and the RCEP, which explicitly grant LDCs longer periods to meet certain obligations, and Article 20 of the Stabilised text of the Agreement on Electronic Commerce, which allows self-designation of obligations requiring longer periods of implementation, the AfCFTA DTP requires all Parties to align their laws and regulations with the Protocol obligations in a period of five years from the Protocol's entry into force, with no flexibility for LDCs.²⁷

4. A post-AfCFTA DTP research agenda on LDCs and digital trade law

Despite growing evidence and information provided on LDCs' digital divides, regulatory gaps and barriers, critical research gaps persist in understanding how digital trade rules impact development and can be better designed to provide meaningful support for LDC development. These gaps span theoretical, empirical, and policy dimensions. Starting with theoretical gaps, much of the digital trade literature is centred on advanced economies. There is limited integration of developmental economics and structural transformation theories in digital trade. For LDCs (and many developing countries), the trade-offs between open digital trade policies and a type of industrial state intervention are not clear (Peng, 2022). National studies assessing the impacts of digital rules and running policy simulations and scenarios are increasingly needed for LDCs.

Moving to empirical gaps, there is little information and lessons learned from digital trade treaties involving Asian LDCs that could have informed the development of the AfCFTA DTP, particularly from the perspective of the practical translation of SDT, cooperation, technical assistance and capacity building provisions into meaningful support to LDCs, or the institutional

27 Article 48(4), AfCFTA DTP.

frameworks and tools mobilized to support them meet their commitments (Peng, 2022; Burri, 2024). There are development-related policy issues that are missing in the narrative of the various treaties, such as technology transfer and access to data or data sharing and the promotion of sustainable development (Agrawal & Mishra, 2022). Also, issues related to competition safeguards and market concentration and their implications on MSMEs in LDCs' nascent digital services industries require further research. Finally, the digital trade and data economy policy and regulatory dimensions are rapidly expanding, requiring dynamic regulatory readiness assessment frameworks in African LDCs to enhance their capacity not only to implement the AfCFTA DTP but also to enhance their readiness and skills to engage in future negotiations.

5. Conclusion

The current regulatory framework for digital trade remains insufficient in addressing the structural inequalities faced by LDCs. Regulatory capacity constraints and the absence of enforceable commitments for support persist as salient concerns. Recent progress in addressing LDCs' structural vulnerabilities can be witnessed in the AfCFTA DTP's extensive provisions on digital inclusion, cooperation and technical assistance with a focus on digital skills, support to MSMEs and an exclusive provision on digital infrastructure, bringing hope for enhanced inclusion in digital trade and digital trade rulemaking for African LDCs. But the lack of SDT flexibilities and enforceable LDC dedicated capacity-building and technical assistance to implement obligations puts these countries at risk of further falling behind. Future research endeavours should contribute to LDCs' articulating their policy options and trade-offs to reap digital trade expansion benefits while building their data economy capacities, consolidating their positions, assessing and upgrading their regulatory capacities, extracting lessons learned from Asian counterparts and forging meaningful cooperation and assistance with treaty parties.

References

- African Union (AU). (2024). *Protocol to the Agreement Establishing the African Continental Free Trade Area on Digital Trade*. Retrieved from https://au-afcfta.org/wp-content/uploads/2024/11/EN_-PROTOCOL-ON-DIGITAL-TRADE-clean.pdf
- Agrawal, B., & Mishra, N. (2022). Addressing the global data divide through digital trade law. *Trade, Law & Development*, 14(2). <https://doi.org/10.2139/ssrn.4276764>
- Bajaj, P. (2022). *Capacity-building in digital economy agreements - the missing link?* (Commonwealth Trade Hot Topics No. 180). London, England: Commonwealth Secretariat. <https://doi.org/10.14217/comsec.951>
- Burri, M. (2024). Inequalities in digital trade and digital trade regulation. In E. Askin & H. Stoll (Eds.), *Contested equality: International and comparative legal perspectives* (pp. 203–220). Cheltenham, UK: Edward Elgar Publishing. <https://doi.org/10.4337/9781035325771.00020>
- Burri, M. (in press). Digital trade rulemaking across preferential agreements and the prospect of economic development. In G. Dimitropoulos & N. Mishra (Eds.), *Reorienting International Economic Law for the Digital Economy*. Cambridge, England: Cambridge University Press. <https://dx.doi.org/10.2139/ssrn.5124316>
- Burri, M., & Chander, A. (2023). What are digital trade and digital trade law? *AJIL Unbound*, 117, 99–103. <https://doi.org/10.1017/aju.2023.14>
- Burri, M., Vásquez Callo-Müller, M., & Kugler, K. (2024). The evolution of digital trade law: Insights from TAPED. *World Trade Review*, 23(2), 190–207. <https://doi.org/10.1017/S1474745623000472>
- Cariolle, J., & da Piedade, C. (2023). Digital connectedness and exports upgrading: Is sub-Saharan Africa catching up? *The World Economy*, 46(11), 3325–3344. <https://doi.org/10.1111/twec.13501>
- Ferracane, M. F., González Ugarte, S., & Rogaler, T. (Eds.). (2025). *Digital Trade Integration Database*. <https://dti.eui.eu/database/>
- Gao, H. (2021). Data sovereignty and trade agreements: Three digital kingdoms. In A. Chander & S. Haochen (Eds.), *Data sovereignty: From the digital Silk Road to the return of the state* (pp. 213–239). Oxford, England: Oxford University Press. <https://doi.org/10.1093/oso/9780197582794.003.0010>

- Hoekman, B. (2022). *Digital trade: Opportunities and challenges*. Geneva, Switzerland: World Trade Organization. Retrieved from https://www.wto.org/english/tratop_e/devel_e/digital_trade2022_e.pdf
- Hoekman, B., Maskus, K., Stephenson, M., Tajoli, L., & Tentori, D. (2021). *Leveraging global digital trade opportunities for all* (Policy brief, Task Force 3: Trade, investment and growth). Think20 Italy 2021. Retrieved from https://www.t20italy.org/wp-content/uploads/2021/09/TF3_PB05_LM04.pdf
- Imbruno, M., Cariolle, J., & de Melo, J. (2025). Digital connectivity and firm participation in foreign markets: An exporter-based bilateral analysis. *Journal of Development Economics*, 177, 103551. <https://doi.org/10.1016/j.jdeveco.2025.103551>
- International Monetary Fund (IMF), Organisation for Economic Co-operation and Development (OECD), United Nations Conference on Trade and Development (UNCTAD), World Bank, & World Trade Organization (WTO). (2023). *Digital trade for development*. Geneva, Switzerland: World Trade Organization. Retrieved from https://unctad.org/system/files/official-document/dtd2023_e.pdf
- Ismail, Y. (2020). *E-commerce in the World Trade Organization: History and latest developments in the negotiations under the Joint Statement*. International Institute for Sustainable Development (IISD). Retrieved from <https://www.iisd.org/system/files/publications/e-commerce-world-trade-organization-.pdf>
- Ismail, Y. (2023). *The evolving context and dynamics of the WTO Joint Initiative on E-commerce: The fifth-year stocktake and prospects for 2023*. International Institute for Sustainable Development (IISD) & Consumer Unity & Trust Society (CUTS) International. Retrieved from <https://www.iisd.org/system/files/2023-04/wto-joint-initiative-e-commerce-fifth-year-stocktake-en.pdf>
- Ismail, Y., & Jose, R. (2024). *E-commerce takes centre stage at World Trade Organization in run-up to MC13*. International Institute for Sustainable Development (IISD). Retrieved from <https://www.iisd.org/articles/policy-analysis/e-commerce-developments-wto-mc13>
- Ismail, Y., & Mwangi, J. (2022). *The WTO Work Programme on Electronic Commerce Post Buenos Aires: Developments in the run-up to MC12*. Geneva: CUTS International. Retrieved from https://www.cuts-geneva.org/wp-content/uploads/2023/09/KP2022-RRN-The_WTO_Work_Programme_on_Electronic_Commerce-2017-2022.pdf
- Ismail, Y., & Tutay, A. (2023). *The Joint Initiative on E-commerce in the WTO: Spotlight on remaining challenges and LDCs' interests towards MC13*. Geneva, Switzerland: Consumer Unity & Trust Society (CUTS) International, Geneva. Retrieved from <https://cuts-geneva.org/pdf/research-report-the-joint-initiative-on-e-commerce-in-the-wto.pdf>

- Kugler, K. (2024). *The AfCFTA Digital Protocol*. International Institute for Sustainable Development (IISD). Retrieved from <https://www.iisd.org/articles/policy-analysis/afcfta-digital-protocol>
- Munga, J. (2025). *Beneath the waves: Addressing vulnerabilities in Africa's undersea digital infrastructure* (The Geopolitics of Subsea Data Cables). Washington, DC: Carnegie Endowment for International Peace. Retrieved from https://assets.production.carnegie.fu-sionary.io/static/files/Munga_Undersea%20Cables-2025.pdf
- Peng, S.-y. (2022). The uneasy interplay between digital inequality and international economic law. *European Journal of International Law*, 33(1), 205–236. <https://doi.org/10.1093/ejil/chac019>
- Stuart, J. (2024). *Will the AfCFTA's Digital Trade Protocol deal with the digital divide?* (tralac Trade Brief No. G24TB04/2024). Stellenbosch, South Africa: Trade Law Centre (tralac). Retrieved from <https://www.tralac.org/publications/article/16507-will-the-afcfta-s-digital-trade-protocol-deal-with-the-digital-divide.html>
- Sucker, F. (2025). *The AfCFTA Protocol on Digital Trade*. SSRN. <http://dx.doi.org/10.2139/ssrn.5386851>
- Tralac. (2024). *Scope and Details of the Annexes to the AfCFTA Protocol on Digital Trade*. Stellenbosch: Trade Law Centre (tralac). Retrieved from <https://www.tralac.org/documents/events/tralac/5394-2024-annual-conference-note-scope-details-of-annexes-to-the-afcfta-protocol-on-digital-trade/file.html>
- Tralac. (2025). *Summary on the Annexes to the AfCFTA Protocol on Digital Trade*. Stellenbosch: Trade Law Centre. Retrieved from <https://www.tralac.org/documents/events/tralac/5918-2025-conference-two-pager-summary-of-the-annexes-to-the-afcfta-protocol-on-digital-trade/file.html>
- Tralac. (2026). *Status of AfCFTA Ratification*. Retrieved from <https://www.tralac.org/resources/infographics/13795-status-of-afcfta-ratification.html>
- United Nations Conference on Trade and Development (UNCTAD). (2021a). *Digital Economy Report 2021: Cross-border Data Flows and Development: For Whom the Data Flow* (UNCTAD/DER/2021). Geneva, Switzerland: UNCTAD. Retrieved from https://unctad.org/system/files/official-document/der2021_en.pdf
- United Nations Conference on Trade and Development (UNCTAD). (2021b). *The least developed countries in the post-COVID world: Learning from 50 years of experience* (The Least Developed Countries Report 2021) (UNCTAD/LDC/2021). Geneva, Switzerland: UNCTAD. Retrieved from https://unctad.org/system/files/official-document/ldc2021_en.pdf

- United Nations Conference on Trade and Development (UNCTAD). (2022). *Digital trade: Opportunities and actions for developing countries* (UNCTAD Policy Brief No. 92). Retrieved from <https://unctad.org/publication/digital-trade-opportunities-and-actions-developing-countries>
- United Nations Conference on Trade and Development (UNCTAD). (2023). *Digitally deliverable services boom risks leaving least developed countries behind*. Retrieved from <https://unctad.org/news/digitally-deliverable-services-boom-risks-leaving-least-developed-countries-behind>
- United Nations, Department of Economic and Social Affairs (UN-DESA). (2024). *Handbook on the least developed country category: Inclusion, graduation and special support measures* (5th ed.). New York, NY: Secretariat of the Committee for Development Policy (CDP). Retrieved from <https://policy.desa.un.org/sites/default/files/publications/2025-06/ldc-handbook-2024.pdf>
- Vásquez Callo-Müller, M., & Kugler, K. (2023). Digital trade, development, and inequality. *AJIL Unbound*, 117, 116–121. <https://doi.org/10.1017/aju.2023.17>
- World Trade Organization (WTO). (1998a). *Declaration on global electronic commerce* (WT/MIN(98)/DEC/2). Geneva, Switzerland: WTO. Retrieved from https://www.wto.org/english/tratop_e/ecom_e/mindec1_e.htm
- World Trade Organization (WTO). (1998b). *Work programme on electronic commerce* (WT/L/274). Geneva, Switzerland: WTO. Retrieved from <https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=Q:/WT/L/274.pdf&Open=True>
- World Trade Organization (WTO). (2019). *Work programme and moratorium on electronic commerce: Communication from Chad on behalf of the LDC Group* (WT/GC/W/787). Geneva, Switzerland: WTO. Retrieved from <https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/GC/W/787.pdf&Open=True>
- World Trade Organization (WTO). (2021). *Work programme on electronic commerce: The moratorium on customs duties on electronic transmissions, need for clarity on its scope and impact* (WT/GC/W/833). Geneva, Switzerland: WTO. Retrieved from <https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/GC/W/833.pdf&Open=True>
- World Trade Organization (WTO). (2023). *Work programme on electronic commerce: Communication from Djibouti on behalf of the LDC Group* (WT/GC/W/905). Geneva, Switzerland: WTO. Retrieved from <https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/GC/W/905.pdf&Open=True>
- World Trade Organization (WTO). (2024). *Work programme on electronic commerce: Communication from Djibouti on behalf of the LDC Group* (WT/GC/W/905/Rev.1). Geneva, Switzerland: WTO. Retrieved from <https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/GC/W/905R1.pdf&Open=True>

Digital rights in Africa's digital trade landscape

Melody Musoni

1. Introduction

As discussed across different chapters of this book, data has become the foundational resource of Africa's emerging digital economy and the backbone of its nascent artificial intelligence (AI) sector, enabling innovation, efficiency and digital trade, while informing evidence-based policymaking (Musoni *et al.*, 2024a; Endeavor Nigeria, 2022; Balogun, 2024). The vision of the African Continental Free Trade Area (AfCFTA) to establish a single digital market depends on the free and secure movement of data across borders.¹ Yet precisely because of its value, data governance has become a site of contestation over who controls data, who benefits from its use, how it is regulated, and which rights individuals and communities can exercise over it (Razzano, 2019). These debates highlight why digital rights must be central to Africa's digital trade agenda. While digital trade offers opportunities for economic growth and social development, it simultaneously opens new frontiers for rights violations and risks reinforcing inequalities (Musoni *et al.*, 2024b). Unequal access to digital platforms, discriminatory algorithmic practices, and inadequate regulatory safeguards could entrench divides across gender, regions, and socio-economic status. In this context, the AfCFTA's promise of inclusive digital integration cannot be realised if digital rights are systematically undermined.

1 African Union (AU). (2018). Agreement Establishing the African Continental Free Trade Area. <<https://au.int/en/treaties/agreement-establishing-african-continental-free-trade-area>>.

Moreover, the proliferation of emerging technologies such as AI, predictive analytics, and digital identification systems raises challenges for existing rights frameworks. In acknowledgement of these concerns, the African Commission on Human and People's Rights has called upon State Parties to undertake rigorous studies to ensure that the development and use of AI, robotics and novel technologies are consistent with the rights and duties enshrined in the African Charter on Human and People's Rights (ACHPR)² as well as with broader regional and international human rights instruments, thereby safeguarding fundamental values of human dignity, privacy, equality, non-discrimination, inclusion, diversity and the evolving spectrum of digital rights.³ To ensure that individuals and communities can participate in and benefit from the digital economy without exploitation, it is necessary to safeguard established digital rights, adapt legal frameworks to address threats to these rights, and develop appropriate legal frameworks to protect them. Without such protections, Africa's digital trade might lead to digital rights violations, exploitation and exclusion.

This chapter maps the current state of digital rights in Africa's digital trade governance. It examines the extent to which digital rights are recognised and protected under existing continental laws, policies and frameworks while critically interrogating the tensions between economic integration and rights protection. In doing so, the chapter highlights key gaps in scholarship and policy, particularly the limited engagement with intra-African dynamics, weak institutional enforcement, and the neglect of broader rights beyond privacy. Finally, it proposes priority areas for a future research agenda that can inform more context-sensitive, inclusive, and rights-based approaches to Africa's digital trade integration.

2. The state-of-the-art on digital rights in Africa

There is no explicit or agreed-upon definition for digital rights. However, digital rights are seen as an extension of human rights in the digital space (Hutt, 2015). In 2012, the United Nations passed a resolution affirming that “ the

2 AU. (1981). African Charter on Human and Peoples' Rights. <<https://au.int/en/treaties/african-charter-human-and-peoples-rights>>.

3 African Commission on Human and People's Rights. (2021). Resolution 473: Resolution on the Need to Undertake a Study on Human and Peoples' Rights and Artificial Intelligence. <<https://achpr.au.int/en/adopted-resolutions/473-resolution-need-undertake-study-human-and-peoples-rights-and-art>>.

same rights that people have offline must also be protected online, in particular freedom of expression”.⁴ This means that fundamental rights like those articulated in the Universal Declaration of Human Rights, the International Covenant on Civil and Political Rights (ICCPR) or the ACHPR, can be considered as digital rights when exercised in online or digital spaces.

Several legal instruments, policies and strategies facilitating digital trade in Africa also make reference to digital rights. The most widely discussed digital rights within digital trade are data privacy and the protection of personal data. This may be due to the central role that personal data plays in the digital economy. In 2024, the African Commission on Human and Peoples' Rights adopted Resolution 620, which seeks to promote and harness data access as a tool for advancing human rights and sustainable development in the digital age.⁵ Dube (2025) opines that this resolution is a clarion call for a more equitable, transparent, and ethical approach to data in Africa, which also addresses risks associated with data misuse, such as privacy violations, discrimination and unequal access to information.

There are several laws and policies shaping digital trade in Africa, including the Convention on Cyber Security and Personal Data Protection 2014 (also known as the Malabo Convention), the African Union (AU) Digital Transformation Strategy 2020-2030, the AU Data Policy Framework 2022, the AU Interoperability Framework for Digital ID 2022, the AU Continental Artificial Intelligence Strategy 2024, and the AfCFTA Protocol on Digital Trade. Of these instruments, only the Malabo Convention and the Digital Trade Protocol are legally binding upon ratification by Member States. The rest are soft law instruments which are meant to shape norms, harmonise approaches and prepare the ground for future laws and regulations. This chapter will only discuss in detail the provisions of the two binding instruments.

2.1 The Malabo Convention

Before 2020, Africa as a region had been viewed as a slow progressor in data protection and digital governance, with most of the legal frameworks being

4 UN-Human Rights Council (UNHRC). (2012). The promotion, protection and enjoyment of human rights on the Internet (A/HRC/RES/20/8). <<https://digitallibrary.un.org/record/731540?ln=en&cv=pdf>>.

5 African Commission on Human and Peoples' Rights. (2024). Resolution 620: Data Access as a Tool for Advancing Human Rights and Sustainable Development. <<https://achpr.au.int/en/adopted-resolutions/620-data-access-tool-advancing-human-rights-and-sustainable-development>>.

imported from other regions (Boshe, 2024). The first legally binding instrument that was adopted by the AU was the Malabo Convention, which was adopted in June 2014.⁶ For the Convention to be operational, it required ratifications from at least 15 AU Member States, which were achieved in June 2023 with Mauritania's ratification.⁷ Scholars view this Convention as a holistic, continent-wide framework to harmonise data protection policies across Africa by catalysing digital rights, particularly data protection, privacy, and internet freedom (Ayalew, 2023).

The Convention is a three-in-one regional treaty, structured around three interconnected pillars, namely: a) electronic transactions, b) personal data protection, and c) cybercrime and cybersecurity. These three areas all protect digital rights and human rights in different capacities. Chapter 1 sets out the rules for electronic commerce and protects the rights of online consumers. For instance, it protects online consumers against direct marketing and requires businesses to be transparent and that consumers have information and rights about the use of their data (Article 4). Chapter 2 deals with the protection of personal data. It outlines the basic principles and obligations for processing personal data, the digital rights of data subjects, and also mandates all state parties to establish Data Protection Authorities. Anyone who processes personal data is required to uphold key principles designed to protect individuals' rights. These include processing data only with the data subject's consent or under lawful exceptions (principle 1); processing, collecting and storing data lawfully (principle 2); processing personal data for a specific purpose (principle 3); ensuring that personal data collected and processed is accurate, regularly updated and corrected or erased when incomplete or incorrect (principle 4); data controllers to disclose their processing activities (principle 5); and ensuring that personal data is handled securely and confidentially (principle 6). Chapter 3 requires State Parties to adopt national cybersecurity policies and strategies and to adopt cybercrime laws. The Convention also protects citizens' rights by ensuring that measures adopted by State Parties do not violate national laws, international conventions and the ACHPR.

6 AU. (2014). African Union Convention on Cyber Security and Personal Data Protection. <<https://au.int/en/treaties/african-union-convention-cyber-security-and-personal-data-protection>>.

7 The latest status list can be accessed at <https://au.int/sites/default/files/treaties/29560-sl-AFRICAN_UNION_CONVENTION_ON_CYBER_SECURITY_AND_PERSONAL_DATA_PROTECTION.pdf>.

Scholars have criticised the structure of the Malabo Convention and argued that its broad scope undermines its effectiveness as it tries to aggregate seemingly unrelated issues of human rights, criminal law, trade and commercial law (Ayalew, 2023). Ifeanyi-Ajufo (2023) argued that “the anatomy of the Malabo Convention – merging cybersecurity and data protection – will be a setback, particularly because the data protection provisions of the Convention are not directly worded in terms of cybersecurity”. Makulilo (2016) contends that the Convention is too broad as it applies to both public and private sectors, to natural persons and legal entities, to automated and non-automated data processing, to matters of public security, defence and criminal law. Abdulrauf and Fombad (2016) also criticised the Malabo Convention for being obscure by failing to define certain terms, such as “physical data” and “local communities”. The Convention has also been criticised for not providing clear guidance to Member States on how to implement its provisions, particularly on cross-border data transfers and protection of children’s data (King’ori, 2025; Sibanda, 2022). Other scholars have further argued that due to the diverse legal frameworks in Africa, the absence of data protection laws and the technical and infrastructural challenges, it is difficult for the Malabo Convention to be implemented (Bouke *et al.*, 2023). Some have proposed that the Convention must be updated to address its shortcomings and better reflect technological and legal developments (Diallo, 2024; Musoni *et al.*, 2023).

2.2 The AfCFTA’s Digital Trade Protocol

Shyllon (2019) posits that the AfCFTA is an attempt by African states to go beyond “speaking with one voice” to actually “acting with one voice” on intra-African trade. The AfCFTA’s Digital Trade Protocol (DTP) establishes harmonised rules and common principles and standards to enable digital trade. These rules and principles also explicitly protect digital rights, particularly data privacy and e-consumer rights.⁸ Part IV of the DTP covers issues on data governance, including cross-border data flows and protection of personal data. Sucker and Beyleveld (2024) have argued that Article 21 of the DTP mirrors the structure and content of Article 17.2 of the Australia–Singapore Digital Economy Agreement and Article 19.8(2) of the United States–Mexico–Canada Agreement. Others have cautioned that transplanting such frameworks may overlook African realities (Gathii, 2024; Musoni *et al.*, 2024a).

8 AU. (2024). Protocol on Digital Trade to the Agreement Establishing the African Continental Free Trade Area. <<https://au.int/en/treaties/protocol-agreement-establishing-african-continental-free-trade-area-digital-trade>>.

The DTP also includes several annexes, which form an integral part of the Protocol and are legally binding. These annexes protect digital rights, with a strong focus on personal data. Compared to the Malabo Convention, the DTP provides a detailed framework for regulating personal data. The Annex on Cross-Border Data Transfers sets out the foundational principles of data protection to include 1) lawfulness, fairness, and transparency; 2) data minimisation; 3) purpose limitation; 4) storage limitation; 5) accuracy; 6) security, confidentiality, and integrity; and 7) accountability. The Annex further guarantees a broad range of individual rights, which include “the right to access, rectify, erase, data portability, object to processing of personal data, and to be informed about the processing of their personal data”. The Annex also emphasises data minimisation and personal data protection by design and default, principles which are absent in the Malabo Convention.

Moreover, the Annex on Online Safety and Security calls upon State Parties to adopt or maintain measures for the protection of personal data, and to ensure cybersecurity, online consumer protection, and to combat unsolicited commercial electronic communications. The Annexes on Emerging and Advanced Technologies, Digital Identities and Cross-Border Digital Payments all emphasise the importance of personal data protection and privacy. By embedding personal data safeguards in the annexes, the AfCFTA seeks to balance the facilitation of digital trade with the protection of personal data and trust in Africa’s digital economy.

2.3 Other policies

Apart from the legally binding instruments, several policies also seek to promote digital rights within the context of digital trade. Digital rights are not only viewed as protections exercised online, but are intrinsically linked to issues on connectivity and equitable participation in the digital economy. Access to affordable, reliable, and meaningful connectivity is therefore a prerequisite for the enjoyment of digital rights and for inclusion in digital trade (Musoni *et al.*, 2024b). The AU’s Digital Transformation Strategy (DTS) outlines a continental roadmap for digital development with digital rights at its core.⁹ It focuses on universal digital access, affordability and inclusion, online safety, data protection, and respect for human dignity and privacy in digital spaces and emerging technologies like artificial intelligence. By foregrounding universal access, af-

9 AU. (2020). Digital Transformation Strategy for Africa (2020–2030). <<https://au.int/sites/default/files/documents/38507-doc-dts-english.pdf>>.

fordability and inclusion, the DTS recognises that digital rights cannot be effectively exercised in the absence of widespread and equitable connectivity.

However, persistent structural constraints continue to undermine the DTS vision. Nanfuka (2022) points out that what hampers Africa's digital aspirations are the challenges of poor digital infrastructure, high costs of the internet, unstable power supplies, low digital skills and digital gender divides. Affordable internet access and widespread availability of mobile devices are essential not only for economic participation but also for enabling individuals to exercise rights such as access to information, freedom of expression, and participation in digital public life (Nanfuka, 2022; Maseko, 2024).

The AU also adopted the Data Policy Framework (DPF), which reinforces this holistic approach by promoting people-centred, equitable data governance, introducing data justice and recommending that the generation and use of data should contribute to Africa's socio-economic development.¹⁰

The AU Digital ID Framework was also introduced in 2023 to promote the development and adoption of interoperable digital ID systems in Africa and enable cross-border interoperability of national digital ID systems.¹¹ Importantly, the Framework advances digital rights by prioritising legal identity, data protection, inclusion, and independent oversight, thereby seeking to ensure privacy, user control, and trust in digital identity systems. However, adoption of digital identity has also raised security risks and concerns around privacy breaches, misuse of personal data, cyberattacks, and surveillance (Roberts, 2025). The development of digital ID systems is also leading to the exclusion of certain groups of people who are either unable to be identified or excluded by virtue of technological failures (Onyango, 2025; Nwanta, 2020; Access Now, 2024).

Lastly, the Continental Strategy on AI adopted in 2024 creates a blueprint for ethical and inclusive AI development in Africa.¹² This strategy also protects digital rights, particularly privacy and equality, promotes harmonised governance, and emphasises human-centred and secure AI systems that support

10 AU. (2022). AU Data Policy Framework. <<https://au.int/en/documents/20220728/au-data-policy-framework>>.

11 AU. (2023). AU Interoperability Framework for Digital ID. <<https://au.int/en/documents/20231211/au-interoperability-framework-digital-id>>.

