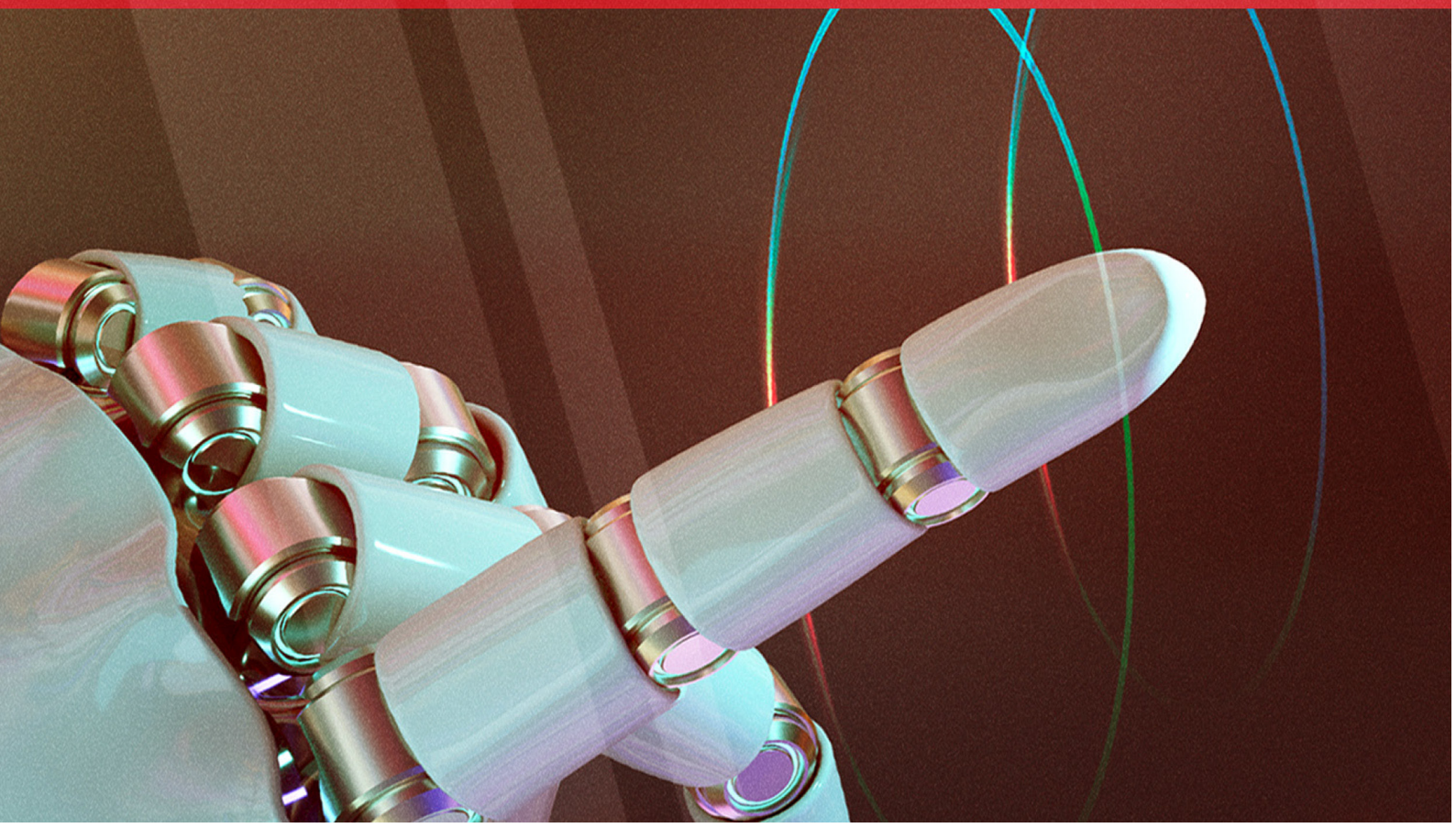
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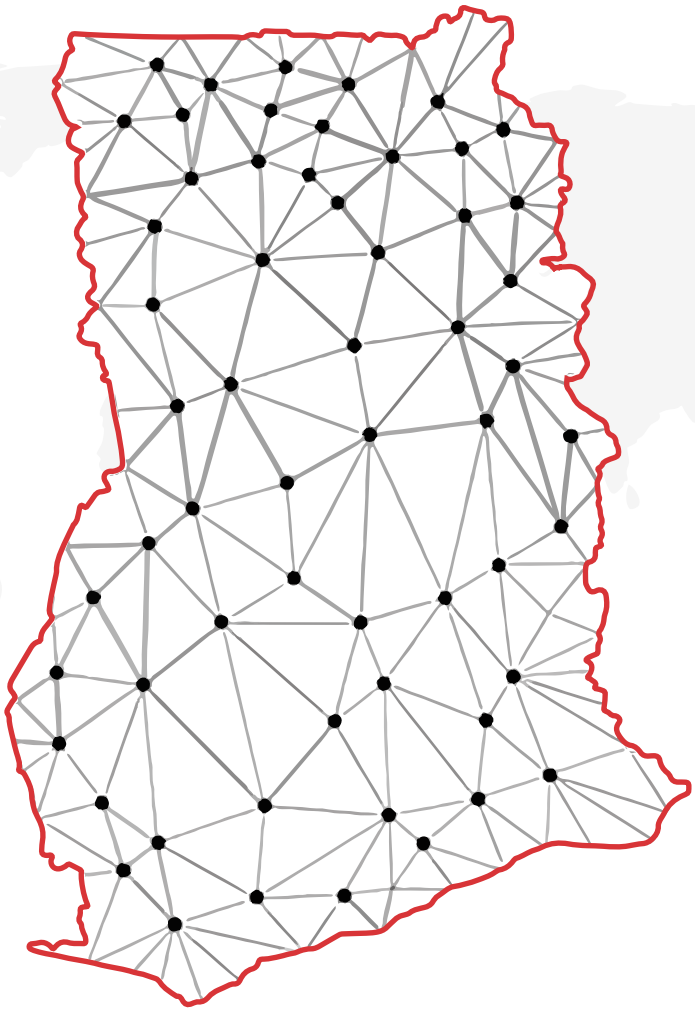
DIAGNOSTIC REPORT

GHANA DIGITAL ECONOMY OUTLOOK 2026



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FOREWORD

Fifty years of Ghana–Germany cooperation has been marked by a gradual deepening of trust, shared learning, and joint commitment to development outcomes that are built together rather than delivered externally. This report reflects that philosophy, drawing its evidence not only from data systems but from the lived experiences of more than a thousand people across Ghana's sixteen regions. Market women running businesses supported by social media platforms. Health workers navigating fragmented digital systems. Young people with connectivity but with limited access to the advanced skills required to turn connectivity into economic opportunities. Their perspectives form the foundation of the Ghana Digital Economy Outlook 2026.

The findings confirm that Ghana's digital economy already has foundational building blocks. The Ghana Card, with over 18 million enrolments, has established a national digital identity infrastructure that is reshaping financial inclusion and public service delivery. At the same time, this progress has yet to translate into broad-based economic integration and sustained productivity gains.

The research findings show that significant gaps remain. Digital trust is weak, with many mobile money users reporting fraud experiences and few feeling fully secure in their transactions. Access to services such as telemedicine remains limited, reaching only about a quarter of the population. Internet connectivity disparities persist, particularly in underserved northern regions where internet penetration remains low. These challenges are not framed as setbacks but as clear signals of where policy and investment must now focus.

The report highlights that Ghana's digital transformation requires stronger systems and safeguards to ensure inclusion and trust. Priority areas include data governance, fibre infrastructure sharing, consumer protection in digital markets, and reforms to the Universal Service Fund. These are presented not as future aspirations but as immediate decisions that will determine whether digital growth benefits the whole population or only a segment of it.

The Digital Transformation Center (DTC) within GIZ Ghana, supported by the German Federal Ministry for Economic Cooperation and Development, is positioned as a partner in enabling this transition. Its role is to strengthen the conditions under which digital transformation translates into inclusive opportunity, reinforcing national efforts led by the Ministry of Communication, Digital Technology and Innovations.

Ultimately, this Outlook is a shared resource. With the evidence now assembled, policymakers, development partners, investors, the private sector, and citizens alike have a solid foundation on which to build the vision of a digital Ghana. What matters now is how this evidence informs action.

As Ghana enters its digital decade, the message is clear: transformation is already underway, and its direction and inclusiveness will be shaped by the choices made together from here, in the same spirit of shared responsibility and mutual respect that has guided fifty years of Ghana–Germany cooperation.

David Robert
Head of Projects, Digital Transformation Center; GIZ Ghana.

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A comprehensive list of additional contributors and partners is provided in Appendix B: Stakeholder Participants and Contributors.

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ACRONYMS AND ABBREVIATIONS

AfCFTA	African Continental Free Trade Area
API	Application Programming Interface
AU	African Union
BoG	Bank of Ghana
BPO	Business Process Outsourcing
CAAP	Cybersecurity Awareness, Assessment, and Protection
CEMIS	Centralised Education Management Information System
CIO	Chief Information Officer
CSIRT	Computer Security Incident Response Team
CSR	Corporate Social Responsibility
DBS	Digital Broadcasting Switchover
DE4A	Digital Economy for Africa
DfID	Department for International Development
DMB	Deposit Money Banks
DPI	Digital Public Infrastructure
DTfD	Digital Transformation for Development
ECOWAS	Economic Community of West African States
ESW	E-Skills for Women
EU	European Union
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GDEO	Ghana Digital Economy Outlook
GDP-Growth	Gross Domestic Product Growth
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoG	Government of Ghana
GSMA	GSM Association
ICT	Information and Communication Technology
ICT4AD	ICT for Accelerated Development
IoT	Internet of Things
IP	Intellectual Property
ISP	Internet Service Provider
ITU	International Telecommunication Union
KYC	Know Your Customer
MDA	Ministries, Departments, and Agencies
MoCD	Ministry of Communication and Digitalisation
MoCDTI	Ministry of Communication, Digital Technology and Innovations
MoF	Ministry of Finance
MSME	Micro, Small, and Medium Enterprises
NCA	National Communications Authority
NITA	National Information Technology Agency
NPRA	National Pensions Regulatory Authority
OECD	Organisation for Economic Co-operation and Development
PPP	Public-Private Partnership
QR	Quick Response
SME	Small and Medium Enterprises
STEM	Science, Technology, Engineering, and Mathematics

UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
USD	United States Dollar
WBG	World Bank Group
WTO	World Trade Organization

EXECUTIVE SUMMARY

PURPOSE AND APPROACH

The Ghana Digital Economy Outlook 2026 is a national diagnostic study commissioned by the Ministry of Communication, Digital Technology, and Innovations (MoCDTI) and GIZ Ghana. It assesses the current state of Ghana's digital economy, quantifies the contribution of digital transformation to national GDP, and provides an evidence-based roadmap for accelerating inclusive growth, job creation, and improved service delivery. Adopting the World Bank's Digital Economy for Africa (DE4A) framework, the study treats digital transformation as an economy-wide phenomenon, measuring effects across key sectors outlined in Ghana's Digital Economy Policy and Strategy as well as complementary sectors identified through desk review. The study combined 28 Key Informant Interviews (KIIs), 8 Focus Group Discussions (FGDs), a national survey of 1,112 respondents across all 16 regions, and quantitative economic modelling. The country was organised into four zones: Coastal, Middle, Southern, and Northern. While the survey targeted users and service providers across the key and complementary sectors such as agriculture, trade, health, education, financial services, manufacturing, transportation, and public administration, the KIIs involved experts in specific sectors and public institutions. The FGDs, however, comprised stakeholder groups such as women entrepreneurs, digital innovators, media and advocacy, academic and research institutions, as well as private and public sector industry players.

1,112 Survey respondents across all 16 regions	GH¢ 21B ICT sector value-added by 2022	GHS 1.9T Mobile money volumes in 2023	0.263 Ghana's DEI score among five African peers

WHERE GHANA STANDS: THE PARADOX OF PROGRESS

Ghana has built genuine digital foundations, evidenced by a mobile penetration exceeding 100% of the population, 92.5% of respondents accessing services via smartphone, 88.9% use mobile money, and the ICT sector contributes an estimated 8% of GDP, including economy-wide spillovers. These achievements reflect decades of deliberate reform, from the 1987 telecommunications liberalisation through to the 2018 Mobile Money Interoperability platform and the 2024 Digital Economy Policy and Strategy.

Yet the study's economic modelling reveals a defining paradox. ICT growth correlates negatively with Finance and Insurance at -0.78 and with Trade at -0.66. Its correlation with overall GDP stands at a near-negligible 0.03 across 2014 to 2022. Ghana's digital economy is expanding in its own lane while the broader economy drives in another. Converting that sectorally concentrated growth into economy-wide productivity gains is the central challenge of the country's next digital decade.

The five foundational pillars each confirm this pattern. On infrastructure, device ownership is strong, but 68.6% of respondents cite data affordability and poor connectivity as primary barriers. On digital finance, mobile money adoption is near-universal, yet 82.9% of users have experienced fraud, and only 7.3% feel very secure online, a trust deficit that caps the sector's growth ceiling. On digital skills, 97.7% demonstrate some competency, but only 29.1% reach advanced proficiency, and 69.1% are unaware of emerging technologies.

In e-commerce, social commerce is active and women-led, with 26% of women using social platforms for business against 17% of men, but last-mile logistics costs and absent consumer protection keep the sector's reach narrow. On emerging technologies, AI adoption is high in enthusiasm but thin in local grounding, with most tools built on datasets that do not reflect Ghanaian contexts or languages.

▸ SECTOR AND ZONAL HIGHLIGHTS

Sector / Zone	Key Finding	Primary Action
Banking & Finance	Mobile money near-universal. GhIPSS Instant Pay flows nearly tripled from 2023 to 2024. Fintech sandbox innovation is active, but fraud exposure remains high at 82.9% of users.	Strengthen consumer fraud protection and redress mechanisms. Expand rural agent density. Introduce AI-driven alternative credit scoring.
Health	LHIMS has connected 147 hospitals and processed 26 million patient encounters. Only 23.7% of respondents have ever used telemedicine. No national Health Information Exchange exists.	Operationalise the national HIE mandated by the 2023-2027 Digital Health Policy. Resolve vendor dependency. Expand rural facility connectivity.
Agriculture	Mobile money near-universal among farmers. Weather apps and e-extension services in use. Most agritech remains fragmented donor pilots rather than integrated national systems.	Integrate agritech into mainstream agricultural policy. Bundle advisory, payments, credit, and insurance for smallholder farmers.
Education	E-learning platforms and hybrid delivery growing. Data costs cited by over 87% of respondents in every zone as the primary barrier. Teacher capacity is the second critical gap.	Subsidise data access for accredited platforms. Invest systematically in teacher digital pedagogy training.
E-Commerce	Social commerce active with women disproportionately engaged. Last-mile delivery costs frequently exceed product value. No comprehensive national e-commerce consumer protection policy.	Enact a national e-commerce consumer protection framework. Invest in regional logistics hubs and cold-chain infrastructure.
Northern Zone	Mobile money adoption exceeds 90%, but advanced digital service uptake remains thin. Internet penetration below 20% in the Upper West and Upper East.	Infrastructure-first approach. Agritech integration and assisted digital onboarding as highest-return priorities.
Middle Zone	The highest share of advanced digital skill holders at 43.38%. Growing SME base around Kumasi. SME financing gaps constrain digital productivity growth.	Scale SME digital finance. Enterprise-grade digital tools at accessible price points for small businesses.
Southern Zone	Connectivity and human capital deficits equally binding. All respondents cited poor internet as a barrier to digital health. 95.8% cite data costs as the top education barrier.	Simultaneous investment in connectivity and skills. Sequencing either before the other leaves one side permanently deficient.
Coastal Zone	Ghana's most digitally active zone. Cybersecurity is the largest unmet need at 19.40%. Fraud is the primary growth ceiling, not access or awareness.	Fraud mitigation, platform reliability, and consumer trust as the zone's defining strategic priorities.

ECONOMIC MODELLING AND REGIONAL BENCHMARKING

The modelling identifies five high-leverage predictors of digital GDP: ICT sector growth, broadband penetration, regional 4G coverage, mobile money transaction volume and average value, and data affordability. Three core insights emerge consistently across all model configurations.

First, digital infrastructure is a structural enabler, but its benefits are constrained without affordability. Second, the scale of mobile money transactions is the strongest predictor of the monetary value of the digital economy, making transaction density and merchant acceptance the highest-return investment Ghana can make. Third, proactive regulatory and institutional frameworks correlate with stronger infrastructure deployment and higher digital usage, confirming that policy coherence is a measurable input to economic growth, not an administrative nicety.

Ghana's Digital Economy Composite Index score of 0.263 places it mid-table among five Sub-Saharan peers, ahead of Nigeria at 0.070 and Rwanda at 0.229, but behind Kenya at 0.578 and South Africa at 0.969. Ghana's differentiator is digital finance. Its clearest structural gap is e-government and secure digital infrastructure. Kenya's trajectory through mobile money inclusion and South Africa's through infrastructure investment both offer directly applicable lessons for Ghana's next phase of digital strategy.

▸ SIX PRIORITY ACTIONS

#	Priority	Required Action
1	Reduce Connectivity Costs	Enact a formal fibre-sharing policy under NCA oversight. Adopt a national fibre blueprint protecting buried infrastructure during road works. Deploy solar-powered hybrid solutions in rural low-revenue areas.
2	Strengthen Data Governance	Develop and pass a national data classification and harmonisation framework. Mandate inter-agency data-sharing agreements under NITA coordination. Resolve data centre oversight ambiguity between NCA and NITA.
3	Close the Trust Gap	Strengthen cybersecurity enforcement and consumer redress mechanisms. Deploy AI-driven fraud detection suited to the Ghanaian context. Launch national digital safety campaigns targeting women and youth who face the highest fraud exposure.
4	Finance Last-Mile Adoption	Reform the Universal Service Fund to prioritise rural broadband, affordable devices, and digital literacy. Expand PPPs for rural logistics hubs and school connectivity. Introduce catalytic financing for MSMEs transitioning to formal digital platforms.
5	Scale Sectoral Interventions	Expand fintech regulatory sandboxes. Operationalise the national Health Information Exchange. Upskill teachers in digital pedagogy. Bundle agritech advisory, payments, credit, and insurance for smallholder farmers.
6	Build Skills at the Edges	Make digital literacy compulsory from basic school to the tertiary level. Establish zone-based innovation hubs. Invest in locally trained AI datasets and Ghanaian-language digital tools to move from consuming to producing relevant technology.

THE BOTTOM LINE

Ghana's digital economy rests on genuine and hard-won foundations. The challenge of the next phase is not expanding access further; it is converting access into impact. The gap between owning a smartphone and using it productively, between having a mobile wallet and being financially empowered, between deploying a government platform and having citizens trust it, is where the country's digital transformation work now lies. When digital tools become so embedded in agriculture, trade, health, and public administration that the distinction between the digital economy and the economy itself disappears, Ghana will have moved from a nation building a digital economy to a digitally integrated nation. That is the goal this Outlook is designed to serve.

1.0 INTRODUCTION

1.1 GHANA AT A GLANCE

Ghana stands as a prominent lower-middle-income leader along the Gulf of Guinea. The Ghana Statistical Service (GSS) projects the population to reach approximately 34 million by 2025. While the nation's wealth historically stems from gold, cocoa, and oil, the economic center of gravity is shifting toward a more diversified landscape. Accra remains the primary administrative and economic hub. However, regional centers like Kumasi, Takoradi, and Tamale now drive significant development across the country's 238,533 square kilometers.

Political stability and an open business environment have fostered a decade of consistent growth. This climate allowed the services sector, led by information and communication technology, to become the largest contributor to national GDP. This transition signals a move toward a knowledge-based economy where digital tools dictate the pace of the market. According to 2024 estimates, GDP growth reached 3.5% as inflationary pressures began to moderate following several years of global and domestic shocks.