12 African Union (AU). (2024). Continental Artificial Intelligence Strategy. <<https://au.int/en/documents/20240809/continental-artificial-intelligence-strategy>>.

Africa's socio-economic transformation.

2.4 Threats to digital rights

A 27-country report on the state of digital rights in Africa (the Londa Report), published by a digital rights organisation called Paradigm Initiative, has shown that there is an increase in attacks on digital rights, the majority of which stem from government actions, legislative frameworks and infrastructural limitations (Paradigm Initiative, 2025). The Londa Report notes an increase in internet shutdowns to either quell protests in countries like Kenya, Mozambique and Nigeria or in response to political events like elections in Senegal and Uganda or in response to conflict in Ethiopia and South Sudan. Anthonio (2022) highlights that internet shutdowns obstruct democratic participation, particularly during elections and protests, harm civic engagement and economic activity, and exacerbate existing inequalities in digital access. Digital rights frameworks must address the deliberate restrictions on internet shutdowns. Such practices curtail access to digital networks and systematically undermine fundamental rights, including freedom of expression, freedom of assembly and access to information (Thumfart, 2024; Ilori, 2024).

Existing legal frameworks are being repurposed as tools of repression, creating a significant chilling effect on free expression. For example, in Togo, the government reportedly uses cybercrime and cybersecurity laws to criminalise speech and silence dissenting voices (Paradigm Initiative, 2025). Scholars have also warned against compulsory SIM card registration requirements that require users to submit biometric data. These systems enable heightened surveillance, facilitate the identification and targeting of critics, and are widely viewed as mechanisms for silencing potential dissent and undermining freedom of expression (Phiri & Abraham, 2025; Kainja, 2025; Gitahi & Kathure, 2025; Nwachukwu, 2025).

A significant challenge with the digital and data economy is extensive data surveillance and data extraction that tend to fuel activities in the digital economy, usually at the hands of governments and powerful tech companies (Sheombar & Skelton, 2025). Munoriyarwa and Mare (2022) argue that global trends in surveillance are negotiated by technology companies that build surveillance infrastructures benefiting governments in power. The growth in use of digital platforms (gig economy)¹³ is also exposing the labour rights vi-

13 The gig economy refers to use of digital platforms for the provision of services as is mainly common with food delivery and ride-hailing services.

olations that gig economy workers face and is a stark reminder of how tech companies can exploit workers (Kwanya & Wakunuma, 2023; BHRC, 2024; CIPESA, 2023; Anwar, 2025). Beyond state and corporate actors, digital rights are further undermined by cybercriminal activities such as hacking, phishing, and online fraud, which disproportionately affect vulnerable users and weak regulatory environments (Alkhalil *et al.*, 2021; Nurse, 2019).

3. Key research gaps

The broader discussion on digital rights discourse has predominantly explored issues around internet freedoms, internet shutdowns, surveillance and data privacy without explicit linkages to digital trade (Diplo, n.d.; Paradigm Initiative, 2025). Where the linkage is made, it is usually through a narrow data protection lens, focusing on cross-border data flows (Mishra & Kugler, 2024). This is also evident in how the DTP and the Malabo Convention are framed. In some cases, the linkage is occasionally via consumer protection (Lemma, 2024) and intellectual property rights (WB & WTO, 2023). While personal data is rightly seen as central to consumer and business trust (Trademark Africa, 2024), the ways in which data rights frameworks shape trade relations within Africa remain underexplored.

Scholarship has often emphasised the European Union's influence on African data protection regimes, invoking the Brussels Effect (Bradford, 2020; Fidler, 2024). Many African data protection laws have been modelled on the EU's General Data Protection Regulation (GDPR)¹⁴ or, to a lesser extent, the Council of Europe's (CoE) Conventions 108¹⁵ and 108+¹⁶ (Abdulrauf, 2024; Fidler, 2024; Ayalew, 2023; Boshe, 2024; Musoni *et al.*, 2023). Some have also reported that the adoption of GDPR-style data protection laws by lower-in-

14 European Union (EU). (2016). Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). Official Journal of the European Union, L 119, 1–88. <<https://eur-lex.europa.eu/eli/reg/2016/679/oj/eng>>.

15 Council of Europe (CoE). (1981). Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (ETS No. 108). <<https://www.coe.int/en/web/conventions/full-list?module=treaty-detail&treatynum=108>>.

16 Council of Europe (CoE). (2018). Protocol amending the Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (CETS No. 223). <https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/LIBE/DV/2018/09-10/Convention_108_EN.pdf>.

come African countries has negatively impacted intra-regional trade (Ferracane *et al.*, 2025). Other scholars argued that the absence of any reference to privacy in the ACHPR reflects the lack of a privacy culture in Africa (Olinger *et al.*, 2007); hence, data protection laws are Western imports. Makulilo rejected these arguments by explaining that privacy is not wholly foreign to Africa, but there are practices, values and legal developments that indicate that privacy has always existed on the continent (Makulilo, 2016).

While these discussions highlight Europe's regulatory power, there is a risk that Africa's agency and its evolving approach to data governance, and by extension, digital rights protection, are downplayed. For example, the AU AI Strategy was developed to reflect African values and African contexts and is not a replication of the EU AI Act.¹⁷ Similarly, the DPF is a unique instrument which addresses data governance beyond personal data protection. Scholars working on geopolitics and its influence on data governance need to study other factors which influence how African countries regulate personal data protection and privacy. How do regional dynamics, domestic pressures and trade priorities beyond Europe shape digital rights protection in Africa? To what extent does the influence of countries like China influence digital rights protection in Africa's digital trade rules? These are important questions worth exploring to get more diverse views on how digital rights develop in Africa.

Institutional and legal gaps also persist. The Malabo Convention has been ratified by 16 states, but ratification has not always translated into domestication or enforcement. Countries such as Namibia and Mozambique have ratified the treaty without enacting national data protection laws (Musoni & Okechukwu, 2024), while others lack functional data protection authorities (Babalola & Sesan, 2021). This raises questions about the justiciability of digital rights: what legal avenues are available to citizens if their data rights are violated in states that ratified the Malabo Convention but lack domestic enforcement capacity? These gaps reflect the disconnect between treaty-level commitments and citizens' lived digital rights.

17 European Union (EU). (2024). Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act) (Text with EEA relevance). Official Journal of the European Union, L 1689. <<https://eur-lex.europa.eu/eli/reg/2024/1689/oj/eng>>.

Finally, digital rights research in Africa tends to equate rights with privacy, leaving broader intersections not extensively analysed. Critical areas such as digital labour rights in the gig economy, algorithmic governance and AI ethics, and the role of cybersecurity capacity in building consumer trust are often neglected. Understanding these dimensions is vital, as they directly affect digital trade, consumer confidence, and Africa's ability to build inclusive and trusted digital markets.

4. Proposed key areas for a future research agenda

In response to the Brussels Effect, some scholars have proposed that African data protection laws should be “Africanised”, which means reframing data protection scholarly discourse and policy agenda to be more Africa-centred (Abdulrauf, 2024). This would require balancing international best practices with Africa's cultural and socio-economic realities, where notions of community and collective rights may carry as much weight as individual privacy rights. However, how such Africanisation can be meaningfully operationalised remains unclear and requires further research.

The AU Data Policy Framework represents an important step in this direction. By framing data protection in terms of data justice, it shifts the debate beyond privacy to include cybersecurity, the rule of law, distributive fairness, and institutional accountability (Mishra & Kugler, 2024). Yet, “data justice” itself is a new concept that needs to be further interrogated to understand what it means, how it should be reflected in legal instruments and embedded in data policy discussions. For example, how should data justice guide negotiations on cross-border data flows, influence competition among African digital platforms, or address inequalities in digital economies? How should this concept be adopted in practice?

There is also a pressing need for empirical research on the intersections between digital rights and trade. Emerging technologies introduce further research needs. The proliferation of AI and predictive analytics across African trade ecosystems, from credit-scoring systems to surveillance systems and digital ID programs, introduces pressing digital rights imperatives that extend beyond privacy concerns. These technologies, which are being deployed in contexts where data governance institutions and accountability mechanisms are often weak, raise critical issues of algorithmic bias and discrimination, potentially entrenching existing socio-economic divides and excluding vulnerable popu-

lations from digital opportunities. Future research must explore how African regulatory frameworks can proactively integrate rights-based safeguards and ensure that fundamental rights are protected, while still promoting innovation and regional trade. Researchers have explored the role of African values like “Ubuntu” in global AI governance discussions (Gwagwa *et al.*, 2022). Future research should explore how African regulatory frameworks can operationalise concepts such as data justice and guide the ethical and rights-respecting deployment of emerging technologies.

Finally, a comprehensive digital trade needs assessment is essential to map not just market opportunities and risks, but also the landscape of digital rights protection within each country’s digital ecosystem. While organisations such as the WTO and World Bank (WB) are already conducting assessments focused on trade frameworks (WTO & WB, 2023), African institutions and civil society must ensure that such exercises explicitly consider digital rights’ impacts and not only economic metrics. Civil society, in particular, has a role to play in developing tools to track rights violations, monitor regulatory enforcement, and advocate for rights-based approaches to digital trade.

Taken together, these research directions show the need for a holistic African digital rights research agenda that bridges trade, law, governance, and human rights. Such an agenda would move the field beyond importing regulations and towards more context-specific scholarship which relies on empirical evidence.

5. Conclusion

The protection of digital rights in Africa is intrinsically linked to the continent’s digital trade ambitions, particularly within the framework of the AfCFTA. While instruments like the Malabo Convention and the DTP aim to establish harmonised rules and principles for digital trade, they also protect digital rights, with a strong emphasis on data privacy and personal data protection.

This chapter highlights the pressing research gaps at the intersection of digital rights and digital trade in Africa. Existing scholarship has largely emphasised internet freedoms, surveillance, shutdowns, and privacy, but has not made the linkages with the impact on digital trade. In cases where linkages are acknowledged, they remain narrow and often limited to data protection and cross-border data flows.



Addressing these challenges requires collaboration across a wide range of stakeholders. Policymakers, scholars, civil society organisations, trade negotiators, and private sector actors must work together to generate empirical evidence, build rights-based governance frameworks, and ensure that digital trade integration strengthens and does not undermine digital rights.

References

- Abdulrauf, L. (2024). African approach(es) to data protection law. In R. A. Akongburo, P. Boshe, S. A. Dei-Tutu, & M. Hennemann (Eds.), *African data protection laws: Regulation, policy, and practice* (pp. 31–54). Berlin, Germany, & Boston, MA: De Gruyter. <https://doi.org/10.1515/9783110797909-005>
- Abdulrauf, L. A., & Fombad, C. M. (2016). The African Union's data protection Convention 2014: A possible cause for celebration of human rights in Africa? *Journal of Media Law*, 8(1), 67–97. <https://doi.org/10.1080/17577632.2016.1183283>
- Access Now. (2024). *A human rights-centered approach to digital public infrastructure*. Retrieved from <https://www.accessnow.org/guide/digital-public-infrastructure/>
- Alkhalil, Z., Hewage, C., Nawaf, L., & Khan, I. (2021). Phishing attacks: A recent comprehensive study and a new anatomy. *Frontiers in Computer Science*, 3, 563060. <https://doi.org/10.3389/fcomp.2021.563060>
- Anthonio, F. (2022). *The kill switch: How internet shutdowns threaten fundamental human rights in Africa and beyond* (Digital Future Whitepaper Series). Yale Information Society Project, Yale Law School. Retrieved from https://law.yale.edu/sites/default/files/area/center/isp/documents/anthonio_kill-switch.pdf
- Anwar, M. A. (2025). Africa's data workers are being exploited by foreign tech firms – 4 ways to protect them. *The Conversation*. <https://doi.org/10.64628/AAJ.q43j9v9hp>
- Ayalew, Y. E. (2023). The African Union's Malabo Convention on Cyber Security and Personal Data Protection enters into force nearly after a decade. What does it mean for Data Privacy in Africa or beyond?. *EJIL: Talk!*. Retrieved from <https://www.ejiltalk.org/the-african-unions-malabo-convention-on-cyber-security-and-personal-data-protection-enters-into-force-nearly-after-a-decade-what-does-it-mean-for-data-privacy-in-africa-or-beyond/>
- Babalola, O., & Sesan, G. (2021). *Data protection authorities (DPAs) in Africa: A report on the establishment, independence, impartiality and efficiency of data protection supervisory authorities in the two decades of their existence on the continent*. Paradigm Initiative. Retrieved from <https://paradigmhq.org/wp-content/uploads/2021/09/DPA-Report-2.pdf>
- Balogun, K. (2024). *Strengthening Data Sharing Practices in Africa: Recommendations for Responsible Data Governance and Economic Development*. Nigeria: Centre for the Study of the Economies of Africa. Retrieved from <https://cseaafrica.org/images/posts/21766846.pdf>
- Boshe, P. (2024). An introduction, data governance in Africa: A change in narrative. In R. A.

- Akongburo, P. Boshe, S. A. Dei-Tutu, & M. Hennemann (Eds.), *African data protection laws: Regulation, policy, and practice* (pp. 1–18). Berlin, Germany, & Boston, MA: De Gruyter. <https://doi.org/10.1515/9783110797909-003>
- Bouke, M. A., Abdullah, A., Alshatebi, S. H., El Atigh, H., & Cengiz, K. (2023). *African Union Convention on Cyber Security and Personal Data Protection: Challenges and Future Directions*. arXiv. <https://doi.org/10.48550/arXiv.2307.01966>
- Bradford, A. (2020). *The Brussels effect: How the European Union rules the world*. New York, NY: Oxford University Press. <https://doi.org/10.1093/oso/9780190088583.001.0001>
- Business & Human Rights Resource Centre (BHRC). (2024). *An overview of gig economy legislation and the protection of workers' rights in Africa*. Retrieved from <https://www.business-humanrights.org/en/latest-news/an-overview-of-gig-economy-legislation-and-the-protection-of-workers-rights-in-africa/>
- Collaboration on International ICT Policy for East and Southern Africa (CIPESA). (2023). *Labour and digital rights in Africa: State of play and policy actions*. Retrieved from https://cipesa.org/wp-content/files/Labour_and_Digital_Rights_Brief_Nov_2023.pdf
- Diallo, B. (2024). Malabo Convention takes effect: Beyond the positive announcement, challenges of implementation and modernization. *Global Africa*, (5), 56–70. <https://doi.org/10.57832/57wg-c486>
- Diplo Foundation. (n.d.). *Digital rights in Africa: A brief national overview*. Retrieved from <https://www.diplomacy.edu/resource/report-stronger-digital-voices-from-africa/digital-rights-in-africa-national-overview/>
- Dube, H. (2025). Harnessing data for human rights and sustainable development: A call to action from the African Commission on Human and Peoples' Rights. *AfricLaw*. Retrieved from <https://africlaw.com/2025/01/23/harnessing-data-for-human-rights-and-sustainable-development-a-call-to-action-from-the-african-commission-on-human-and-peoples-rights/>
- Endeavor Nigeria. (2022). *The inflection point: Africa's digital economy is poised to take off*. Retrieved from https://endeavor.org/wp-content/uploads/dlm_uploads/2022/06/Endeavor_The-Inflection_Point_June-2022.pdf
- Ferracane, M. F., González Ugarte, S., & van der Marel, E. (2025). The Brussels effect in Africa: Is it beneficial for intra-regional trade in digital services? *Journal of International Economic Law*, 28(1), 1–22. <https://doi.org/10.1093/jiel/jgae059>
- Fidler, M. (2024). African data protection laws: Politics, but as usual. In R. A. Akongburo, P. Boshe, S. A. Dei-Tutu, & M. Hennemann (Eds.), *African data protection laws: Reg-*

- ulation, policy, and practice* (pp. 55–74). Berlin, Germany, & Boston, MA: De Gruyter. <https://doi.org/10.1515/9783110797909-006>
- Gathii, J. T. (2024). The AfCFTA's digital trade rules are not fit for Africa. *Afronomicslaw*. Retrieved from <https://www.afronomicslaw.org/category/analysis/afcftas-digital-trade-rules-are-not-fit-africa>
- Gitahi, J., & Kathure, M. (2025). Panoptic real-time surveillance in Kenya. In T. Roberts & A. Mare (Eds.), *Digital surveillance in Africa: Power, agency, and rights* (pp. 133–156). London, England: Zed Books. <https://doi.org/10.5040/9781350422117.ch-6>
- Gwagwa, A., Kazim, E., & Hilliard, A. (2022). The role of the African value of Ubuntu in global AI inclusion discourse: A normative ethics perspective. *Patterns*, 3(4), 100462. <https://doi.org/10.1016/j.patter.2022.100462>
- Hutt, R. (2015). What are your digital rights?. *World Economic Forum*. Retrieved from <https://www.weforum.org/stories/2015/11/what-are-your-digital-rights-explainer/>
- Ifeanyi-Ajufo, N. (2023). Cyber governance in Africa: At the crossroads of politics, sovereignty and cooperation. *Policy Design and Practice*, 6(2), 146–159. <https://doi.org/10.1080/25741292.2023.2199960>
- Ilori, T. (2024). Protecting digital rights through soft law: Ensuring the implementation of the revised Declaration of Principles on Freedom of Expression and Access to Information in Africa. *African Human Rights Law Journal*, 24(1), 1–30. <https://doi.org/10.17159/1996-2096/2024/v24n1a1>
- Kainja, J. (2025). State surveillance in Malawi: Changes and continuities. In T. Roberts & A. Mare (Eds.), *Digital surveillance in Africa: Power, agency, and rights* (pp. 113–132). London, England: Zed Books. <https://doi.org/10.5040/9781350422117.ch-5>
- King'ori, M. (2025). *Cross-border data flows in Africa: Examining policy approaches and pathways to regulatory interoperability*. Future of Privacy Forum. Retrieved from <https://fpf.org/blog/cross-border-data-flows-in-africa-examining-policy-approaches-and-pathways-to-regulatory-interoperability/>
- Kwanya, T., & Wakunuma, K. J. (2023). *Regulation of digital platforms for a socially-just gig economy in Kenya* (HIIG Impact Publication Series). Alexander von Humboldt Institute for Internet and Society. <https://doi.org/10.5281/zenodo.7588795>
- Lemma, A. (2024). *Framework to assess the impact of the AfCFTA Protocol on Digital Trade*. London, England: ODI. Retrieved from <https://odi.org/en/publications/framework-to-assess-the-impact-of-the-afcfta-protocol-on-digital-trade/>

- Makulilo, A. B. (2016). Data privacy in Africa: Taking stock of its development after two decades. In L. A. Abdulrauf & H. Dube (Eds.), *Data privacy law in Africa: Emerging perspectives* (pp. 41–77). Pretoria, South Africa: Pretoria University Law Press. Retrieved from https://www.pulp.up.ac.za/images/edocman/edited-collections/data_privacy/Chapter%202.pdf
- Maseko, M. (2024). Understanding digital rights in an era of digital politics in Africa. *Digital Policy Studies*, 3(1), 58–72. <https://doi.org/10.36615/ba9c4567>
- Mishra, N., & Kugler, K. (2024). International community in the global digital economy: A case study on the African Digital Trade Framework. *International and Comparative Law Quarterly*, 73(4), 853–889. <https://doi.org/10.1017/S0020589324000290>
- Munoriyarwa, A., & Mare, A. (2022). *Digital surveillance in Southern Africa: Policies, politics and practices*. Cham, Switzerland: Palgrave Macmillan. <https://doi.org/10.1007/978-3-031-16636-5>
- Musoni, M., Karkare, P., Teevan, C., & Domingo, E. (2023). *Global approaches to digital sovereignty: Competing definitions and contrasting policy* (ECDPM Discussion Paper No. 344). Maastricht, The Netherlands: European Centre for Development Policy Management (ECDPM). Retrieved from <https://ecdpm.org/application/files/7816/8485/0476/Global-approaches-digital-sovereignty-competing-definitions-contrasting-policy-ECDPM-Discussion-Paper-344-2023.pdf>
- Musoni, M., Karkare, P., & Teevan, C. (2024a). *Cross-border data flows in Africa: Continental ambitions and political realities* (ECDPM Discussion Paper No. 379). Maastricht, The Netherlands: European Centre for Development Policy Management (ECDPM). Retrieved from <https://ecdpm.org/application/files/8417/3202/4662/Cross-Border-Data-Flows-Africa-Continental-Ambitions-Political-Realities-ECDPM-Discussion-Paper-379-2024.pdf>
- Musoni, M., Mzinyati, L., & Cloete, D. (2024b). *Futures of digital rights in SADC: Towards a common approach to digital protection and data justice* (Occasional Paper No. 358). Johannesburg, South Africa: South African Institute of International Affairs (SAIIA). Retrieved from https://saiia.org.za/wp-content/uploads/2024/09/SAIIA_OP_358_FutureDigitalRights.pdf
- Musoni, M., & Okechukwu, N. (2024). *Interactive tool: Data policies in African countries*. European Centre for Development Policy Management (ECDPM). Retrieved from <https://ecdpm.org/work/interactive-tool-data-policies-african-countries>
- Nanfuka, J. (2022). *Digital access and economic transformation in Africa* (Africa Paper Series No. 4). Institute for New Economic Thinking. Retrieved from https://www.ineteconomics.org/uploads/papers/Digital-Access-Africa_Draft-Section-Nov-9_CT120222_Clean34.pdf

- Nurse, J. R. C. (2019). Cybercrime and you: How criminals attack and the human factors that they seek to exploit. In A. Attrill-Smith, C. Fullwood, M. Keep, & D. J. Kuss (Eds.), *The Oxford Handbook of Cyberpsychology* (pp. 663–690). Oxford, England: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780198812746.013.35>
- Nwachukwu, N. (2025). Digital surveillance in Nigeria. In T. Roberts & A. Mare (Eds.), *Digital surveillance in Africa: Power, agency, and rights* (pp. 157–182). London, England: Zed Books. <https://doi.org/10.5040/9781350422117.ch-7>
- Nwanta, N. (2020). *Digital identification and inclusionary delusion in West Africa*. Center for Human Rights and Global Justice, NYU School of Law. <https://doi.org/10.13140/RG.2.2.16023.34728>
- Olinger, H. N., Britz, J. J., & Olivier, M. S. (2007). Western privacy and/or Ubuntu? Some critical comments on the influences in the forthcoming data privacy bill in South Africa. *International Information & Library Review*, 39(1), 31–43. <https://doi.org/10.1080/10572317.2007.10762729>
- Onyango, R. (2025). *DPI can be transformative for Africa's digital future. Civil society has a critical role to play*. Digital Impact Alliance. Retrieved from <https://dial.global/civil-societys-role-dpi-africa/>
- Paradigm Initiative. (2025). *LONDA 2024: Digital rights and inclusion in Africa report*. Retrieved from <https://paradigmhq.org/wp-content/uploads/2025/04/Londa-2024-2-1.pdf>
- Phiri, S., & Abraham, K. (2025). State surveillance and digital rights in Zambia. In T. Roberts & A. Mare (Eds.), *Digital surveillance in Africa: Power, agency, and rights* (pp. 85–112). London, England: Zed Books. <https://doi.org/10.5040/9781350422117.ch-4>
- Razzano, G. (2019). Human rights dimensions of digital trade. In D. Luke, H. R. Schilling, & N. Vwede-Obahor (Eds.), *Digital trade in Africa: Implications for inclusion and human rights* (pp. 61–70). Geneva, Switzerland: Friedrich-Ebert-Stiftung. Retrieved from https://geneva.fes.de/fileadmin/user_upload/documents/2019/2019_07_Digital_Trade_Africa.pdf
- Roberts, T. (2025). *Decolonising digital public infrastructure*. Appropriating Technology. Retrieved from <https://appropriatingtechnology.org/decolonising-digital-public-infrastructure>
- Sheombar, A., & Skelton, S. K. (2025). Who supplies digital surveillance technologies to African governments?: Pathways for resistance. In T. Roberts & A. Mare (Eds.), *Digital surveillance in Africa: Power, agency, and rights* (pp. 183–210). London, England: Zed Books. <https://doi.org/10.5040/9781350422117.ch-8>

- Shyllon, F. (2019). Advancing the protection of personal data in the implementation of the African Continental Free Trade Area: A human rights perspective. In D. Luke, H. R. Schillinger, & N. Vwede-Obahor (Eds.), *Digital trade in Africa: Implications for inclusion and human rights* (pp. 81–91). Geneva, Switzerland: Friedrich-Ebert-Stiftung. Retrieved from https://geneva.fes.de/fileadmin/user_upload/documents/2019/2019_07_Digital_Trade_Africa.pdf
- Sibanda, O. M. (2022). Towards a more effective and coordinated response by the African Union on children's privacy online in Africa. *African Human Rights Yearbook*, 6, 154–178. <https://doi.org/10.29053/2523-1367/2022/v6a7>
- Sucker, F., & Beyleveld, A. (2024). African rules on cross-border data flows: The significance of regulatory convergence and the AfCFTA Digital Trade Protocol's potential contribution. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4741632>
- Thumfart, J. (2024). Digital rights and the state of exception: Internet shutdowns from the perspective of just securitization theory. *Journal of Global Security Studies*, 9(1), ogad024. <https://doi.org/10.1093/jogss/ogad024>
- Trademark Africa. (2024). *Trade facilitation report: Driving African Trade through Digitalisation*. Retrieved from https://atdf.trademarkafrica.com/wp-content/uploads/2024/12/TRADE_Facilitation_report_B5-v1.13.pdf
- World Bank (WB) & World Trade Organization (WTO). (2023). *Turning digital trade into a catalyst for African development: Joint WBG–WTO policy note*. Retrieved from https://www.wto.org/english/thewto_e/minist_e/mc13_e/policy_note_digital_trade_africa_e.pdf

Digitalising Africa's trade processes: Challenges, opportunities, and a future research agenda for AfCFTA implementation

Erick Sirali

1. Introduction

The increasing digitalisation of global trade necessitates a focused examination of its transformative potential and inherent challenges within the African context. Digitalising trade processes involves a fundamental transformation from traditional, often paper-based, trade procedures into efficient, interconnected digital systems. This transformation is crucial for realising the full potential of the African Continental Free Trade Area (AfCFTA). This shift encompasses a move to paperless trade, utilising electronic single windows for streamlined submissions, and implementing automated customs systems, such as ASYCUDA World, to accelerate clearance and boost revenue.¹

1 ASYCUDA World is a computerised customs management system developed by the United Nations Conference on Trade and Development (UNCTAD), which manages most foreign trade procedures.

Key advancements include the widespread adoption of e-payment systems, particularly leveraging mobile money. In 2024 alone, the continent processed 81 billion mobile money transactions, facilitated by 178 service providers, representing a cumulative transaction value of USD 1 trillion.² Another key feature consists of establishing robust digital identities for secure transactions. Furthermore, this shift necessitates seamless cross-border data exchange and interoperability, a core focus of the AfCFTA Protocol on Digital Trade (DTP), which was adopted in February 2024 (AfCFTA Secretariat, 2024; AU, 2024) with key annexes adopted in February 2025.