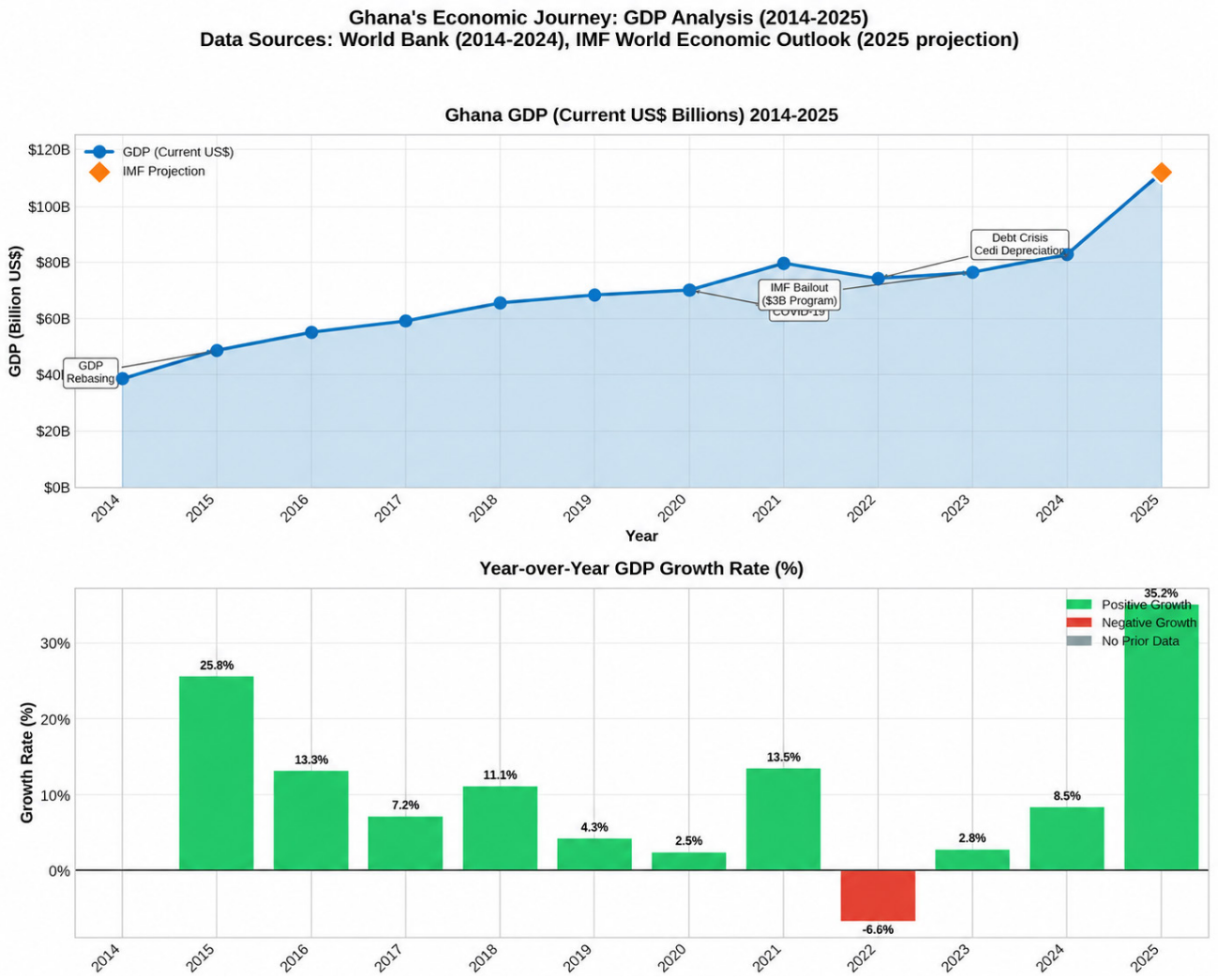


Figure 1: Year-on-Year GDP Growth Rate

Ghana is recognised among the leading digital technology inclusion countries in Africa, with mobile phone penetration reaching as high as 133% of the population in 2018 and remaining well over 100% in recent years (World Bank, 2025). Mobile money adoption is also robust: 67% of adults used fintech applications in 2021, with 62% actively using mobile money services (World Bank, 2023). The government's policy direction, through initiatives such as the National Financial Inclusion and Development Strategy, the Digital Economy Policy and Strategy, and the National Broadband Infrastructure Plan, reflects a strong commitment to leveraging technology for socio-economic transformation. Nonetheless, challenges remain in bridging the rural–urban digital divide, improving digital skills, and ensuring equitable access to infrastructure and services across all regions.

1.2 RATIONALE FOR STUDY OUTLOOK

Reports from the OECD (2021) and the World Bank (2022) demonstrate that countries effectively integrating technology into productive sectors see immediate gains in efficiency and job creation. In Ghana, a persistent divide remains between urban centers and rural communities. Bridging this gap requires more than just infrastructure. It demands a focus on digital skills and equitable access to services for all citizens.

Current research often treats digitalization as a series of isolated events rather than a connected ecosystem. This study addresses that gap by linking digital enablers directly to sectoral outcomes and national growth. By providing an evidence-based outlook for 2026, the report assesses how technology influences jobs and productivity. Understanding these connections allows the state to move beyond fragmented initiatives toward a cohesive strategy for national development.

1.3 OBJECTIVE OF STUDY

The Ghana Digital Economy Outlook 2026 aims to assess the contribution and impact of digital transformation on Ghana's national GDP while finding opportunities for growth and job creation. Specifically, the study seeks to:

- Assess the current state of digital transformation in Ghana. Identify key sectors and areas where digital transformation has significantly impacted the national economy.
- Identify and analyze high-potential sectors within the digital economy that could drive economic growth, job creation, and overall development.
- Benchmark Ghana's digital transformation progress against other African countries, while highlighting some best practices in digital transformation from other countries.
- Provide actionable recommendations for the government and other stakeholders to enhance digital transformation efforts.
- To produce a comprehensive report that will guide future digital strategies and initiatives in Ghana.

1.4 ORIGINALITY OF STUDY

The 2026 Ghana Digital Economy Outlook identifies several unique factors that existing literature often overlooks. It begins with the unrecognized centrality of telecommunications. As the backbone of the digital economy, the mobile industry contributes approximately 8% to Ghana's GDP (GSMA, 2025). It powers everything from edtech, fintech, e-health, agritech, to e-commerce. Despite this, policy frameworks frequently fail to emphasize it as the primary foundation for all other digital innovations. Sustained investment in broadband and spectrum optimization is a prerequisite for any broader economic transformation.

Infrastructure growth is currently hindered by the absence of a formal, legally binding fiber-sharing policy. Without a regulatory mandate to share passive assets like ducts and poles, operators face excessive capital expenditures and create redundant networks. Establishing a clear framework overseen by the National Communications Authority (NCA) would lower operational costs and accelerate broadband access in underserved areas. Such a policy is a critical step toward building a competitive and inclusive market.

Data management within the public sector presents a similar hurdle due to the lack of a formal classification and harmonization framework. While a data harmonization bill is currently in development, its absence forces government institutions to operate in silos. This fragmentation leaves national data centers underutilized. It also makes it difficult to determine what data is shareable or how it should be utilized. Furthermore, the low adoption of inter-agency data-sharing agreements prevents the public sector from minimizing this fragmentation as a temporary measure.

The study also highlights the rise of gig jobs powered by the synergy between national ID systems and mobile payment infrastructure. These tools have built a layer of digital trust that allows e-commerce and last-mile delivery services to flourish. These systems have specifically deepened financial inclusion for women in the informal sector. However, these participants remain the most vulnerable to fraud and cyberbullying. Protecting this confidence is vital because any decline in trust could hinder long-term participation in the digital ecosystem.

Finally, while there is high interest in emerging tools like Artificial Intelligence, most models currently used in Ghana do not reflect local challenges or datasets. There is a clear need for coordinated deployment of IT personnel across government agencies. Current deployment strategies often fail to match technical competencies with institutional needs. Addressing these personnel gaps and focusing on local data creation will ensure that Ghana's digital transformation is both technically sound and culturally relevant.

1.5 LIMITATIONS OF THE STUDY

The findings in this report account for the realities of a rapidly changing landscape and the challenges of data collection. Inconsistent data standards across government ministries required the research team to triangulate information from national datasets with reputable international sources, including the ITU and the World Bank. To ensure the outlook reflects the entire country, a zonal-based stratified sampling framework was used to capture voices from the Coastal, Middle, Southern, and Northern zones.

Capturing the informal digital economy remains a primary challenge. Much of Ghana's social commerce and gig work occurs outside formal registries. To mitigate this, the team conducted in-depth qualitative interviews with both formal and informal actors to ensure their contributions were not overlooked. Additionally, the rapid pace of technological and policy shifts meant that the team grounded its analysis in policy-neutral frameworks like the World Bank's DE4A model. This ensures the findings remain relevant as regulations evolve.

While the study employed robust statistical validation, including models like Random Forest and Linear Regression, the lack of longitudinal data in some sectors limits the ability to draw full causal inferences. These constraints are managed through stakeholder validation workshops that verify trends and ensure the data is broadly reflective of the national context. This multi-source approach provides a reliable foundation for the 2026 economic outlook.

1.6 STRUCTURE OF THE REPORT

The Ghana Digital Economy Outlook 2026 Diagnostic Report presents a detailed overview of how Ghana's digital ecosystem is taking shape and influencing key areas of the economy. It is structured around the core pillars of the digital economy, with each section building insights into how digital systems are being adopted, where gaps remain, and how these shifts are affecting inclusion and productivity across priority sectors.

Chapter 2 outlines the diagnostic methodology, setting out the approach used to gather and analyse the evidence presented in the report. Chapter 3 then provides a broad overview of the digital economy, establishing the context for the analysis that follows. Chapter 4 examines the key enablers that support digital transformation in Ghana, while Chapter 5 explores sector-specific developments and trends. Chapter 6 shifts the focus to zonal and regional dynamics, highlighting variations in digital adoption and access across the country.

Chapter 7 considers the evolving regulatory and policy landscape, assessing how existing frameworks are responding to the pace of digital change. Chapter 8 examines the impact of digital transformation on economic growth, with attention to productivity, jobs, and broader development outcomes. Chapter 9 presents benchmarking and comparative analysis, situating Ghana's progress alongside that of peer economies. The report concludes with Chapter 10, which looks ahead, offering insights into the future direction of Ghana's digital economy and the opportunities and challenges that lie ahead.

DIAGNOSTIC METHODOLOGY



2.0 DIAGNOSTIC METHODOLOGY

2.1 THEORETICAL CONCEPT

The study draws on four theoretical frameworks to ground its analysis. Schumpeter's Theory of Innovation frames digital transformation as a driver of "creative destruction". This enables new business models and economic restructuring, which justifies the focus on digital infrastructure, finance, e-commerce, and emerging technologies. The New Growth Theory adds to this by treating human capital and knowledge as core engines of growth, supporting the inclusion of digital skills and literacy as factors shaping how technology translates into real outcomes such as productivity and poverty reduction.

To address context and equity, the Technology Organization Environment (TOE) framework explains why organizations adopt technology differently depending on the policy environment, private-sector involvement, and cultural norms, which act as moderating variables. Digital Divide Theory is adopted to highlight how gaps, be it access, affordability, and regional distribution, limit who actually benefits from digital transformation. Together, these theories shape the study's variable selection and guide how both qualitative and quantitative evidence on Ghana's digital economy is interpreted.

2.2 STUDY FRAMEWORK

The study framework examines how digital transformation drives economic growth in Ghana. Five independent variables: digital infrastructure, digital financial inclusion, digital skills and literacy, e-commerce adoption, and data and emerging technologies form the foundation of the analysis. These represent the key digital forces expected to reshape economic activity across sectors.

These variables do not operate in isolation. Their impact on economic outcomes, GDP growth rate, economic production, employment rate, and poverty reduction rate is influenced by four moderating factors: government digital policies, culture and societal norms, human capacity, and private sector involvement. These moderators determine how effectively digital adoption translates into real economic gains, either amplifying or limiting its reach depending on the environment.

The framework also takes a broad view of the digital economy, looking beyond ICT services to capture how digital tools are reshaping sectors like agriculture, health, education, finance, and trade. To operationalise this broader scope, the study integrates secondary data, surveys, key informant interviews, and focus group discussions (which form the primary data for the study) to map both core ICT components (infrastructure, platforms, devices) and their sector-specific applications (such as e-learning, telemedicine, agritech, digital payments, and logistics platforms). Figure 2 below illustrates the framework of the study.

This comprehensive framework ensures that the analysis captures both the direct contributions of ICT and the indirect effects of digital tools on productivity, inclusion, innovation, and service delivery across the Ghanaian economy.

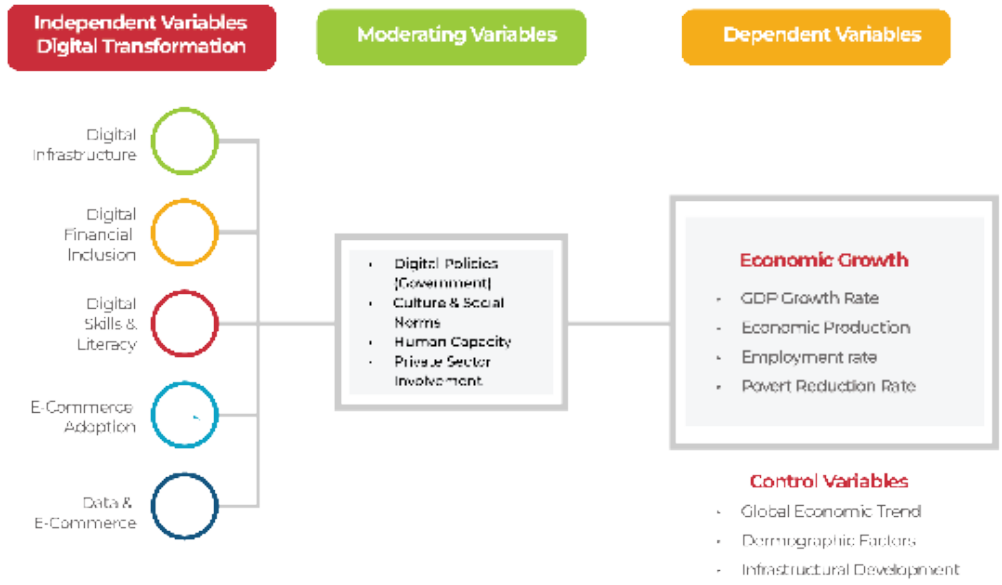


Figure 2: Ghana Digital Economy Outlook 2026 Project Framework

2.3 DIAGNOSTIC APPROACH

This study applied an exploratory sequential mixed-methods design, beginning with qualitative inquiry to identify key themes and followed by quantitative analysis to validate and deepen the insights. To capture the shared perspectives of Ghana's digital ecosystem, the approach combined extensive literature and secondary data review with primary data collection using in-depth interviews, focus group discussions, and a survey to engage diverse stakeholders across sectors.

2.4 DATA COLLECTION

2.4.1 Desk Study and Secondary Data

The study began with an extensive desk review to establish context and guide primary data design. This component examined the impact of digital transformation on economic growth using multidimensional datasets that integrated national statistics, regulatory and administrative records or data, and international development indicators. Data covering the period from 2014 to 2024 was sourced from reputable institutions, including the Ghana Statistical Service (GSS), National Communications Authority (NCA), Bank of Ghana (BoG), World Bank, Ministry of Communication, Digital Technology and Innovations (MoCDTI), Ministry of Finance (MoF), and United Nations (UN) bodies. Insights from this review informed the design of survey instruments and interview guides, ensuring alignment with both national policy priorities and global digital economy benchmarks.

2.4.2 Primary Data Collection

- **QUALITATIVE DATA COLLECTION**

  Twenty-eight Key Informant Interviews (KIIs) and eight Focus Group Discussions (FGDs) with 58 participants were conducted across government, private sector, academia, development partners, women entrepreneurs, youth leaders, and digital service users. KIIs provided expert insights on policy and market trends, while FGDs captured grassroots adoption experiences. To complement each other, KII findings shaped thematic areas that were further validated through the FGDs.

QUANTITATIVE DATA COLLECTION (SURVEY)

A nationwide survey of 1,112 respondents across all 16 regions of Ghana was conducted, covering individuals, SMEs, fintechs, agritech startups, government agencies, educational institutions, mobile network operators, and policymakers. The survey generated statistical evidence to complement and validate the qualitative findings. Figure 3 gives an overview of the demography of the survey respondents.

The total sample was categorized into two principal groups: (1) the community of users and (2) the service providers.

The community of users represents end-users of digital and technological services, including individuals, micro-enterprises, and organisations that depend on digital tools for daily activities and business operations.

Service providers, however, constitute entities involved in the supply, deployment, or enablement of digital solutions such as fintech companies, agritech firms, MNOs, ICT service providers, and related intermediaries.

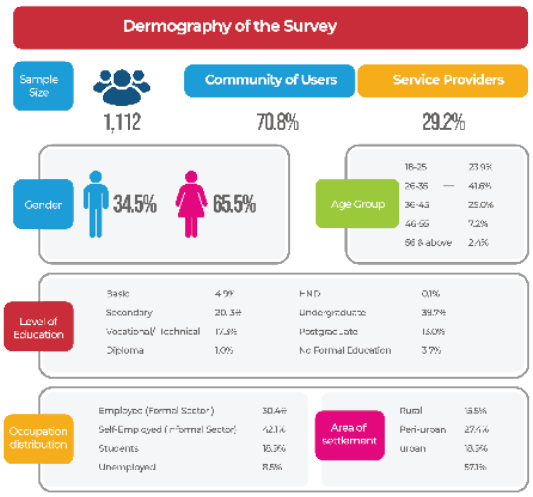


Figure 3: Demography of Survey

Respondents were purposively selected to reflect the interest in surveying more females. This deliberate sampling of respondents is expected to generate deeper insights into gendered patterns of access, usage, and capability within the digital ecosystem. This intentional emphasis strengthens the study's ability to assess whether women are adequately equipped and empowered to benefit from digital transformation, given persistent national and global concerns around digital gender gaps.

For analytical and strategic purposes, the 16 regions were further grouped into four zones: Northern, Middle, Southern, and Coastal. The Northern Zone encompasses the Northern, North East, Savannah, Upper West, and Upper East Regions. The Middle Zone comprised Bono, Bono East, Ahafo, Oti, and Ashanti Regions.

The Southern Zone included Eastern, Western North, and Volta Regions, while the Coastal Zone covered Greater Accra, Central, and Western Regions. This zonal approach reflects meaningful differences in sociodemographic characteristics, ICT penetration, digital readiness, and economic activity across the country.

It also enhanced comparative analysis, supported geographic representativeness, and aligned with the study's purposive sampling strategy, which ensured adequate inclusion of key digital ecosystem actors.

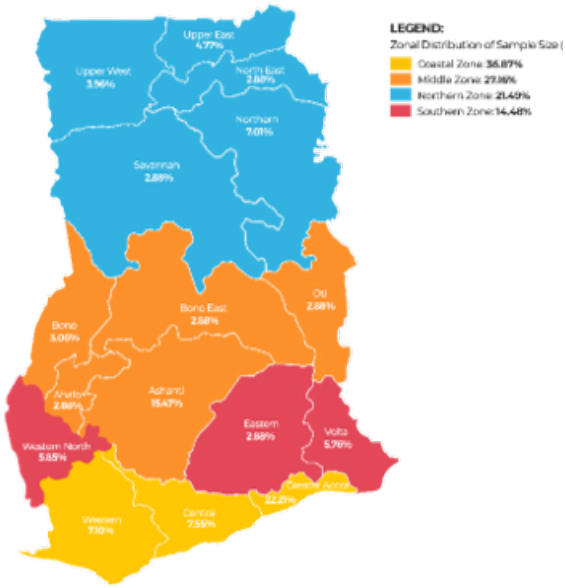


Figure 4: Zonal Distribution of Sample Data

In contrast to the KIIs and FGDs that formed the qualitative component, the survey provided statistical breadth and geographic depth, enabling robust triangulation across data sources and strengthening the validity of the findings.

2.5 DATA ANALYSIS

2.5.1 Secondary Data Analysis

To ensure robust and interpretable economic modelling on impact on economic growth, a two-stage feature selection process was applied, combining Random Forest feature importance ranking with Recursive Feature Elimination to isolate high-leverage predictors. Five complementary algorithms, Linear Regression, Lasso, ElasticNet, Gaussian Process Regression, and XGBoost, were tested across three feature scenarios: the full dataset, top predictors from Random Forest, and refined subsets from RFE. Model performance was evaluated using R^2, Root Mean Squared Error (RMSE), and Mean Absolute Error (MAE), enabling comparison between predictive accuracy and model simplicity. This structured approach ensured that results were both data-driven and policy-relevant.

2.5.2 Primary Data Analysis

Qualitative data from KIIs and FGDs were transcribed and analyzed through thematic and content analysis. Initial coding revealed broad issues, which were then grouped into six thematic pillars: Policy Transformation, High-Potential Areas, Infrastructure Gaps, Critical Tools and Technologies, Gender Implications, and Challenges Confronting Digital Transformation. The convergence of quantitative and qualitative strands enhanced the findings, providing both statistical generalizability and contextual nuance. The qualitative analysis is depicted below in Figure 5.

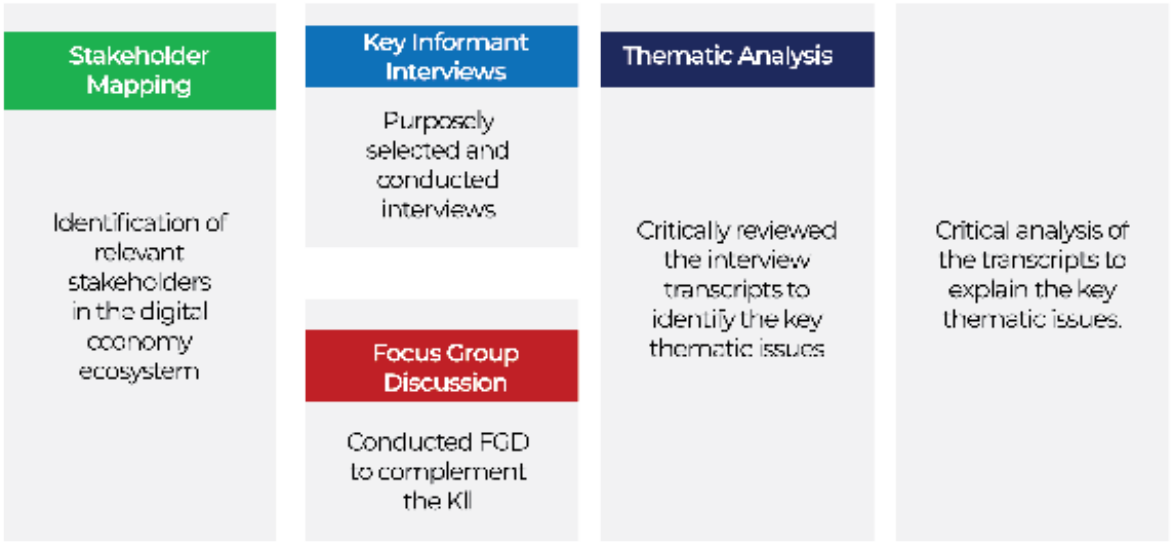


Figure 5: Qualitative Analysis Approach

Quantitative survey data were analyzed using both descriptive and comparative statistics, allowing for the identification of patterns, trends, and comparisons across geographic zones and demographic groups.

2.5.3 Benchmark Approach

To enable meaningful cross-country comparison, a composite Digital Economy Index (DEI) was constructed for five countries: Rwanda, Nigeria, Ghana, South Africa, and Kenya. The DEI brings together several indicators that capture different but complementary dimensions of digital development. Specifically, the index includes measures of internet usage, mobile connectivity, e-government development, digital financial inclusion, and the availability of secure internet servers.

- THE SELECTION OF THESE VARIABLES IS DELIBERATE
  a. Internet usage and mobile connectivity reflect the extent to which populations are connected and able to participate in digital activities.
  b. E-government development and government digitalization highlight the capacity of states to provide online services, improve transparency, and foster trust in digital systems.
  c. Digital finance adoption, particularly mobile money, is essential in the African context, where traditional banking services are often limited; it measures how digital platforms promote financial inclusion.
  d. The presence of secure internet servers represents the technical foundation for safe and reliable online transactions, which is crucial for building user confidence in the digital economy.

2.6 LIMITATIONS OF THE METHODOLOGY

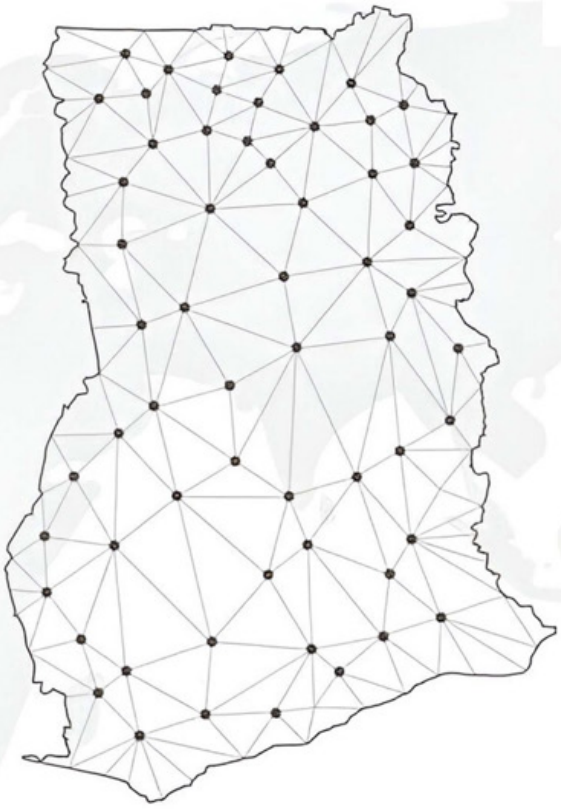
The study's mixed-methods design and rigorous triangulation ensure the findings remain credible and policy-relevant. Despite the study acknowledging four key limitations, these include; Sampling: Women were deliberately oversampled to capture gendered digital experiences, meaning the sample does not always reflect national population proportions. Self-Reporting Bias: Self-reported responses may carry biases related to personal perception, recall, or social desirability.

Regional Consideration: The zonal analytical approach was efficient but may obscure important sub-regional differences. Unavailability of Data and Data Gaps: There were data gaps and inconsistencies, which included unconsolidated or fragmented data across institutions, which constrained quantitative modelling and required greater reliance on triangulation and qualitative insights.

2.7 ETHICAL CONSIDERATIONS

Ethical data practices guided the entire research process. All participants (whether in surveys, KIIs, or FGDs) provided informed consent, their anonymity was preserved, and data collection complied with relevant protection and privacy guidelines.

OVERVIEW OF DIGITAL ECONOMY



3.0 OVERVIEW OF DIGITAL ECONOMY

Digital technologies are fundamentally changing how the world works, produces, and communicates. This transition has turned the digital economy, which the Organisation for Economic Co-operation and Development (OECD, 2020) defines as "economic activities that rely on digitized information and knowledge, information networks such as the internet, and modern ICT to drive productivity, trade, and economic growth," into a major force for job creation and poverty reduction. For Africa, the stakes are high. Projections suggest the continent's digital economy could reach $180 billion by 2025 and climb as high as $712 billion by 2050 (IFC, 2020). This growth follows a surge in mobile technology adoption, which serves as the primary gateway to services for millions of people (GSMA, 2024).

Generally, economists often view this environment through a layered framework. At the core sit ICT industries like telecommunications and hardware manufacturing. The next layer involves digital services and platforms such as fintech and e-commerce. The final and most expansive layer includes every traditional sector, from farming to retail, that has been transformed by technology (Bukht & Heeks, 2018). This study looks at the digital economy from a broad scope, exploring in what ways Ghana uses this structure to design its national strategies, ensuring that policy interventions reach every level of the economy.

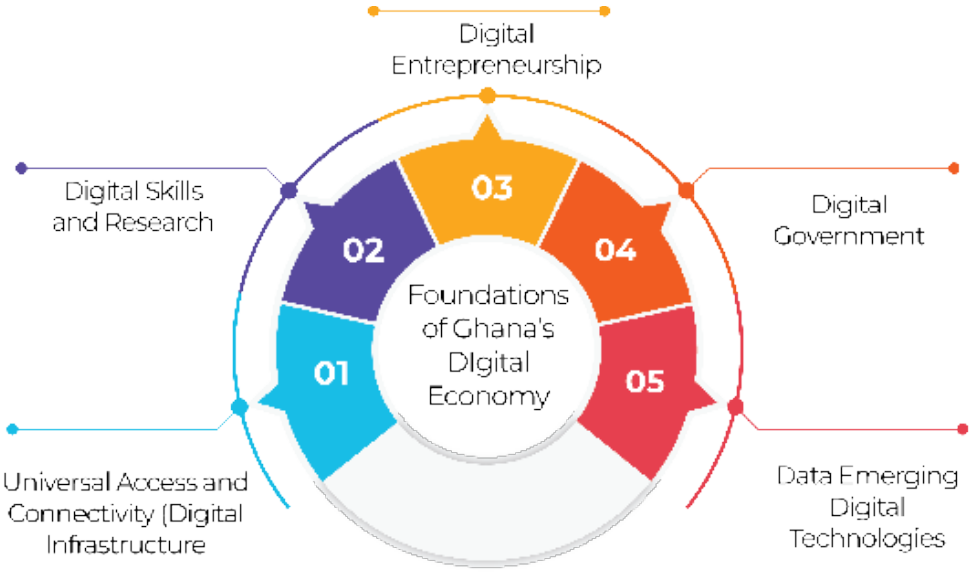


Figure 6: Scope of Digital Economy (Bukht and Heeks, 2018)

Ghana's Digital Economy Policy and Strategy is guided by both the World Bank's Digital Economy for Africa (DE4A) framework and the Pathways for Prosperity (P4P) Commission's Digital Economy Toolkit. This model focuses on five pillars: infrastructure, platforms, financial services, entrepreneurship, and skills (MoCD, 2024). By aligning national priorities with these global standards, the government seeks to turn policy intent into measurable economic gains.

3.1 A LOOK AT GHANA'S DIGITAL ECONOMY

Over the last decade and a half, Ghana has made meaningful progress in internet penetration and regulatory reform. A youthful population drives this evolution. As of 2023, roughly 57% of Ghanaians were under the age of 25 (World Bank, 2023).

This demographic is naturally more adept at adopting new technologies. However, high youth unemployment remains a barrier because limited income often restricts access to the very digital tools that could provide new opportunities (Lambon-Quayefio et al., 2023). Geographic and gender divides also remain fragmented. While urban areas enjoy better connectivity, only 19% of rural women in Ghana accessed the internet in 2021 compared to 31% of rural men (ITU, 2022). Closing these gaps is a central goal for the Ministry of Communication, Digital Technology, and Innovations (MoCDTI). The state aims to transform Ghana into a knowledge-based society (KBS) and a smart economy where ICT serves as the foundation for social mobility.

3.2 FOUNDATIONS OF GHANA'S DIGITAL ECONOMY

As mentioned earlier, the framework of Ghana's digital economy is built around five foundational pillars. Universal access and connectivity (digital infrastructure) are the starting points for any digital strategy. This is why the country's mobile broadband now reaches 99.7% of the population and 4G services cover 75% of the country (NCA, 2023). By early 2025, internet penetration reached nearly 70%, supported by the expansion of the National Fibre Optic Backbone (DataReportal, 2025). Despite these figures, rural and underserved users still struggle with slow speeds and inconsistent service quality (ITU, 2023).

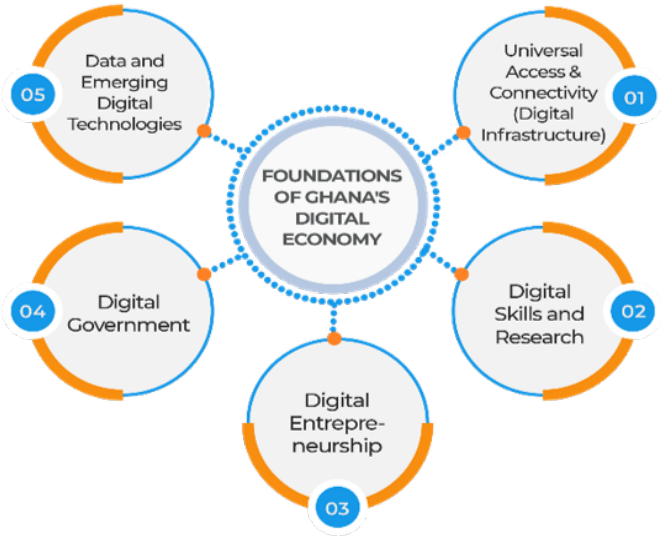


Figure 7: Foundations of Ghana's Digital Economy

Digital infrastructure must be matched by human capital to be effective. Programs like the Girls in ICT initiative have trained over 50,000 young women in cybersecurity (MoCD, 2022). In total, government-led projects have equipped more than 90,000 individuals with foundational skills (MoCD, 2024). A gap still exists in advanced fields. Many of Ghana's labour force, including graduates, lack the high-level expertise in Artificial Intelligence (AI), cybersecurity, and data analytics that modern employers demand (AfDB, 2022). This talent pool fuels an expanding startup ecosystem. Programs like YouStart provide early-stage financing, while the pending Ghana Innovation and Startup Bill (2025) seeks to offer tax incentives and a formal startup label to help businesses scale. These reforms aim to reduce the red tape that often stifles young entrepreneurs.

The government is also leading by example through its own digital transformation. Platforms like Ghana.gov and the Ghana Card have streamlined public services and boosted revenue collection (NIA, 2024). Currently, nearly 80% of government services are hosted locally via the Ghana Domain Name Registry (MoCD, 2024). These efforts demonstrate a shift toward a more efficient and data-driven public sector.

3.3 KEY SECTORS IN GHANA'S DIGITAL ECONOMY

The digital economy is not only actively transforming traditional sectors across Ghana and creating new business models such as the "gig economy" and Business Process Outsourcing (BPOs), but also driving efficiency. The recently enacted Ghana Digital Economy Policy and Strategy identifies and prioritises selected key sectors linked to Ghana's digital economy. These sectors, financial services, e-commerce, health, education, and agriculture, are to foster inclusive and sustainable growth. This strategic effort is part of a broader national ambition to position Ghana as a digital hub in Africa (The Business & Financial Times, 2025).

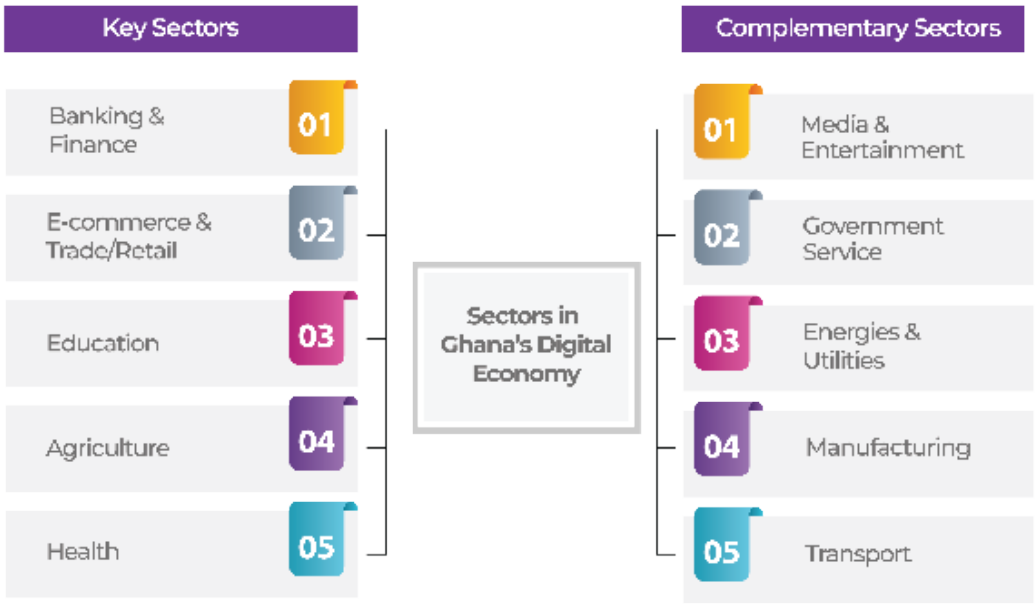


Figure 8: Sectors in Ghana's Digital Economy

Telecommunications operates as the indispensable utility for Ghana's digital aspirations. As an enabler, it alone contributes roughly 8% of the national GDP, valued at approximately GHS 94 billion (GSMA, 2025). By providing the data-exchange layer, telecommunications enables every other sector in the digital ecosystem. Banking and Financial Services have experienced the most aggressive transformation. Total industry transaction values via mobile money and payment service providers reached GHS 3.01 trillion in 2024, a 57.4% increase over the previous year (Bank of Ghana, 2025). This financial foundation supports E-commerce and Retail, where the government has drafted a National E-Commerce Strategy (2025-2029) to capitalize on the rising demand for digital trade (UNCTAD, 2024).

Social services are increasingly moving toward this digital-first model. In Health, the rollout of the Lightwave Health Information Management System (LHIMS) has aimed to unify electronic records across facilities, though administrative reviews in 2025 focus on addressing vendor and funding sustainability (WHO, 2025). Similarly, Education has seen a shift toward hybrid models. The 2026 Budget allocation of GHS 33.3 billion for education emphasizes digital tools and the "One Million Coders" initiative to future-proof the workforce (PwC, 2026; MoCD, 2025). In Agriculture, agritech platforms like Farmerline have scaled to reach millions, providing AI-powered advisory services that can increase yields by over 100% (Daily Agric News, 2024).

The ripple effects extend into complementary sectors that rely on high-speed data and digital trust. Transportation has been fundamentally altered by ride-hailing services, while Media and

Entertainment have moved almost entirely to streaming and digital content platforms. Government Services continue to migrate to the Ghana.gov portal, though current efforts are focusing on breaking down “data silos” to allow for better inter-agency analytic solutions (Parliament of Ghana, 2025). In the Energy and Utilities sector, the Electricity Company of Ghana is prioritizing smart meters to curb revenue leakage, while Manufacturing is beginning to integrate IoT and AI to improve value addition in gold and cocoa processing (GSMA, 2025; ECG, 2025).

3.4 ECONOMIC IMPACT AND GROWTH

Ghana’s digital economy is not a peripheral activity but a central driver of macroeconomic resilience. The five foundations identified in the national strategy: infrastructure, skills, entrepreneurship, government services, and emerging technology, collectively determine national productivity. Research indicates a direct causal link between these pillars and wealth creation. A 10% increase in mobile broadband penetration alone is associated with a 1.6% rise in GDP per capita in developing markets (ITU, 2025). Earlier estimates by Minges (2015) reinforce this, suggesting that a 10% rise in overall broadband can yield up to 1.5% growth in GDP per capita. In Ghana, this impact is reflected in the ICT sector’s output, which surged from GHS 4.4 billion in 2016 to GHS 21 billion by 2022 (GSS, 2024). By 2026, the Services sector, led by these digital activities, is expected to remain the dominant economic driver, accounting for 47% of national output (KPMG, 2026).

These foundational pillars have a direct and indirect impact on economic growth, particularly within the informal sector. Digital government initiatives, such as the 18.7 million enrolments for the Ghana Card, have provided the biometric identity needed for informal workers to access formal credit and insurance (NIA, 2025). Mobile money has been equally transformative, providing a 13% uplift in GDP relative to an economy without digital finance by lowering transaction costs for micro-businesses (GSMA, 2025). This is further evidenced by the rapid growth in mobile money interoperability, where transaction values on the Instant Pay platform tripled from GHS 120.1 billion in 2023 to GHS 355.1 billion by late 2024 (Bank of Ghana, 2024). Such foundations support the transition toward a “24-Hour Economy” model, allowing for continuous service delivery and broader market participation (KPMG, 2026).

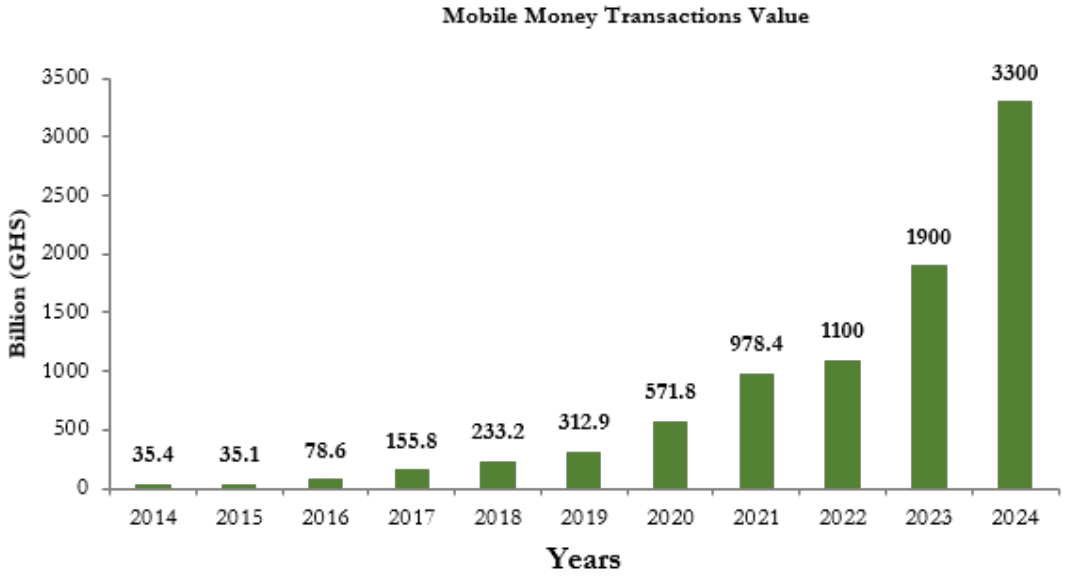


Figure 9: Mobile Money Transactions Value (GHS), Source: Bank of Ghana

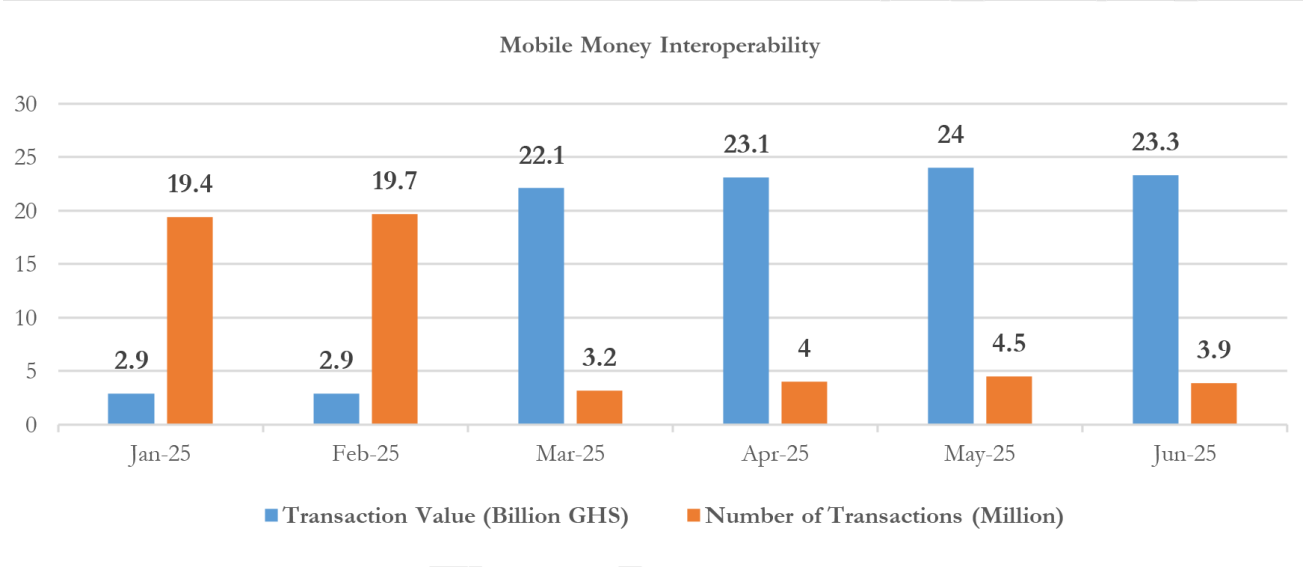


Figure 10: Mobile Money Interoperability, Source: Bank of Ghana

The broader socioeconomic benefits are realized through the synergy of all five pillars. Beyond connectivity, digital skills training is projected to create 230 million jobs across Sub-Saharan Africa by 2030, potentially generating $130 billion in revenue (World Bank, 2025). In Ghana, programs targeting youth and women, such as the Accra Digital Skills Hub, aim to achieve a 60% employment or startup rate among graduates by 2026 (Tsandy, 2025). Digital entrepreneurship further acts as a "transformative mechanism" that bridges the gap between innovation and job creation, specifically helping micro-enterprises become "digital bricoleurs" who use social media platforms and mobile money to remain resilient against economic shocks (ITU, 2022; ResearchGate, 2025). Additionally, emerging technologies like AI and the Internet of Things (IoT) are being codified through the Emerging Technologies Bill to boost agricultural yields by 10% to 20% and add GHS 15 billion in value to the manufacturing sector (GSMA, 2025; FurtherAfrica, 2025).