Emerging technologies, such as blockchain and stablecoins, are transforming Africa's cross-border payments by reducing costs, accelerating transactions, and enhancing security. In 2024, stablecoins accounted for over 40 per cent of digital asset activity in Africa, facilitating trade settlements and currency hedging (Conduit, 2025). The cross-border payments market, valued at USD 329 billion in 2025, is expected to reach USD 1 trillion by 2035, driven by fintech innovations reducing remittance fees from 7.5 per cent to 1.5 per cent (Abdulrasheed, 2025). Artificial intelligence (AI) is also improving risk management and logistics, with 45 per cent of South African companies using it to reduce disruptions (Bradshaw, 2025).

This digital transformation can reduce the high transaction costs and delays prevalent in Africa. These trade costs are among the highest globally, with non-tariff barriers making trade within Africa approximately 50 per cent more expensive than in other regions (UNCTAD, 2022). According to the AfCFTA Secretariat, the reliance on third-party currencies for intra-African transactions alone adds an estimated USD 5 billion in annual costs, a challenge directly addressed by digital solutions like the Pan-African Payment and Settlement System (PAPSS) (Oramah, 2021).

By fostering a more competitive and resilient trading environment, digitalisation is poised to drive economic growth and unlock Africa's vast trade potential, ultimately contributing to the formalisation of aspects of the economy and enabling data-driven decision-making for sustainable development.

The digitalisation of trade processes constitutes a critical imperative for realising the economic ambitions of the AfCFTA. By transitioning from paper-based procedures to interconnected digital ecosystems underpinned by in-

2 See GSMA. Mobile Money Metrics. Retrieved on 18 February 2026 from <<https://www.gsma.com/mobile-money-metrics>>.

novations like mobile money, Africa can significantly reduce non-tariff barriers and transaction costs. This chapter critically examines this transformative shift. Section 2 evaluates the dichotomy between emerging digital successes and persistent structural fragmentation. Section 3 identifies substantial theoretical and empirical gaps in current scholarship. Finally, Section 4 proposes a targeted research agenda and policy framework to guide effective AfCFTA implementation, and Section 5 concludes with a synthesis of key insights.

2. Major challenges and opportunities

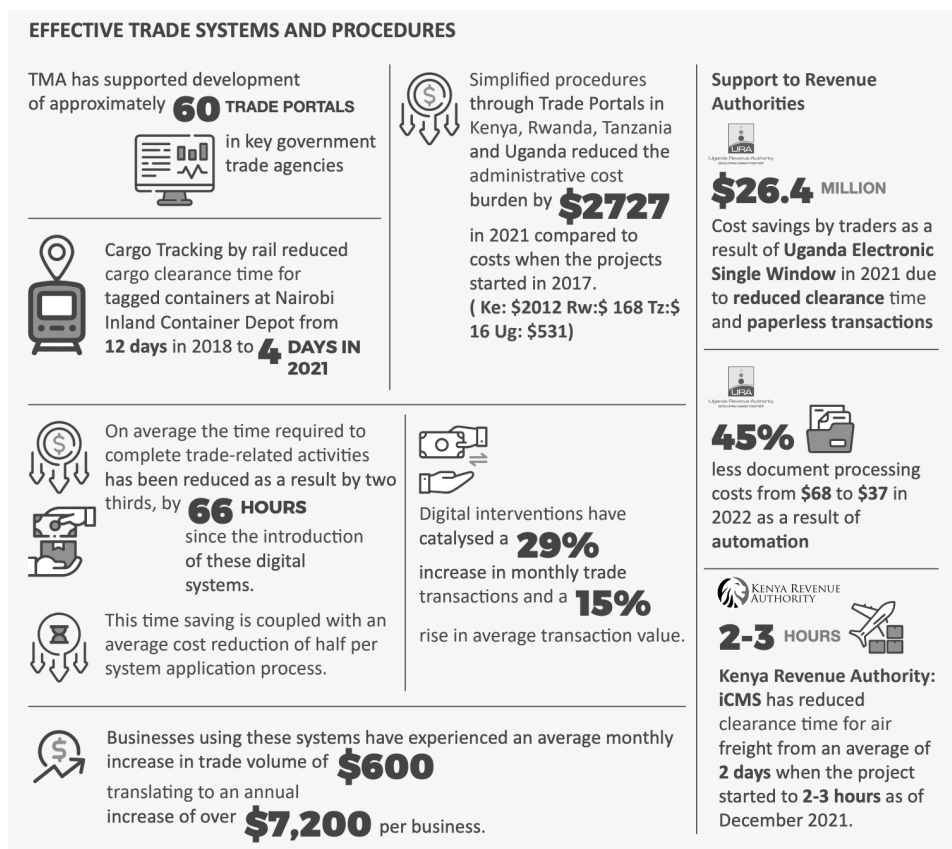
Digitising processes across African trade has progressed beyond the nascent stages, as evidenced by a 62 per cent implementation rate of facilitation measures in Sub-Saharan Africa (UN-ECA *et al.*, 2025). However, advancements remain localised; while domestic paperless trade systems have expanded, cross-border interoperability remains low, limiting broader regional integration.

Many countries have implemented or are developing National Single Windows (NSWs) to streamline document submission and approvals. The existing evidence shows that NSWs in several East African countries have notably reduced cargo clearance times, demonstrating efficiency gains (Gikonyo *et al.*, 2019). Progress is also evident in digital customs clearance and electronic cargo tracking systems (ECTS), which provide real-time visibility of cargo movement, thereby enhancing security and efficiency (Mwelu, 2021).

The digitalisation of trade has transformative potential, with recent interventions, such as trade portals and integrated customs management systems, catalysing measurable improvements in trade efficiency and transparency. These digital solutions have reduced administrative costs and document processing expenses while boosting trade volume and value (TMA, 2024). Further advancements are being seen in the initial adoption of blockchain-based platforms for secure trade finance and digital compliance tools, often augmented by private sector platforms that address niche market needs. Ricci *et al.* (2024) report that fintech and digital payment platforms are rapidly evolving in Sub-Saharan Africa, often filling gaps left by traditional banks. These platforms utilise technologies such as distributed ledgers to provide specialised financing and payment solutions.

The AfCFTA framework, particularly its Digital Trade Protocol, represents a major continental policy push, setting a unified vision for harmonising and accelerating digital trade. Figure 1 visually summarises the impact of some of these digital trade facilitation initiatives across several African countries.

Figure 1. Digital trade facilitation outcomes in selected African countries.



Source: TMA (2024).

Despite this progress, significant challenges persist. Fragmentation remains high, with varying levels of digital maturity across countries and processes. Interoperability between different national systems across borders, for instance, linking NSWs and diverse private platforms, is a major hurdle hindering seamless cross-border trade. A digitally cleared cargo in one country may still encounter manual processes at the next border if systems are not linked. Ensuring secure and trusted cross-border data exchange is crucial but complex, requiring robust legal frameworks and technical standards. Translating ambitious policy frameworks, such as the AfCFTA's DTP, into practical, implemented digital solutions on the ground faces considerable bureaucratic, technical, and capacity constraints, including limited digital literacy in certain areas. Defining what constitutes truly successful digitalisation ("what's working") versus persistent issues ("what's not") requires deeper, granular analysis beyond mere technol-

ogy adoption statistics, focusing on tangible impacts on trade volumes, costs, and inclusion.

The AfCFTA provides an unprecedented political mandate and a robust framework to drive harmonisation and standardisation in digital trade processes across Africa. Focused initiatives, such as digital trade corridors, offer a potential pathway to demonstrate tangible benefits quickly along key routes. For instance, regional efforts along key trade corridors, such as the Northern Corridor, have incorporated digital components to streamline the movement of goods and enhance efficiency across multiple borders (TMA, 2025). Leveraging existing regional economic communities (RECs) for coordinated implementation is another critical opportunity, as they often have established mechanisms for integration. Furthermore, enhanced collaboration between the public and private sectors can spur innovation, mobilise necessary investment, and ensure that solutions are market-relevant and sustainable.

Existing research predominantly prioritises broad trade facilitation impacts (Hansen-Addy *et al.*, 2024), the technical architecture of single window systems (TMA, 2023), or the macro-level potential of the AfCFTA (Afreximbank, 2025). Whilst there is valuable policy analysis from organisations such as the African Union (AU) and practical implementation evidence from bodies like Trademark Africa (TMA), cohesive academic and policy research specifically on the process of digitalisation across the continent, especially research systematically linking policy design, technology implementation, and practical outcomes for various stakeholders (including SMEs), remains nascent. A critical challenge lies in translating these gains into cohesive, process-oriented digitalisation frameworks that align with local realities and stakeholder needs (AUDA-NEPAD, 2025). Consequently, a deeper understanding of the drivers and impediments of digital transformation, and how to scale best practices across Africa, remains a critical area for future inquiry.

3. Key research gaps

Despite the significant momentum towards digitalising trade processes in Africa, several critical research gaps hinder a comprehensive understanding and effective scaling of initiatives. Addressing these gaps is crucial for translating policy ambition into tangible, widespread benefits across the continent.

3.1 Conceptual gaps in analysing policy harmonisation and implementation

A significant theoretical gap exists in the models used to explain the success or failure of digital trade harmonisation and interoperability strategies in Africa. For instance, while recent studies have documented the persistent variations in national mobile money and payment system regulations (Mensah & Jumah, 2024; Rattel *et al.*, 2024), there is a lack of theoretical models that explain the persistence of these regulatory divergences despite high-level integration goals.

To move beyond observing variations, there is a pressing need to adapt contemporary frameworks from institutional economics and innovation diffusion theory, specifically the diffusion under dependency model (Kugler & Tavengerwei, 2024), to model the adoption and scalability of digital corridor initiatives within the African institutional context (Sangwa *et al.*, 2025). Developing these theoretical contributions requires a clearer, Africa-specific conceptualisation of the digitalisation of trade processes.

Current research often conflates this with the broader concept of digital trade, which the OECD *et al.* (2023) define primarily as international trade that is digitally ordered and/or delivered. An effective framework must distinguish between digitalisation of processes (government-to-business – G2B) and digital trade, accounting for the continent's unique dynamics. Specifically, it must address the potential for digitalisation to bridge the gap between informal cross-border trade, which relies on relational trust (Omeihe *et al.*, 2021), and formal systems requiring institutional trust. Furthermore, understanding the complex interplay between traditional governance structures and emerging digital regulatory environments is vital for predicting outcomes (Research ICT Africa, 2025).

3.2 Methodological gaps

Measuring the tangible benefits and persistent challenges of specific digitalised processes requires robust methodologies beyond anecdotal evidence or simple reporting of technology adoption rates. A primary challenge lies in navigating data opacity and fragmentation across borders. For instance, while ECTs have been implemented, precise longitudinal methodologies are needed to quantify their exact contribution to reduced transit times and costs compared to other trade facilitation efforts (World Bank, 2023), independent of confounding variables.

How can the effectiveness of different interoperability standards, for example, comparing API-based integration versus a centralised hub model for customs systems, be comparatively assessed across diverse African contexts? Developing methodologies to evaluate the specific contribution of localised digital corridors versus nationwide systems to overall trade efficiency is also needed. This demands a mixed-methods approach: quantitative econometrics (e.g., time-series analysis of clearance times amidst data scarcity) and qualitative inquiry (e.g., stakeholder analysis of user experience) to triangulate findings where official data may be incomplete or siloed (Umarova, 2024).

3.3 Empirical evidence gaps

There is a lack of comprehensive, comparative empirical data on which specific trade processes have seen the most effective digitalisation across different African countries and, crucially, how these benefits are distributed. For instance, while NSWs are a common goal, empirical studies detailing the impacts post-implementation are scarce, often limited to high-level aggregate data rather than granular operational metrics (Tijan *et al.*, 2019; Bueno Rezende de Castro & Kornher, 2023). Specifically, there is limited evidence regarding whether digitalisation reduces corruption and rent-seeking or merely shifts these bottlenecks to different nodes in the supply chain (Amaglobeli *et al.*, 2023).

More empirical evidence is also needed on the priority actions required by different actors to effectively leverage the AfCFTA's Digital Trade Protocol (Lemma *et al.*, 2025). Furthermore, concrete evidence on the digital divide within the logistics sector (i.e., the impact on small and medium enterprises versus established incumbents) is crucial for informing future policy. The limited research on the trade effects of data-related regulations and restrictiveness in Africa highlights another significant gap that must be addressed (Ferracane *et al.*, 2025).

3.4 Interdisciplinary perspectives

Effectively researching this complex topic requires integrating perspectives from diverse disciplines to understand inherent systemic tensions. These include economics (e.g., analysing value chain transformations), information technology (e.g., systems design and blockchain applications), law (e.g., regulatory harmonisation and digital contracts), political science (e.g., the political economy of data sovereignty), and logistics (e.g., optimising digital platforms

for port efficiency). Siloed approaches limit understanding of the interconnected nature of digital transformation in trade. For example, technical solutions for interoperability often conflict with legal frameworks regarding data localisation and sovereignty (Research ICT Africa, 2025). Therefore, truly interdisciplinary collaboration is required to generate holistic insights that balance technical efficiency with legal and political realities.

4. Proposed key areas for a future research agenda

To effectively advance the digitalisation of trade processes in Africa and unlock the full potential of the AfCFTA, a targeted research agenda is crucial. This agenda should bridge existing theoretical, methodological, and empirical gaps by focusing on practical solutions and policy-relevant questions.

4.1 Key areas for research

4.1.1 Comparative analysis of process digitalisation

Research on digital adoption should move beyond descriptive case studies and employ quantitative methods that identify key determinants. Although time savings are noted, few econometric studies account for institutional differences. Future work should utilise longitudinal data to evaluate the impact of interventions, such as single window systems, on trade costs, independent of infrastructure. Comparative institutional analysis is also necessary to explain varying outcomes of similar technical solutions, such as ASYCUDA World, across different political economies, including their effect on revenue mobilisation within RECs (UNCTAD, 2025).

4.1.2 AfCFTA's Digital Trade Protocol implementation

The transposition of the AfCFTA's DTP into national frameworks presents a complex principal-agent problem. Research is required to investigate the political economy of harmonisation, specifically the tension between regulatory sovereignty and continental integration. Inquiry should focus on identifying policy frictions where national revenue retention goals, such as control over digital services taxes, may disincentivise the ratification of protocol annexes (Banga *et al.*, 2021). Additionally, scholars should evaluate the efficacy of institutional coordination mechanisms by mapping the alignment, or lack thereof, between the continental framework and diverse REC-level digital strategies. Specifically, this involves analysing documents such as the EAC

Regional E-Commerce Strategy and the ECOWAS Regional E-Commerce Strategy 2023-2027. Research must quantify the compliance costs created by these overlapping regimes and identify where regional data classification standards diverge from the AfCFTA's Protocol. This divergence creates a “digital spaghetti bowl” effect that impedes private sector scalability and regional value chain integration (Banga *et al.*, 2021).

4.1.3 Interoperability solutions

Achieving seamless data exchange requires moving beyond technical connectivity to address legal and semantic interoperability. While technical standards such as the World Customs Organization (WCO) Data Model (UN/CEFACT standards) are well documented (WCO, 2019), a significant legal interoperability gap remains. Research must empirically assess the compatibility of the Electronic Transactions Acts across African jurisdictions to determine the evidentiary weight of cross-border digital signatures and e-documents in courts of law (UNCITRAL, 2017; UNCTAD, 2021). Furthermore, empirical studies are needed to evaluate the performance of diverse data exchange architectures, specifically contrasting centralised hubs with federated blockchain networks, in facilitating the mutual recognition of trade certificates (e.g certificates of origin, sanitary and phytosanitary (SPS) certificates, etc.) along landlocked corridors (TMA, 2023).

4.1.4 Feasibility and impact of digital trade corridors

The emergence of digital trade corridors offers a pragmatic testing ground for digitalisation, yet it risks creating “digital islands” within the broader economy. Research should move beyond feasibility studies to critically assess the distributional impacts of these corridors (TMA, 2023). Specifically, scholars should investigate the presence of “digital dualism”, where advanced digital infrastructure along a corridor fails to integrate with broader national systems and subsequently excludes peripheral SMEs (World Bank, 2021; WTO, 2023). Methodologically, this area demands impact evaluations that measure not only logistics efficiency but also the spillover effects of corridor digitalisation on regional value chain integration and the reduction of informal cross-border trade friction costs (Lemma *et al.*, 2025).

4.1.5 Role of standards and data governance

Investigating how international standards are adopted and adapted for digital trade documents and processes across Africa is essential and requires

examining both the barriers and drivers affecting the implementation of global best practices such as e-invoicing, electronic consignment notes (e-CMRs), and other digital trade documentation. Equally important is the development of effective data governance frameworks to ensure security, privacy, and trust in increasingly frequent cross-border exchanges. As cross-border data flows expand rapidly, policy debates around data localisation versus the free flow of data with trust have intensified, highlighting an urgent need for research that assesses the economic consequences of strict data residency rules in Africa.³ This includes analysing the impact of fragmented data governance on cloud computing costs and efficiency compared to the perceived security benefits associated with data localisation (AU, 2020; UNCTAD, 2021).

4.2 Practical solutions and policy questions

The preceding analysis of research gaps highlights the need for actionable insights to inform the digitalisation of African trade processes. This section transitions from identifying what is unknown to proposing key policy questions, aiming to inform effective implementation strategies within the AfCFTA framework.

4.2.1. Context-specific models for interoperability

Achieving true interoperability between NSWs and private-sector trade platforms requires a focus beyond technical compatibility to encompass semantic and legal dimensions. As detailed in the UN/CEFACT White Paper on Paperless Trade, effective process digitalisation requires not only technical connectivity (APIs) but also the harmonisation of data definitions (semantic) and the alignment of regulatory frameworks (legal) (UN/CEFACT, 2017). This ensures that trade data, such as electronic certificates of origin, is not only exchanged but also consistently understood and legally binding across different customs systems. Given the significant disparities in digital maturity across African countries, context-specific models should prioritise interoperability along high-volume trade corridors rather than attempting simultaneous continent-wide integration. Strategies must include fostering public-private dialogue for the co-creation of standards (Agarwal *et al.*, 2024) as critical for reducing friction in digital customs processing. Furthermore, leveraging existing regional digital payment systems is essential to facilitate the financial settlement of trade fees (TMA, 2025). Critically, regulation pertaining

3 See Chapter 11 of the book for a discussion on cross-border data policies.

to cross-border data flows is more central than physical infrastructure for the robust functioning of electronic NSWs; even with advanced hardware, regulatory fragmentation can impede the seamless automated exchange of declaration data (Ferracane & van der Marel, 2021).

4.2.2. *Regulatory adjustments and SME capacity building*

Effective implementation of the AfCFTA's DTP critically depends on targeted regulatory adjustments that reduce process barriers for SMEs (Agarwal *et al.*, 2024). A top priority is the continental harmonisation of cross-border data policies. This involves addressing bans on data transfers and easing local processing requirements, which currently force SMEs to duplicate data storage infrastructure across borders (Banga *et al.*, 2021; Ferracane *et al.*, 2025). Legal reforms must update national laws to grant full legal recognition to electronic signatures and transferable records. Recent reviews by UNCITRAL (2017) emphasise the urgency of adopting frameworks consistent with the Model Law on Electronic Transferable Records (MLETR) to allow for the complete dematerialisation of documents such as the bill of lading. The lack of such frameworks creates a "trust gap" where paper processes remain the default due to legal uncertainty (UNCTAD, 2021). Evaluating the application of international frameworks such as the MLETR can help inform recommendations that balance national data priorities with efficiency goals under the AfCFTA (Ganne & Nguyen, 2022; UNCITRAL, 2017). Furthermore, capacity-building initiatives are paramount. As noted by the OECD (2021), providing accessible training programmes on digital compliance tools is essential to empower SMEs to navigate complex digital customs procedures without incurring prohibitive costs.

4.2.3. *Design and governance of digital corridors*

Designing and governing digital corridor projects to maximise benefits requires a strategic approach that prevents the fragmentation of trade processes. Such projects should be conceived as interconnected segments of a larger continental network rather than isolated digital islands, necessitating adherence to common technical standards for cargo tracking and clearance (Ganne & Nguyen, 2022). Governance structures for these corridors must involve multi-stakeholder participation, including national customs, trade ministries, and private logistics providers, in order to ensure operational alignment. Recent evaluations indicate that such integrated governance is vital for reducing transit delays and streamlining the release of goods (TMA, 2024). Further-

more, project design should embed strong data governance frameworks to ensure security in the exchange of sensitive commercial data while prioritising a modular architecture. This allows for seamless linkage with existing NSWs, ensuring that investments in digital corridors enhance, rather than duplicate, national trade facilitation systems.

4.2.4. Benchmarks and progress indicators

Robust benchmarks for tracking the digitalisation of trade processes must move beyond high-level economic indices to capture granular operational gaps. The Horn of Africa Initiative Digital Trade Gap Assessment (HOAI, 2024) provides an elaborate model for this purpose. Unlike broad regulatory surveys, this assessment specifically audits the maturity of trade-related ICT systems, identifying precise deficits in NSWs, such as the lack of electronic payment modules or the inability to exchange sanitary and phytosanitary (SPS) certificates electronically. Adopting this process-centric benchmarking approach allows for evidence-based policy adjustments by mapping specific technical gaps to trade outcomes. To provide a holistic view, these findings should be complemented by performance metrics such as the reduction in customs clearance times and the percentage of trade documents processed legally in electronic format, as monitored by the HOAI (2024). Additionally, tracking the adoption of the DTP's provisions will provide critical benchmarks for iterative policy refinement (Agarwal *et al.*, 2024).

5. Conclusion

The digitalisation of trade processes is not merely an optional enhancement but an indispensable imperative for realising the full economic potential of the AfCFTA and profoundly boosting Africa's trade competitiveness. While tangible progress is evident through the implementation of NSWs and electronic customs systems across various countries, significant challenges persist. These include the fragmentation of digital systems, a pervasive lack of interoperability between diverse national and private-sector platforms, and the complex task of effectively translating high-level policy frameworks into practical, on-the-ground digital solutions. Crucial knowledge gaps remain concerning what specific digitalisation approaches work best within Africa's varied contexts and why.

There is a need for a deeper understanding of how to effectively leverage the AfCFTA framework for digital harmonisation, moving beyond policy adoption to tangible implementation. For instance, research is vital to deter-

mine the optimal strategies for achieving seamless interoperability between different national electronic payment systems for cross-border trade, building on the burgeoning success of mobile money. The viability and scalability of focused approaches, such as digital trade corridors (TMA, 2025), also require rigorous assessment to ensure they integrate into broader national systems rather than creating isolated digital islands.

Addressing these critical gaps requires a concerted, multifaceted research effort. Collaboration is paramount, involving diverse stakeholders: researchers from academia and think tanks, policymakers in the national government and in the regional economic commissions (RECs), the AfCFTA Secretariat, international organisations (such as the AU and TMA), the private sector (including technology providers, logistics companies, and financial institutions), and development partners. Future research must move beyond descriptive analysis to generate actionable insights and evidence-based recommendations that can directly guide the development of a seamless, secure, and efficient digital trading environment across Africa. This proposed research agenda aims to contribute vital empirical evidence and practical solutions, ultimately transforming Africa's policy aspirations for digital trade into tangible, continent-wide trade facilitation outcomes.

References

- Abdulrasheed, A. (2025). *Los pagos digitales impulsarán el mercado transfronterizo de un billón de dólares de África para 2035, afirma Ovi Capital*. TechCabal. Retrieved from <https://techcabal.com/es/2025/05/27/digital-payments-powers-1-trillion-cross-border-market/>
- African Export-Import Bank (Afreximbank). (2025). *Annual report 2024: Global Africa, new horizons for Africa and its diaspora*. Retrieved from <https://media.afreximbank.com/afrexim/Annual-Report-2024-English.pdf>
- African Union (AU). (2020). *The digital transformation strategy for Africa (2020–2030)*. Addis Ababa, Ethiopia. Retrieved from <https://au.int/en/documents/20200518/digital-transformation-strategy-africa-2020-2030>
- African Union (AU). (2024). *Protocol to the Agreement Establishing the African Continental Free Trade Area on Digital Trade*. Retrieved from https://au-afcfta.org/wp-content/uploads/2024/11/EN_-PROTOCOL-ON-DIGITAL-TRADE-clean.pdf
- African Union Development Agency (AUDA-NEPAD). (2025). Africa's digital transformation and future growth: The progress of science, technology, and innovation. Retrieved from <https://www.nepad.org/blog/africas-digital-transformation-and-future-growth-progress-of-science-technology-and-innovation>
- Agarwal, P., Mba-Kalu, S., & Lemma, A. (2024). *Advancing implementation of the AfCFTA Protocol on Digital Trade in Nigeria* (ODI Report). London: Overseas Development Institute. Retrieved from https://media.odi.org/documents/ODI_Report_-_Advancing_implementation_of_the_AfCFTA_Protocol_on_Digital_Trade_mluVg14.pdf
- Amaglobeli, D., de Mooij, R. A., Mengistu, A., Moszoro, M., Nose, M., Nunhuck, S., Patanayak, S., Rivero del Paso, L., Solomon, F., Sparkman, R., Tourpe, H., & Uña, G. (2023). *Transforming public finance through GovTech* (Staff Discussion Note No. 2023/004). International Monetary Fund. <https://doi.org/10.5089/9798400245480.006>
- Banga, K., Macleod, J., & Mendez-Parra, M. (2021). *Digital trade provisions in the AfCFTA: What can we learn from South–South trade agreements?* (Supporting Economic Transformation (SET) Working Paper). Retrieved from <https://set.odi.org/wp-content/uploads/2021/04/Digital-trade-provisions-in-the-AfCFTA.pdf>
- Bradshaw, C. (2025). *AI and business continuity in Africa: Navigating risks and opportunities in the South African context*. SAP News Center (Africa). Retrieved from <https://news.sap.com/africa/2025/02/ai-and-business-continuity-in-africa-navigating-risks-and-opportunities-in-the-south-african-context/>

- Bueno Rezende de Castro, A., & Kornher, L. (2023). The effect of trade and customs digitalization on agrifood trade: A gravity approach. *Q Open*, 3(1), qoac037. <https://doi.org/10.1093/qopen/qoac037>
- Conduit. (2025). *Redefining payments in Africa: A 2025 outlook*. Retrieved from <https://conduitpay.com/blog/redefining-payments-in-africa-a-2025-outlook>
- Ferracane, M. F., & van der Marel, E. L. (2021). *Regulating personal data: Data models and digital services trade* (Policy Research Working Paper No. 9596). Washington, DC: World Bank Group. Retrieved from <http://documents.worldbank.org/curated/en/890741616533448170>
- Ferracane, M. F., González Ugarte, S., & van der Marel, E. (2025). The Brussels effect in Africa: Is it beneficial for intra-regional trade in digital services? *Journal of International Economic Law*, 28(1), 1–22. <https://doi.org/10.1093/jiel/jgae059>
- Ganne, E., & Nguyen, H. (2022). *ICC standards toolkit for cross-border paperless trade*. International Chamber of Commerce (ICC), & World Trade Organization (WTO). Retrieved from <https://iccwbo.org/news-publications/policies-reports/standards-toolkit-for-cross-border-paperless-trade/>
- Gikonyo, A., Kariuki, F., Okwenda, V., & Makokha, P. W. (2019). *Impact evaluation of the Kenya National Electronic Single Window* (Kenya Investment Climate Program-II, Trade Logistics). Washington, DC: World Bank Group, International Finance Corporation. Retrieved from <https://www.kentrade.go.ke/wp-content/uploads/2019/05/Impact-of-Kenya-TradeNet-System-2018.pdf>
- Hansen-Addy, A. E., Parrilli, D. M., & Tingbani, I. (2024). The impact of trade facilitation on African SMEs' performance. *Small Business Economics*, 62, 105–131. <https://doi.org/10.1007/s11187-023-00756-4>
- Horn of Africa Initiative (HOAI). (2024). *Digital trade gap assessment*. Retrieved from <https://www.hoainitiative.org/sites/default/files/2025-02/HOAI-Digital-Gap-Assessment-FINAL-cleared-for-publication.pdf>
- Kugler, K., & Tavengerwei, R. (2024). Navigating digital sovereignty: Implications for African countries. *Global Trade and Customs Journal*, 19(7/8). <https://doi.org/10.54648/gtcj2024058>
- Lemma, A., Agarwal, P., & te Velde, D. W. (2025). *Implementing the Digital Trade Protocol of the African Continental Free Trade Area: Expected impacts, early experiences and challenges ahead* (ODI Global Working Paper). London, England: ODI Global. Retrieved from <https://odi.org/en/publications/implementing-the-afcfra-digital-trade-protocol-expected-impacts-early-experiences-and-challenges-ahead/>

- Mensah, S., & Jumah, J. (2024). *The state of inclusive instant payment systems in Africa (SIIPS 2024)*. AfricaNenda Foundation. Retrieved from https://www.africanenda.org/uploads/files/siips_2024_mainreport_EN.1.pdf
- Mwelu, M. J. (2021). *Effect of electronic cargo tracking systems (ECTs) implementation on performance of customs and border control department in Kenya* (Master's thesis). Moi University, Kenya. Retrieved from <https://ikesra.kra.go.ke/server/api/core/bitstreams/1d4a6847-b493-44ac-9dc5-03e3876b5245/content>
- Omeihe, K., Amoako, I., & Gustafsson, V. (2021). Trust in Nigerian SMEs exporting to West African market. In D. M. Nziku & J. J. Struthers (Eds.), *Enterprise and economic development in Africa* (pp. 59–80). Bingley, UK: Emerald Publishing Limited. <https://doi.org/10.1108/978-1-80071-322-220211003>
- Oramah, B. (2021). Afreximbank in the era of the AfCFTA. *Journal of African Trade*, 8(2), Article 7. <https://doi.org/10.2991/jat.k.211208.002>
- Organisation for Economic Co-operation and Development (OECD). (2021). *The digital transformation of SMEs* (OECD Studies on SMEs and Entrepreneurship). Paris, France: OECD Publishing. <https://doi.org/10.1787/bdb9256a-en>
- Organisation for Economic Co-operation and Development (OECD), International Monetary Fund (IMF), United Nations Conference on Trade and Development (UNCTAD), & World Trade Organization (WTO). (2023). *Handbook on measuring digital trade* (2nd ed.). Paris, France: OECD Publishing. <https://doi.org/10.1787/ac99e6d3-en>
- Rattel, F., Bahia, K., & Wambugu, W. (2024). *The impact of mobile interoperability: Insights for policy makers and industry stakeholders*. London, UK: GSMA. Retrieved from <https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-for-development/wp-content/uploads/2024/01/The-impact-of-mobile-interoperability.pdf>
- Research ICT Africa. (2025). *Alignment problems: The AfCFTA Digital Trade Protocol and AI*. In *African Just AI Conference Proceedings*. Cape Town, South Africa: Research ICT Africa. Retrieved from https://researchictafrica.net/wp-content/uploads/2025/02/Alignment-problems-AfCFTA-digital-trade-protocol-AI_Just_AI_2025.pdf
- Ricci, L. A., Ahokpossi, C., Belianska, A., Khandelwal, K., Lee, S., Li, G. B., Mu, Y., Quayyum, S. N., Nunez, S. G., Ree, J. J., Rietti Souto, M., & Simione, F. F. (2024). *Central bank digital currency and other digital payments in Sub-Saharan Africa: A regional survey* (FinTech Note No. 2024/001). International Monetary Fund. <https://doi.org/10.5089/9798400273025.063>
- Sangwa, S., Ndahimana, S., Dusengumuremyi, F., & Celestin, M. (2025). FinTech inclusion in Africa: Bridging innovation diffusion and digital dependence in the AfCFTA era. *Brainae*

- Journal of Business, Sciences and Technology*, 9(08), 77–104. <https://doi.org/10.5281/zenodo.16693665>
- Tijan, E., Agatić, A., Jović, M., & Aksentijević, S. (2019). Maritime national single window, a prerequisite for sustainable seaport business. *Sustainability*, 11(17), 4570. <https://doi.org/10.3390/su11174570>
- TradeMark Africa (TMA). (2023). *Annual report 2022/2023*. Nairobi, Kenya: TMA. Retrieved from <https://www.trademarkafrica.com/wp-content/uploads/2025/01/TMA-Annual-Report-2223.pdf>
- TradeMark Africa (TMA). (2024). *Trade facilitation report: Driving African trade through digitalisation*. Retrieved from https://atdf.trademarkafrica.com/wp-content/uploads/2024/12/TRADE_Facilitation_report_B5-v1.13.pdf
- TradeMark Africa (TMA). (2025). *Transforming Africa's trade: Annual report 2024–2025*. Nairobi, Kenya: TMA. Retrieved from <https://www.trademarkafrica.com/wp-content/uploads/2026/02/TMA-Annual-Report-FY2024-25-Single-Page-View-1.pdf>
- Umarova, S. (2024). Quantitative and qualitative methods for assessing trade facilitation. *Science and Innovation: International Scientific Journal*, 3(2), 69–77. <https://doi.org/10.5281/zenodo.10696559>
- United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT). (2017). *White paper on paperless trade*. Retrieved from https://unece.org/fileadmin/DAM/cefact/GuidanceMaterials/WhitePapers/WP-PaperlessTrade_Eng.pdf
- United Nations Commission on International Trade Law (UNCITRAL). (2017). *UNCITRAL Model Law on Electronic Transferable Records (2017)*. Retrieved from https://uncitral.un.org/en/texts/ecommerce/modellaw/electronic_transferable_records
- United Nations Conference on Trade and Development (UNCTAD). (2021). *Digital Economy Report 2021: Cross-border data flows and development, for whom the data flow*. Retrieved from <https://unctad.org/webflyer/digital-economy-report-2021>
- United Nations Conference on Trade and Development (UNCTAD). (2022). *Economic development in Africa report 2022: Rethinking the foundations of export diversification in Africa, the catalytic role of business and financial services*. Retrieved from <https://unctad.org/publication/economic-development-africa-report-2022>
- United Nations Conference on Trade and Development (UNCTAD). (2025). *ASYCUDA World: Enhancing trade facilitation and integration — ASYCUDA World system overview* (UNCTAD Technical Notes on ICT for Development No. DTL-ASYCUDA2025-D1). Geneva: UNCTAD. Retrieved from https://unctad.org/system/files/official-document/dtlasycuda2025d1_en.pdf

- United Nations Economic Commission for Africa (UN-ECA), United Nations Economic Commission for Europe (UN-ECE), United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP), United Nations Economic Commission for Latin America and the Caribbean (UN-ECLAC), United Nations Economic and Social Commission for Western Asia (UN-ESCWA), & United Nations Conference on Trade and Development (UNCTAD). (2025). *Digital and sustainable trade facilitation: Global report 2025*. Retrieved from <https://www.untfsurvey.org/files/documents/2025-UNTF-Global-Report.pdf>
- World Bank. (2021). *World Development Report 2021: Data for Better Lives*. Washington, DC: World Bank. <https://doi.org/10.1596/978-1-4648-1600-0>
- World Bank. (2023). *Connecting to compete 2023: Trade logistics in the global economy — The Logistics Performance Index and its indicators* (LPI 2023 report). Washington, DC: World Bank. Retrieved from https://lpi.worldbank.org/sites/default/files/2023-04/LPI_2023_report_with_layout.pdf
- World Customs Organization (WCO). (2019). *Data model technical brochure*. Brussels: WCO. Retrieved from https://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/instruments-and-tools/tools/data-model/dm_technicalbrochure_en.pdf
- World Trade Organization (WTO). (2023). *World trade report 2023: Re-globalization for a secure, inclusive and sustainable future*. Geneva, Switzerland: WTO. Retrieved from https://www.wto.org/english/res_e/booksp_e/wtr23_e/wtr23_e.pdf

Cross-cutting research agenda

Unequal gains, unequal costs: Environmental disparities in digital trade's life cycle in Africa

Tomás Rogaler

1. Introduction

The environmental implications of digital trade have attracted increasing global attention due to the rapid rise in digitalisation, cross-border data flows, and investment in digital infrastructure (see, e.g., UNCTAD, 2024). The demand for digital technologies and services continues to grow, resulting in an ever-increasing volume of data that must be transmitted, stored, and processed. This expansion relies on extensive physical infrastructure, comprising end-user devices, transmission networks, data centres, servers, cables, satellites, and routers, leading to increased energy and water consumption, the generation of electronic waste, and changes in resource extraction patterns. At the same time, digital technologies are increasingly recognised as tools for mitigating environmental pressures in high-emission sectors such as transport, construction and agriculture (European Commission, 2022; IPCC, 2022; Scotti, 2024; UNCTAD, 2024).

While some research exists on the dual role of digitalisation (Bremer *et al.*, 2023; Goel *et al.*, 2024; Itten *et al.*, 2020), this nexus remains largely under-explored on the African continent. Regional frameworks such as the African

Union's Digital Transformation Strategy (2020-2030) and the AfCFTA Protocol on Digital Trade aim to promote inclusive growth but do not explicitly address environmental sustainability. Meanwhile, the expansion of digital trade on the continent intersects with persistent environmental vulnerabilities, including energy poverty, water stress, and inadequate waste management systems (Baldé *et al.*, 2024; Li *et al.*, 2025). Moreover, Africa's position as a major supplier of critical raw materials for ICT goods (U.S. Geological Survey, 2025) further raises concerns about the socio-environmental costs of integration into global value chains.

Empirical research on the environmental impacts of digital trade in Africa also remains scarce. Bridging this gap requires interdisciplinary research, improved data systems, and coordinated regional efforts to align digital governance with climate and environmental objectives. This chapter maps the contours of this relationship, identifies key knowledge gaps, and outlines a research agenda to ensure that digital trade in Africa contributes to, rather than undermines, environmental sustainability.

2. Environmental landscape of digital trade in Africa: Different phases, different impacts

The relationship between digital trade and the environment has been primarily examined through the life cycle assessment (LCA) framework, a standardised methodology governed by ISO 14040 and ISO 14044 and a widely used tool for assessing the environmental impacts of different products and services.

In the context of digitalisation and digital trade, the LCA literature has focused on breaking down the environmental effects of certain digital trade elements, such as ICT goods and cloud services, across three phases: production, use, and end-of-life (Itten *et al.*, 2020; Pohl *et al.*, 2019; Popowicz *et al.*, 2025).

Complementary research distinguishes between direct (or first-order) effects, which derive from digital devices and ICT infrastructure throughout their life cycle, and indirect (or second-order) effects, that arise over time through broader changes in behaviour, the market or production as a result of the use of digital technologies and services in different sectors of the economy, thus extending beyond the direct footprint of the ICT sector (Bieser & Hilty, 2018; Horner *et al.*, 2016; ITU, 2014; Williams, 2011). These effects can be both beneficial and harmful to the environment. Positive indirect effects that

reduce emissions or other environmental damage, such as increased efficiency enabled by certain digital technologies or services, are sometimes referred to as “enabling effects” (Bremer *et al.*, 2023). Conversely, other studies have identified rebound effects, whereby initial efficiency gains stimulate greater demand and use, thereby diminishing environmental benefits (Coroamă & Mattern, 2019; Gossart, 2015; Lange *et al.*, 2023).

The evidence presented in the following sections indicates that Africa occupies a structurally disadvantaged position in the environmental geography of digital trade. The continent is deeply embedded in the production and end-of-life phases, both of which carry significant environmental burdens, while its limited participation in the use phase means that it captures fewer enabling and efficiency gains from digital trade. The following sections outline the analytical framework for each phase and synthesise the corresponding evidence on the effects produced.

2.1 Production phase

Although digital trade operates in the virtual sphere, it relies on a substantial physical base. The production and operation of ICT devices, transmission networks, and data centres involve intensive use of materials (CODES, 2022) and, in the initial stages, depend on the extraction and processing of numerous critical minerals and raw materials (UNCTAD, 2020, 2022). In this context, the production phase encompasses the extraction and refining of raw materials, the manufacture and assembly of components for end-user devices, network hardware and data centre infrastructure, through to their transport and deployment for global use (UNCTAD, 2024). The extraction and processing of raw materials and critical minerals are the most environmentally impactful steps in this phase (Danish *et al.*, 2019; Manhart *et al.*, 2019; OECD, 2019).

The international market for these materials is characterised by a high degree of geographical concentration in reserves, extraction, and processing. Here, Africa plays a central role in supplying minerals essential for digital infrastructure and technologies (UNCTAD, 2024). For instance, countries such as the Democratic Republic of the Congo (DRC), Guinea, and South Africa are major exporters of several critical minerals (Table 1). These countries are not only leading producers of key minerals – including cobalt, bauxite, manganese, platinum, and chromium – but also hold substantial shares of global reserves (ranging from 16 to over 75 per cent, depending on the mineral). This dual position, as both top producers and resource holders, underscores Africa’s strategic importance in global ICT supply chains.

Table 1: Africa’s role in global ICT mineral supply and reserves (2024).

Mineral	Leading producer	% of global production	% of global reserves	Primary use in ICT goods and digital infrastructure
Bauxite	Guinea	29%	25.5%	Source of aluminium used in lightweight ICT casings, server racks, and cabling.
Chromium	South Africa	45%	16.6% ¹	Stainless steel is used in server racks, cooling systems, and structural components.
Cobalt	DRC	76%	54.5%	Lithium-ion batteries are used in smartphones, laptops, servers, and telecom equipment.
Manganese	South Africa	37%	32.9% ²	Batteries, printed circuit boards, and metal alloys in ICT manufacturing.
Platinum (PGM)	South Africa	70.5%	77.7% ³	Hard disk drives, chemical sensors, optical fibres, and connectors.

Source: U.S. Geological Survey, 2025.

Yet, the environmental costs are substantial. Extraction and processing of raw materials have far-reaching consequences, contributing significantly to greenhouse gas (GHG) emissions, increased water use, land degradation, deforestation, and air and water pollution (Danish *et al.*, 2019; Manhart *et al.*, 2019; OECD, 2019). The United Nations Environment Programme (UNEP) and the International Resource Panel (IRP) estimate that resource extraction and processing account for approximately 60 per cent of global GHG emissions, more than 90 per cent of biodiversity loss, and 40 per cent of pollution-related health impacts. Looking ahead, material resource extraction is projected to increase by approximately 60 per cent between 2020 and 2060, further intensifying environmental pressures (UNEP & IRP, 2024). These burdens are felt most acutely in resource-rich extractive economies, such as those across the African continent, with consequences unequally distributed across regions.

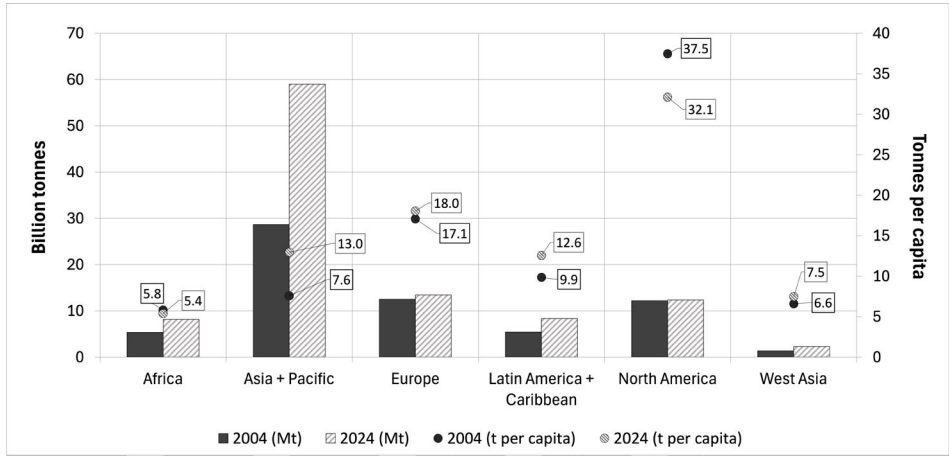
1 Zimbabwe holds 45 per cent of global chromium reserves, yet its share of global production in 2024 was only 2.3 per cent.

2 Gabon and Ghana together accounted for 8 per cent of global manganese mine production and 4.3 per cent of global manganese reserves in 2024.

3 The reserve figure for platinum is part of the Platinum Group Metals (PGMs). South Africa holds approx. 63,000 tonnes out of a global total of 170,000 tonnes.

Despite being a central supplier of raw materials, Africa recorded the lowest per-capita material footprint⁴ in 2024, at 5.4 tonnes, reflecting limited domestic consumption of material-intensive goods (Figure 1). By contrast, per-capita material footprints in Europe and North America were 18 and 32.1 tonnes, respectively. This disparity highlights a persistent structural asymmetry in global material use, in which extraction-stage burdens are concentrated in Africa while much of the consumption occurs elsewhere.

Figure 1: Material footprint by world regions.



Source: Author's calculations based on data from the Global Material Flows Database of the United Nations Environment Programme retrieved on 30 November 2025 from <<https://www.resourcepanel.org/global-material-flows-database>> and from the UN Population Division (UN-DESA) Data Portal retrieved on 30 November 2025 from <<https://population.un.org/dataportal/home>>.

The production stage is the most environmentally and socially demanding segment of the value chain. It is also where a large share of extractive activity occurs in developing countries, while generating relatively little domestic value added (UNCTAD, 2024). In many African economies, mineral exports remain a critical source of foreign exchange; yet, the environmental costs of extraction are rarely internalised in policy decisions. Although initiatives such as Africa's

⁴ According to Wiedmann *et al.* (2015), the material footprint is a consumption-based indicator that quantifies the total volume of raw materials extracted globally to meet a nation's final demand, regardless of where the extraction takes place. In essence, it assigns all globally mobilised material resources to the final consumer, tracing the embodied or virtual flows of materials linked to economic value, rather than limiting the analysis to territorially bounded physical flows.

Green Minerals Strategy⁵ signal growing regional commitment to aligning extraction with sustainability goals, they are still in an early stage and have not yet significantly altered entrenched extractive patterns.

2.2 Use phase

The use phase encompasses the environmental effects generated by the operation of ICT devices (or end-user devices), transmission networks, and data processing facilities (Malmudin *et al.*, 2024; UNCTAD, 2024). The extent of these effects varies by service and technology used (e.g., video streaming, email, blockchain, artificial intelligence, the Internet of Things and 5G), each placing different demands. Access to enabling benefits and exposure to associated impacts vary markedly within and across regions, reflecting differences in infrastructure, regulatory capacity and technological readiness.

End-user devices are a major contributor of GHG emissions in the use phase, with impacts varying by device type and energy efficiency (Malmudin *et al.*, 2024). While such devices are widely used worldwide, access to them is highly unequal across different regions. In 2025, 82 per cent of the global population owned a mobile cellular telephone, but this figure dropped to 66 per cent in Africa, compared with 81 per cent in Asia and the Pacific, 89 per cent in the Americas, and 96 per cent in Europe.⁶ Similarly, household computer access in Africa averages just 13 per cent, with some countries reporting rates below 3 per cent, such as Uganda (2 per cent), Rwanda (2.5 per cent), Guinea-Bissau (2.8 per cent), and the Central African Republic (2.9 per cent).⁷

Disparities also exist with respect to data transmission networks, encompassing mobile (2G to 5G), fibre, and fixed broadband systems. In 2025, only 36 per cent of individuals in Africa used the Internet, compared with more than 90 per cent in both Europe and the Commonwealth of Independent States (CIS). The African region registered only 55 active mobile broadband subscriptions per 100 inhabitants, compared with 132 in the Americas and

5 See African Union (AU). (2025). Africa's Green Minerals Strategy (AGMS). AU. Retrieved from <https://au.int/sites/default/files/documents/44539-doc-AGMS_Final_doc.pdf>.

6 See International Telecommunication Union (ITU). *ITU DataHub, data explorer*. <<https://datahub.itu.int>>.

7 Author's calculations based on data for the indicator 12046: "Households with a computer" for the latest year available for each African country, retrieved on 8 July 2025 from the ITU DataHub, <<https://datahub.itu.int/data/?v=&i=12046&e=1>>. While there is considerable variation in the reference years across countries, this approach provides a representative snapshot of the regional situation regarding household computer access.

116 in Europe. Merely 12 per cent of Africa's population was covered by a 5G mobile network, compared with 60 per cent in the Americas, 70 per cent in Asia-Pacific, and 74 per cent in Europe.⁸ In addition, mobile broadband traffic averaged just 63 GB per subscription per month in Africa – the lowest among all world regions – while Europe, Asia-Pacific, the CIS, and the Arab States each exceeded 190 GB.⁹

Similarly, this dynamic is evident in data processing facilities. Data centres, as core components of the digital ecosystem, store and process vast volumes of data while consuming significant amounts of electricity and water, particularly for cooling. They also contribute directly to GHG emissions, thereby generating increasing environmental impacts on a global scale (Borchert *et al.*, 2025; Castro *et al.*, 2024; Malmudin *et al.*, 2024).

Following the patterns observed for end-user devices and data transmission networks, Africa currently accounts for approximately 2.1 per cent of global data centre capacity.¹⁰ In Sub-Saharan Africa, this equates to just 0.1 data centres per million people, compared to a global average of 0.5 and a North American average of 3.1 (Begazo *et al.*, 2023). However, with the expansion of Internet use and intensifying concerns over data sovereignty, the African data centre market is projected to grow substantially (Carrington, 2025), reaching USD 5 billion by 2026, up from an estimated USD 2 billion in 2020 (ADCA, 2024).

Furthermore, the implementation of the AfCFTA is also expected to support this growth by reducing tariffs on ICT equipment, easing capital flows, and facilitating intra-African trade, thereby creating a more conducive environment for digital infrastructure investment across the continent (ADCA, 2024). In this context, electricity and water demand from data centres in Africa is expected to rise sharply in the coming years (IEA, 2022), while many facilities still rely on diesel-powered backup systems, increasing GHG emissions (Smolaks, 2023). Ensuring sustainable growth will require expanding the use of renewable energy, improving energy efficiency, and advancing water management practices (Begazo *et al.*, 2023; Kadium Limited, 2022).

Finally, regarding the use of digital services, the region continues to exhibit

8 See ITU. *ITU DataHub, data explorer*. <<https://datahub.itu.int>>.

9 See ITU. *Statistics*. <<https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>>.

10 See Data Center Map. *Data centers*. Retrieved 29 January 2026 from <<https://www.datacentermap.com/datacenters/>>

low penetration levels. Africa's imports of digitally delivered services in 2024 amounted to USD 81,727 million – representing just 2 per cent of global imports, far below Europe (54 per cent) and Asia (23 per cent).¹¹

Africa's limited digitalisation constrains both the potential benefits and environmental impacts of the use phase. While the continent has not yet fully experienced enabling effects, including dematerialisation (replacing physical goods with digital alternatives), enhanced efficiency in energy and resource use, and the deployment of digital tools that support climate mitigation and adaptation (IPCC, 2022; Scotti, 2024), it has also been relatively shielded from the intensive energy use and emissions associated with large-scale digital service consumption. However, as digital transformation accelerates, both the opportunities and externalities of the use phase are likely to intensify.

2.3 End-of-life phase

The end-of-life phase, which involves the treatment of digital technologies after use, raises significant environmental concerns on the continent, primarily due to the generation and disposal of e-waste. This waste stream contains hazardous substances (e.g., lead, mercury, and cadmium) as well as valuable, recoverable materials (e.g., gold, copper, and rare earth elements) (Baldé *et al.*, 2024). When improperly managed, e-waste can release toxic pollutants into the air, water and soil, posing serious risks to human health and the environment (Bremer *et al.*, 2023; ITU, 2012; WHO, 2024).

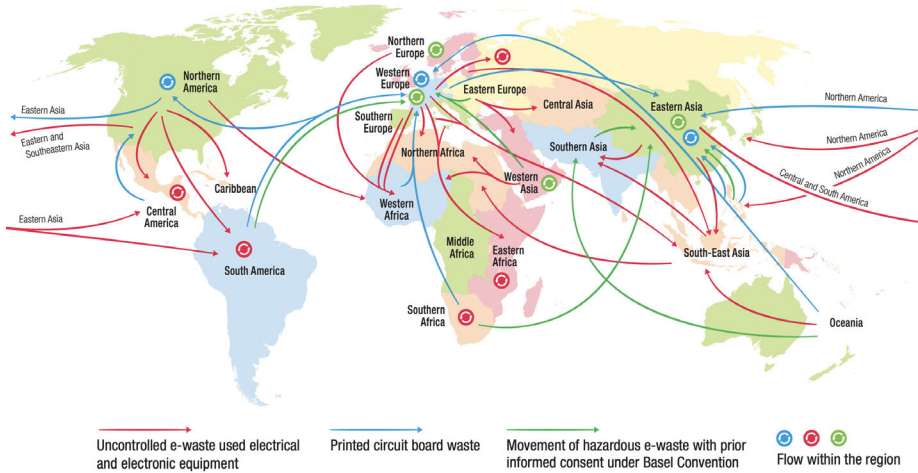
In the region, e-waste collection and management are hindered by structural constraints and further complicated by the increasing transboundary movement of used electrical and electronic equipment. In 2022, Africa generated approximately 3.5 million tonnes of e-waste, yet only 20 per cent was formally collected and recycled (Baldé *et al.*, 2024). Moreover, although some shipments consist of legally imported functional second-hand goods, a significant share enters through informal or illegal channels. In 2019, of the 546 million kg of e-waste exported to Africa, only 3.4 per cent qualified as controlled imports, whereas the remaining part was classified as illegal (Baldé *et al.*, 2024).

As shown in Figure 2, large volumes of uncontrolled e-waste flow from North America, Western Europe and other high-income regions to West, East and Southern Africa. When properly regulated, legal imports can support

11 See WTO. (2025). *Digitally delivered services trade dataset*. Retrieved 8 July 2025 from <https://www.wto.org/english/res_e/statis_e/gstdh_digital_services_e.htm>.

reuse, expand digital access and feed formal recycling systems. By contrast, illegal shipments are often non-functional or nearing the end of their life and are typically processed informally, leading to environmental contamination and serious public health risks.

Figure 2: International trade routes in controlled e-waste and uncontrolled used equipment and e-waste.



Source: UNCTAD (2024) based on Baldé *et al.* (2022).

A further layer of complexity arises from the limited adoption of relevant policy and regulatory frameworks. As of 2024, 82 countries worldwide had enacted domestic e-waste policies, laws, or regulations; yet only 11 African countries have such frameworks in place (Baldé *et al.*, 2024; UNCTAD, 2024). At the regional level, the Bamako Convention, which prohibits the import of hazardous waste into African countries, is not widely enforced (Saleh & Abene, 2016). Inadequate data systems further hinder efforts to assess volumes, monitor flows, and design evidence-based interventions. These institutional gaps contribute to persistently low rates of formal recycling, which in turn intensify the environmental and public health consequences of the end-of-life phase.