Even with these successes, the full economic potential depends on bridging the "usage gap." While 99% of the population is covered by 4G, a 62% usage gap persists, meaning millions have access to the network but cannot afford devices or lack the skills to use them (GSMA, 2025). Closing this gap through strategic policy reforms, such as the repeal of the e-levy and expanded device financing, could add $3.4 billion to Ghana's economy by 2030 (GSMA, 2025; PwC, 2025). This holistic development of the foundation pillars is essential for ensuring that digital growth translates into inclusive prosperity, a reduced poverty headcount, and a healthier national debt profile (World Bank, 2025).

DIGITAL ECONOMY ENABLERS



4.0 GHANA DIGITAL ECONOMY ENABLERS

The success of Ghana's digital agenda depends on the foundational pillars previously established in this report. The study evaluates those enablers by drawing on quantitative evidence from 1,112 respondents, as well as qualitative insights from key informants and focused group discussions. The findings offer a detailed look at device access, digital readiness, and the infrastructure constraints that define the national digital environment. While the data confirms steady progress across these pillars, persistent structural gaps remain that require targeted policy and strategic investment.

4.1 DIGITAL INFRASTRUCTURE

The current digital sphere features high mobile device penetration but uneven access to high-capacity hardware. Smartphones serve as the primary gateway to the digital world, used by 92.5% of survey respondents. This trend aligns with 2021 Population and Housing Census data, which noted that 75.7% of Ghanaians aged six and older owned a mobile phone, with significantly higher rates in urban centers (GSS, 2021). Ghana has clearly become a mobile-first ecosystem.

Notwithstanding this mobile success, access to more powerful computing tools remains low. Only 45.5% of respondents own a laptop or desktop, and just 17.9% own a tablet. This disparity reflects a broader national trend where mobile broadband penetration far outpaces fixed broadband connections (ITU, 2023). While smartphones handle communication and payments well, the lack of computers limits participation in complex tasks like software engineering, large-scale data analysis, and sophisticated business operations.

Ownership patterns further clarify this divide. Most respondents (89.7%) personally own their devices, which indicates strong hardware readiness at a basic level. Even so, because smartphones dominate this ownership (92.5%), it seems to suggest that digital activity remains largely focused on consumption rather than production. Moving from simple usage to high-value digital productivity will be difficult without broader access to high-capacity devices and stable, high-speed broadband.

Devices Used to Access Digital Services	Frequency of Usage
Smartphone	92.5%
Feature Phone	8.2%
Laptop or Desktop Computer (personal)	45.5%
Tablet/iPad	17.9%
Public or Shared Computer	8.9%
Device Ownership	**Percentage**
Owned	89.7%
Shared	7.7%
Borrowed	2.6%

Table 1: Device Used to Access Digital Services

4.1.1 Infrastructure Constraints and User Barriers

High costs and unreliable service continue to stifle potential. Approximately 68.6% of respondents identify expensive data and poor connectivity as their primary barriers. While Ghana's nominal mobile data prices often look favorable in African comparisons, affordability is a relative metric. Broadband is generally considered affordable when 1GB of data costs no more than 2% of average monthly income (Alliance for Affordable Internet, 2023). For many low-income Ghanaian households, costs far exceed this threshold, making high-volume usage a financial impossibility.

Reliability also changes based on geography. National diagnostics highlight a sharp contrast between urban infrastructure and rural service quality (World Bank, 2020). These gaps explain why owning a device does not always lead to economic gain. On the supply side, 46.2% of service providers cite financial constraints as a major hurdle to expansion. High deployment costs, taxes, and energy prices all threaten the sustainability of digital networks. The digital divide is therefore less about owning a digital device and more about the connectivity quality, affordability, and ecosystem investment gaps.

4.1.2 Industry Stakeholder Perspectives and Policy Priorities

Industry leaders consistently call for more public-private partnerships to strengthen the digital backbone. While 4G coverage has expanded, variations in the quality of service remain a persistent frustration for users (NCA, 2023). Focus group discussions and key informant interviews reveal that critical sectors like telemedicine and remote education depend entirely on stable, low-cost connectivity. Without these improvements, the benefits of technology will remain concentrated in a few hands.

Reflecting these concerns, 53.7% of survey respondents want the government to prioritize infrastructure investment. This public demand matches national goals to expand rural broadband and improve fiber networks. If Ghana is to compete globally, it must move beyond basic access. Targeted investments in underserved regions and better coordination between the state and private operators are essential steps toward long-term competitiveness.

4.2 DIGITAL FINANCIAL SERVICES

Digital finance is perhaps the most advanced pillar of Ghana's digital economy. Mobile money has moved from a simple payment tool to the center of daily economic life, used by 88.9% of respondents. This adoption rate positions Ghana as a leader in Sub-Saharan Africa (Bank of Ghana, 2023). The technology now supports everything from personal remittances to micro-enterprise savings, greatly expanding financial inclusion.

Security and cost concerns still cast a shadow over this success. While many experience no issues, nearly a third of users identify barriers related to reliability and trust. Specifically, 33% of respondents worry about fraud and cybersecurity. These fears are grounded in reality, as the Cyber Security Authority has reported a rise in digital financial crimes (Cyber Security Authority, 2023). Providers also feel the pinch, with 46.2% naming high taxes on digital transactions as a significant growth constraint.

4.2.1 Gendered Patterns in Digital Finance

Inclusion is not yet equal across genders. Among female respondents, 61% report limited financial literacy, 45% lack access to credit, and 37.6% feel they have reduced autonomy in financial decisions. Furthermore, 29% of women experience direct restrictions from male relatives regarding their use

of mobile financial services. These findings highlight how digital tools interact with existing social norms and economic inequalities (GSMA, 2023). Providing a woman with a digital wallet does not automatically empower her if literacy and social barriers remain unaddressed. Addressing literacy, credit access, and socio-cultural constraints remains essential for achieving meaningful inclusion.

4.3 DIGITAL SKILLS AND LITERACY

Digital skills and literacy form the necessary bridge between having both a digital device and connectivity and making them productive. The more advanced the digital skills of the human capital are, the easier and more productive they become in using digital tools and learning new ones quickly. While 22.3% of respondents claim basic digital competency, 46.2% possess intermediate skills, and just 29.1% reach advanced proficiency, as shown in Figure 11. This skill gap is a concern because the World Bank (2020) and International Labour Organization (2022) identify increasing demand in areas such as digital marketing, data analytics, cybersecurity, software development, artificial intelligence, and cloud computing, which are relatively more complex digital tasks in the gig economy. Ghana's expanding fintech ecosystem and technology startup environment further reinforce the need for intermediate and advanced digital skills.

Study Definition for Levels of Digital Skills:

Advance: Respondents can use digital tools and technologies with ease, learn new ones quickly, and even help others. They are comfortable with complex digital tasks.

Intermediate: They can use digital tools and technologies for everyday tasks, like browsing, emailing, and using social media. They might need some help with more complex tasks.

Basic: They have some knowledge of digital tools and technologies, but you might struggle to use them confidently. They can perform simple tasks like sending emails or texts.

None: They have little to no knowledge or experience with digital tools and technologies.

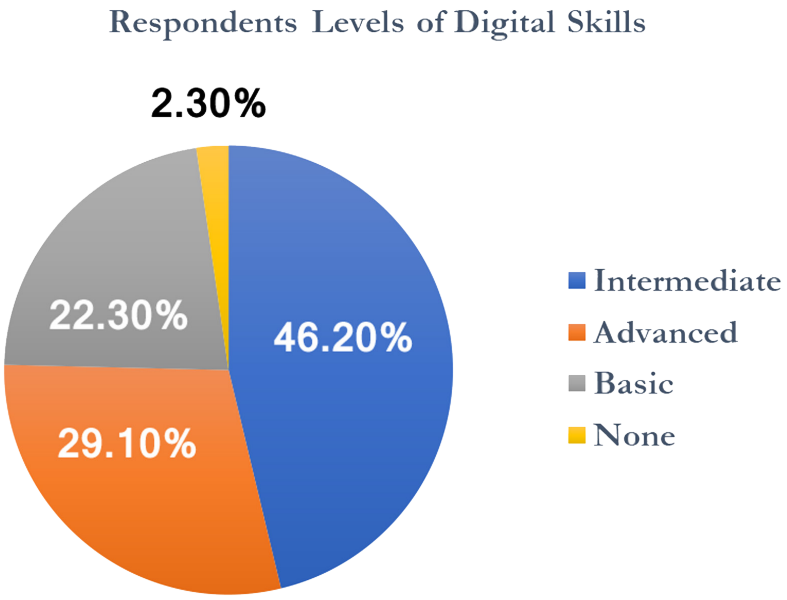


Figure 11: Respondents' Level of Digital Skills

Most Ghanaians now acquire these skills through a mix of university courses, e-learning platforms like Coursera, and informal online tutorials. The data shows that 58.3% of respondents use digital tools for both personal and business needs, integrating technology into their daily work. Even with this engagement, only 4.1% use these tools exclusively for business. While digital engagement is widespread, the depth of commercial integration is still shallow.

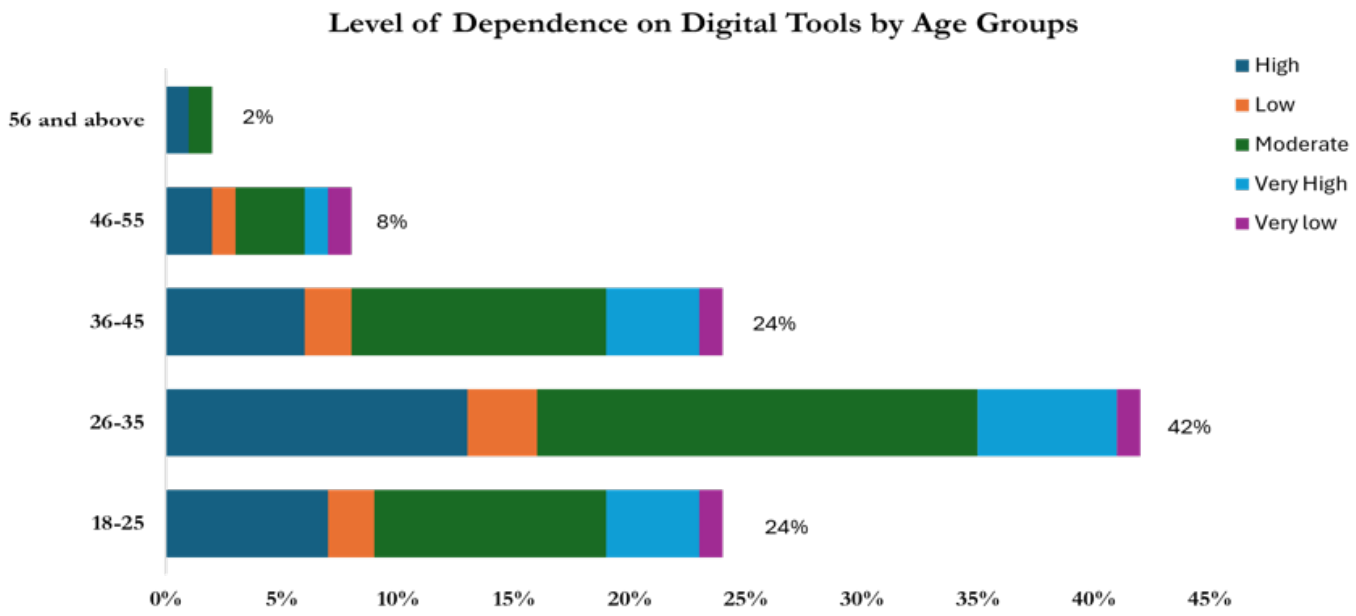


Figure 12: Level of Dependence on Digital Tools by Age Group

Demographics play a major role in this proficiency. In Figure 12, engagement is highest among those aged 26 to 35 and drops significantly after age 46. Education also correlates strongly with skill levels; those with university degrees report much higher proficiency than those with basic schooling. Focus group participants also noted that while urban schools are integrating ICT into their classrooms, rural areas still lack the capacity to offer advanced digital training.

4.4 DIGITAL ENTREPRENEURSHIP AND TRADE (E-COMMERCE ADOPTION)

E-commerce is growing, with 28.5% of respondents using online platforms daily. Ghana's market is a hybrid where formal sites like Jumia coexist with a massive social commerce sector on WhatsApp, Instagram, and Facebook. These social platforms are vital for small-scale trade, particularly for micro-enterprises (UNCTAD, 2022). Interestingly, 26% of women use social media for business compared to 17% of men, showing that these platforms are accessible entry points for female entrepreneurs.

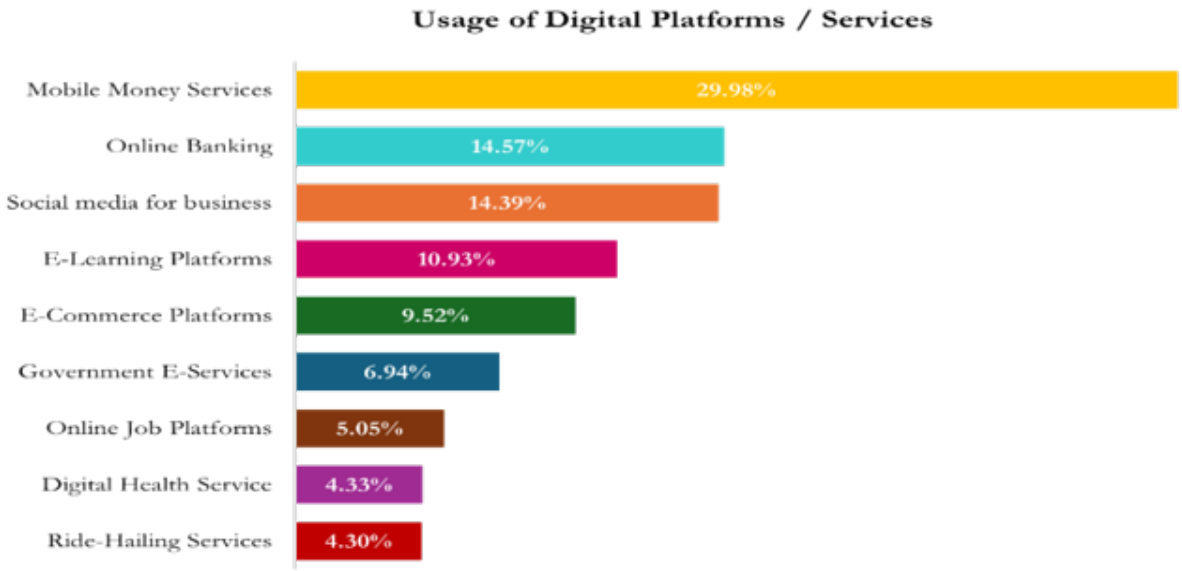


Figure 13: Usage of Digital Platforms/ Services

Growth is currently held back by high delivery costs (41.3%), logistics gaps (38.7%), and a lack of consumer trust (36.5%). To transition e-commerce from a mid-tier usage service into a core economic enabler, stakeholders posited that Ghana needs:

clearer e-commerce rules and consumer-protection standards (returns, refunds, dispute resolution),
tighter payment – marketplace integration (including escrow and interoperable wallets)
targeted logistics and addressing improvements for affordable, trackable delivery, and
digital skills/onboarding support for MSMEs, especially women-led enterprises in the informal sector.

4.5 DATA AND EMERGING TECHNOLOGY

The adoption of advanced technologies like Artificial Intelligence (AI) is picking up speed. Roughly 60.3% of service providers have adopted at least one emerging technology, primarily to improve productivity and decision-making. Users are also noticing the shift, with 64.2% interacting with these technologies in their daily lives.

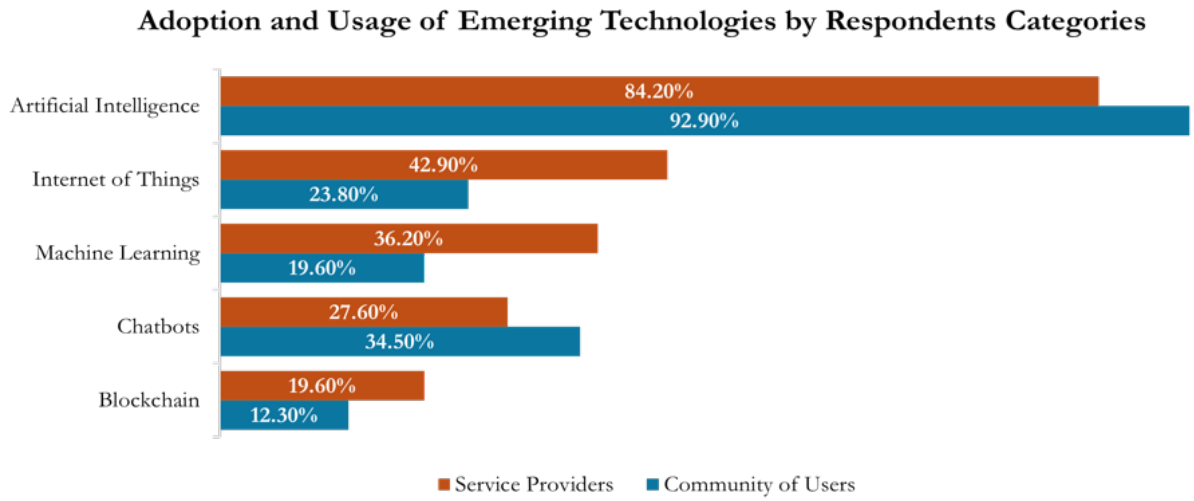
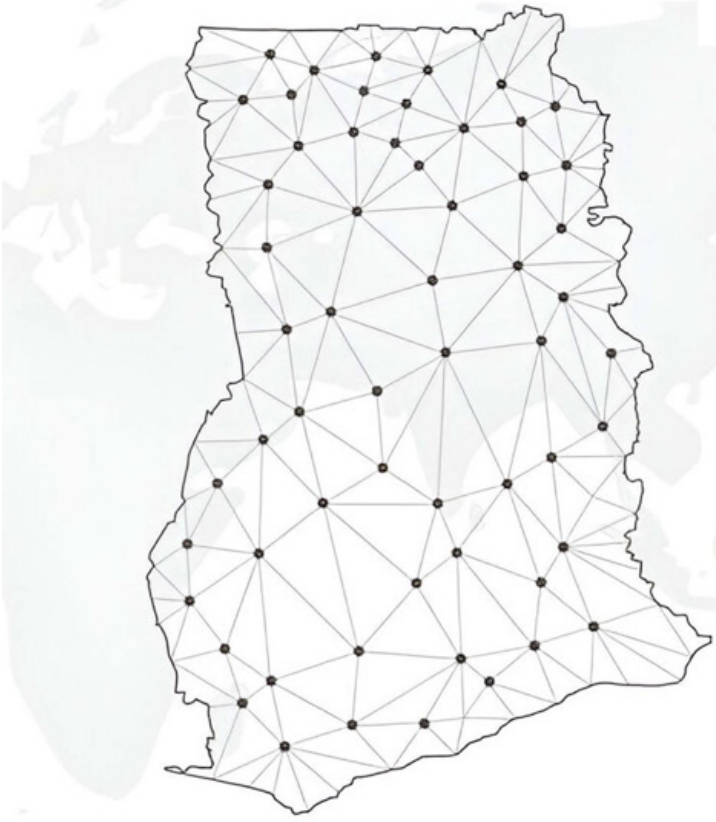


Figure 14: Adoption and usage of emerging technologies by respondent categories

Interest in these tools is high, with a quarter of providers planning to integrate new technologies within the next two years. Regardless of this interest, stakeholders warn that scaling these innovations requires more than just enthusiasm. It requires harmonized regulations, affordable tools, and stronger support for startups. Current barriers include a lack of awareness among 65% of providers and high implementation costs. Like the other pillars, the success of emerging tech depends on regulatory clarity and a workforce ready to use these tools (ITU, 2023).