3. Key research gaps

Despite limited in-depth research directly linking digital trade to environmental outcomes, recent studies on digitalisation and ICT trade in Africa reveal a challenging landscape. While the broader literature on the environmental effects of ICT goods, online services, and cross-border data flows is expanding (Directorate-General for Energy (European Commission) *et al.*, 2023), evidence on low-income and developing countries, including those in Africa, remains comparatively limited.

Beyond LCA literature, empirical regional studies have not directly examined the relationship between digital trade and the environment. Instead, they focus on specific dimensions (such as trade in ICT goods, e-waste governance and institutional capacity) without offering integrated, system-wide assessments. Arogundade and Hassan (2025) document significant spatial spillovers, whereby digitalisation in one country influences environmental outcomes in neighbouring states, highlighting the relevance of reinforcing regional frameworks. Drawing on ecological modernisation theory, Shao *et al.* (2025) highlight weak alignment between digital transformation strategies and e-waste governance in most African countries, with informal and hazardous recycling practices remaining widespread. Studies of institutional capacity reach similarly differentiated conclusions: Evans and Mesagan (2022) find that ICT trade worsens pollution where governance is weak but supports environmental improvements where regulations are effective; and Amowine *et al.* (2025) show that digitalisation – particularly via internet penetration and mobile financial services – enhances carbon efficiency, although the contribution of green technological innovation remains limited.

Taken together, the evidence suggests heterogeneous, context-dependent effects, highlighting the need for an integrated, system-wide analysis. Read alongside insights from the different LCA phases, this evidence (or the lack of it) reveals several research gaps, including: (i) the landscape of actual and future direct environmental effects in the use phase (beyond production and end-of-life); (ii) indirect effects already occurring in, or likely to emerge across, the region; (iii) rebound and combined effects of digitalisation and digital trade trends; and (iv) the extent and distribution of the enabling effects that digital trade could deliver.

3.1 Direct environmental effects

While it is acknowledged that end-user devices, data transmission networks, and data centres contribute significantly to energy and water consumption, region-specific measurements of their environmental footprint remain largely unavailable. For instance, we do not yet know the full extent of electricity and water usage by African data centres, nor the specific emissions profiles linked to their current energy mixes, which often rely on diesel-based backup systems.

Similarly, there is limited evidence on energy consumption patterns associated with mobile and fixed broadband networks in African countries, including how they vary across different connectivity technologies (2G to 5G) and levels of digital intensity. Although disparities in access and infrastructure are well documented, their environmental implications, such as GHG emissions from data traffic, cooling requirements, and power losses, are not systematically quantified. Moreover, due to low device penetration, the environmental impact of end-user devices remains understudied in Africa compared to other regions (see e.g. Directorate-General for Energy (European Commission) *et al.*, 2023), and there is insufficient data to assess the cumulative energy demand generated by growing trends such as video streaming, generative AI services, and e-commerce activity in African settings.

3.2 Indirect environmental effects

The indirect environmental effects of digital trade in Africa remain largely underexplored, especially with regard to the use phase. These impacts, stemming from broader behavioural, economic, and structural transformations, are inherently difficult to trace and have yet to receive systematic, region-specific attention. For instance, while digital trade may be reshaping sectors such as retail, agriculture, and logistics by facilitating faster delivery systems and more fragmented supply chains (Shahmohammadi *et al.*, 2020), the resulting increases in transport-related emissions, packaging waste, and land-use changes remain undocumented in the region.

Similarly, behavioural shifts driven by greater digital access, such as higher consumption rates, shorter product lifespans, and growing dependence on remote services (Buldeo Rai, 2021), have not been assessed for their cumulative environmental footprint in African contexts. There is also a lack of data on the indirect demand for energy and infrastructure spurred by digital trade beyond the ICT sector, particularly in rapidly expanding urban areas.

Moreover, the environmental consequences of digital policy decisions, such

as data localisation requirements, cross-border service liberalisation, or investment incentives for digital infrastructure, have been poorly researched. These measures can shape patterns of energy consumption, infrastructure siting, and technological path dependency, yet their environmental implications remain largely unexamined within the region.

3.3 Rebound effects and combined effects

Since there is limited research on the direct and indirect environmental impacts, the way in which efficiency gains could be offset by increased digital consumption remains unknown. These rebound effects may already be taking shape as digital access and service usage expand across the region, but there is no empirical data to evaluate their scale or implications. Likewise, no studies have explored how different types of impacts may interact and accumulate over time. Without this knowledge, it is difficult to assess the full environmental consequences of Africa's digital transformation or to design policies that minimise unintended outcomes.

3.4 Enabling the potential of digital technologies

The environmental benefits that could be enabled by new digital technologies and services – such as artificial intelligence, the IoT, blockchain, and cloud-based applications – remain largely unexplored in Africa. Although authors such as Kuyoro & Bagus (2025) highlight the potential of these technologies to improve energy efficiency, streamline logistics, and enhance sectors like retail, banking, mining, and telecom, there is limited empirical evidence from the region. No country-level or sector-specific assessments exist to evaluate how these technologies and services are being adopted or whether they are delivering measurable sustainability outcomes. As digitalisation expands across key sectors, understanding how these tools and platforms can contribute to low-carbon transitions is increasingly relevant.

4. Future research agenda

As digital trade and digital infrastructure continue to expand across Africa, future research should aim to produce actionable insights into their environmental implications, with particular attention to the differentiated effects experienced within the region.

Regarding the production and end-of-life phases, existing research has iden-

tified specific environmental risks associated with mineral extraction and the disposal of electronic waste. Nevertheless, a gap persists regarding data availability and the evaluation of the effectiveness of current protocols and plans aimed at mitigating these environmental consequences. Potential avenues for research include (i) country-level assessments of environmental degradation linked to mineral extraction for the production of ICT goods; (ii) comparative analyses of regulatory approaches to e-waste management, such as extended producer responsibility schemes, import restrictions, and public–private recycling partnerships, together with their environmental effectiveness; and (iii) policy-oriented research on the operationalisation of regional strategies, such as the Africa Green Minerals Strategy, to ensure robust environmental safeguards.

The use phase presents the most significant knowledge gap. This area is broad, encompassing various aspects of the use phase that require attention. For instance, a critical research area involves integrating environmental considerations into governance frameworks for new ICT infrastructure and services. Potential topics for future research include: (i) evaluating the feasibility of incorporating environmental criteria into regional frameworks like the AfCFTA Protocol on Digital Trade, with a focus on network efficiency, data center sustainability, and device standards; (ii) explore regulatory approaches to managing the environmental footprint of storage and data transmission infrastructure, including site selection, energy sources, and cooling requirements; and (iii) identify governance mechanisms to monitor and mitigate the indirect environmental impacts of digitalisation.

The adoption of new technologies and services in the region is likely to create opportunities to leverage advanced tools for sustainability. In this context, future research on how to harness emerging technologies for low-carbon transitions could include: (i) the development of empirical case studies on the application of AI, IoT, blockchain, and cloud-based platforms to foster green innovation in sectors such as agriculture, transport, and energy; (ii) policy-oriented research on pathways to scale up successful pilot projects and integrate enabling technologies into national digital and climate strategies; and (iii) assessments of the market, regulatory, and infrastructure conditions necessary to unlock the potential of these technologies, particularly in underserved or rural areas.

Research into the use phase should also examine the environmental consequences of regulatory frameworks adopted by countries in the region. Particular

attention should be given to assessments of policy decisions, specifically: (i) the environmental impacts of data localisation, considering infrastructure location, energy use, and data storage redundancy; (ii) how public procurement and infrastructure planning can promote low-emission, resource-efficient digital systems; and (iii) how investment incentives and digital industrial policies can influence environmental outcomes across various countries and subregions.

Finally, the region lacks sufficiently robust data systems, which constrains the proper development of empirical studies and, consequently, the effective design of policies. Areas that warrant more in-depth development include: (i) adapting and harmonising existing environmental indicators to African contexts and ICT sector priorities, while ensuring regular monitoring and cross-country comparability;¹² (ii) establishing regional observatories or knowledge-sharing platforms to connect researchers, policymakers, and industry stakeholders working at the intersection of digital trade and sustainability;¹³ and (iii) developing methodologies for data integration that combine environmental, digital trade, and economic indicators, thereby enabling multi-dimensional assessments and policy simulations.

12 A useful model to review, which could potentially be replicated for harmonisation purposes, is provided by the indicators developed by the European Union for measuring the environmental impact of EU consumption. See Sala *et al.* (2019).

13 An illustrative example that could inform similar initiatives in the region is the European Platform on Life Cycle Assessment, hosted by the European Commission's Joint Research Centre (JRC), which facilitates knowledge sharing and methodological consistency in environmental assessment. See <<https://eplca.jrc.ec.europa.eu/>>

References

- Africa Data Centres Association (ADCA). (2024). *Data Centres in Africa: Focus Report 2024*. In collaboration with Oxford Business Group (OBG). Retrieved from https://africadca.org/wp-content/uploads/2024/05/ADCA-Report-2024_with-PPT.pdf
- Amowine, N., Li, H., Baležentis, T., & Štreimikienė, D. (2025). Technology innovation and carbon efficiency in Africa: What is the role of digitalization and digital inclusive finance? *Technological and Economic Development of Economy*, 31(3), 916–949. <https://doi.org/10.3846/tede.2025.23879>
- Arogundade, S., & Hassan, A. S. (2025). Digital economy and environmental quality of African countries: Evidence from spatial Durbin model. *Environment, Development and Sustainability*. Advance online publication. <https://doi.org/10.1007/s10668-025-06059-w>
- Baldé, C. P., D'Angelo, E., Luda, V., Deubzer, O., Kuehr, R., Yamamoto, T., & McDonough, M. (2022). *Global Transboundary E-Waste Flows Monitor 2022*. United Nations Institute for Training and Research (UNITAR). Retrieved from https://ewastemonitor.info/wp-content/uploads/2022/06/Global-TBM_webversion_june_2_pages.pdf
- Baldé, C. P., Kuehr, R., Yamamoto, T., McDonald, R., D'Angelo, E., Althaf, S., Bel, G., Deubzer, O., Fernandez-Cubillo, E., Forti, V., Gray, V., Herat, S., Honda, S., Iattoni, G., Khetriwal, D. S., Luda di Cortemiglia, V., Lobuntsova, Y., Nnorom, I., Pralat, N., & Wagner, M. (2024). *The Global E-waste Monitor 2024: Quantities, flows and resources* (4th ed.). United Nations Institute for Training and Research (UNITAR) & International Telecommunication Union (ITU). Retrieved from https://ewastemonitor.info/wp-content/uploads/2024/12/GEM_2024_EN_11_NOV-web.pdf
- Begazo, T., Blimpo, M. P., & Dutz, M. A. (2023). *Digital Africa: Technological transformation for jobs*. World Bank Group. Retrieved from <https://www.worldbank.org/en/region/afr/publication/digital-africa>
- Bieser, J. C. T., & Hilty, L. M. (2018). Assessing indirect environmental effects of information and communication technology (ICT): A systematic literature review. *Sustainability*, 10(8), 2662. <https://doi.org/10.3390/su10082662>
- Borchert, I., Castro, V., & Friday, A. (2025). *TaPP Insight: The environmental effects of digital trade*. The TaPP Network. Retrieved from <https://tappnetwork.org/resource/tapp-insight-the-environmental-effects-of-digital-trade/>
- Bremer, C., Kamiya, G., Bergmark, P., Coroama, V. C., Masanet, E., & Lifset, R. (2023). *Assessing energy and climate effects of digitalization: Methodological challenges and key recommendations* (nDEE Framing Paper Series). <https://doi.org/10.2139/ssrn.4459526>

- Buldeo Rai, H. (2021). The Net Environmental Impact of Online shopping, beyond the Substitution Bias. *Journal of Transport Geography*, 93, 103058. <https://doi.org/10.1016/j.jtrangeo.2021.103058>
- Carrington, D. (2025). Big tech's thirst for water: The hidden cost of data centres. *The Guardian*. Retrieved from <https://www.theguardian.com/environment/2025/apr/09/big-tech-datacentres-water>
- Castro, V., Georgiou, M., Jackson, T., Hodgkinson, I. R., Jackson, L., & Lockwood, S. (2024). Digital data demand and renewable energy limits: Forecasting the impacts on global electricity supply and sustainability. *Energy Policy*, 195, 114404. <https://doi.org/10.1016/j.enpol.2024.114404>
- Coalition for Digital Environmental Sustainability (CODES). (2022). *Action plan for a sustainable planet in the digital age*. Geneva: CODES. Retrieved from https://www.un.org/digital-emerging-technologies/sites/www.un.org.techenvoy/files/GDC-submission_CODES.pdf
- Coroamă, V. C., & Mattern, F. (2019). *Digital rebound – Why digitalization will not redeem us our environmental sins*. ETH Zurich, Department of Computer Science. Retrieved from https://ceur-ws.org/Vol-2382/ICT4S2019_paper_31.pdf
- Danish, Zhang, J., Wang, B., & Latif, Z. (2019). Towards cross-regional sustainable development: The nexus between information and communication technology, energy consumption, and CO₂ emissions. *Sustainable Development*, 27(5), 990–1000. <https://doi.org/10.1002/sd.2000>
- Directorate-General for Energy (European Commission), Ramboll & Resilio. (2023). Assessment of the energy footprint of digital actions and services. Publications Office of the European Union. <https://data.europa.eu/doi/10.2833/478689>
- European Commission. (2022). *2022 strategic foresight report: Twinning the green and digital transitions in the new geopolitical context* (COM(2022) 289 final). Brussels: Publications Office of the European Union. <https://eur-lex.europa.eu/legal-content/EN/TX-?uri=CELEX%3A52022DC0289>
- Evans, O., & Mesagan, E. P. (2022). ICT-trade and pollution in Africa: Do governance and regulation matter? *Journal of Policy Modeling*, 44(3), 511–531. <https://doi.org/10.1016/j.jpolmod.2022.06.003>
- Goel, A., Masurkar, S., & Pathade, G. R. (2024). An overview of digital transformation and environmental sustainability: Threats, opportunities, and solutions. *Sustainability*, 16(24), 11079. <https://doi.org/10.3390/su162411079>

- Gossart, C. (2015). Rebound effects and ICT: A review of the literature. In L. Hilty & B. Aebischer (Eds.), *ICT innovations for sustainability* (Vol. 310, pp. 435–448). Springer. https://doi.org/10.1007/978-3-319-09228-7_26
- Horner, N. C., Shehabi, A., & Azevedo, I. L. (2016). Known unknowns: Indirect energy effects of information and communication technology. *Environmental Research Letters*, 11(10), 103001. <https://doi.org/10.1088/1748-9326/11/10/103001>
- Intergovernmental Panel on Climate Change (IPCC). (2022). *Climate change 2022: Mitigation of climate change*. Working Group III contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva. Retrieved from https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_FullReport.pdf
- International Energy Agency (IEA). (2022). *Africa Energy Outlook 2022*. Paris: International Energy Agency. Retrieved from <https://iea.blob.core.windows.net/assets/220b2862-33a6-47bd-81e9-00e586f4d384/AfricaEnergyOutlook2022.pdf>
- International Telecommunication Union (ITU). (2012). *End-of-life management for ICT equipment*. Retrieved from https://www.itu.int/dms_pub/itu-t/oth/4B/04/T4B-0400000B0013PDFE.pdf
- International Telecommunication Union (ITU). (2014). *L.1410: Methodology for environmental life cycle assessments of information and communication technology goods, networks and services (Recommendation ITU-T L.1410)*. Geneva: International Telecommunication Union. Retrieved from <https://www.itu.int/rec/T-REC-L.1410>
- Itten, R., Hirschier, R., Andrae, A. S. G., Bieser, J. C. T., Cabernard, L., Falke, A., Ferreboeuf, H., Hilty, L. M., Keller, R. L., Lees-Perasso, E., Preist, C., & Stucki, M. (2020). Digital transformation—Life cycle assessment of digital services, multifunctional devices and cloud computing. *International Journal of Life Cycle Assessment*, 25, 2093–2098. <https://doi.org/10.1007/s11367-020-01801-0>
- Kadium Limited. (2022). *African Wireless Communications Yearbook 2022*. Cape Town: Kadium Limited. Retrieved from <https://www.africanwirelesscomms.com/Media/Default/archive/AWCY/AWCY22.pdf>
- Kuyoro, M., & Bagus, U. (2025). *Leading, not lagging: Africa's gen AI opportunity*. McKinsey & Company. Retrieved from <https://www.mckinsey.com/capabilities/quantumblack/our-insights/leading-not-lagging-africas-gen-ai-opportunity>
- Lange, S., Frick, V., Gossen, M., Pohl, J., Rohde, F., & Santarius, T. (2023). The induction effect: Why the rebound effect is only half the story in the digital economy. *Frontiers in Sustainability*, 4, 1178089. <https://doi.org/10.3389/frsus.2023.1178089>

- Li, C., Ibrahim, R. L., Alomair, A., & Al Naim, A. S. (2025). Energy poverty, air quality, and health expenditures in Africa: A triple burden on sustainable development. *International Journal of Sustainable Development & World Ecology*, 32(6), 728–754. <https://doi.org/10.1080/13504509.2025.2540629>
- Malmodin, J., Lövehagen, N., Bergmark, P., & Lundén, D. (2024). ICT sector electricity consumption and greenhouse gas emissions – 2020 outcome. *Telecommunications Policy*, 48(3), 102701. <https://doi.org/10.1016/j.telpol.2023.102701>
- Manhart, A., Vogt, R., Priester, M., Wäger, P., Schleicher, T., & Schleicher, A. (2019). The environmental criticality of primary raw materials: A new methodology to assess global environmental hazard potentials of minerals and metals from mining. *Mineral Economics*, 32(1), 91–107. <https://doi.org/10.1007/s13563-018-0160-0>
- Organisation for Economic Co-operation and Development (OECD). (2019). *Global material resources outlook to 2060: Economic drivers and environmental consequences*. OECD Publishing. <https://doi.org/10.1787/9789264307452-en>
- Pohl, J., Hilty, L. M., & Finkbeiner, M. (2019). How LCA contributes to the environmental assessment of higher order effects of ICT application: A review of different approaches. *Journal of Cleaner Production*, 219, 698–712. <https://doi.org/10.1016/j.jclepro.2019.02.018>
- Popowicz, M., Katzer, N. J., Kettele, M., Schöggel, J.P., & Baumgartner, R.J. (2025). Digital technologies for life cycle assessment: A review and integrated combination framework. *International Journal of Life Cycle Assessment*, 30, 405–428. <https://doi.org/10.1007/s11367-024-02409-4>
- Sala, S., Beylot, A., Corrado, S., Crenna, E., Sanyé-Mengual, E., & Secchi, M. (2019). *Indicators and assessment of the environmental impact of EU consumption: Consumption and consumer footprint for assessing and monitoring EU policies with life cycle assessment* (JRC Technical Report No. JRC114814). Luxembourg: Publications Office of the European Union. <https://doi.org/10.2760/403263>
- Saleh, P., & Abene, N. M. (2016). Africa and the problem of transboundary movement of hazardous waste: An assessment of Bamako Convention of 1991. *Journal of Law, Policy and Globalization*, 48, 47–55. Retrieved from <https://www.iiste.org/Journals/index.php/JLPG/article/view/30145/30958>
- Scotti, C. (2024). *Digital and green: Twice the transformation, twice the win?* [Closing remarks]. Banca d'Italia. Retrieved from <https://www.bancaditalia.it/pubblicazioni/interventi-direttorio/int-dir-2024/en-Scotti-28.06.2024.pdf>
- Shahmohammadi, S., Steinmann, Z. J. N., Tambjerg, L., van Loon, P., King, J. M. H., & Huijbregts, M. A. J. (2020). Comparative greenhouse gas footprinting of online versus tradi-

- tional shopping for fast-moving consumer goods: A stochastic approach. *Environmental Science & Technology*, 54(6), 3499–3509. <https://doi.org/10.1021/acs.est.9b06252>
- Shao, D., Kibinda, N., Mambile, C., & Mwogosi, A. (2025). *Digital transformation and e-waste management in Africa: An ecological modernisation approach to sustainability* [Working paper]. SSRN. <https://doi.org/10.2139/ssrn.5134090>
- Smolaks, M. (2023). The effects of a failing power grid in South Africa. Uptime Institute Journal. Retrieved from <https://journal.uptimeinstitute.com/the-effects-of-a-failing-power-grid-in-south-africa/>
- U.S. Geological Survey. (2025). *Mineral commodity summaries 2025* (U.S. Geological Survey No. 150). Reston, VA: U.S. Department of the Interior. Retrieved from <https://pubs.usgs.gov/periodicals/mcs2025/mcs2025.pdf>
- United Nations Conference on Trade and Development (UNCTAD). (2020). *Digital Economy Growth and Mineral Resources: Implications for Developing Countries*. Retrieved from https://unctad.org/system/files/official-document/tn_unctad_ict4d16_en.pdf
- United Nations Conference on Trade and Development. (2022). *The least developed countries report 2022: The low-carbon transition and its daunting implications for structural transformation*. Retrieved from https://unctad.org/system/files/official-document/ld-c2022overview_en.pdf
- United Nations Conference on Trade and Development (UNCTAD). (2024). *Digital Economy Report 2024: Shaping an environmentally sustainable and inclusive digital future* (UNCTAD/DER/2024). Geneva: United Nations Conference on Trade and Development. Retrieved from https://unctad.org/system/files/official-document/der2024_en.pdf
- United Nations Environment Programme (UNEP) & International Resource Panel (IRP). (2024). *Global resources outlook 2024: Bend the trend – Pathways to a liveable planet as resource use spikes*. Nairobi: United Nations Environment Programme. Retrieved from https://wedocs.unep.org/bitstream/handle/20.500.11822/44901/Global-Resource-Outlook_2024.pdf?sequence=3&isAllowed=y
- Wiedmann, T. O., Schandl, H., Lenzen, M., Moran, D., Suh, S., West, J., & Kanemoto, K. (2015). The material footprint of nations. *Proceedings of the National Academy of Sciences of the United States of America*, 112(20), 6271–6276. <https://doi.org/10.1073/pnas.1220362110>
- Williams, E. (2011). Environmental effects of information and communications technologies. *Nature*, 479, 354–358. <https://doi.org/10.1038/nature10682>
- World Health Organization (WHO). (2024). Electronic waste (e-waste). Retrieved from <https://www.who.int/news-room/fact-sheets/detail/electronic-waste-%28e-waste%29>

Bytes, borders and budgets: Mobilising fiscal revenue from digital trade in Africa

Nicolas Köhler-Suzuki & Rutendo Tavengerwei

1. Introduction

Domestic revenue mobilisation (DRM) sits at the centre of African fiscal debates. It is grounded in the United Nations Sustainable Development Goal 17.1 and successive financing-for-development instruments, such as the Addis Ababa Action Agenda (UN, 2015), Integrated National Financing Frameworks (UN & IATF, 2019), the International Monetary Fund-World Bank DRM Initiative (IMF & World Bank, 2024) and the Seville Commitment (UN, 2025). Achieving these targets depends partly on taxing the digital economy, as economic value in Africa is increasingly generated online, including through cross-border transactions involving digitally delivered services and digitally ordered parcels.

The Organisation for Economic Co-operation and Development (OECD) process to prevent base erosion and profit shifting (BEPS) has recognised that multinational digital platforms often reach consumers without a taxable nexus and has tried to close this gap through the Inclusive Framework and the Multilateral BEPS Convention, which 89 jurisdictions have ratified, accepted, or approved at the time of writing (OECD, 2025). However, the future of BEPS

remains uncertain after the United States suspended its participation in early 2025 and threatened sanctions against jurisdictions that adopt unilateral taxes targeting US-headquartered firms – many of which are central to the global digital economy (The White House, 2025).

Against this complex political backdrop, the chapter examines the potential fiscal revenues from digital trade in Africa and the corresponding legal frameworks, identifying key research gaps and proposing areas for future research. It proceeds as follows. Section 2 reviews existing scholarship on the topic and identifies key conceptual and empirical gaps, including persistent challenges in defining and measuring digital trade. Section 3 maps how African Union (AU) members tax the digital operations of multinational enterprises, with a comparative overview of rules targeting non-resident suppliers and the international tax instruments embedded in domestic law. Section 4 quantifies the fiscal revenue potential from VAT on digitally delivered services and from corporate taxation under BEPS Pillar One and unilateral digital services taxes. Section 5 focuses on parcel trade volumes, routes and regulatory frictions using postal and other firm-level data and discusses the implications for VAT collection. Section 6 sets out priorities for future research, such as improved measurement, data integration and the scope for regulatory convergence under the AfCFTA. The final section summarises the main findings and their implications for domestic revenue mobilisation.

2. The state-of-the-art

The literature on the taxation of digital services has developed mainly in response to the limitations of existing international tax rules in addressing the digitalisation of the economy. Smith (2022) finds that initiatives like the OECD BEPS process fall short of meeting the fiscal needs of developing countries, particularly in how taxing rights are allocated. Possibly in response to these shortcomings, many jurisdictions have adopted unilateral digital services taxes (DSTs), prompting legal debates about their compatibility with international tax rules and the stability of the global tax order. Kartal (2023), for example, examines the coherence of these measures under international law and highlights tensions between national sovereignty and multilateral coordination. Furthermore, most of the literature on digital services taxation focuses on early adopters such as France, the United Kingdom, and India, with an emphasis on legal design, international coherence, and revenue implications (Karnosh, 2021; Pirlot & Culot, 2021).

In contrast, scholarship on digital taxation in Africa is still in its early stages. Mpofu and Moloi (2022) explore digital services taxes through classical tax principles, including equity and neutrality, while Magwape (2022) highlights legislative fragmentation and weak institutional enforcement across the region. Kelbesa (2020) surveys broader policy trends across the continent but stops short of offering jurisdiction-specific legal analysis. Banga *et al.* (2025) examine how trade rules on services, electronic transmissions, and digital products affect the ability of African countries to tax their digital economies. In a comparative analysis of Kenya, Rwanda, and South Africa, they argue that trade commitments – under the World Trade Organization (WTO), the African Continental Free Trade Area (AfCFTA)’s Digital Trade Protocol, and plurilateral initiatives – can constrain domestic fiscal space by limiting the design and enforcement of digital taxation instruments.

Therefore, while there is a small body of work that explores legal and normative questions in specific countries, there is no region-wide academic study that systematically analyses and compares national digital tax laws in Africa through the lens of digital trade. Two policy reports by Köhler-Suzuki and Tavengerwei (2021, 2022) provide early empirical insights into digital tax initiatives in selected African countries. However, these policy reports were written in the context of the negotiations for the OECD’s BEPS process and do not engage in the academic debate on digital trade governance. This chapter, drawing on insights from these reports, addresses that gap by providing a structured, comparative analysis of digital taxation instruments in 37 African countries, and situating them within broader debates on digital trade law, fiscal sovereignty, and digital economy governance.

Before moving to the next section, it is important to note that the digital taxation debate has also been affected by the lack of conceptual clarity about the definition and measurement of digital trade. A first common reference point emerged with the *Handbook on Measuring Digital Trade*, a joint effort between several international organisations that defines digital trade as ‘all trade that is digitally ordered and/or delivered’ (OECD *et al.*, 2023). Yet only a few countries and regions have so far developed systematic measurements of cross-border digital trade based on this definition. Consequently, policymakers have been legislating in the dark: discussions on value-added tax (VAT) for non-resident suppliers and other forms of digital taxation have raced ahead of any empirical evidence of digital trade values and potential tax yields.

What is known from scattered data sources is that cross-border digital services are growing faster than merchandise trade, and that parcel imports are expanding at a high rate (World Bank & WTO, 2023). Even if unquantified, the existing evidence therefore suggests a significant revenue potential.

However, two significant knowledge gaps persist. Conceptually, African countries still lack a coherent link between trade-facilitation goals and tax sovereignty. Parcel trade, digital services and platform regulations are often treated in silos, obscuring where value is created and therefore taxable. Methodologically, statistical systems across the AU remain fragmented. For example, customs, postal, payment and telecom datasets have not been linked. Closing these gaps demands more interdisciplinary collaboration, as well as accessing new data sources, including those from the private sector.

3. Tax arrangements for the digital operations of multinational enterprises in Africa

As digital trade accelerates across the African continent, the challenge of effectively taxing non-resident multinational enterprises (MNEs) that supply digital services has become an increasingly urgent legal and fiscal issue. To map the current regulatory landscape of taxation laws that cover digital services, Köhler-Suzuki and Tavengerwei (2021, 2022) conduct a comparative legal analysis of digital tax laws across 37 African countries. While all surveyed jurisdictions include some form of provision related to digital services, the study reveals significant legal fragmentation and emerging policy trends that shape how African states are approaching digital taxation in the context of cross-border trade.

First, none of the 37 African countries examined currently maintains bilateral or regional tax agreements specifically tailored to the digital activities of MNEs. In the absence of coordinated regional or multilateral rules, countries have developed domestic legal frameworks to govern digital transactions, although many of these were originally designed for traditional forms of commerce. Second, only 18 jurisdictions explicitly impose tax obligations on non-resident MNEs through income tax or VAT regimes. This leaves a substantial share of cross-border digital activity either untaxed or ambiguously governed, creating risks for both revenue mobilisation and legal certainty.

Furthermore, countries differ markedly in how they define digital services and apply tax instruments. For example, Egypt and Seychelles adopt broad

definitions that capture nearly all intangible services, effectively taxing digital transactions without naming them.¹ In contrast, Ghana uses a narrower list-based approach that covers “telecommunication and e-commerce services”, including website supply, web hosting, remote maintenance, digital images, and distance learning.² These definitional differences affect which services are taxable and whether tax obligations fall on providers, intermediaries, or consumers, raising questions about equity, enforceability, and legal coherence.

Finally, implementation capacity and enforcement mechanisms vary widely. Ghana, South Africa, and Cameroon require non-resident MNEs to register for VAT and file returns electronically, indicating more robust digital tax infrastructure.³ Others, including Nigeria, are still developing mechanisms to track and tax foreign providers. Only Nigeria, Kenya, and Zimbabwe have adopted a dual-tax approach that imposes both direct and indirect obligations on non-resident MNEs, effectively shifting part of the tax burden to consumers.⁴

These findings indicate a fragmented digital tax landscape across the AU, characterised by inconsistent interpretation and uneven administrative reach. This pattern is not unique to the region but rather reflects broader global challenges in adapting tax systems to digital business models. While several African countries have introduced innovative legal measures, the absence of shared definitions and interoperable enforcement mechanisms raises concerns about the coherence and effectiveness of regional regulation. This legal diversity affects not only domestic revenue mobilisation but also cross-border digital trade, where inconsistent tax treatment can distort competition, create uncertainty

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- 1 Value Added Tax Act of Egypt, 2016, <<https://www.eta.gov.eg/sites/default/files/2024-02/Law-english-no.67-2016.pdf.pdf>>; Value Added Tax Act 35 of Seychelles 2010, <<https://seylil.org/akn/sc/act/2010/35/eng@2021-08-09>>.
 - 2 Value Added Tax Act of the Republic of Ghana, 2013, <https://gra.gov.gh/wp-content/uploads/2020/09/vat_act_870.pdf>.
 - 3 Value Added Tax Act of the Republic of Ghana, 2013, Art. 2(c), <https://gra.gov.gh/wp-content/uploads/2020/09/vat_act_870.pdf>.
 - 4 Value Added Tax Act of the Republic of Kenya, 2012, Arts. 5-6, <<https://new.kenyalaw.org/akn/ke/act/2013/35/eng@2024-12-27>>; Value Added Tax (Digital Marketplace Supply) Regulations of the Republic of Kenya, 2020, Art. 8(3) (text not available online); Nigeria’s Companies Income Tax (Significant Economic Presence) Order, 2020, <[https://assets.kpmg.com/content/dam/kpmg/ng/pdf/tax/companies-income-tax-\(significant-economic-presence\)-order-2020.pdf](https://assets.kpmg.com/content/dam/kpmg/ng/pdf/tax/companies-income-tax-(significant-economic-presence)-order-2020.pdf)>; Income Tax Act of the Republic of Zimbabwe, 1967, <<https://zimlil.org/akn/zw/act/1967/5/eng@2019-02-20>>; Zimbabwe Finance Bill, 2019, <https://www.veritaszim.net/sites/veritas_d/files/Finance%20Bill%20%28No.%203%29%2C%202019.pdf>.

for service providers, and inhibit the free flow of digital goods and services.

The effects of this fragmentation are particularly significant in light of the WTO's ongoing moratorium on customs duties for electronic transmissions. With customs channels unavailable for taxing digital goods and services, countries increasingly rely on domestic income tax and VAT regimes to capture value from cross-border digital activity (Kuhlmann & Francis, 2024). Where these regimes remain uncoordinated, they introduce legal uncertainty for foreign suppliers and may undermine broader trade integration goals (Banga *et al.*, 2021). Addressing these challenges will require legal frameworks that are aligned across jurisdictions, supported by institutional capacity, and responsive to the regulatory demands of a growing digital trade environment.

As digital trade expands across Africa, the legal architecture for taxing cross-border business transactions remains anchored in traditional international tax instruments. These include transfer pricing rules, controlled foreign company legislation, thin capitalisation limits, withholding taxes, and anti-treaty shopping provisions (Köhler-Suzuki & Tavengerwei, 2021, 2022). Although these tools are now widely used across AU members, they were not designed with digital business models in mind and reflect legal concepts developed for a territorially fixed industrial economy. Their continued application to digital trade, therefore, raises questions about both conceptual adequacy and regulatory coherence in the region's tax policy responses.

Against this backdrop, the international tax measures embedded in AU members' domestic laws become central, because they remain the main tools states rely on to address profit shifting in cross-border digital activity. Among these measures, transfer pricing rules play the leading role. These rules govern how related parties set prices for cross-border transactions, and they rely on the arm's length principle to stop companies from shifting profits through manipulated internal prices. These rules are the most widely adopted of the mechanisms, and they appear in 32 AU jurisdictions. While some countries, such as Sierra Leone and Morocco, lack formal legislation, general anti-avoidance provisions perform a similar regulatory function. Only five jurisdictions explicitly target low-tax regimes, and just 13 mandate country-by-country reporting. This limited uptake of transparency measures reduces the capacity of tax authorities to detect and challenge profit shifting within highly digitalised MNEs.

While transfer pricing focuses on the prices charged within multinational groups, it does not address situations where profits are shifted entirely out

of the jurisdiction, which is where controlled foreign company rules become relevant. These rules, which define how a country taxes profits that its residents shift into entities they control abroad, are even less common. Only six countries have enacted them, leaving the majority of AU members exposed to aggressive tax planning through offshore entities. This is particularly significant in the digital economy, where profits can be concentrated in low-tax jurisdictions without requiring physical infrastructure.

Alongside these profit-allocation concerns, countries must also contend with base erosion through excessive interest deductions, which is the focus of thin capitalisation rules. These rules define when a company is over-leveraged for tax purposes, and they set limits on interest deductions by using debt-to-equity ratios or similar tests. These rules appear in 25 countries, and the wide variation in thresholds and enforcement lets MNEs push debt into lenient jurisdictions, inflate deductions and erode tax bases.

Beyond these entity-level measures, many jurisdictions rely on withholding taxes and treaty anti-abuse rules to safeguard taxing rights over cross-border payments. Withholding taxes on passive income, such as dividends, royalties, and interest, are near-universal across the AU. However, in the absence of robust anti-abuse clauses in treaty networks, their effectiveness remains limited. The broader adoption of anti-treaty shopping measures through multilateral instruments has also been uneven. Only 12 AU members have signed the OECD Multilateral Instrument (OECD, 2017), and efforts to renegotiate bilateral treaties to include modern anti-abuse language have progressed slowly. These limitations persist despite the centrality of treaty networks in determining taxing rights over cross-border digital payments such as royalties for software, cloud services, or subscription platforms.

What links these instruments is a shared reliance on conventional nexus concepts that assume physical presence or corporate residency. This assumption no longer aligns with the structure of the digital economy. In sectors where economic activity is conducted entirely online and value is created remotely, traditional rules offer a limited legal basis for asserting taxing rights (OECD, 2019). As a result, many of these instruments operate at the periphery of digital regulation and may be more effective in paper than in practice. Without structural reform, reliance on these legacy tools may entrench legal fragmentation and further constrain efforts to build coherent regional frameworks under initiatives such as the AfCFTA.

4. Estimating the fiscal revenue potential of digital services trade in Africa

Digital trade herein denotes cross-border transactions that are either digitally ordered or digitally delivered, in line with the *Handbook on Measuring Digital Trade* (OECD *et al.*, 2023). For the analysis of fiscal revenue potential, two taxable bases can be distinguished. One is value-added tax (VAT) – and, similarly, goods and services tax (GST) – for business-to-consumer (B2C) digitally delivered services. The second is corporate income tax (CIT), which can be levied on the residual profits of multinational digital enterprises under the formula for OECD BEPS Pillar One Amount A,⁵ or as a unilateral Digital Services Tax (DST).

Across Africa, statutory VAT rates average 15 per cent, yet most AU economies lack effective non-resident-supplier registration, leaving digitally delivered imports largely untaxed (Köhler-Suzuki & Tavengerwei, 2021, 2022). CIT exposure is even more limited because nexus tests usually still hinge on physical presence.

To estimate how much revenue AU members could mobilise from indirect taxation on the cross-border supply of digitally delivered services, Köhler-Suzuki and Tavengerwei (2021, 2022) combine data from the WTO's Trade in Services by Mode of Supply (TISMOS) database with statutory consumption-tax schedules.⁶ For potential (direct) CIT revenues under BEPS Pillar One and DSTs, they also examined firm-level financial data from the ORBIS platform.⁷

TISMOS provides a disaggregation of balance-of-payments services flows by mode of supply, which the authors employ to find that the combined imports of digitally delivered services for the 55 members of the AU rose from USD 14 billion in 2005 to USD 37 billion in 2017. Applying sector-specific VAT or GST rates to each country's digital trade imports (after deducting exempt categories such as education and health) yields an AU-wide estimated poten-

5 Amount "A" reallocates taxing rights to eligible jurisdictions: 25 per cent of an in-scope MNE group's residual profit – defined as profit above 10 per cent of global revenue – apportioned across those markets in proportion to the group's sourced revenues. See OECD (2025).

6 World Trade Organization (WTO). *Trade in services by mode of supply dataset*. <https://www.wto.org/english/res_e/statis_e/gstdh_mode_supply_e.htm>.

7 Moody's ORBIS database is a resource for financial information on over 600 million public and private companies globally. It can be accessed at <<https://www.moody.com/web/en/us/capabilities/company-reference-data/orbis.html>>.

tial VAT revenue of USD 2 billion in 2005, rising to just over USD 5 billion by 2017. Expressed relative to domestic tax bases, the implied revenue equals 1-4 per cent of total tax receipts in the median African economy for which relevant fiscal data exist.

For the potential of direct (CIT) taxation, because profit-allocation keys are unavailable at the country level, the authors approximate the African market share of automated-digital-services (ADS) firms as a function of (a) each country's share of global internet users and (b) relative purchasing-power-adjusted GDP per capita.⁸ Under the multilateral BEPS convention, 25 per cent of residual profit above a 10 per cent profit margin is reallocated to market jurisdictions and taxed at the domestic CIT rate. Weighting the global profits of the 25 largest ADS firms in ORBIS by the composite demand proxy yields an estimated USD 980 million in residual profits attributable to the AU member states per year. However, due to the leading role of US technology firms, this amount would likely decrease significantly if the United States remains outside the scope of the agreement.

For comparative purposes, Köhler-Suzuki and Tavengerwei (2021, 2022) simulate a uniform revenue-based DST for the same ADS firms. A 4.2 per cent DST would raise about the same amount (about USD 980 million) as reallocating 25 per cent of residual profit under Pillar One. In contrast, the 2-3 per cent rates enacted or proposed in Kenya, Nigeria, and Zimbabwe would yield less.

Three broad insights follow. First, consumption-tax potential is significantly greater than direct-tax potential: even after allowing for imperfect compliance, VAT on imported digital services could fetch four to five times more revenue than African countries would gain from residual-profit reallocation under the current BEPS design.⁹ Second, the distribution of gains is highly skewed. For most African countries, potential BEPS Pillar One revenues would be 0.01-0.02 per cent of GDP or less than 0.25 per cent of total tax revenue, which raises questions about its salience for meaningful domestic resource mobilisation. Third, the scale of uncollected VAT underscores the importance of non-resident supplier registration, simplified electronic filing and data-sharing protocols.

8 The term “automated digital services” is used in the OECD BEPS process to define businesses that “generate revenue from the provision of automated digital services that are provided on a standardised basis to a large population of customers or users across multiple jurisdictions” (OECD, 2020).

9 Note, however, that indirect and direct tax potential are not mutually exclusive.

5. Size, patterns and fiscal implications of parcel trade in Africa

Parcel trade refers to the exchange of small packages or parcels, both domestically and cross-border, that are typically of low value and weigh up to 31.5 kilograms (López González & Sorescu, 2021). Given the steady increase in cross-border parcel trade in the African region in recent years, it is crucial to understand the regulatory and logistical gaps that impact parcel trade as a key component of digital trade in order to grasp its taxation potential.

Using Universal Postal Union (UPU) data for the 2018-2023 period and proprietary firm-level data from an express shipper operating across Africa, Köhler-Suzuki and Tavengerwei (2024) provide the first continental baseline of volumes, routes and regulatory conditions.

Outbound parcels handled by UPU-designated postal operators fell from 4.3 million in 2018 to 1.7 million in 2020 as COVID-19 disrupted air cargo, then rebounded to 3.1 million in 2023. Inbound flows are far larger: deliveries to African countries peaked around 8 million items in 2019, dipped to 4.5 million in 2020, and surged to 6.8 million in 2023, as supply chains normalised. The aggregate trajectory therefore mirrors global e-commerce cycles, yet with sharper troughs, perhaps owing to Africa's thinner transport connectivity.

According to UPU data, the share of parcels moving within Africa has drastically decreased, from 37 per cent of all outbound items in 2018 to just 4 per cent in 2023. Conversely, extra-regional trade dominates, with the Asia-Pacific and Europe jointly supplying over two-thirds of all parcels delivered to Africa between 2018 and 2023. Notably, Europe overtook Asia as the top origin in 2021. Köhler-Suzuki and Tavengerwei (2024) attribute the intra-regional decline to fragile postal interconnectivity in Africa.

Within Africa, Eastern Africa has been the principal sender and recipient, although Western Africa briefly led in 2021, possibly due to pandemic-induced route shifts. By 2023, Eastern Africa again absorbed 28 per cent of intra-AU parcels, followed by Southern (25 per cent) and Western Africa (23 per cent). These shares reveal substantial heterogeneity in parcel trade activity across AU sub-regions.

Proprietary data from an express shipping firm confirms such route asymmetries: in 2022-23, Nigeria-US traffic accounted for 36 per cent of shipments outside of Sub-Saharan Africa, and the Nigeria-UK corridor rose from 11 per

cent to 17 per cent. Such concentration may underscore the role of diaspora communities in shaping parcel flows.

Köhler-Suzuki and Tavengerwei (2024) could only sketch the goods traded in parcels because current UPU data lack detail. The proprietary firm-level data obtained indicate a dominance of fashion goods, cosmetics and agro-products.¹⁰

This evidence is directly relevant to revenue mobilisation, as the increase in parcel trade implies a widening VAT base – much of which likely escapes collection because foreign sellers are rarely VAT-registered and many parcels may clear under *de minimis* thresholds.

6. Proposed key areas for a future research agenda

Future research should first close the foundational measurement gap of digital trade identified above. First and foremost, national statistics offices across the AU need to generate more timely digital-trade series based on the definitions established in the *Handbook for Measuring Digital Trade* (OECD *et al.*, 2023). Second, new data sources need to be explored creatively. For the AU, this could include micro-level data from mobile-money platforms, which are ubiquitous across the AU, that can be anonymised and aggregated to capture intra-continental digital payments correlated with digital trade activities. Third, UPU parcel records, now restricted to operators, must be systematically supplemented with proprietary firm-level data from express shipping firms to map low-value merchandise flows. Finally, triangulating these sources with actual VAT and CIT receipts will permit an evaluation of reform options and reveal where domestic revenue mobilisation could be improved.

Future research on the taxation of digital trade in Africa should respond to these conceptual and empirical gaps. Much of the current work remains either doctrinal or policy-oriented, with limited comparative analysis of how national tax laws engage with cross-border digital transactions. There is a need for deeper inquiry into how African countries can design tax systems that are legally coherent across jurisdictions, administratively feasible, and tailored to

10 Mandatory Electronic Advance Data (EAD) requirements that were jointly developed by the UPU, the World Customs Organization (WCO) and the International Civil Aviation Organization (ICAO) should close this information gap in the coming years. For detailed information, see <<https://www.upu.int/en/postal-solutions/programmes-services/postal-supply-chain/postal-supply-chain-integration>>.

digital economic activity.

The AfCFTA offers a distinctive institutional setting for examining legal convergence, particularly in how African states tax non-resident digital service providers. Future research should therefore evaluate not only how existing VAT and digital services tax regimes perform, but also whether alternative tax models are more suitable for the digital economy. This includes models that abandon traditional nexus and source rules in favour of approaches that link taxing rights to economic reality. Comparative legal analysis of regional adaptations, such as allocating taxing rights based on the location of users or applying simple revenue-based thresholds to establish tax liability, could help policy-makers design digital tax systems that are fairer, easier to administer, and better aligned with Africa's economic and administrative capacities.

Realising the fiscal potential of digital trade in Africa requires coordinated action. National statistics offices, customs and tax authorities must partner with mobile-money providers, platforms, the UPU and express carriers to build a better evidence base. Regional bodies – above all, the AU Commission and AfCFTA Secretariat – should drive the rollout of standardised, non-resident VAT policies and the integration of electronic advance data for parcels. Such initiatives could lead to long-term budgetary gains and underpin the continent's broader financing-for-development agenda.

7. Conclusion

Africa's digital trade is rapidly expanding, yet current tax systems capture only a fraction of the associated revenue. This chapter shows that destination-based VAT on digitally delivered services could yield multiple times the prospective corporate tax receipts under the OECD BEPS system – on life support at the time of writing – while parcel trade flows represent a rapidly expanding but largely unmonitored and untapped VAT base.

The legal analysis presented in this chapter reveals fragmented nexus rules and uneven enforcement capacity, all of which depress the potential of domestic revenue mobilisation. While the digital economy is already subject to various forms of taxation across AU members, there is no uniform approach to DSTs, and significant variation exists in the scope, implementation, and enforcement of digital tax measures. The fragmented regulatory landscape, characterised by differing definitions of digital services, uneven adoption of VAT and direct taxes, and inconsistent treatment of non-resident MNEs, underscores the need

for more precise and more coordinated policy approaches.

Perhaps most importantly, the decline in intra-AU parcel trade and the continued dependence on extra-regional markets point to the urgency of harmonising digital trade regulations to unlock the full potential of Africa's digital and e-commerce sectors and facilitate domestic resource mobilisation.

References

- Banga, K., Gharib, M., Mendez-Parra, M., & Macleod, J. (2021). *E-commerce in preferential trade agreements: Implications for African firms and the AfCFTA*. London, England: ODI. Retrieved from https://cdn.odi.org/media/documents/e-commerce_in_preferential_trade_agreements_report.pdf
- Banga, K., Beyleveld, A., & Munu, M. L. (2025). Trading away tax sovereignty? How trade rules shape taxation of the digital economy in Africa. *Journal of International Economic Law*, 28(1), 43–62. <https://doi.org/10.1093/jiel/jgaf004>
- International Monetary Fund (IMF) & World Bank. (2024). *Stepping up domestic resource mobilization: A new joint initiative from the IMF and WB* (G20 note). Washington, DC: World Bank. Retrieved from <https://www.imf.org/-/media/Files/Research/imf-and-g20/2024/domestic-resource-mobilization.pdf>
- Karnosh, K. E. (2021). The application of international tax treaties to digital services taxes. *Chicago Journal of International Law*, 21(2), 513–547. Retrieved from <https://chicagounbound.uchicago.edu/cjil/vol21/iss2/8/>
- Kartal, S. (2023). *Is the DST a coherent response to taxing digital services under international obligations and norms? Comparative analysis of DSTs enacted in the United Kingdom and Türkiye* (Doctoral thesis, University of Exeter). <https://hdl.handle.net/10871/139644>
- Kelbesa, M. (2020). *Digital service taxes and their application* (K4D Helpdesk Report 914). Brighton, England: Institute of Development Studies. <https://hdl.handle.net/20.500.12413/16968>
- Köhler-Suzuki, N., & Tavengerwei, R. (2021). *The fiscal impact of cross-border e-commerce in the African Union*. Report prepared for the African Union Commission. <https://doi.org/10.13140/RG.2.2.35736.72968>
- Köhler-Suzuki, N., & Tavengerwei, R. (2022). *Revised estimates on the fiscal impact of cross-border e-commerce in the African Union* (Unpublished report). African Union Commission.
- Köhler-Suzuki, N., & Tavengerwei, R. (2024). *Parcel trade in the African Union: Estimating the size and scope* (Unpublished report). African Union Commission.
- Kuhlmann, K., & Francis, T. (2024). *The “MSME moratorium.” Stories from MSMEs in South Africa and Kenya on the WTO moratorium on customs duties on electronic transmissions*. SSRN. <https://doi.org/10.2139/ssrn.4723285>

- López González, J., & Sorescu, S. (2021). *Trade in the time of parcels* (OECD Trade Policy Papers, No. 249). Paris, France: OECD Publishing. <https://doi.org/10.1787/0faac348-en>
- Magwape, M. (2022). Debate: Unilateral digital services tax in Africa; Legislative challenges and opportunities. *Intertax*, 50(5), 444–458. <https://doi.org/10.54648/taxi2022039>
- Mpofu, F. Y., & Moloi, T. (2022). Direct digital services taxes in Africa and the canons of taxation. *Laws*, 11(4), 57. <https://doi.org/10.3390/laws11040057>
- Organisation for Economic Co-operation and Development (OECD), International Monetary Fund (IMF), United Nations Conference on Trade and Development (UNCTAD), & World Trade Organization (WTO). (2023). *Handbook on Measuring Digital Trade* (2nd ed.). Paris, France: OECD Publishing. <https://doi.org/10.1787/ac99e6d3-en>
- Organisation for Economic Co-operation and Development (OECD). (2017). *Multilateral Convention to Implement Tax Treaty Related Measures to Prevent Base Erosion and Profit Shifting*. Paris, France: OECD. Retrieved from <https://www.oecd.org/content/dam/oecd/en/topics/policy-sub-issues/beps-mli/multilateral-convention-to-implement-tax-treaty-related-measures-to-prevent-beps.pdf>
- Organisation for Economic Co-operation and Development (OECD). (2019). *Addressing the Tax Challenges of the Digitalisation of the Economy – Policy Note*. Paris, France: OECD. Retrieved from <https://www.oecd.org/content/dam/oecd/en/topics/policy-issues/cross-border-and-international-tax/policy-note-beps-inclusive-framework-addressing-tax-challenges-digitalisation.pdf>
- Organisation for Economic Co-operation and Development (OECD). (2020). *Statement by the OECD/G20 Inclusive Framework on BEPS on the Two-Pillar Approach to Address the Tax Challenges Arising from the Digitalisation of the Economy – January 2020*. Paris, France: OECD. Retrieved from <https://www.oecd.org/content/dam/oecd/en/topics/policy-issues/beps/statement-by-the-oecd-g20-inclusive-framework-on-beps-january-2020.pdf>
- Organisation for Economic Co-operation and Development (OECD). (2025). *Signatories and parties to the Multilateral Convention to Implement Tax Treaty Related Measures to Prevent Base Erosion and Profit Shifting*. Paris, France: OECD. Retrieved from <https://www.oecd.org/content/dam/oecd/en/topics/policy-sub-issues/beps-mli/beps-mli-signatories-and-parties.pdf>
- Pirlot, A., & Culot, H. (2021). When international trade law meets tax policy: The example of digital services taxes. *Journal of World Trade*, 55(6), 895–920. <https://doi.org/10.54648/trad2021038>

- Smith, C. L. (2022). Reflections from the brink of tax warfare: Developing countries, digital services taxes, and an opportunity for more just global governance with the OECD's two-pillar solution. *Boston College Law Review*, 63(5), 1797–1861. Retrieved from <https://bclawreview.bc.edu/articles/34>
- The White House. (2025). *The Organization for Economic Co-operation and Development (OECD) Global Tax Deal (Global Tax Deal)*. Retrieved from <https://www.whitehouse.gov/presidential-actions/2025/01/the-organization-for-economic-co-operation-and-development-oecd-global-tax-deal-global-tax-deal/>
- United Nations (UN). (2015). *Addis Ababa Action Agenda of the Third International Conference on Financing for Development (Addis Ababa Action Agenda)* (A/RES/69/313). Retrieved from https://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA_Outcome.pdf
- United Nations (UN), Inter-agency Task Force on Financing for Development (IATF). (2019). *Financing for sustainable development report 2019*. New York, NY: United Nations. Retrieved from <https://desapublications.un.org/publications/financing-sustainable-development-report-2019>
- United Nations (UN). (2025). *Sevilla Commitment: Outcome document adopted at the Fourth International Conference on Financing for Development, Sevilla, Spain, 30 June–3 July 2025* (A/CONF.227/2025/L.1). Retrieved from https://financing.desa.un.org/sites/default/files/2025-08/FFD4%20Outcome%20Booklet%20v4_EN%20-%20spread.pdf
- World Bank & World Trade Organization (WTO). (2023). *Turning digital trade into a catalyst for African development* (Joint WBG–WTO policy note). Washington, DC: World Bank. Retrieved from https://www.wto.org/english/thewto_e/minist_e/mc13_e/policy_note_digital_trade_africa_e.pdf

Gender, ICT skills and digital trade in Africa

Emmanuel Orkoh

1. Introduction

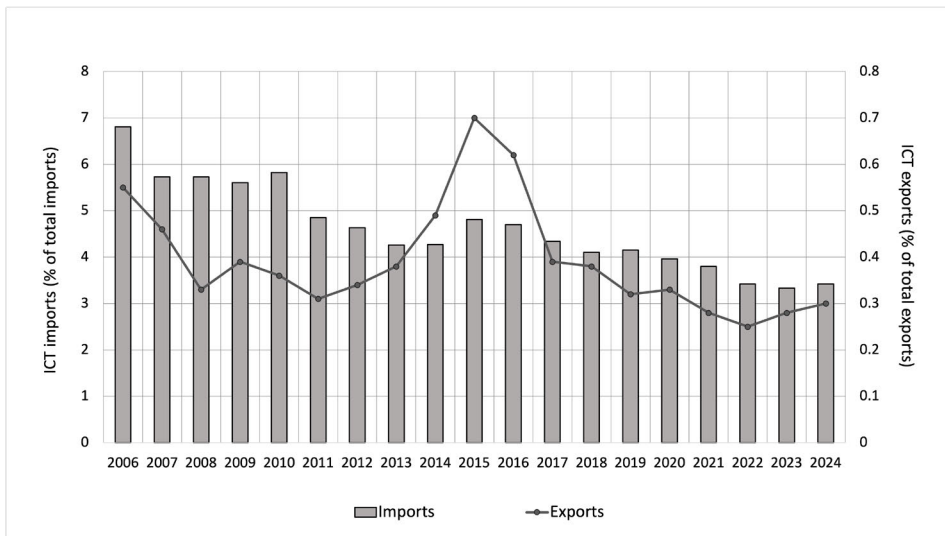
The rise of digital trade has significantly transformed societies and economies, offering new opportunities and presenting unique challenges. Digital trade enables broader economic participation, fosters entrepreneurship by reducing barriers to market entry (Xia *et al.*, 2024), and offers significant opportunities to expand and make trade more inclusive (Orkoh & Teh, 2025). It can enable Africa to increase exports to existing markets, access new ones, diversify its export base, enhance competitiveness, and promote the participation of small businesses, women, and youth in trade (WTO & World Bank, 2024). Recent estimates indicate that digital trade accounts for nearly 25 per cent of global trade – just under USD 5 trillion – with digitally deliverable trade being the fastest-growing segment (OECD, 2023).