SECTORAL OUTLOOK



5.0 SECTORAL OUTLOOK

The sectoral spread of the 1,112 respondents offers a clear sense of where digital engagement is most visible across the economy. Education accounts for a notably larger share at 22.10%, which points to how frequently digital tools are used in learning and administration. E-commerce, retail, and trade at 17.70% show a similarly strong presence, shaped by everyday transactions and interactions that naturally draw users onto digital platforms. In comparison, agriculture (11.22%) and health (10.95%) sit in a middle range where digital tools are becoming more common, reflecting growing interest and investment in areas that have traditionally relied more on manual or offline systems.

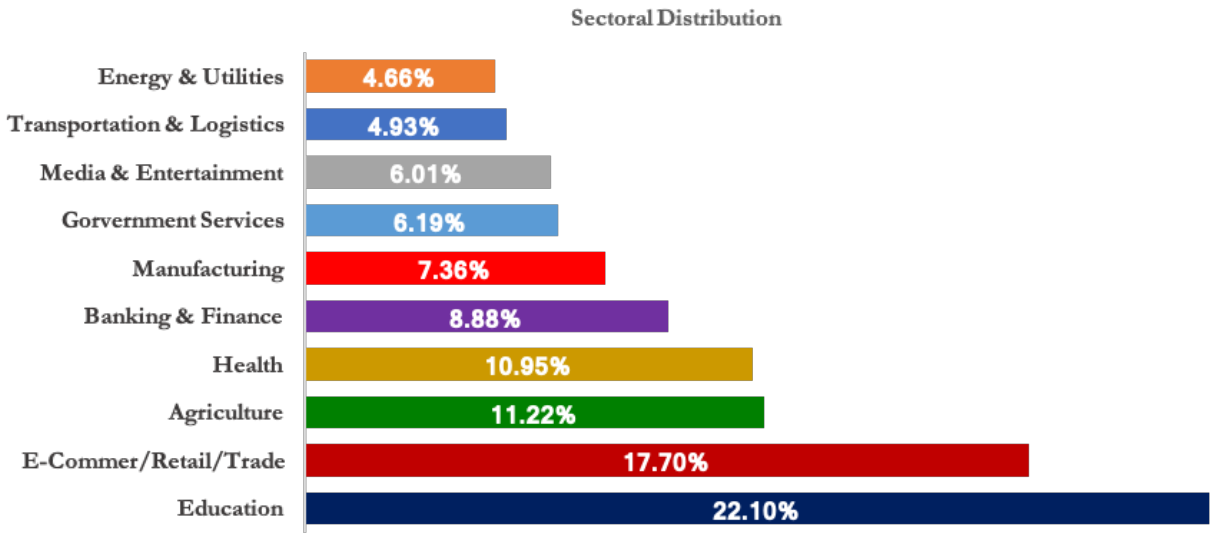


Figure 15: Sectoral Distribution

Banking and finance (8.88%) alongside manufacturing (7.36%) appear more contained, which may suggest that digital activity is concentrated within specific institutions or user groups rather than widely spread across all participants. Government services (6.19%) and media and entertainment (6.01%) reflect steady engagement without the same level of visibility seen in more user-driven sectors. Transportation and logistics (4.93%) and energy and utilities (4.66%) record smaller shares, which could be linked to the more operational or behind-the-scenes nature of digital systems in these areas, where users may not interact with them as directly or as frequently.

The distribution does not suggest uniform digital uptake across sectors; rather, it highlights where engagement is most observable within the context of this study. Sectors with a stronger presence naturally bring more varied perspectives into the analysis, while those with smaller shares require a more careful reading so that their lower visibility is not mistaken for lower relevance. In many ways, the spread reflects not just levels of adoption but the different ways in which digital systems are experienced, whether as everyday touchpoints or as background infrastructure supporting more complex operations.

5.1 DIGITAL INFRASTRUCTURE

Ghana's health sector is entering a decisive phase in its digital transformation, with telemedicine, mobile health applications, and electronic health records (EHR) becoming visible in service delivery. Within the sector, 76 users and 36 service providers were engaged, with women comprising 71% of

users and caregivers or guardians (34.2%) and community health volunteers (25%) forming the largest user groups, confirming that Ghana's digital health ecosystem depends more on care intermediaries than direct patient engagement. Health workers such as doctors, nurses, and pharmacists represented 15.7%, whereas direct patients and regulators represent 9.2% and 4%, respectively. Nearly 78% of users held undergraduate degrees, and 55% were urban-based, indicating a persistent equity gap skewed toward the educated and urban.

The digital transition is driven most strongly by patient demand, the accelerating legacy of COVID-19 as a platform adoption catalyst, cost-reduction imperatives for providers, and government policy.

As one expert observed: "Things are being digitized, but without synchronized records, the potential of digital health remains underutilized" (KII, Private Sector), a verdict that accurately captures both the ambition and the execution gap defining Ghana's digital health decade.

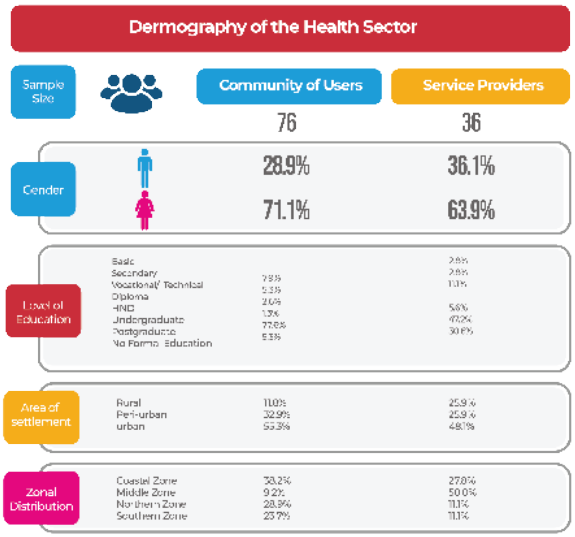


Figure 16: Demography of the Health Sector

5.1.1 Building a Digitally-Enabled Health System: Policy, Financing, and Access

This sector presents one of the clearest illustrations of how sustained public investment, policy direction, and digital infrastructure can converge to reshape service delivery while opening new pathways for economic expansion. Widely recognised as a continental benchmark, the country's digital health trajectory has drawn global attention, including acknowledgement by institutions such as Johns Hopkins University for its government-led transformation model (Johns Hopkins University, 2025).

This position did not emerge in isolation. It reflects a sequence of policy decisions stretching from the 2005 Health Sector ICT Policy through to the Lightwave Health Information Management System (LHIMS) to the 2010 e-Health Strategy, all of which set the early direction for digitising service delivery and health information systems (Ministry of Health, 2010; BMC Health Services, 2026).

The LHIMS, since its rollout in 2018, connected 147 hospitals by December 2022, including all five teaching hospitals at Korle Bu, Komfo Anokye, Tamale, Cape Coast, and Ho, and has processed over 26 million patient encounters through 2025. More recent frameworks, including the Health Information Systems Strategic Plan (2022–2025) and the Digital Health Policy (2023–2027), have shifted attention toward interoperability, electronic health records, telemedicine, and artificial intelligence readiness, linking earlier investments to a more integrated, forward-looking system (Ministry of Health, 2022; Ghana Health Service, 2023).

At the centre of this evolving architecture sits the National Health Insurance Scheme (NHIS), established under Act 650 of 2003. With over 16 million active members, it functions not only as a financing mechanism but also as a digital access point through biometric registration, USSD renewals, and Ghana Card integration (National Health Insurance Authority, 2025; Ghana Statistical Service, 2021) For instance, Ghana Card–NHIS linkage in 2020 makes the Ghana Card the single

identity credential for all NHIS enrolment, renewal, and facility access. As of 2025, all adults seeking NHIS enrolment must present a Ghana Card, enabling the National Identification Authority (NIA) biometric verification at the point of registration. The uncapping of the National Health Insurance Levy in 2025, which enabled a record GH¢9.93 billion allocation, further signals how fiscal policy continues to reinforce this system (Ministry of Finance, 2025).

What becomes evident from the primary data is how this infrastructure is being experienced in practice.

Demand for digital health is being driven strongly by patients and caregivers who are seeking convenience and quicker access to services.

Caregivers (34.2%) and community health volunteers (25%) form the largest group of users, often navigating digital systems on behalf of patients (Figure 17).

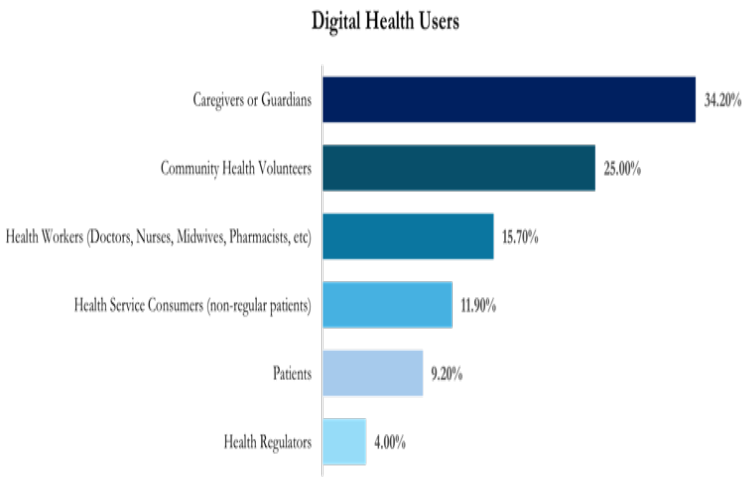


Figure 17 Digital Health Users Engaged

This reliance on intermediaries suggests that while the policy and financing layers have expanded access, direct patient interaction with digital platforms is still catching up.

5.1.2 Workforce Pressures and the Expanding Digital Health Labour Market

The scale of investment in health is closely tied to employment. Ghana's public health system employs about 127,000 workers, although projections indicate a requirement of more than 367,000 to reach 80% universal health coverage by 2030, leaving a gap of roughly 240,000 professionals (MoH, 2025). This gap sits alongside an estimated 20,000 to 30,000 trained but unemployed nurses and midwives, pointing to a misalignment between training output and fiscal absorption capacity. Experience shows that this gap is not insurmountable. During the COVID-19 response, 45,107 health workers were recruited within nine months, demonstrating how quickly the system can expand when funding and urgency align (PMC, 2022).

Digital transformation is adding another dimension to this labour equation. The expansion of platforms such as District Health Information Management System 2 (DHIMS2), Ghana Health Information Management System (GHIMS), and telemedicine services is generating demand for data managers, system administrators, IT support staff, and digital health coordinators across all levels of care. The formal establishment of the Ghana Health Service ICT Directorate in 2024 reinforces this shift by embedding digital roles within the public sector structure.

Survey findings highlight how participation in this emerging workforce is already taking shape. As indicated in the biodata, this is the only sector in which women dominate both service provision (63.9%) and usage (71.1%), particularly in mobile health and caregiving roles in this study. However, regulatory and licensing barriers appear to affect their ability to scale services, with a higher proportion of female providers calling for simplified licensing processes. This introduces an important policy consideration: workforce expansion alone is not sufficient; the conditions under which that workforce operates will influence how inclusive and productive it becomes.

5.1.3 From Fragmented Records to Connected Systems: The Data Challenge

The expansion of digital infrastructure across Ghana's health system has moved steadily from basic record-keeping toward more integrated data use. The rollout of DHIMS2 has enabled nationwide aggregation of health data, supporting disease surveillance, immunisation tracking, and programme monitoring across all levels of care (BMZ Digital, 2024). A more recent shift came with the transition from the privately managed LHIMS platform to the fully state-owned Electronic Health Record system GHIMS in 2025, following audit concerns around governance and delivery (Ministry of Health, 2025). This move goes beyond ownership. It opens space for domestic software development, local system maintenance, and sustained public sector demand for technical expertise.

Even with these advances, system integration continues to define the limits of what digital health can achieve. Platforms such as DHIMS2, GHIMS, SORMAS (Surveillance Outbreak Response Management and Analysis System), and National Health Insurance Scheme (NHIS) claims systems still operate with limited interoperability, which constrains both clinical efficiency and economic value. This is precisely why recent policy frameworks emphasise the development of a national Health Information Exchange (Ministry of Health, 2022; Ghana Health Service, 2023).

Survey findings bring this issue into everyday perspective. Service providers report that electronic health records are among the most widely used tools, alongside health education platforms (Figure 18).

Still, the benefits of these systems are not fully realised because patient data is not consistently synchronised across facilities.

As stakeholders observed, digitisation is progressing, though the absence of unified records limits its practical impact. The gap between system deployment and system integration becomes especially visible here.

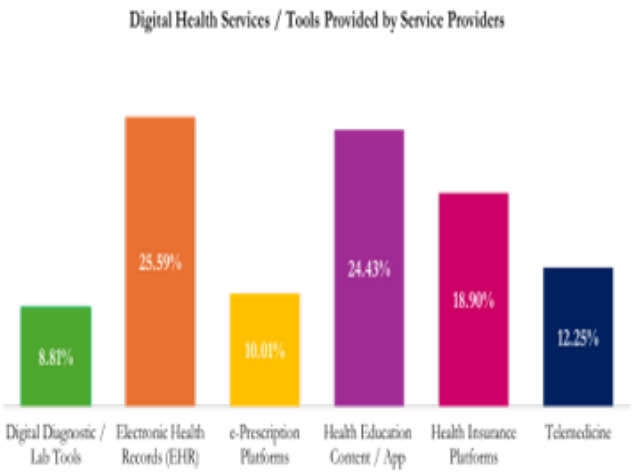


Figure 18 Digital Health Services & Tools Provided by Service Providers

5.1.4 Service Delivery Beyond Facilities: Platforms, Logistics, and Access

Digital health in Ghana is no longer confined to hospitals and clinics. It is increasingly defined by how services reach patients across distances. The introduction of drone-based medical deliveries through the Zipline programme in 2019 provides a clear example, reducing delivery times for essential medicines and blood supplies while improving health outcomes (BMC Health Services Research, 2025; Gavi, 2022).

This model has also created specialised roles in drone operations, maintenance, and logistics coordination, all staffed locally. Administrative systems have followed a similar path. Tools such as CLAIM-it and GhiLMIS have improved claims processing, reduced delays, and strengthened transparency within the NHIS framework (Johns Hopkins University, 2025; NHIA, 2025).

At the user level, field findings show how these innovations are being accessed and prioritised.

Platforms like Y'ello Care/mCare, Zipline, and mClinic are among the most recognised, reflecting the influence of private and specialised solutions in shaping adoption (Figure 19).

Public sector applications, although present, show lower visibility, suggesting that integration into everyday service delivery is still developing. Digital health platforms heard or used.

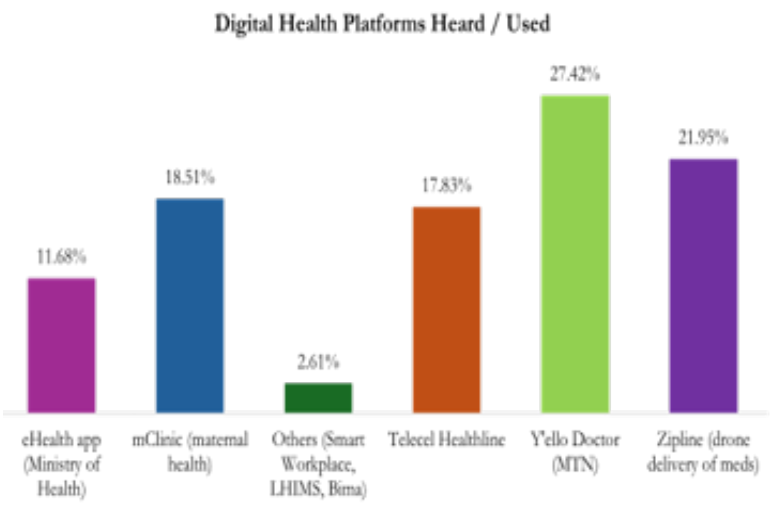


Figure 19: Digital Health Platforms Heard/Used

Differences across gender and geography further illustrate how digital health is taking root. Women seem to engage more with health education, diagnostics, and appointment systems, while men show stronger use of insurance and pharmaceutical platforms (Figure 20).

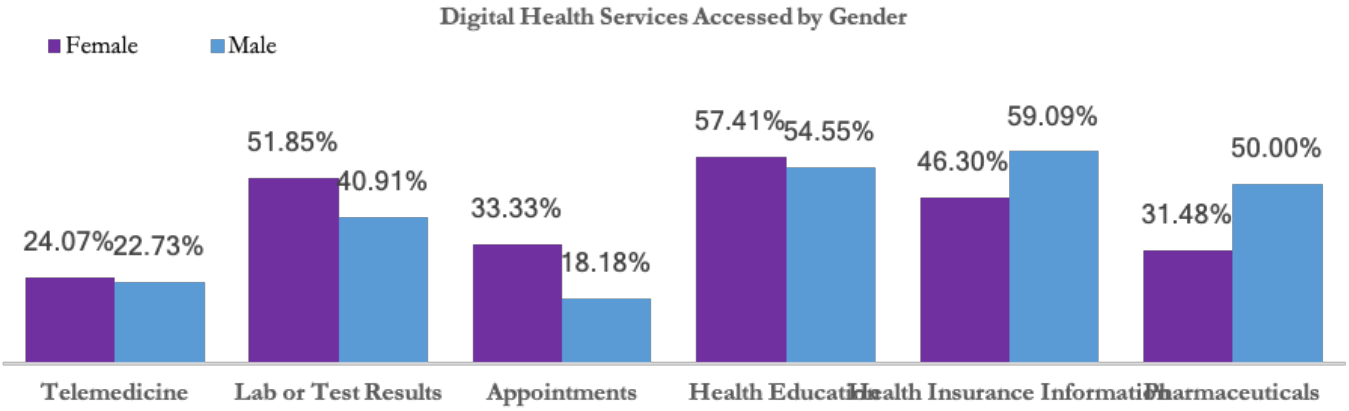


Figure 20 Digital Health Services Accessed by Gender

Regionally, the Coastal and Middle Zones show stronger uptake of informational services, while the Southern Zone demonstrates higher use of telemedicine and digital pharmacy services (Figure 21). These differences point to a system adapting to varied needs rather than a uniform pattern of adoption.

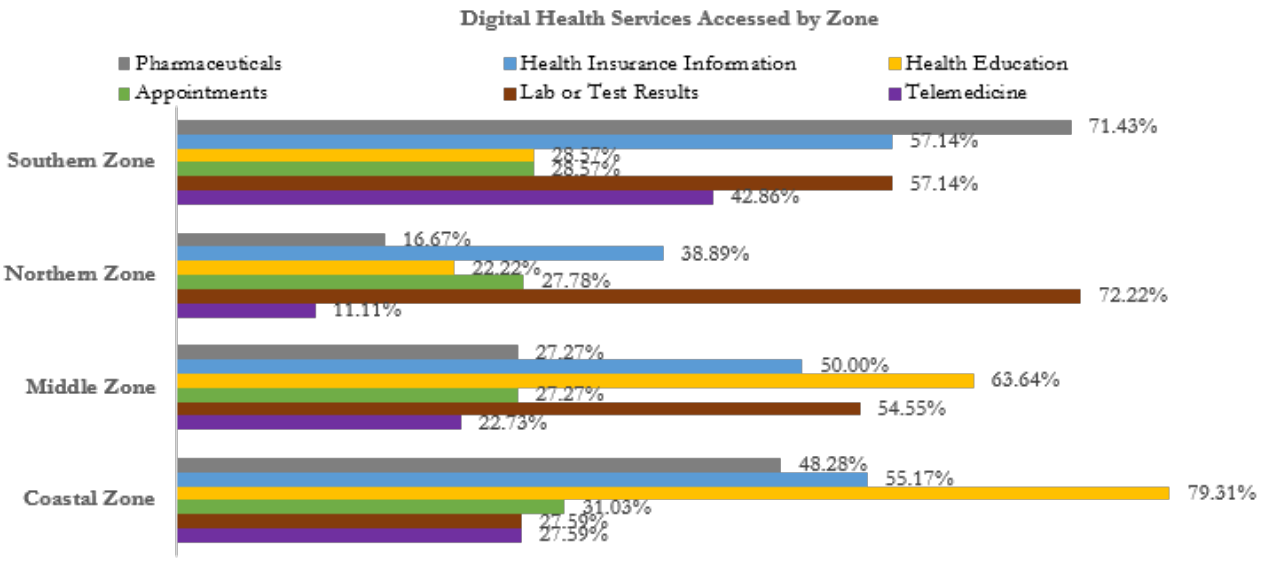


Figure 21: Digital Health Services Accessed by Zone

5.1.5 Barriers That Shape Access and Usage

The progress outlined above is accompanied by constraints that continue to influence how digital health expands across the country. Workforce shortages, migration pressures, and infrastructure gaps remain central concerns (IJISRT, 2026). Primary data provides a more granular view of these challenges. Cost emerges as the most immediate barrier, with 71.1% of users identifying affordability as a key constraint, particularly in relation to data and devices. Connectivity follows closely, with 84.2% reporting poor internet coverage, limiting the use of telemedicine and other real-time services. Providers note that 75% of users struggle with literacy barriers, and 13.9% cite shortages of technical staff. Encouragingly, there is an appetite for capacity-building; 77.6% of users said they would attend training, with 64.5% requesting rural-focused programs.

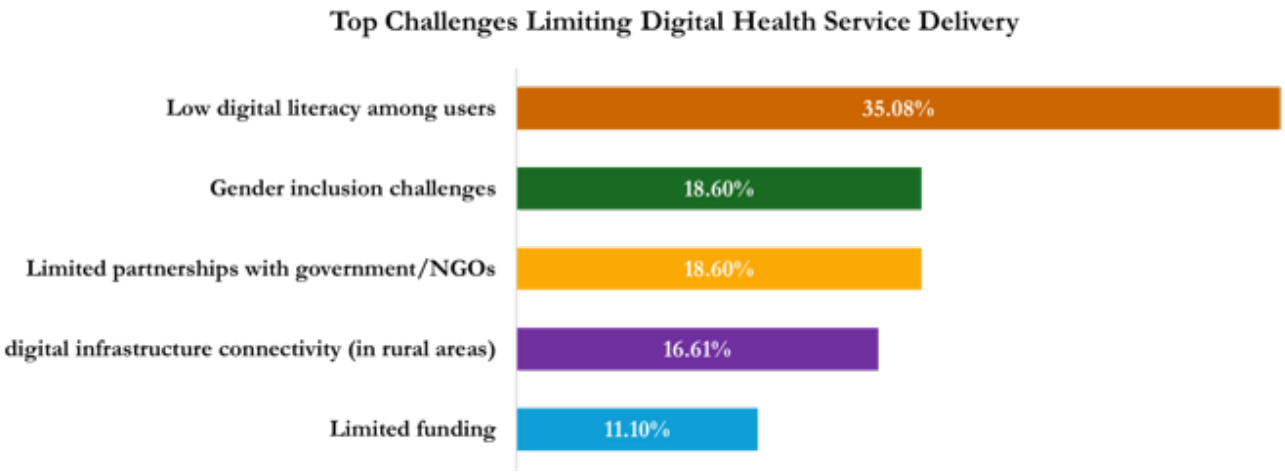


Figure 22: Top Challenges Limiting Digital Health Service Delivery

Regional differences reinforce how these barriers play out in practice. The Southern Zone reports widespread connectivity challenges, while the Middle Zone combines infrastructure limitations with low awareness of digital health platforms. In the Northern Zone, high costs and limited localisation reduce engagement, even where some level of access exists (Figure 22).

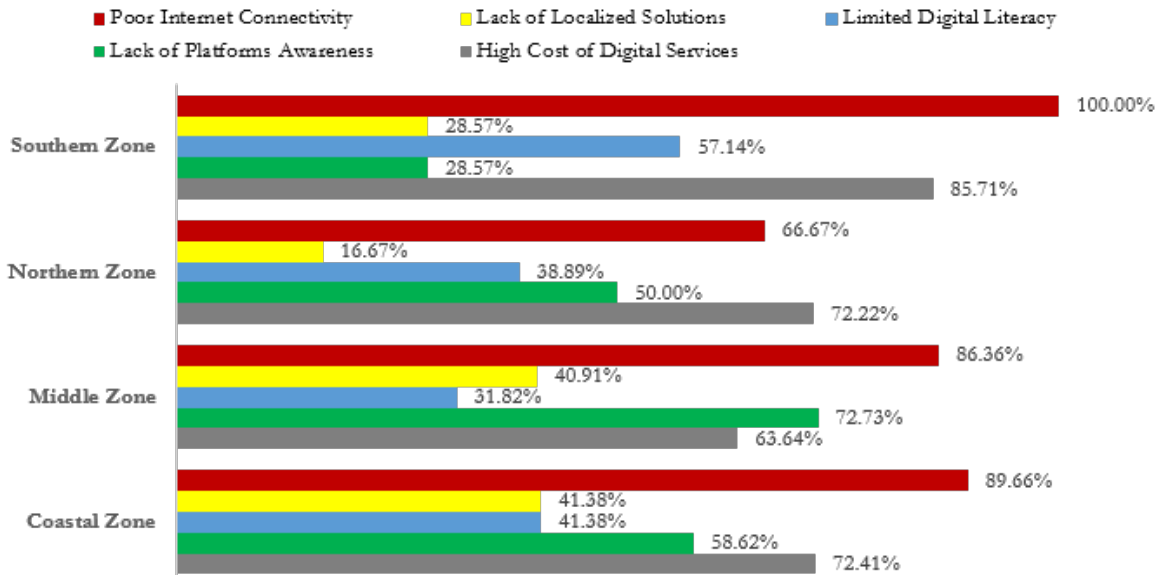


Figure 23: Top Barriers Faced in Using Digital Health Services by Zone

Human capacity also plays a role. A combined 86.7% of users reported low digital literacy and limited awareness of available platforms. In addition, service providers note that 75% of users struggle with literacy barriers, and 13.9% cite shortages of technical staff. Encouragingly, there is an appetite for capacity-building; 77.6% of users said they would attend training, with 64.5% requesting rural-focused programs. These findings suggest that expanding infrastructure alone will not be sufficient; user capability and awareness will determine how effectively digital systems are used.

5.1.6 Regulation, System Confidence, and the Pace of Innovation

Policy consistency has been a defining feature of Ghana's digital health journey, with each framework building on previous investments. Current strategies emphasise interoperability, telemedicine, and emerging technologies such as artificial intelligence (Ghana Health Service, 2023). However, stakeholders explained that regulatory processes are not always keeping pace with technological change.

Service providers highlight licensing complexity, slow approval timelines for AI-driven tools, and unclear data-sharing frameworks as key constraints (Figure 24).

These concerns point to a gap between policy direction and operational execution.

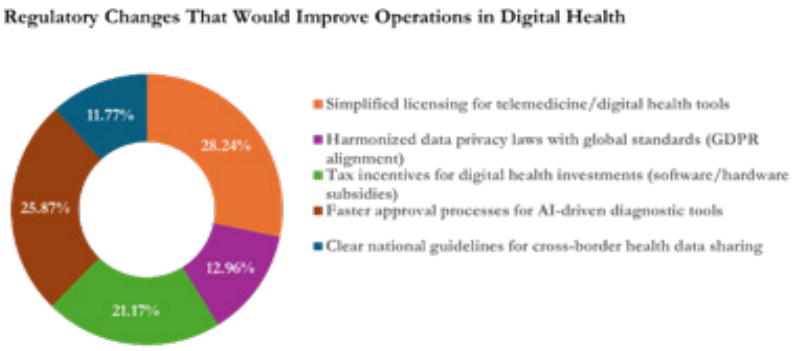


Figure 24 Regulatory Changes to Improve Digital Health Operations

Expectations of government support also vary across regions. In areas with higher adoption, affordability is the primary concern, while in less connected regions, respondents prioritise infrastructure and digital literacy (Figure 25). This variation suggests that a single national approach may not fully address local realities.

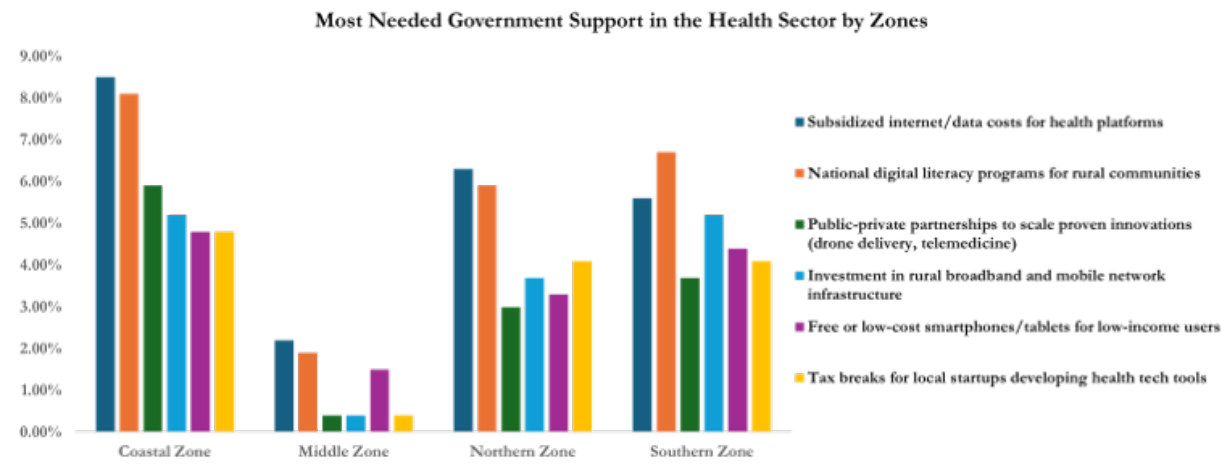


Figure 25: Most Needed Government Support in the Health Sector by Zone

5.1.7 Linking Health Transformation to Economic Opportunity

What emerges from this combined analysis is a sector where improvements in service delivery are closely linked to broader economic outcomes. The continued rollout of GHIMS, expansion of telemedicine, and push toward interoperability are creating demand for digital skills across the public sector. Logistics innovations such as drone delivery are opening new areas of employment, while private health technology firms are extending Ghana's reach into regional markets. Primary data reinforces this direction. Electronic health records and health education platforms are forming the foundation of scalable services, while telemedicine, mobile diagnostics, and AI-driven tools are gradually extending the scope of care (Figure 26).

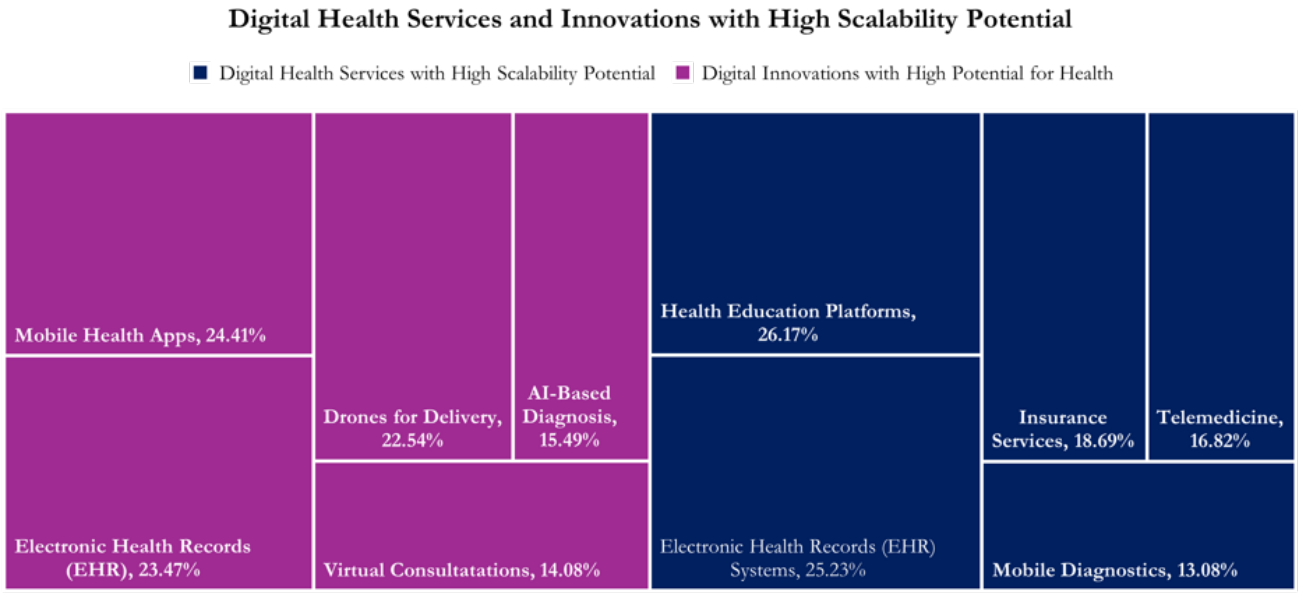


Figure 26 Digital Health Services & Innovation with High Scalability Potential

Large-scale policy commitments around universal health coverage and workforce expansion indicate that the health sector will continue to serve as a major source of formal employment. The broader implication is that Ghana's digital health transformation is not only improving access and quality of care. It is also reshaping labour markets, strengthening domestic innovation capacity, and positioning the sector as a contributor to long-term economic growth.

HEALTH SECTOR STRATEGIC GROWTH OUTLOOK

High-Growth Potential Area	Growth Potential Assessment	Key Challenges & Barriers	Recommended Actions for Stakeholders
Telemedicine & Remote Care	a. Global telehealth market projected to grow at 24% CAGR through 2030 b. Strong domestic demand c. Potential to reach underserved rural populations and reduce travel costs.	a. Regulatory uncertainty b. Limited broadband in rural areas c. Cultural preference for in-person visits.	a. Government to streamline licensing and invest in rural broadband b. Service providers to offer hybrid models blending digital and physical care c. Awareness campaigns to build trust.
Diagnostics & Mobile Lab Tools	a. High demand from 62% of users; b. Aligns with the WHO priority for early detection c. Potential to reduce healthcare system strain.	a. Equipment cost b. Lack of trained operators c. Interoperability issues with EHR systems.	a. Tax incentives for diagnostic tech imports b. Integration with national health data systems c. Training programs for health workers.
Electronic Health Records (EHR)	a. Strong provider adoption interest (75%) b. Proven efficiency gains globally c. Key to data-driven healthcare.	a. Fragmented system b. Unclear data ownership c. Low interoperability.	a. Establish national interoperability standards b. Enforce data protection laws c. Incentivize EHR adoption via subsidies or grants.
AI-Enabled Diagnostics	a. Global AI healthcare market growing at >35% CAGR b. Early adoption by 31% of Ghanaian service providers c. Potential for faster, more accurate diagnosis.	a. Skills gap b. Lack of an AI regulatory framework c. High cost of customization for local context.	a. Develop AI approval pathways b. Invest in local AI adaptation c. Build digital literacy among clinicians.
Drones for Medical Delivery	a. Strong user interest (63%) b. Proven efficiency in Rwanda and Ghana's own vaccine delivery programs c. Potential to expand to pharmaceuticals and diagnostics.	a. Operational cost b. Airspace regulation c. Limited rural distribution hubs.	a. Expand public–private partnerships (PPPs) for drone networks b. Review aviation regulations c. Develop last-mile delivery points in rural areas.

Figure 27: Summary of Health Sector Strategic Growth Outlook

5.2 AGRICULTURE SECTOR

Representation in this sector included 90 users and 25 service providers, summing up to 115 respondents out of the total sample. The users were largely actors across the agricultural value chain, including farmers, agro-processors, distributors, extension officers, agricultural cooperatives, and consumers of agricultural products and services who engage with farming and food systems in various capacities. The service providers, on the other hand, were mainly organizations and enterprises delivering digital and technology-enabled agricultural solutions, including agri-tech startups, NGOs, government institutions, cooperatives, and private agribusiness firms.

Figure 28 suggests that this developing system remains anchored in a sector where end-users, especially farmers, agro-processors, and traders, constitute roughly 78% of respondents, compared to about 22% representing service providers.

This structure reflects a production-oriented ecosystem in which digital solutions are still largely consumed rather than produced within the sector.

In earlier years, the emphasis was on improving access to information and basic advisory services. Over time, this expanded into farmer registration systems, digital input distribution, financial services integration, and more recent applications of satellite monitoring and data-driven decision-making.

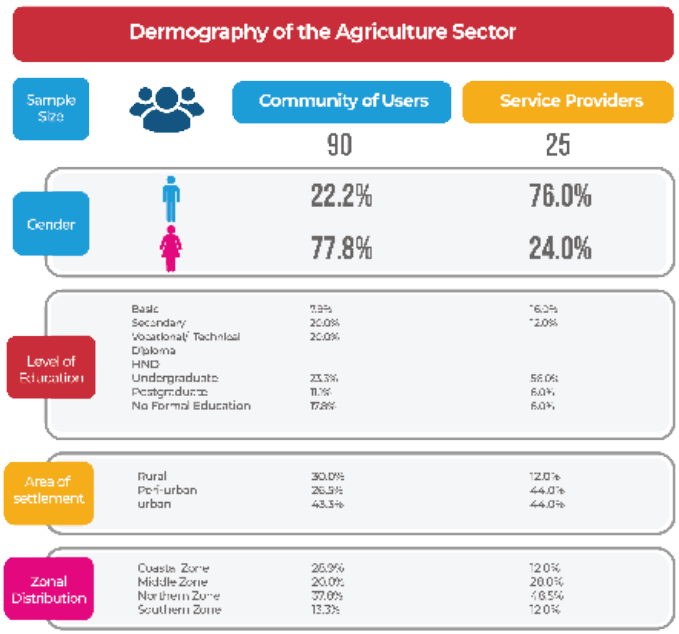


Figure 28: Demography of the Agriculture Sector

5.2.1 Expanding Access and Strengthening the Digital Layer in Agriculture

Digitalization within this sector has been a gradual but deliberate process over the period. Initial efforts to introduce digital tools into agriculture focused on bridging information gaps between farmers and extension services. The E-Agriculture Programme introduced interactive voice response systems and mobile-enabled advisory services that allowed farmers to access information in local languages without relying on internet connectivity (Food and Agriculture Organization of the United Nations [FAO], n.d.). This marked an early shift toward more inclusive service delivery models. This emphasis on accessibility continues to be reflected in current usage patterns, where approximately 90% of sector respondents report ownership or access to mobile devices, providing a strong foundation for mobile-based service delivery.

Over time, these systems developed into more structured digital infrastructure. The Ghana Agriculture and Agribusiness Platform (GhAAP) stands out in this regard. By 2024, it had registered approximately 1.2 million farmers using biometric identification and geospatial mapping (World Bank, 2025). This scale of digital registration has improved the targeting and transparency of government interventions. World Bank (2025) records indicate that between 86% and 98.6% of farmers received inputs during major distribution exercises, reflecting stronger delivery systems. However, field data suggests that access to these systems is mediated by practical constraints, as only about 65% of users describe their connectivity as reliable, with more stable access concentrated in commercially active zones.

These improvements are not only administrative. They translate into real economic effects. Better targeting reduces input leakages, improves timeliness, and supports higher yields. When inputs arrive on time and in the right quantities, productivity responds. This is part of the reason digital coordination is increasingly linked to improvements in agricultural output and sector performance. Yet, the extent of these improvements appears varied in practice, with only about 30 to 35% of stakeholders directly associating digital tools with measurable improvements in productivity, suggesting that access alone does not automatically translate into production outcomes.

Climate and environmental data systems have also expanded. Investments in automated weather stations and satellite-based monitoring tools now support more accurate forecasting and crop assessment (European Space Agency [ESA], 2025; World Bank, 2024). These tools feed into advisory services used by both farmers and policymakers. As climate variability intensifies, the value of timely and location-specific information becomes more evident, both for farm-level decisions and for national food security planning. However, only around 35% of users report regular use of weather or advisory tools, indicating that while such systems exist, their integration into everyday farming decisions remains selective.

When it comes to Access, however, evidence from Northern Ghana shows that digital adoption is closely linked to income, education, and farm size, with more vulnerable farmers less likely to benefit from digital services (African Geographical Review, 2025). This distributional gap shapes outcomes across the sector. It also signals where future investments will matter most. Expanding connectivity, improving device affordability, and strengthening rural digital access will determine whether these systems can deliver broad-based productivity improvements rather than concentrated benefits. Field insights reinforce this trend, with approximately 60 to 64% of users identifying the high cost of digital services (especially data and device costs) as a limiting factor, alongside 35 to 40% pointing to power reliability challenges that affect consistent usage. Figure 29 provides a broader overview of the top challenges in accessing digital agriculture services across the zones.