Africa has the lowest proportion of its population engaged in digital trade, with only 30 per cent participating in e-commerce activities in 2019 compared to 45 per cent in South America and 50 per cent in Asia (Lemma *et al.*, 2022). Africa's business-to-consumer (B2C) e-commerce score¹ was 30 in 2020, compared to 49 in Latin America and the Caribbean, 57 in East, South

1 The UNCTAD B2C E-commerce Index measures an economy's readiness for online shopping and is calculated as the unweighted average of four indicators – account ownership, internet use, postal reliability, and secure servers – using data from 2019 or the latest available year, with sources including the World Bank, International Telecommunication Union (ITU), and Universal Postal Union (UPU) (UNCTAD, 2021).

and Southeast Asia, and 58 in Western Asia (UNCTAD, 2021). In 2019, B2C generated only USD 22 billion in turnover, compared with Asia's USD 1,100 billion, while digitally delivered services in Africa totalled USD 30 billion, far below Asia's USD 790 billion (Lemma *et al.*, 2022). Although digital trade in Africa is expanding rapidly and outpacing other forms of trade, the continent still accounts for less than 1 per cent of global exports of digitally delivered services (WTO & World Bank, 2024). This trend also applies to ICT goods (Figure 1). ICT goods exports as a share of total exports of Sub-Saharan Africa (SSA) have consistently decreased from 0.5 per cent in 2006 to approximately 0.3 per cent in 2024, while imports' share decreased from approximately 7 per cent to 3 per cent in the same period.

Figure 1: SSA's ICT goods export and import trends (2006-2024).



Source: Author based on data from UNCTADstat Data Centre, retrieved on 20 February 2026 from <<https://unctadstat.unctad.org/datacentre/>>.

The internet has become the backbone of international trade, enabling transactions across all levels from informal exchanges to large-scale agreements, via email, e-commerce platforms, and digital marketplaces. Today, most formal trade activities rely on digital infrastructure to manage financing, documentation, and logistics. These are underpinned by digital skills,² which are essential

² Digital skills can be described as the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately using digital technologies for purposes such as employment, decent work, and entrepreneurship (World Bank, 2023).

for effective participation in global trade. However, many African economies risk being left behind due to limited digital capacity, exacerbating the digital divide both between and within African countries (Stuart, 2024). Estimates suggest that in 2022, African countries recorded scores ranging from 1.8 to 5 on the Digital Skills Gap Index, falling below the global average of 6.³ Among the 20 countries with the weakest digital skills worldwide, 12 are located in Africa (Dupoux *et al.*, 2022). Moreover, only 11 per cent of tertiary education graduates in Africa have received formal digital training, underscoring a significant shortage of digital skills across the continent – particularly at the intermediate and advanced levels. Approximately 65 per cent of employment opportunities in Sub-Saharan Africa require at least a basic level of digital skills (Feijao *et al.*, 2021). As African economies grow, digital skills will become increasingly essential, as their absence could hinder the effective adoption of technologies crucial for realising the full potential of digital trade (World Bank, 2023).

This lack of digitally skilled labour force in Africa could be compounded by the observed persistence of a marked digital gender divide,⁴ which has been a key concern of policymakers and scholars over the past decade (Orkoh & Viviers, 2021). This gender divide may have profound implications for women's entrepreneurship and their ability to fully benefit from digital trade, raising concerns about its potential to deepen existing economic inequalities in Africa (Mastercard, 2020). Despite this documented evidence, there is limited research on how gender intersects with the nexus between ICT skills and digital trade, especially in Africa. This chapter provides a concise overview of the current state of knowledge on digital trade, ICT skills and gender in Africa, highlighting key research gaps and outlining priority areas for future research and policy action.

2. The state-of-the-art

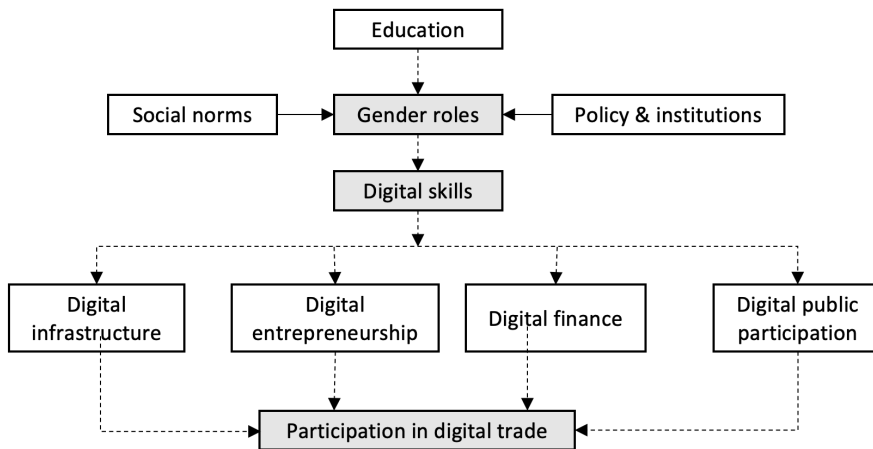
Figure 2 illustrates a conceptualisation of the key literature at the intersection of digital trade, ICT skills and gender, structured around three interrelated themes: the relationship between ICT skills and gender, the link between ICT skills and digital trade, and the connection between digital trade and

3 The Digital Skills Gap Index ranges approximately from 1 to 10, where higher scores indicate stronger digital skills capacity and smaller gaps relative to global standards (Dupoux *et al.*, 2022).

4 The gender digital divide refers to disparities between men and women in access to and use of information and communication technologies (Çılan *et al.*, 2009).

gender. The digital economy comprises five key dimensions: digital infrastructure, digital entrepreneurship, digital finance, digital public participation, and digital skills (Bhorat *et al.*, 2023). This chapter focuses on digital skills and their relationship with digital trade, as they are the fundamental requirement for the effective functioning of the other four dimensions. Education quality, social norms, policies, and institutions shape gender roles, which influence the acquisition of digital skills by males and females. The effect of digital skills on digital trade is mediated by the other four dimensions of the digital economy.

Figure 2: Conceptual nexus between gender, ICT skills, and digital trade.



Source: Author's construct, adapted from Bhorat *et al.* (2023).

2.1 ICT skills and gender

The gender gap in ICT skills⁵ across Africa remains a pressing concern, particularly given the increasing centrality of digital competencies in education, employment, and broader economic development. Despite a growing body of research that highlights the benefits of digital inclusion, women and girls continue to face structural, socio-cultural, and psychological barriers that limit their engagement with ICT (van Deursen *et al.*, 2023).

One of the core challenges is unequal access to digital tools and learning environments. In many African contexts, male students report significantly higher levels of interaction with e-learning platforms and ICT resources

⁵ The gender gap in ICT skills denotes systematic differences between men and women in their levels of digital literacy and technical competence in information and communication technologies (Antonio & Tuffley, 2014; Bipasha *et al.*, 2025).

compared to their female peers. For instance, a study on distance learners in Tanzania revealed a notable gender gap in usage, with male learners demonstrating significantly greater engagement, partly due to increased familiarity and confidence with digital platforms (Adams *et al.*, 2024). This disparity is not solely a matter of physical access but also about experience with and confidence in using technology – areas in which female students are often at a disadvantage.

Attitudinal and psychological factors further reinforce this gap. Research among technical university students in Ghana found that male students exhibited stronger ICT self-efficacy⁶ and more positive attitudes toward digital technologies, which in turn contributed to greater usage and engagement (Asare *et al.*, 2023; Mensah *et al.*, 2023). In contrast, female learners were more likely to underestimate their digital skills, a phenomenon shaped by gender norms and stereotypes that suggest technological competence is a male domain. Such internalised perceptions often result in reduced motivation and limited use of ICT tools, even when access is available.

However, the assumption that boys are inherently more skilled in ICT is increasingly being contested. Another strand of the literature on ICT literacy found that girls slightly outperformed boys in performance-based assessments, particularly in primary school settings. Although the difference was modest, it suggests that when girls are exposed to structured digital learning environments early on, they are equally capable of developing strong ICT skills (Siddiq & Scherer, 2019). This challenges the prevailing narrative that boys are naturally more digitally inclined and underscores the importance of early intervention and skill-building among girls.

Further complicating the landscape are socio-cultural norms and economic disparities that constrain girls' engagement with ICT. A review of studies across Africa emphasised that gender roles, limited household resources, and societal expectations often prioritise boys' use of technology while discouraging girls from pursuing digital learning opportunities (Founou *et al.*, 2023). Yet, when given the opportunity, girls frequently outperform boys in more advanced ICT tasks, indicating that the gender gap stems more from unequal opportunities than from a lack of ability (Remi-Aworemi, 2023). Studies in Ghana, Nigeria and Kenya suggest that gendered digital inequalities stem not from a

6 ICT self-efficacy refers to an individual's belief in their own capability to effectively use information and communication technologies – such as computers, the internet, and digital applications – to organize, execute, and complete tasks required to achieve specific goals.

lack of ability among girls but from attitudinal, cultural, and structural barriers that limit their access, confidence, and sustained engagement with digital tools (Mensah *et al.*, 2023).

Finally, the broader societal context plays a decisive role in shaping these outcomes. A cross-national study that included several African countries found that in more gender-equal societies, girls often outperform boys in digital knowledge and skills. Conversely, in regions with high levels of gender inequality, boys are more likely to excel. The findings reinforce the importance of addressing gender inequality beyond the education sector (van Deursen *et al.*, 2023).

Recognising the urgency to equip women and girls in Africa with the skills needed to thrive in this digital economy, several impactful initiatives have emerged. One such effort is the Connected African Girls Coding Camp by the United Nations Economic Commission for Africa (UN-ECA), a hybrid training program designed to empower young women with essential digital competencies (UN-ECA, 2021, 2023). Through hands-on learning in basic coding, robotics, gaming, 3D animation, and web design, the program has reached over 35,000 girls across seven countries: Ethiopia, Senegal, Guinea, Cameroon, Namibia, Tanzania, and Niger.⁷

Building on the momentum of digital empowerment, the Tech African Women (TAW) program focuses on nurturing the next generation of female tech entrepreneurs (UNESCO, 2024). Powered by UN-ECA and implemented by Betacube, TAW supports women in transforming ideas into viable tech startups. Through intensive three-day boot camps, a two-month online incubation for top teams, and a final pitching ceremony in Ethiopia, participants gain the tools, mentorship, and seed funding necessary to bring their innovations to life. The program has made significant strides in Ethiopia, Senegal, Tanzania, and Tunisia. Together, these initiatives are laying the foundation for a more inclusive digital future – one where African women are not just participants but leaders in the digital economy.

2.2 ICT skills and digital trade

The literature on ICT skills and digital trade consistently highlights that ICT skills play a foundational role in enabling digital trade across Africa. These

7 UN Office of the Special Adviser on Africa (UN-OSAA). (13 May 2024). *Shaping Tomorrow: The Journey of the Connected African Girls Coding Camp Across Africa* (Video). YouTube <<https://www.youtube.com/watch?v=9GWnITXYsYs>>.

skills empower individuals and businesses to effectively engage with digital platforms, drive participation in e-commerce, and expand access to local and international markets (Mhlongo *et al.*, 2024; Mutula & Van Brakel, 2007). Improved ICT competencies also foster innovation and entrepreneurship, particularly among micro, small, and medium-sized enterprises (MSMEs), contributing to inclusive economic growth and industrial development (Madhav, 2024; Mhlongo *et al.*, 2024).

At the same time, a persistent gap in ICT skills is a recurring theme, acting as a significant barrier to the expansion of digital trade in Africa. The lack of technical expertise hampers the implementation of ICT-enabled systems, raises trade costs, and limits Africa's competitiveness in regional and global markets (Ndonga, 2012; Souter *et al.*, 2014). This digital divide is particularly pronounced in underserved regions, where limited ICT literacy restricts both e-commerce adoption and broader economic participation (Fafunwa & Odufuwa, 2022; Moses, 2023).

In contrast, regions with more developed ICT skills tend to exhibit better outcomes in digital trade. Countries with more digitally skilled workforces, such as South Africa, Kenya and Rwanda, show stronger engagement in e-commerce compared to those with lower digital literacy, like Mozambique and Côte d'Ivoire (Bhorat *et al.*, 2023). ICT capabilities enhance operational efficiency, facilitate business-government interactions, and promote access to global markets, thereby fostering competitive advantage and social inclusion (Thompson & Walsham, 2010; Kamel, 2018).

Moreover, extant literature has focused on the strategic importance of ICT skills in supporting broader policy goals, particularly in the context of regional integration under the African Continental Free Trade Area (AfCFTA). While some papers do not directly examine ICT skills, they highlight the relevance of digital empowerment and policy reforms in maximising the benefits of digital trade (Adams *et al.*, 2024; Bello *et al.*, 2025). In this regard, digital skills are not only tools for economic empowerment but also critical enablers of sustainable development and digital sovereignty (Bashir & Daniels, 2022).

The literature calls for more comprehensive research and investment in digital capacity building. This includes digital upskilling, infrastructure development, and institutional support to enable effective engagement in the digital economy (Fafunwa & Odufuwa, 2022; Mhlongo *et al.*, 2024). Bridging the ICT skills gap is thus essential for creating a user-friendly digital landscape,

enhancing connectivity, and unlocking Africa's full potential in digital trade.

2.3 Digital trade and gender

While there is substantial literature on the gendered dimensions of trade (Fofana *et al.*, 2019; Fosu *et al.*, 2024; Orkoh *et al.*, 2022; Wamboye & Seguino, 2015), research specifically examining the intersection of digital trade and gender remains limited, largely due to the lack of gender-disaggregated data in this area and the absence of a comprehensive, continent-wide gender-responsive regulatory framework governing digital trade and national literacy policies (Domingo *et al.*, 2024).

Nonetheless, emerging evidence highlights the transformative potential of digital platforms, with a recent study showing that social media has become the main e-commerce channel for many MSMEs in six African countries. Among those surveyed, 60 per cent of micro, 49 per cent of small, and 33 per cent of medium-sized enterprises rely exclusively on social media for online business. These platforms are significantly boosting women's participation in digital trade across Africa (Komminoth, 2023). Initiatives such as Shop Soko, Anka, SheTrades, and M-Farm are helping women entrepreneurs overcome structural barriers by providing access to markets, financial tools, digital infrastructure, and business intelligence. These platforms are fostering greater inclusion, enabling women to engage competitively in both local and international markets (Ugwu, 2024).

However, the existing literature also underscores the deep-rooted challenges African women face in this space, including limited access to technology, socio-economic constraints, educational gaps, gender-based discrimination, and regulatory obstacles. Women are less likely to own digital devices, tend to earn lower incomes, and often lack the education or support networks needed to succeed in digital trade (World Bank, 2023). Cultural norms and inadequate infrastructure further restrict their opportunities. Additionally, many digital trade policies remain gender-neutral or gender-blind, failing to address the specific barriers women encounter in e-commerce (Viilup, 2015).

A recent study of five countries (Egypt, Tunisia, Ghana, Tanzania, and South Africa) across 18 platforms in four sectors (ride-hailing, delivery, professional, and microtask) reveals key insights (Mehdar *et al.*, 2025). Men and women face similar structural issues, such as the lack of contracts, weak social protection, and algorithmic control, but broader inequalities shape different outcomes. Women often enter platform work out of necessity, facing greater

precarity and dependence due to exclusion from formal jobs. Despite higher average educational levels, they earn less than men, mainly because unpaid care responsibilities limit their working hours, thereby undermining the promise of flexibility. Platforms also rarely reward qualifications, further disconnecting education from income. Though overt discrimination is rare, subtle gender biases like unfair complaints and cancellations persist. Ultimately, digital platforms, though seemingly neutral, often reinforce existing gender inequalities.

It is evident from the literature that the digital gender trade divide extends beyond access and usage to include meaningful participation, such as tech entrepreneurship, online economic gains, and leadership roles. Persistent gender imbalances in ICT ministries, regulatory bodies, and trade negotiation teams highlight deep-rooted disparities across all levels of digital trade policy and governance. Addressing these challenges requires coordinated action from governments, the private sector, and civil society to expand digital access, invest in targeted skills development, and implement gender-responsive regulatory frameworks.

3. Key research gaps

A critical review of the literature reveals significant research and policy gaps in digital trade, ICT skills and gender. Despite growing awareness of the gender gap in digital skills, there is still limited empirical analysis exploring why these disparities persist across Africa. Much of the existing research falls short in addressing the psychological and attitudinal barriers – such as low self-efficacy and entrenched gender stereotypes – that hinder girls' engagement with digital tools and platforms. Additionally, there is a noticeable lack of longitudinal studies assessing the long-term impact of early digital interventions on girls' learning trajectories and professional outcomes.

Existing studies are largely descriptive, often focusing on the potential benefits of digital platforms for women's participation rather than providing rigorous, data-driven analysis. This gap is primarily attributed to the lack of gender-disaggregated data, which limits the ability to assess how digital trade affects men and women differently.

The relationship between ICT skills and digital trade participation remains under-researched. There is a scarcity of studies that quantitatively assess how variations in digital competencies affect trade outcomes across different African

contexts. Similarly, there is minimal research on how disparities in ICT skills contribute to unequal participation in e-commerce and other digital trade activities, particularly among marginalised groups.

There is a notable lack of empirical research examining how digital trade impacts women differently from men. The absence of gender-disaggregated data continues to hinder rigorous, evidence-based analysis and policy development in this area. Most available insights are drawn from anecdotal or descriptive accounts, which, while valuable, do not provide a sufficient basis for targeted interventions or structural change.

Currently, there is limited literature on the measurement and analysis of digital skills. Existing efforts have primarily relied on proxy indicators such as school enrolment rates, average years of schooling, and internet access in schools (Bhorat *et al.*, 2023). These proxies are based on the implicit assumption that they are positively correlated with the ICT and digital skills necessary for the effective use of digital technologies and platforms. They are also insufficient in capturing actual digital competencies, particularly for younger populations in Africa and other developing regions, where informal digital skills often emerge outside traditional educational systems.

Many studies conflate digital literacy, the basic use of digital tools, with digital trade skills, which involve advanced competencies for engaging in e-commerce, cross-border services, and data governance. These are distinct skill sets with different indicators and policy implications, yet most research focuses only on digital literacy, overlooking the capabilities needed for effective participation in digital trade.

4. Areas for future research consideration

Based on these research gaps, several key areas emerge as priorities for future inquiry into the intersections of digital trade, ICT skills, and gender in Africa.

First, there is a pressing need for empirical studies that unpack the root causes of gender disparities in ICT skills, particularly those that investigate the psychological and attitudinal barriers impeding girls' and women's engagement with digital technologies. Future research should delve into how self-efficacy, social norms, and stereotypes influence digital literacy and confidence levels among different gender groups. Such studies would benefit from both qualitative and quantitative methodologies to capture the nuanced experiences

shaping digital inclusion.

Second, longitudinal research tracking the effects of early digital interventions on girls' educational and professional outcomes is crucial. While short-term training initiatives show promise, their long-term impact remains unclear. Longitudinal studies would provide insight into how sustained digital exposure shapes trajectories in education, employment, and entrepreneurship, and whether these effects differ by gender.

Third, scholars should prioritise generating and analysing gender-disaggregated data to enable more robust and granular assessments of how digital trade affects men and women differently. Without such data, the development of effective, inclusive policies remains severely constrained. Future research should work in tandem with national statistics offices and digital platforms to promote systematic data collection practices that capture gendered dimensions of participation.

Fourth, there is a need for quantitative analysis of the impact of ICT skills on digital trade outcomes, particularly within African regional contexts. Such research should explore how digital literacy influences engagement in e-commerce, cross-border trade, and digital entrepreneurship. Moreover, understanding how ICT skill gaps contribute to broader digital divides would help policymakers design more targeted digital capacity-building programs.

Future studies should investigate the intersectional dynamics of digital exclusion, looking beyond gender alone to consider how factors such as geography, age, income, and education interact with digital trade participation. Exploring how marginalised women in rural areas, for example, navigate digital economies could offer deeper insights into the structural and systemic barriers that limit inclusive growth.

Beyond these factors, there is a pressing need for scholars to focus on the conceptualisation and measurement of digital skills, particularly within the context of African countries. This should be done without prioritising “hard skills” such as operating computers, installing software, coding and creating online content at the expense of “soft skills”,⁸ including internet and media literacy, the ability to navigate e-services, appropriate online social behaviour as well the creativity and resilience, which are required to meet the challenges of the digital era, especially in digital trade (Ballerini *et al.*, 2024). Both skills

8 Hard digital skills are measurable and acquired through training or experience, while soft digital skills are transferable attributes that guide the effective use of digital technologies and support collaboration and digital adaptation.

are essential at a whole-of-society level, from schoolchildren to formal and informal workers (Domingo *et al.*, 2024). Future research should examine how gender-based skill gaps develop from early education and influence participation in digital trade. A clear theory of change is needed to guide this work – one that connects school-level interventions to long-term outcomes, tested through rigorous randomised control trials (RCTs) to identify effective strategies for promoting gender inclusion in digital skills.

5. Conclusion

This chapter explores the intersection of digital trade, ICT skills, and gender in Africa, identifying key research and policy gaps that hinder women's full participation in the digital economy. It highlights significant barriers, including gender-based disparities in ICT skills and socio-cultural factors limiting women's engagement with digital technologies, and the lack of gender-disaggregated data on digital trade outcomes. A key insight from the discussion is that addressing these gaps through targeted research and data collection is crucial for developing inclusive policies that promote women's participation in digital trade. Without bridging these gaps, the potential of digital trade to foster inclusive economic growth in Africa will remain untapped.

References

- Adams, K., Attah-Boakye, R., Yu, H., Chu, I., & Mali, D. (2024). African Continental Free Trade Area and regional trade in ICT and digital technologies. *Journal of International Management*, 30(4), 101156. <https://doi.org/10.1016/j.intman.2024.101156>
- Antonio, A., & Tuffley, D. (2014). The gender digital divide in developing countries. *Future Internet*, 6(4), 673–687. <https://doi.org/10.3390/fi6040673>
- Asare, S., Emmanuel, M. K., Dankwah, E. A., & Eric, A.-M. (2023). ICT integration in teaching and learning: Perceptions and practices in Ghanaian college of education. *International Journal of Educational Technology and Learning*, 14(2), 7–15. <https://doi.org/10.55217/101.v14i2.668>
- Ballerini, V., Dominici, A., Ferracane, M. F., Menchetti, F., Noirjean, S. (2024). Stimulating creativity and grit of high school students with creative STEM activities: An RCT with noncompliance. *Quality & Quantity*, 59(Suppl 1), 605–634. <https://doi.org/10.1007/s11135-024-01992-w>
- Bashir, S., & Daniels, C. (2022). Digital skills in Africa: Prospects for AU–EU collaboration. In C. Daniels, B. Erforth, & C. Teevan (Eds.), *Africa–Europe cooperation and digital transformation* (pp. 184–198). Routledge. <https://doi.org/10.4324/9781003274322>
- Bello, A. A., Hassan, A., Akadiri, S. S., et al. (2025). Towards ICT diffusion and trade liberalisation on inclusive growth in Sub-Saharan Africa. *Environment, Development and Sustainability*, 27, 11221–11246. <https://doi.org/10.1007/s10668-023-04355-x>
- Bhorat, H., Signé, L., Asmal, Z., Monnakgotla, J., & Rooney, C. (2023). *Digitalization and digital skills gaps in Africa: An empirical profile*. Brookings. Retrieved from <https://www.brookings.edu/articles/digitalization-and-digital-skills-gaps-in-africa-an-empirical-profile/>
- Bipasha, N. J., Islam, M. S., & Bhuyan, M. M. (2025). Bridging the digital gender divide: Is digital literacy truly an equalizer for female students across different demographic factors? *Digital Library Perspectives*, 41(3), 497–517. <https://doi.org/10.1108/DLP-11-2024-0178>
- Çilan, Ç. A., Bolat, B. A., & Coşkun, E. (2009). Analyzing digital divide within and between member and candidate countries of European Union. *Government Information Quarterly*, 26(1), 98–105. <https://doi.org/10.1016/j.giq.2007.11.002>
- Domingo, E., Muscat, S., Arnold, S., Salzinger, M., & Chetty, P. (2024). *The geopolitics of digital literacy and skills cooperation with Africa* (ECDPM Discussion Paper No. 369). Maastricht, The Netherlands: ECDPM. Retrieved from <https://ecdpm.org/application/>

[files/8717/1921/9245/The-geopolitics-digital-literacy-skills-cooperation-with-Africa-ECDPM-Discussion-Paper-369-2024.pdf](https://www.bcg.com/publications/2022/africas-opportunity-in-digital-skills)

- Dupoux, P., Dhanani, Q., Oyekan, T., Rafiq, S., & Yearwood, K. (2022). *Africa's opportunity in digital skills and climate analytics*. Boston Consulting Group (BCG). Retrieved from <https://www.bcg.com/publications/2022/africas-opportunity-in-digital-skills>
- Fafunwa, T., & Odufuwa, F. (2022). African micro, small, and medium enterprises need to digitally transform to benefit from the Africa Continental Free Trade Area (AfCFTA). In C. Daniels, B. Erforth, & C. Teevan (Eds.), *Africa–Europe cooperation and digital transformation* (pp. 66–82). Routledge. <https://doi.org/10.4324/9781003274322>
- Feijao, C., Flanagan, I., Van Stolk, C., & Gunashekar, S. (2021). *The global digital skills gap: Current trends and future directions*. Santa Monica, CA: RAND Corporation. <https://doi.org/10.7249/RR.A1533-1>
- Fofana, I., Odjo, S. P., & Traore, F. (2019). Gender and trade in Africa: Case study of Niger. In A. Quisumbing, R. Meinzen-Dick, & J. Njuki (Eds.), *Gender equality in rural Africa: From commitments to outcomes* (ReSAKSS 2019 Annual Trends and Outlook Report). Washington, DC: International Food Policy Research Institute. <https://doi.org/10.2499/9780896293649>
- Fosu, M. A. F., Songwe, V., & Abor, J. Y. (2024). Gender and trade in Africa. In M. K. Ocran & J. Y. Abor (Eds.), *The Palgrave handbook of international trade and development in Africa*. Palgrave Macmillan. https://doi.org/10.1007/978-3-031-65715-3_20
- Founou, L. L., Yamba, K., Kouamou, V., Asare Yeboah, E. E., Saidy, B., Jawara, L. A., B., H., Sambe Ba, B., Kamweli Aworh, M., & Darboe, S. (2023). African women in science and development, bridging the gender gap. *World Development Perspectives*, 31, 100528. <https://doi.org/10.1016/j.wdp.2023.100528>
- Kamel, S. H. (2018). The potential role of the software industry in supporting economic development. In M. Khosrow-Pour (Ed.), *Encyclopedia of information science and technology* (4th ed., pp. 7259–7269). IGI Global. <https://doi.org/10.4018/978-1-5225-2255-3.ch631>
- Komminoth, L. (2023). *Social media put pressure on African e-commerce platforms*. *African Business*. Retrieved from <https://african.business/2023/05/technology-information/social-media-puts-pressure-on-african-e-commerce-platforms>
- Lemma, A., Mendez-Parra, M., & Naliaka, L. (2022). *The AfCFTA: unlocking the potential of the digital economy in Africa* (ODI report). Overseas Development Institute. Retrieved from https://media.odi.org/documents/Digital_trade_report_AfCFTA.pdf

- Madhav, N. (2024). Digital technologies in intra-African trade: A bibliometric analysis. In *Proceedings of the International Conference on Intelligent and Innovative Computing Applications (ICONIC 2024)* (pp. 172–178). <https://doi.org/10.59200/ICONIC.2024.019>
- Mastercard. (2020). *The Mastercard index of women entrepreneurs: 2020 report*. Retrieved from https://www.mastercard.com/news/media/1ulpy5at/ma_miwe-report-2020.pdf
- Mehdar, B. A., Geeling, S., Rizk, N., Spilda, F. U., Affi, E., Budu, J., Tsibolane, P., Boateng, R., Mwakatumbula, H., Graham, M., & Heeks, R. (2025). Gendered inequalities of platform work in Africa: Findings from a multi-country analysis. *Platforms & Society*, 2, 29768624251323332. <https://doi.org/10.1177/29768624251323332>
- Mensah, C., Azila-Gbetteor, E. M., Kugbonu, M. A., & Tahiru, F. (2023). Revisiting gendered ICT attitude and self-efficacy: A study of technical university students in Ghana. *Education Research International*, 2023, 6555823. <https://doi.org/10.1155/2023/6555823>
- Mhlongo, N. Z., Daraojimba, D. O., Olubusola, O., Ajayi-Nifise, A. O., & Falaiye, T. (2024). Reviewing the impact of digital platforms on entrepreneurship in Africa. *International Journal of Science and Research Archive*, 11(1), 1364–1375. <https://doi.org/10.30574/ijjsra.2024.11.1.0228>
- Moses, V. (2023). Digital transformation and e-commerce adoption among small businesses in developing African economies: Evidence from Ethiopia and Uganda. *Branding: Jurnal Manajemen dan Bisnis*, 2(1). <https://doi.org/10.15575/jb.v2i1.38746>
- Mutula, S. M., & Van Brakel, P. (2007). ICT skills readiness for the emerging global digital economy among small businesses in developing countries: Case study of Botswana. *Library Hi Tech*, 25(2), 231–245. <https://doi.org/10.1108/07378830710754992>
- Ndonga, D. (2012). E-commerce in Africa: Challenges and solutions. *African Journal of Legal Studies*, 5(3), 243–268. <https://doi.org/10.1163/17087384-12342009>
- Organisation for Economic Co-operation and Development (OECD). (2023). *Key issues in digital trade: OECD Global Forum on Trade 2023 “Making Digital Trade Work for All”*. Paris, France: OECD Publishing. <https://doi.org/10.1787/b2a9c4b1-en>
- Orkoh, E., & Viviers, W. (2021). Gender composition of ownership and management of firms and the gender digital divide in Africa. *South African Journal of Business Management*, 52(1), a2227. <https://doi.org/10.4102/sajbm.v52i1.2227>
- Orkoh, E., Blaauw, D., & Claassen, C. (2022). The trade openness–gender wage differential nexus: Household-level evidence from Ghana. *Review of Development Economics*, 26(1), 156–179. <https://doi.org/10.1111/rode.12853>

- Orkoh, E., & Teh, R. (2025). Inclusive trade through online presence. *Journal of International Development*, 37(1), 314–333. <https://doi.org/10.1002/jid.3961>
- Remi-Aworemi, F. O. (2023). Gender disparities in digital literacy and education: A case study of young girls in Northwest Nigeria. *Iconic Research and Engineering Journals*, 7(3), 416–420. Retrieved from <https://www.irejournals.com/paper-details/1705053>
- Siddiq, F., & Scherer, R. (2019). Is there a gender gap? A meta-analysis of the gender differences in students' ICT literacy. *Educational Research Review*, 27, 205–217. <https://doi.org/10.1016/j.edurev.2019.03.007>
- Souter, D., Adam, L., Jagun, A., & Tusubira, T. (2014). *ICTs for regional trade and integration in Africa*. Washington, DC: World Bank Group. <https://doi.org/10.1596/19018>
- Stuart, J. (2024). *The AfCFTA Protocol on Women and Youth in Trade and Trade-Driven Development in Africa*. tralac. Retrieved from <https://www.tralac.org/blog/article/16324-the-afcfta-protocol-on-women-and-youth-in-trade-and-trade-driven-development-in-africa.html>
- Thompson, M., & Walsham, G. (2010). ICT research in Africa: Need for a strategic developmental focus. *Information Technology for Development*, 16(2), 112–127. <https://doi.org/10.1080/02681101003737390>
- Ugwu, B. C. (2024). *Advancing women's trade opportunities in Africa through digital trade platforms: Challenges and opportunities*. The Young African Policy Research Hub. Retrieved from <https://youngafricanpolicyresearch.org/advancing-womens-trade-opportunities-in-africa-through-digital-trade-platforms-challenges-and-opportunities/>
- United Nations Conference on Trade and Development (UNCTAD). (2021). *The UNCTAD B2C e-commerce index 2020: Spotlight on Latin America and the Caribbean* (UNCTAD Technical Notes on ICT for Development No. 17). Retrieved from https://unctad.org/system/files/official-document/tn_unctad_ict4d17_en.pdf
- United Nations Economic Commission for Africa (UN-ECA). (2021). *African Girls' Coding Camp*. Retrieved from <https://www.uneca.org/events/central-africa/african-girls-coding-camp>
- United Nations Economic Commission for Africa (UN-ECA). (2023). *Empowering Young Girls Digitally in Chimoio: The Regional Connected African Girls Coding Camp*. Retrieved from <https://www.uneca.org/stories/empowering-young-girls-digitally-in-chimoio-the-regional-connected-african-girls-coding-camp>
- United Nations Educational, Scientific and Cultural Organization (UNESCO). (2024). *African Women in Tech and AI: 15 entrepreneurs win grants and support for their busi-*

nesses. Retrieved from <https://www.unesco.org/en/articles/african-women-tech-and-ai-15-entrepreneurs-win-grants-and-support-their-businesses>

van Deursen, A. J. A. M., van Laar, E., Helsper, E., & Schneider, L. (2023). *The youth digital skills performance test results: Report on the results of real-life information navigation and processing, communication and interaction, and content creation and production skills tasks*. Zenodo. <https://doi.org/10.5281/zenodo.8297778>

Viilup, E. (2015). *The EU's trade policy: From gender-blind to gender-sensitive?* (In-depth analysis, PE 549.058). European Parliament, Directorate-General for External Policies, Policy Department. Retrieved from [https://www.europarl.europa.eu/RegData/etudes/IDAN/2015/549058/EXPO_IDA\(2015\)549058_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2015/549058/EXPO_IDA(2015)549058_EN.pdf)

Wamboye, E. F., & Seguino, S. (2015). Gender effects of trade openness in Sub-Saharan Africa. *Feminist Economics*, 21(3), 82–113. <https://doi.org/10.1080/13545701.2014.927583>

World Bank. (2023). *Digital skills to accelerate human capital for youth in Africa*. Washington, DC: World Bank. Retrieved from <https://thedocs.worldbank.org/en/doc/3eb99d-2c0a89888a7d1292898cce4651-0010012023/original/004-Digital-Skills-to-Accelerate-Human-Capital-for-Youth-in-Africa.pdf>

World Trade Organization (WTO) & World Bank. (2024). *Digital trade for Africa* (Fact sheet). Retrieved from https://www.wto.org/library/events/event_resources/serv_2502202416/factsheet_dta_e.pdf

Xia, L., Baghaie, S., & Sajadi, S. M. (2024). The digital economy: Challenges and opportunities in the new era of technology and electronic communications. *Ain Shams Engineering Journal*, 15(2), 102411. <https://doi.org/10.1016/j.asej.2023.102411>

Digital trade in Africa: The data challenge

Erik van der Marel & Ben Shepherd

1. Introduction

Measuring digital trade is no simple task. Physical goods cross borders in tangible form and are recorded through customs, making import and export data relatively straightforward to track. Digital trade, by contrast, relies on flows of information that may be embedded in goods but can also be disembodied and thus invisible to customs records – making its measurement far more challenging.

This book chapter focuses on the challenge of measuring trade flows related to the digital economy in Africa. Specifically, we argue that estimates of trade flows related to the digital economy in Africa are largely speculative due to the paucity of directly observed services trade data in the region. Digital trade covers digitally deliverable and digitally ordered trade, which is important for Africa to measure accurately, but remains a challenge.

Additionally, digital trade is enabled by cross-border data flows between countries. These flows are even less observable because they are often non-monetised, making them extremely hard to measure. We argue that measuring all these flows in Africa should be a priority for assessing digital trade as a whole.

Why is better measurement so important? Simply because it is a prerequisite to rigorous policy-relevant research. The existence of data also exerts a pull effect on the research ecosystem by making it possible for interested parties, from students to senior researchers, to conduct research on digital trade, which

can ultimately inform policy. In the absence of data of sufficient quality and quantity, many of these potential contributors would be discouraged and may look at other areas, given constraints on researchers such as the need to pass peer review in leading journals, where data quality is a critical consideration.

2. What do we already know?

This section gives an overview of the state of the art in relation to the challenge of measuring digital trade in Africa. The emphasis is on collection, estimation, and synthesis of data rather than development of policy-related insights. Key implications of our findings include the need to collect and disseminate data, which implies a resource need in statistical agencies, as well as improved monitoring of international transactions, particularly from the Balance of Payments. Services trade data are typically derived from the Balance of Payments and then broken down by sector and partner using surveys, which require a certain level of resource capacity from statistical agencies.

We first examine the state of services trade data in the region, then we look specifically at issues related to digital trade. The reason for starting with services trade is that many measures of performance and extent of regional and global digital economic integration depend on the availability and reliability of services trade data, such as digital and digitally deliverable services.

2.1 Services trade data

While aggregate data on trade in services are of reasonable quality, as they are directly taken from the Balance of Payments, bilateral services trade data are notoriously incomplete for the reasons described above. International agencies have been working to improve coverage since the entry into force of the World Trade Organization (WTO), which brought services into the multilateral trading system for the first time in 1995.

The United States International Trade Commission's (USITC) International Trade and Production Database for Simulation (ITPD-S) database¹ provides a simple check of the proportion of all bilateral services data that is directly observed and reported on each continent, relative to observations that are imputed by mirroring (using a trade partner's direct observation), or which are missing (unobserved) and therefore have to be estimated. We use

1 See USITC. *International Trade and Production Database for Simulation (ITPD-S)*. Gravity Portal. <<https://www.usitc.gov/data/gravity/itpds>>. See also Borchert *et al.* (2024).

the latest year available (2019), but the results are not materially different for earlier years. ITPD-S brings together data from the WTO's Trade in Services Annual Dataset,² including Comtrade, as well as other sources of trade data. The authors then fill in missing observations using statistical estimates but leave a data "flag" to indicate when this procedure has been used, which makes it easy to track observations that are missing in the original data.

An alternative approach is to use the International Trade and Production Database for Estimation (ITPD-E),³ which is a sister database that relies only on direct observations. However, it is not complete in all dimensions, due to the fact that it only contains direct observations, which means it is not straightforward to compute the percentage of cells that is missing in any given dimension because the denominator is unknown. Using ITPDS is more rigorous in this sense but gets to the same answer as directly observed data are the same in both datasets.

Table 1 shows the results of this exercise, which are striking. Nearly all services trade globally needs to be imputed, because it is not directly observed. Of all the continents, Africa has the highest rate of missing data, i.e. the lowest rate of direct reported observations of services trade data. It is also the region where mirroring is least effective as an imputation method, because bilateral intra-regional data are nearly totally absent, and only observations with other regions can be obtained through mirroring.

It is important to stress that ITPD-S is a bilateral database with sectoral disaggregation. As such, it cannot use the much more prevalent estimates of services trade with partner "world", or estimates of total services trade not broken down by sector. The figures in Table 1 may therefore seem unduly pessimistic after thirty years of efforts to improve services data, but they reflect the fact that many countries continue to collect services data in ways that are not always useful for empirical research, which typically requires disaggregation by partner and by sector.

2 See WTO. (2025). *Trade statistics: Bulk download of select services datasets*. <https://www.wto.org/english/res_e/statis_e/trade_datasets_e.htm>

3 See USITC. (2025). *International Trade and Production Database for Estimation (ITPD-E)*. <<https://www.usitc.gov/data/gravity/itpde.htm>>. See also Larch *et al.* (2025) and Borchert *et al.* (2021).

Table 1: Services data observations availability by continent, ITPD-S, 2019.

Continent	Mirrored (%)	Reported (%)	Missing (%)
Africa	0.258	0.481	99.261
America	0.649	1.449	97.902
Asia	1.390	1.478	97.132
Europe	1.817	14.131	84.052
Pacific	0.400	0.465	99.135

Source: Authors based on data from the ITPD-S database retrieved on 30 October 2025 from <<https://www.usitc.gov/data/gravity/itpds>>.

Thus, most data on bilateral services trade by sector for African countries are estimated by statistical techniques rather than being directly observed. ITPD-S provides one set of such estimates. Balanced Trade in Services (BaTiS),⁴ produced by the Organization of Economic Cooperation and Development (OECD) and the WTO, or the OECD’s Trade in Value Added (TiVA),⁵ in which data for some African countries are available,⁶ provide other options. Yet, as these databases offer estimated data for the African countries covered, they potentially cause problems for empirical work, as they introduce smoothing and inaccuracy relative to direct observation. In terms of observing digitally deliverable services trade, this problem is fundamental: in the case of African countries, few services trade flows are directly observed in sources like the Balance of Payments, which means that the available information is largely based on statistical estimates.

The problem is even more serious when we move to General Agreement on Trade in Services (GATS) modes of supply rather than Balance of Payments data. Few countries globally collect comprehensive data on the four modes of

4 See WTO. *Balanced Trade in Services (BaTiS) dataset*. <https://www.wto.org/english/res_e/statis_e/gstdh_batis_e.htm>. See also Fortanier *et al.* (2017).
5 See OECD. *Trade in value-added*. <<https://www.oecd.org/en/topics/sub-issues/trade-in-value-added.html>>.
6 There are eight African countries covered by TiVA, namely Cameroon, Ivory Coast, Egypt, Morocco, Nigeria, Senegal, South Africa, and Tunisia.

supply under the GATS.⁷ The leading data source, WTO Trade in Services by Mode of Supply (TiSMoS),⁸ which offers services trade data by all modes of supply on a non-bilateral basis, is therefore largely a collection of estimates based on surveys and other approaches used by a small number of primarily high-income country statistics offices to estimate services trade by each mode of supply for a country with the world as a total. TiSMoS covers African countries, but the underlying estimates could plausibly be quite inaccurate for them, given that there is little direct observation of the modal breakup of services trade on the continent.

2.2 Digital trade

The IMF-OECD-UN-WTO Handbook on Measuring Digital Trade (IMF *et al.*, 2023) divides digital trade into two parts: one is all international trade that is digitally ordered, and the other is all international trade that is digitally deliverable.⁹ Key to this statistical definition is that it is based on the nature of the transaction, rather than the product traded or the actors involved. This definition also implies that digital trade transactions form a subset of all trade transactions. Note, however, that the definition of digital trade is limited to digital trade transactions performed on a cross-border basis, as measured by ITPD-S and BaTiS, but leaves out foreign affiliate sales statistics, which are measured by Mode 3 trade in services, and which are covered by TiSMoS.

Digitally ordered trade includes all types of international transactions of goods or services conducted over “computer networks by methods specifically designed for the purpose of receiving or placing orders,” as defined by the Handbook. It is therefore equivalent to the definition of international e-commerce and covers both goods and services. For digitally ordered goods, standard trade sources such as ITPD-S, UN Trade and Development is an intergovern-

7 The four modes of supply as part of the GATS refer to Mode 1 covering cross-border supply, which applies when service suppliers resident in one country provide services in another country, without either supplier or buyer/consumer moving to the physical location of the other; Mode 2 covering consumption abroad, which refers to a consumer resident in one country moving to the location of the supplier(s) to consume a service; Mode 3, covering commercial presence, which refers to legal persons (firms) moving to the location of consumers to sell services locally through the establishment of a foreign affiliate or branch; and finally Mode 4 covering or movement of natural persons, which refers to a process through which individuals (temporarily) move to the country.

8 See WTO. *Trade in services by mode of supply dataset*. <https://www.wto.org/english/res_e/statistics_e/gstdh_mode_supply_e.htm>. See also Wettstein *et al.* (2019)

9 Digital trade that is both digitally deliverable and ordered is subtracted from the sum of these two components to avoid double-counting.

mental organization's (UNCTAD), COMTRADE, WITS, and others can be consulted, and data for the African region should be readily available due to customs data. However, these goods trade sources typically do not clarify which part of the traded goods are digitally ordered. To gain insight into the true volume of digitally ordered goods, one needs additional information, such as that from online platforms, as further explained below. For digitally ordered services, the same caveats apply as those noted above when using data from ITPD-S, BaTiS, TiSMoS, or TiVA.

Digitally deliverable trade includes services only, as it covers “all international trade transactions that are delivered remotely over computer networks”. Another commonly used term for this type of trade is ICT-enabled services, which are essentially the same. Since digital trade excludes services deliverable through foreign affiliates, digitally deliverable services cover only those supplied on a cross-border basis (i.e., Mode 1). It is important to note that not all cross-border trade in services is digitally deliverable; therefore, digitally deliverable services exclude non-digital services such as construction, transport, and postal services. UNCTAD and the WTO each maintain a dedicated database for digitally deliverable services (DDS), which includes all African countries.¹⁰ However, since the latter's source is BaTiS, the same caveats mentioned earlier apply.¹¹

Additionally, a final flow important to digital trade is cross-border data flows. Many digital trade transactions are enabled by these flows, which are considered a disembodied form of digital movement in the global economy (World Bank, 2021). However, data flows remain largely unmeasured due to the non-monetary nature of the international transactions involved. As global flows, they primarily support the delivery of digital services or goods and are therefore excluded from the statistical definition of trade, despite being considered part of the digital economy. That said, monetary transactions can involve data products, such as datasets, when purchased across borders. To the extent that these transactions involve digitally ordered or digitally deliverable trade, they do fall under the statistical definition of digital trade. Measuring cross-border

10 See UNCTAD. (2025). *International trade in digitally deliverable services, value, shares and growth, annual (analytical)*. UNCTADstat Data Centre. <<https://unctadstat.unctad.org/datacentre/data-viewer/US.DigitallyDeliverableServices>>. See also WTO. (2025). *Digitally delivered services trade dataset*. <https://www.wto.org/english/res_e/statis_e/gstdh_digital_services_e.htm>.

11 Even though both UNCTAD and the WTO each have developed a special database for digitally deliverable services, the former base their data on the WTO's Trade in Services Annual Dataset while the latter on the BaTiS database. Trade numbers therefore diverge slightly between the two sources.

der data flows can only be done indirectly, for example, by tracking international internet bandwidth use. One such data source is TeleGeography.¹²

3. What do we need to know? A future research agenda

A first priority, which has been on the trade policy agenda since the 1990s, is to directly collect comprehensive services data in African countries. Comprehensive in this sense means disaggregated both by partner and by sector. African countries are not unique in lacking direct observation of services trade data, but the problem is most pronounced in Africa relative to other continents. There are issues of technical and financial capacity, but as part of the servicification and digitalisation of the global trading economy, it will be important for research on Africa to have the ability to do sound empirical work based on direct observation.

Related to this point is the desirability of conducting pilot surveys in selected African countries on trade in services by mode of supply, which also includes digital trade. These surveys could form the basis for better TiS-MoS-style estimates of trade in services flows by the GATS's four modes of supply in the region. They would complement existing work that largely draws on experience in European countries, and would provide valuable insights into the regional services economy.

A second priority is to improve the measurement of digital trade, specifically in African countries, which, in large part, can be done by directly collecting services trade data as described above. However, some digital transactions on the international market require special attention, particularly those involving online platforms, commonly referred to as Digital Intermediation Services (DIPs). Although these transactions are monetised – despite the platform not taking ownership of the goods or services traded – the associated fees are part of digital trade but can be difficult to capture directly. Additionally, pilot surveys focused on digital trade, such as ICT/e-commerce surveys, may be helpful, as the international transactions recorded in these services often overlap with those classified as digitally ordered and digitally deliverable trade.

12 See TeleGeography. (2025). *Submarine Cable Map 2025* (Interactive map). <<https://submarine-cable-map-2025.telegeography.com/>>.

Additionally, given the paucity of data, and despite progress in estimating trade in digitally deliverable services, recorded administrative trade data remains weak, even decades after the recognition of services trade through the establishment of the GATS. This suggests there is room to revisit fundamental questions about how the statistical community collects and tracks services trade data, even in high-income countries. It may be time for trade experts to ask what services trade actually is and how businesses themselves perceive it when engaging in international transactions. Administrative data collection methods may no longer reflect the reality of how services firms operate globally, with much of the current framework still rooted in goods trade. There is therefore a strong case for researchers to engage directly with firms – to understand their service supply chains, business practices, how value is created through international transactions, and what share of that value stems from digital transmission over the internet. This could inform better design of statistical units around those concepts.

The African region could be a strong starting point for collecting trade data through surveys. These surveys might begin with open-ended questions, asking firms to describe how they engage in international service transmissions and transactions, whether they consider themselves exporters or importers, how their contracts and invoices are structured, and how payments and other monetary flows for international services are handled. Today, technology has made services value chains highly complex – spanning multiple countries and involving service providers, clients, software, management, and data. This complexity makes it difficult for statisticians and researchers to assign a clear (net) value created across borders. Surveys could help uncover how service firms themselves perceive and measure their international involvement across different parts of the business process, and what, according to them, is considered an international transaction or trade.

Finally, other types of datasets, typically outside the scope of traditional trade statistics, should also be considered when assessing international trade or transactions by digital businesses. For example, data on the number of foreign users of a platform or international revenue generated by foreign users of a mobile app could serve as useful proxies for measuring digital trade. Such microdata goes beyond traditional Balance of Payments statistics and is often provided by private sources. This raises not only statistical challenges – around data collection, cleaning, and standardisation – but also ethical questions, such as whether such data is objective, as they would not be collected by public

agencies. Still, these alternative data sources could offer valuable insights into how digital services are transmitted across borders. Their selection could be guided by the information gathered through surveys of digital service providers, as mentioned above.

4. Conclusion

The international economic and statistical community has made significant progress in improving the measurement of international trade in services and digital trade, including for African countries. However, many trade datasets providing information for African countries are based on estimates, which remains a weak point for empirical analysis due to the risk of mismeasurement and bias. Therefore, efforts to directly measure international trade using the accounting principles outlined in BPM6, IMTS 2010, and MSITS 2010 are critically important.¹³ In addition, surveys can play a valuable role in capturing international transactions, particularly for digitally ordered and digitally deliverable trade, as well as for other modes of supply beyond cross-border trade. Two policy recommendations are key to improving both approaches: (1) providing better statistical resources – technical expertise and funding – for domestic institutions in African countries to record trade flows, and (2) strengthening their capacity to monitor international transactions, either for directly measuring trade in services or for developing targeted surveys.

13 BPM6 refers to the Sixth Edition of the IMF's Balance of Payments and International Investment Position Manual; the IMTS 2010 refers to International Merchandise Trade Statistics: Concepts and Definitions 2010; and the MSITS 2010 refers to the Manual on Statistics of International Trade in Services 2010.

References

- Borchert, I., Larch, M., Shikher, S., & Yotov, Y. V. (2021). The International Trade and Production Database for Estimation (ITPD-E). *International Economics*, 166, 140–166. <https://doi.org/10.1016/j.inteco.2020.08.001>
- Borchert, I., Larch, M., Shikher, S., & Yotov, Y. V. (2024). *Globalization, trade, and inequality: Evidence from a new database* (Economics Working Paper Series No. 2024–11–A). Washington, DC: U.S. International Trade Commission. Retrieved from https://www.usitc.gov/publications/332/working_papers/blsy_globalization_trade_and_inequality.pdf
- Fortanier, F., Liberatore, A., Maurer, A., Pilgrim, G., & Thomson, L. (2017). *The OECD-WTO balanced trade in services database: Methodology*. Organisation for Economic Co-operation and Development (OECD) & World Trade Organization (WTO). Retrieved from <https://web-archive.oecd.org/2017-12-01/467721-OECD-WTO-Balanced-Trade-in-Services-database-methodology.pdf>
- International Monetary Fund (IMF), Organisation for Economic Co-operation and Development (OECD), United Nations Conference on Trade and Development (UNCTAD), & World Trade Organization (WTO). (2023). *Handbook on measuring digital trade* (2nd ed.). Retrieved from https://www.wto.org/english/res_e/booksp_e/digital_trade_2023_e.pdf
- Larch, M., Shikher, S., & Yotov, Y. V. (2025). *The International Trade and Production Database for Estimation – Release 3 (ITPD-E-R03)* (Economics Working Paper No. 2025–06–A). Washington, DC: U.S. International Trade Commission. Retrieved from https://www.usitc.gov/publications/332/working_papers/itpd_e_r03.pdf
- Wettstein, S., Liberatore, A., Magdeleine, J., & Maurer, A. (2019). *A global trade in services data set by sector and by mode of supply (TiSMoS)* (Methodology paper). Geneva, Switzerland: World Trade Organization. Retrieved from https://www.wto.org/english/res_e/statis_e/daily_update_e/tismos_methodology.pdf
- World Bank. (2021). World Development Report 2021: Data for Better Lives. Washington, DC: World Bank. <https://doi.org/10.1596/978-1-4648-1600-0>

DIGITAL TRADE IN AFRICA: A RESEARCH AGENDA

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