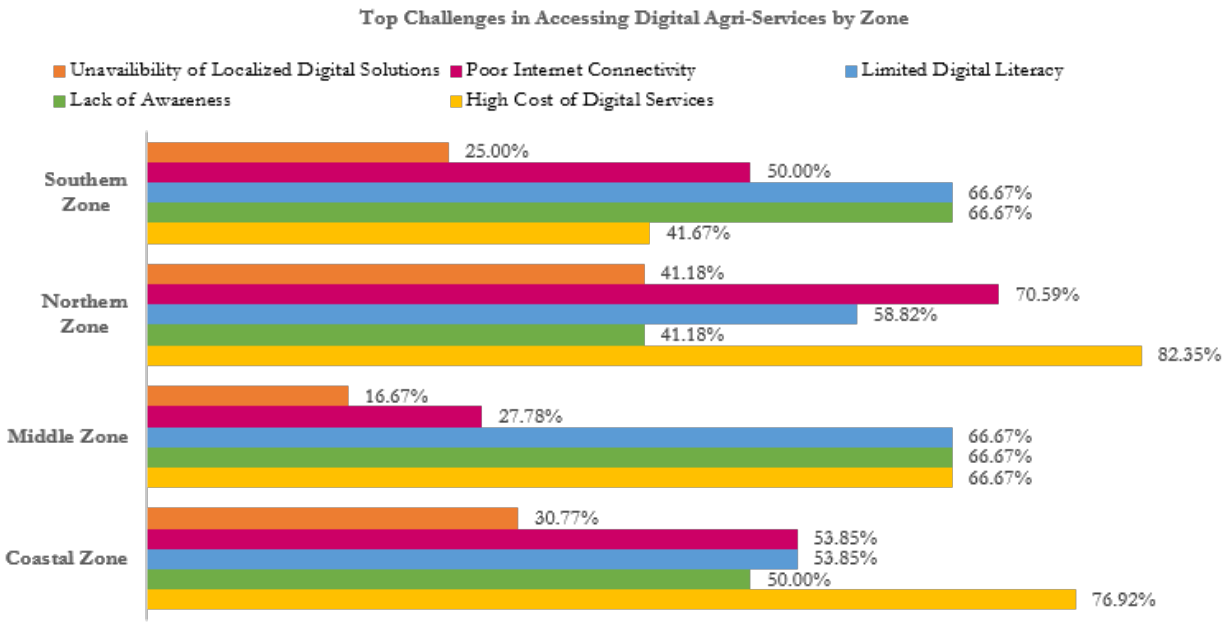


Figure 29: Zonal Distribution of Top Challenges in Accessing Digital Agri-Services

5.2.2 Building Capabilities for a More Data-Driven Agricultural System

As digital systems become more central to agricultural operations, the development of skills and institutional capacity has gained importance. Training initiatives under programmes such as the Food Systems Resilience Programme have supported extension officers and policymakers in using digital tools for data collection and analysis (World Bank, 2024). This has contributed to more informed planning and service delivery. Complementary field evidence suggests that digital capability across the sector is concentrated at basic and intermediate levels, with approximately 48 to 52% of users operating at intermediate levels and 30 to 35% at basic levels, while advanced capabilities remain limited to about 15%.

Over time, this shift toward data use is beginning to influence how decisions are made within the sector. Extension services are becoming more responsive. Planning is increasingly evidence-based. These changes, while less visible than infrastructure investments, shape productivity outcomes in meaningful ways. However, the relatively low share of advanced digital skills may constrain the extent to which more sophisticated data-driven tools can be effectively deployed and utilised across the sector.

At the same time, innovation and entrepreneurship programmes are building digital capabilities among young people. The Kosmos Innovation Center and similar initiatives have supported training and startup development within the agritech space (Kosmos Innovation Center, n.d.; Mastercard Foundation, n.d.). More recently, the launch of the Timbuktoo AgriTech Hub reflects an effort to expand innovation ecosystems across the country (Ministry of Communication and Digitalisation, 2026). These developments are complemented by a growing base of service providers, among whom 40 to 45% report advanced digital capabilities, although this expertise is not uniformly distributed.

These developments carry implications beyond skills alone. They open pathways for employment in areas such as agritech development, data services, and digital extension. In this sense, digital agriculture is not only reshaping how farming is done, but also who participates in the sector and in what capacity. Nonetheless, gender disparities persist at higher levels of capability, with women representing less than 40% of those with advanced digital skills, reflecting structural differences in access to training and technical roles. Women face structural barriers related to literacy, access to devices, and participation in decision-making processes. These constraints limit their ability to engage fully with digital platforms (African Geographical Review, 2025). Youth participation also reflects mixed trends, where opportunities exist but are shaped by broader perceptions of agriculture as a career. Addressing these gaps will be central to ensuring that the employment and productivity benefits of digital transformation are more evenly distributed.

5.2.3 Platform Ecosystems and Changing Market Dynamics

The expansion of agritech platforms has introduced new forms of interaction within agricultural markets. Platforms such as Esoko, Farmerline, and AgroCenta provide services that address market access, price discovery, and financial inclusion challenges (ODI Impact, 2024; Farmerline, 2025). In practice, stakeholder evidence indicates that mobile money has become the most widely adopted digital tool, with usage exceeding 90%, while information accessing and communication platforms are used by approximately 70 to 75% of actors to coordinate transactions and market interactions.

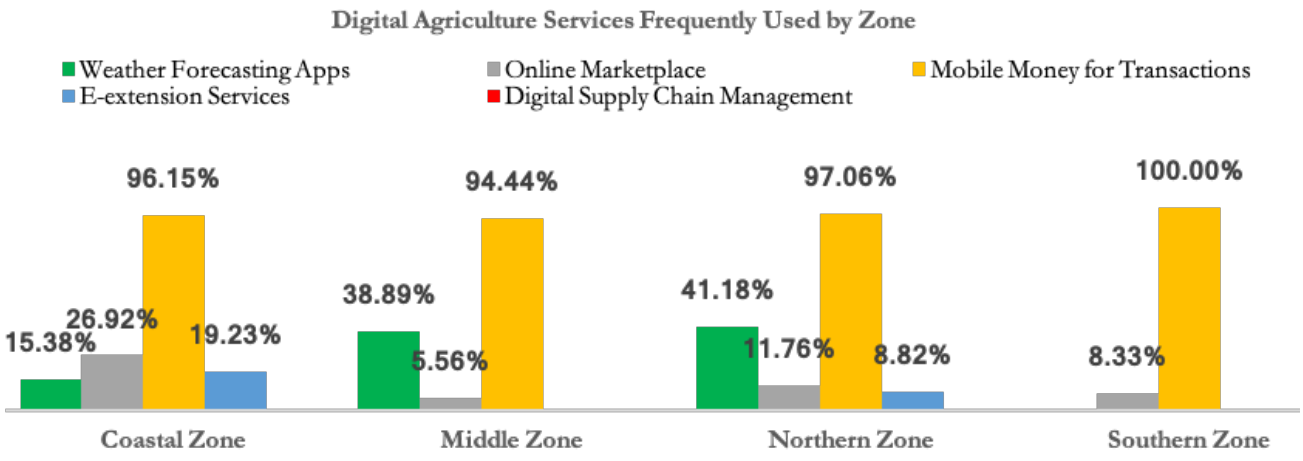


Figure 30: Zonal Distribution of Digital Agriculture Services Frequently Use

Studies provide evidence of impact. Access to mobile-based market information systems has been associated with price improvements of approximately 10% for farmers, driven by improved market timing and negotiation (Courtois & Subervie, 2014). These improvements illustrate how information asymmetry, a long-standing constraint in agricultural markets, can be reduced through digital tools. However, the use of more structured digital marketplaces (as indicated in Figure 30) remains comparatively limited, with adoption estimated at around 30% among agribusiness operators and below 20% among smallholder farmers.

Digital financial services have also become more prominent. Mobile money platforms facilitate transactions across value chains, while data-driven credit systems expand access to finance. For example, Farmerline's partnership with financial institutions has enabled the extension of credit to farmers based on digital farm records (Farmerline, 2025). This approach reduces reliance on traditional collateral and supports broader financial inclusion. Improved access to finance, in turn, allows farmers to invest in inputs, adopt better technologies, and expand production. Field findings suggest that these financial efficiencies are reflected in practice, with about 50 to 55% of users reporting improvements in transaction speed.

At a broader level, these platform-driven changes are contributing to shifts in income patterns and market participation. Farmers are better connected to buyers. Payment delays are reduced. Post-harvest losses can be managed more effectively. These outcomes strengthen the link between digital adoption and income growth. Nonetheless, only about 20 to 30% of stakeholders report accessing new markets through digital platforms, indicating that while benefits exist, they are not yet universal.

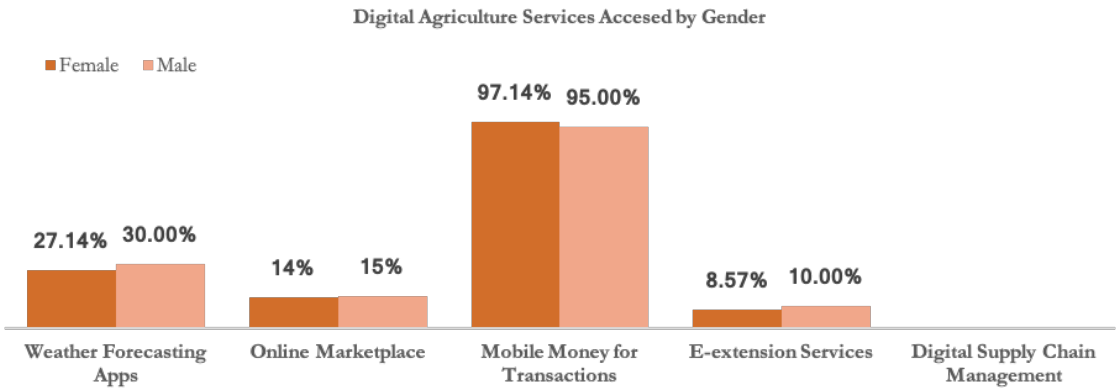


Figure 31: Digital Agriculture Services Accessed by Gender

However, the ecosystem faces constraints related to financing and scale. While the number of agritech startups has grown, only a small proportion have secured significant investment, limiting their expansion and overall impact (Tracxn, 2025), which the survey findings confirm – the majority of service providers (56%) reported their initial capital investment is less than GHS1 million.

The implication is that without stronger financing pathways, the ability of digital platforms to drive sector-wide productivity and employment improvements will remain constrained.

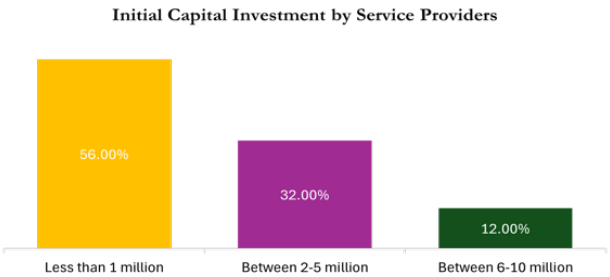


Figure 32: Initial Capital by Service Providers

5.2.4 Public Sector Systems and the Evolution of Digital Coordination

Government programmes have played a central role in integrating digital tools into agricultural systems. The Planting for Food and Jobs programme illustrates this progression. During its first phase, digitised registration and input tracking systems supported the mobilisation of approximately 1.2 million farmers (MoFA, 2023). The effectiveness of such programmes is partly shaped by the structure of the sector, where variations in education and income levels between users and providers influence the ability to engage with digital systems.

This period was associated with measurable improvements in sector performance. Agricultural GDP growth increased from 2.7% in 2016 to an average of 6.3% between 2017 and 2021, alongside increases in fertiliser use and certified seed distribution (MoFA, 2023). These outcomes point to how improvements in coordination, supported by digital systems, can translate into higher productivity and contribute to national economic growth. However, field-level evidence suggests that the realisation of these improvements is not uniform, shaped by differences in access, skills, and local infrastructure conditions.

The second phase of the programme has expanded digital requirements, including GPS-based farm mapping and integration with national identification systems. Newer initiatives, such as the Feed Ghana Programme, aim to consolidate these improvements through centralised data platforms and monitoring systems (MoFA, 2025). These efforts reflect a broader shift toward real-time decision-making and integrated policy execution.

At the same time, large-scale programmes linked to the digital agriculture ecosystem are contributing to employment creation. Initiatives such as the HAPPY programme and the Initiative for Youth in Agricultural Transformation have generated substantial job opportunities, many of them targeted at young people and women (Agri-Impact Limited, 2025; Mastercard Foundation, 2025). These roles span production, logistics, extension services, and digital platform operations, illustrating how digital transformation is expanding the employment footprint of agriculture.

However, policy fragmentation remains an issue. Digital agriculture initiatives are distributed across multiple frameworks, and the absence of a standalone national strategy continues to create gaps in areas such as data governance and system interoperability (MoFA, 2023). Strengthening coordination across these systems will be important for sustaining productivity improvements and ensuring that digital investments translate into long-term economic outcomes.

5.2.5 Emerging Technologies and the Growing Importance of Data

The increasing use of advanced technologies is shaping the next phase of digital agriculture in Ghana. Satellite-based systems provide detailed crop monitoring and yield estimation, supporting both farm-level decisions and national planning (ESA, 2025). Artificial intelligence is also being applied in advisory platforms to generate more precise recommendations. However, field insights indicate that the adoption of such advanced tools remains limited, with usage levels below 15% across most stakeholder groups, despite moderate levels of awareness.

In the cocoa sector, traceability requirements linked to international regulations have accelerated the adoption of geospatial tracking and blockchain-based systems. These tools enable the tracking of production across supply chains, supporting compliance with environmental standards and maintaining access to export markets. For a sector that supports hundreds of thousands of livelihoods, the ability to meet such requirements carries direct implications for income stability and foreign exchange earnings.

At the same time, data governance has become a critical concern. A large share of digital agricultural services is delivered by private platforms, raising questions about data ownership and value distribution (Taylor & Francis, 2024). Without clear frameworks, there is a risk of fragmented systems and unequal benefits. Moving forward, greater attention to interoperability, data standards, and regulatory clarity will shape how effectively these technologies contribute to inclusive growth. This is further reinforced by observed gaps between awareness and consistent use, with approximately 40 to 45% of stakeholders indicating familiarity with emerging technologies but significantly fewer applying them in routine agricultural practice. Respondents also highlighted digital services and innovations they foresee as having high potential for scalability within the sector (as shown in Figure 33).

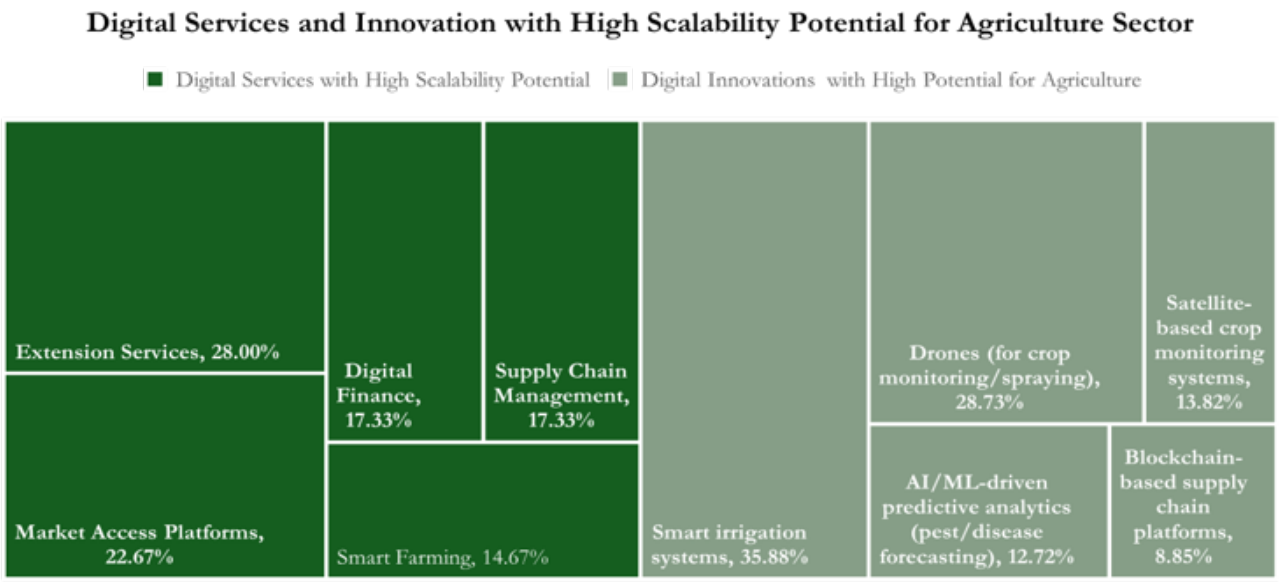


Figure 33: Digital Services & Innovations with High Scalability for the Agriculture Sector

Ghana's agriculture sector continues to experience steady advancement in infrastructure, platforms, and policy integration. The next phase will depend on how effectively these systems are aligned, expanded, and made accessible to a broader base of stakeholders, especially farmers within the value chain. The direction is evident. Digital transformation is becoming part of how agriculture functions in Ghana. At the same time, field evidence points to a process that is not uniform, where improvements in access, skills, and affordability will determine the extent to which digitalisation translates into sustained productivity improvements, inclusive participation, and long-term economic development.

AGRICULTURE SECTOR STRATEGIC GROWTH OUTLOOK

High-Growth Potential Area	Growth Potential Assessment	Key Challenges & Barriers	Recommended Actions for Stakeholders
Digital Financial Services for Agriculture	a. Near-universal mobile money adoption (97% of users) creates a strong foundation for credit, insurance, and savings products. b. Proven link to financial inclusion and productivity gains globally.	a. Fraud risk b. Trust deficits c. Affordability barriers for women d. Limited product diversity.	a. Strengthen cybersecurity and fraud prevention b. Promote gender-inclusive financing models c. Integrate value-added services like credit scoring and insurance.
E-commerce & Market Linkages	a. 85% of users sell produce online b. Potential to boost farm incomes and integrate smallholders into formal value chains c. Aligns with global trends toward traceable, transparent food systems.	a. High service costs b. Limited rural connectivity c. Low trust in new buyers/platforms.	a. Subsidize connectivity for rural sellers b. Promote digital literacy for online trade c. Develop trusted certification/traceability systems.
Data-Driven Agriculture & Precision Tools	a. Strong farmer interest in AI analytics (74%) b. Smart irrigation (72%) and drones (58%) c. Proven yield gains in pilot projects d. Aligns with climate-smart agriculture goals.	a. High upfront cost b. Lack of technical skills c. Weak rural infrastructure.	a. Provide financing for equipment acquisition b. Establish training hubs c. Integrate precision tools into extension services.
Blockchain-Based Supply Chain Transparency	a. 82% farmer interest b. Growing global demand for verifiable supply chain data c. Potential to increase export competitiveness.	a. Lack of standardized platforms b. Interoperability gaps c. Data governance issues.	a. Develop national blockchain standards. b. Incentivize adoption in export crops. c. Partner with buyers for market access.
Smart Farming & IoT Solutions	a. Providers see 56% scalability potential. b. Can optimize inputs, reduce waste, and increase yields.	a. High IoT maintenance costs. b. Frequent power outages. c. Lack of local technical support.	a. Reduce import taxes on IoT devices. b. Invest in rural energy reliability. c. Train local IoT technicians.

Figure 34: Agriculture Sector Strategic Growth Outlook

5.3 EDUCATION SECTOR

A total of 236 respondents were engaged, including 209 users and 27 service providers. Most came from public schools (59.3%), with smaller shares from private schools (22.2%), NGOs and development partners (11.1%), and government agencies (7.4%). Among users, women make up the majority at 73.7%. In contrast, service providers are more evenly distributed by gender, with 51.9% women and 48.1% men. This makes education the most gender-balanced sector in terms of the provision of digital services among the remaining sectors analysed.

Use of digital platforms is largely driven by learners themselves. Students represent 79.4% of users, compared to 13.5% for parents and just 7.1% for teachers. This points to a shift where demand is coming from end-users, rather than being led primarily by institutions.

The most widely used platforms are YouTube (44.19%) and Google Classroom (35.83%), while formal providers, Coursera (7.74%), Udemy (7.49%), and Eneza Education (0.87%) show modest adoption.

This preference for free, accessible, and familiar tools over structured e-learning platforms underscores that affordability and ease of access are stronger drivers of adoption than certification value.

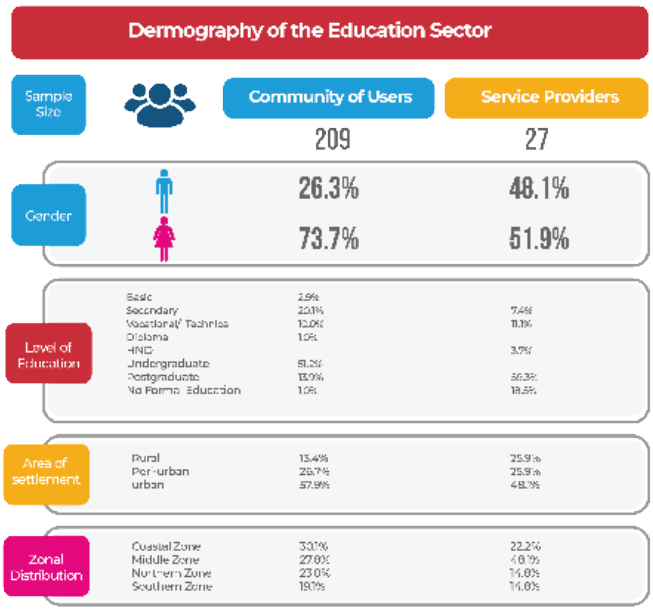


Figure 35: Demography of the Education Sector

5.3.1 Education as Infrastructure: Financing, Access Expansion, and System Demands

Ghana's education sector presents one of the most expansive and structurally grounded examples of how sustained public investment, policy sequencing, and digital infrastructure deployment are shaping both service delivery and long-term economic potential. In 2025 alone, the sector received GH¢42.16 billion, which is about 15.6% of total government expenditure, the highest allocation in the country's history (Ministry of Education [MoE], 2025). This level of financing is closely linked to the transformation triggered by the Free Senior High School policy, introduced in 2017, which expanded gross enrolment from 25% in 2005/06 to 72% in 2022/23 and brought total enrolment to over 1.4 million students by 2024 (Oxford Business Group, 2024; MoE PBB, 2025). Managing this scale has required more than an expansion of physical infrastructure. It has driven the development of national digital systems for student tracking, placement, and resource allocation, positioning digital infrastructure as a core operational requirement rather than a supporting tool.

This institutional reality is reflected in the study sample, where public schools account for 59.3% of service providers, followed by private institutions, NGOs, and government agencies.

The distribution corresponds with national trends and reinforces the central role of public schools in shaping how digital adoption unfolds across the sector.

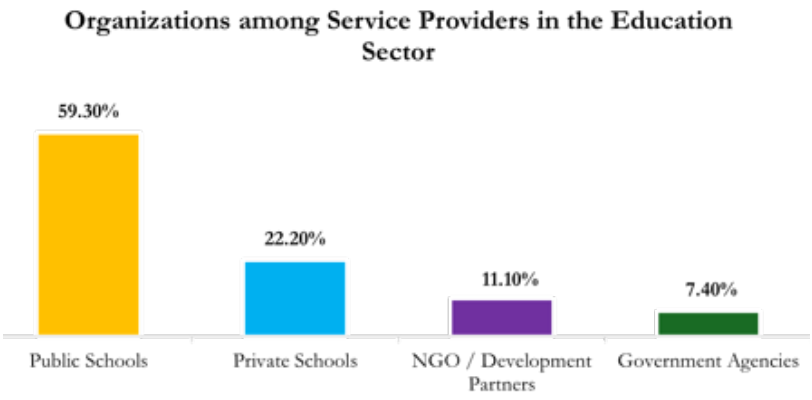


Figure 36: Organizations Among Service Providers in the Education Sector

What becomes evident is that scale is not only about enrolment numbers, but also about coordination. Digital systems are now central to how access is managed, monitored, and sustained across the education system.

5.3.2 From Policy to Practice: Building the Digital Education Architecture

This foundation rests on a sequence of policy frameworks that have gradually integrated digital technology into education delivery. Beginning with the ICT for Accelerated Development Policy in 2003, followed by the ICT in Education Policy in 2008 and its 2015 revision, Ghana established early mandates for ICT integration in teaching, learning, and administration (AUB, 2025; MoE, 2008). These frameworks created the basis for later large-scale programmes such as the Secondary Education Improvement Project, which introduced the iBox offline server and iCampus learning management system across 148 senior high schools between 2016 and 2021, reaching up to 1.2 million students (World Bank, 2024).

Subsequent policy developments have shifted attention toward system coordination and standardisation. The National Teacher Digital Competency Framework (2023) provides a six-level roadmap for ICT proficiency among teachers, while the draft National EdTech Strategy (2025) sets out a broader governance structure for infrastructure, content, and delivery. At the curriculum level, the SMART Curriculum reform extends digital integration into the classroom, embedding coding, digital literacy, and STEM learning from the foundational level (UNESCO, 2023; MoE, 2025). These policy directions become more meaningful when viewed alongside primary data.

Figure 37 shows that the push toward digital learning is being driven strongly by student and parent demand, rather than institutional readiness alone. Government policy and access challenges follow closely as drivers.

The interaction suggests a system where policy provides the structure, but users are accelerating adoption through everyday engagement.

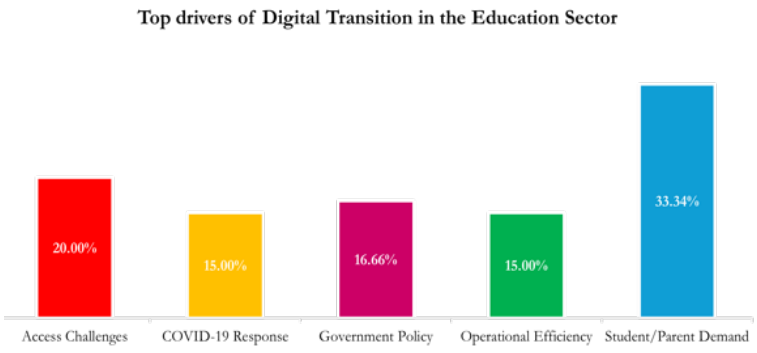


Figure 37 Drivers of Digital Transformation in the Education Sector

As the sector's experts noted, learner demand, COVID-19 disruption, and operational efficiency needs converged to accelerate Ghana's digital education trajectory during the pandemic period.

5.3.3 Platforms, Content, and the Everyday Reality of Digital Learning

At the institutional level, the Centre for National Distance Learning and Open Schooling (CENDLOS) has become central to coordinating digital education infrastructure. Its platforms, including iBox, iCampusgh, the Ghana Learning Passport, and Channel MOE, illustrate a layered delivery model designed to respond to both connectivity and accessibility constraints. During the COVID-19 pandemic, Ghana Learning TV and the Ghana Learning Radio and Reading Programme extended curriculum-based instruction across households in multiple Ghanaian languages (EdTech Hub, 2020). The launch of Channel MOE in December 2024 signals a shift toward a more permanent digital broadcasting system. Recent updates to the CENDLOS ecosystem, including platforms such as Minecraft Education Edition, Global Teacher Campus, and Emui TV, further expand the range of digital learning tools available.

In addition, platforms like GhanaEduCONNECT provide access to thousands of open educational resources, helping to address longstanding barriers related to content availability and procurement (UNESCO, 2025). According to stakeholders, one of the significant developments following the pandemic is the adoption of remote learning. They explained that these tools facilitate both remote learning and interactive pedagogy, as creating an engaging classroom environment requires the integration of appropriate learning technologies.

These interventions are highlighted in user engagement trends. While parents (13.5%) and teachers (7.1%) reported engaging with edtech platforms, students account for the majority (79.4%), with platforms such as YouTube and Google Classroom leading adoption (Figure 38). Their appeal appears to be driven by accessibility, familiarity, and low cost, rather than formal certification structures.

While the known platform (awareness) was explained as whether respondents have heard of a platform or recognize its brand, usage connoted its relevance and accessibility within the Ghanaian context.

The reported outcome (as indicated in Figure 38) was analyzed as non-exclusive.

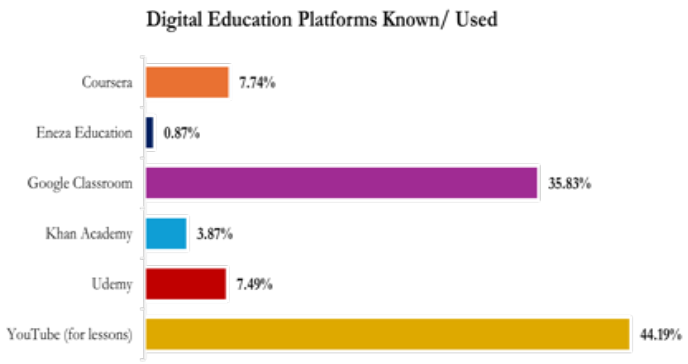


Figure 38: Digital Education Platform Known/Used

Furthermore, engagement patterns (Figure 39) suggest that the system remains largely centred on content delivery. Online course materials, video lectures, and virtual classrooms dominate usage, while more interactive tools such as simulations and real-time feedback systems are less prominent. Service providers reflect this same orientation, with curriculum-aligned content and e-learning platforms forming the bulk of offerings, while teacher support systems and deeper LMS integration remain less developed.

This alignment between supply and use points to a digital ecosystem that is expanding outward from content access, with more advanced pedagogical tools likely to depend on further investment in teacher capacity and system integration.

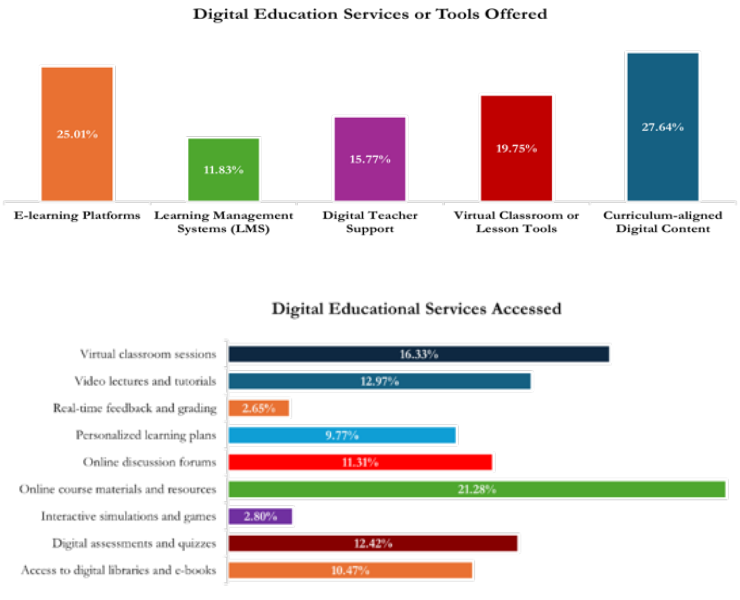


Figure 39 Edtech Services Offered and Accessed

5.3.4 Devices, Systems, and the Expansion of Digital Access

The scale of device-based learning has expanded significantly through the Ghana Smart Schools Project, launched in March 2024, with plans to distribute between 1.3 and 1.4 million tablets to senior high school students (MoE, 2025; GES, 2025). Each device integrates learning management systems, assessment tools, and curriculum materials, and is supported by a network of 274 service centres staffed with technicians.

This alone translates into at least 822 direct technical roles, linking digital access with employment creation (MoE PBB, 2025). Parallel efforts such as the Ghana Accountability for Learning Outcomes Project have focused on strengthening teacher capacity and improving learning outcomes. The programme has trained over 70,000 teachers and distributed laptops and connectivity tools, with plans to extend coverage to all public primary schools and kindergartens by 2028 (World Bank, 2024).

Despite these large-scale interventions, user-level realities are not the same. Figure 40 shows that dependence on digital tools increases with higher levels of education, with undergraduate and postgraduate respondents reporting stronger engagement. Those with basic education levels show lower levels of use, indicating differences in access, exposure, and digital literacy. These findings suggest that while infrastructure is expanding, its actual use continues to differ across user groups.

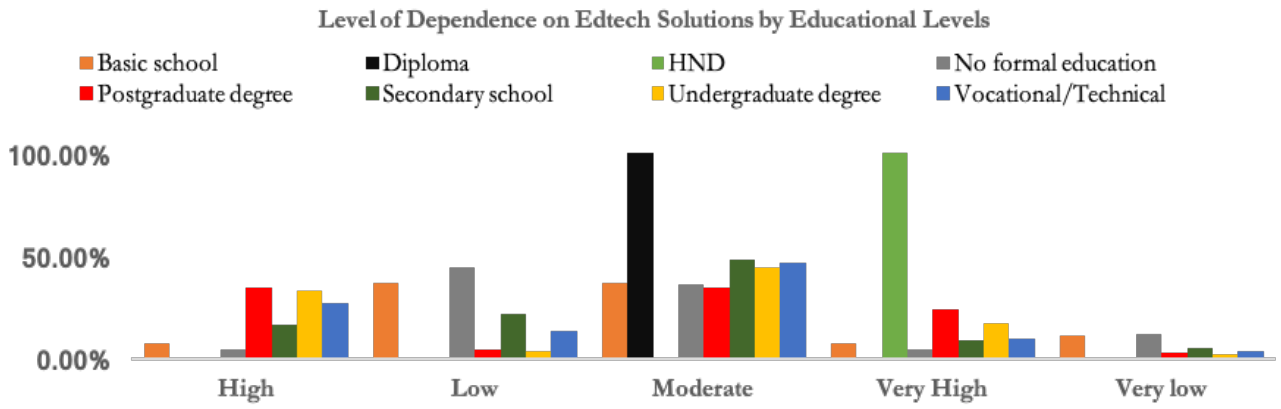


Figure 40: Level of Dependence on Edtech Solutions by Educational Levels

5.3.5 Regional Access, Learning Experience, and Emerging Gaps

Observable shifts of access and engagement diverge across geographic zones, which hints at the differences in infrastructure, institutional support, and exposure to digital systems. The Southern Zone records broader engagement across virtual classrooms, discussions, and digital libraries, while the Coastal Zone shows stronger use of assessments and multimedia learning. The Middle Zone presents moderate engagement, and the Northern Zone records lower overall usage, with some concentration in personalised learning and assessments.

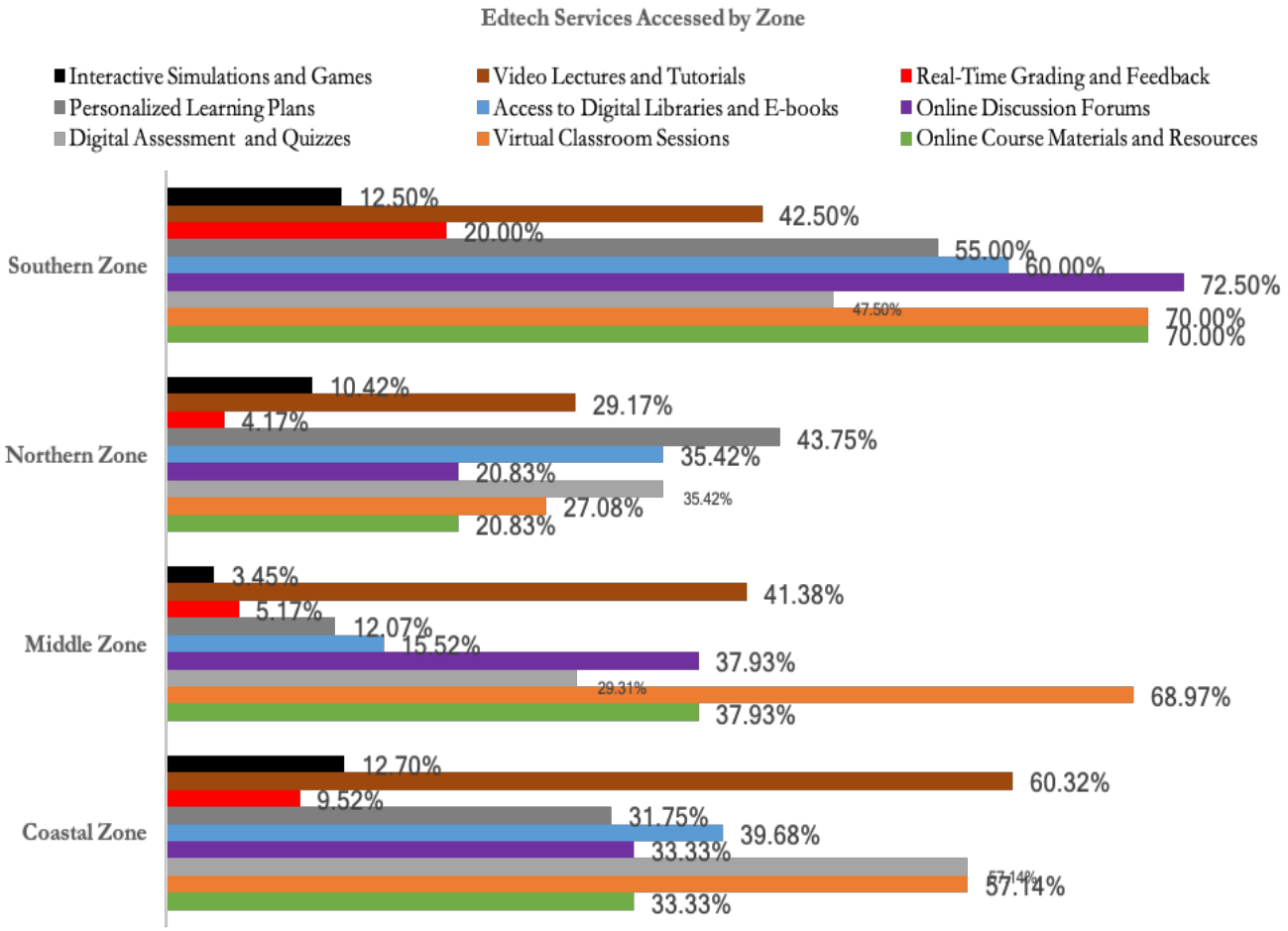


Figure 41: Edtech Services Accessed by Zone

These disparities align with underlying structural differences in digital education infrastructure across the country. While large-scale national interventions such as the Ghana Smart Schools Project and the expansion of Learning Management Systems are designed to reach all Senior High Schools, access at the basic education level is still unequal. For instance, electricity is reported to be available in only about 25% of primary schools and 49% of Junior High Schools, which directly limits the ability of learners in many parts of the Northern and Middle Zones to participate consistently in digital learning (WATHI, 2023; World Bank, 2024). In such contexts, even well-designed platforms such as iCampus, Ghana Learning Passport, and Channel MOE depend on complementary offline solutions like iBox to function effectively. Stakeholders explained that the iBox has had a notable impact, as evidenced by success stories gathered during monitoring visits. Beyond routine monitoring, during both international and local programmes, beneficiaries of related projects have attested to their success, attributing part of it to the use of materials available on the iBox platform.

Affordability and connectivity constraints further shape these regional differences. Data costs and poor network connectivity are reported by over 87% of respondents, reinforcing existing evidence that many digital education platforms rely on mobile data networks with inconsistent coverage, especially outside major urban centres (UNICEF Ghana, 2026; World Bank, 2024). This helps explain why engagement in some zones leans toward lower-bandwidth activities such as assessments or offline-enabled learning, rather than continuous participation in live or interactive platforms.

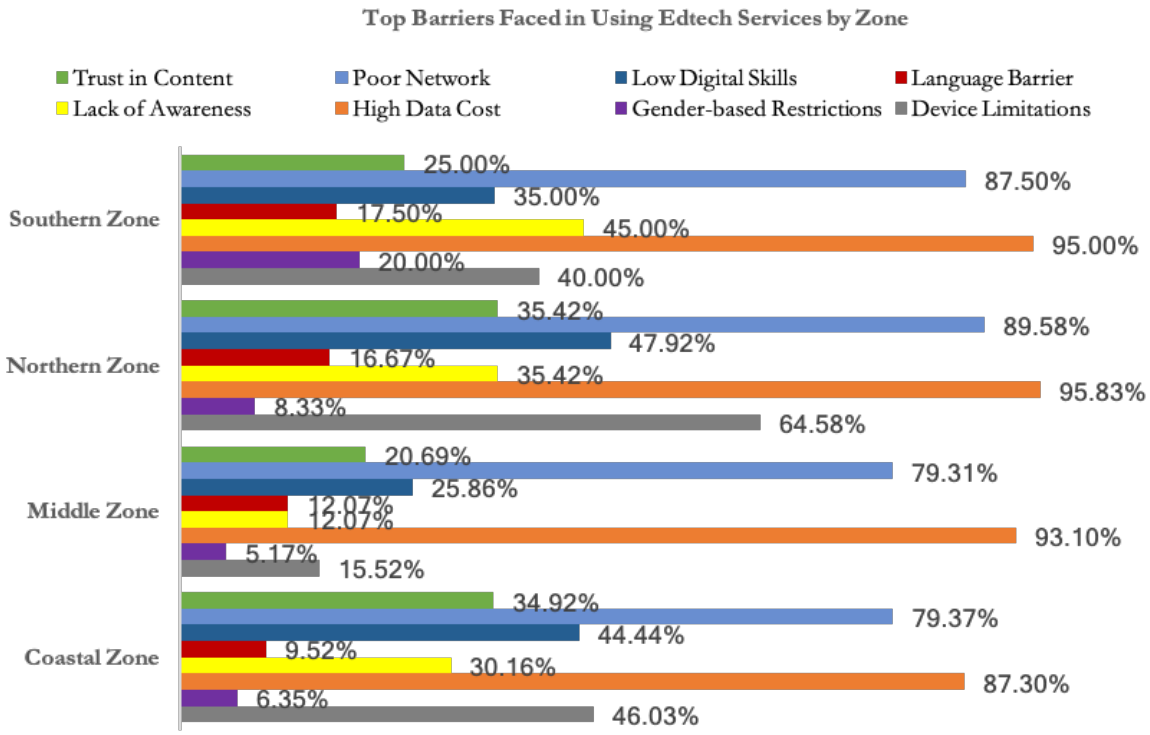


Figure 42: Top Barriers Faced in Using Edtech Services by Zone

Beyond infrastructure, differences in learning experience are also linked to awareness, language, and content accessibility. Earlier national interventions, such as Ghana Learning Television, revealed that English-only delivery excluded many learners, especially in underserved regions, prompting the introduction of multilingual alternatives like the Ghana Learning Radio and Reading Programme (EdTech Hub, 2020; WATHI, 2023). These dynamics continue to influence how digital education is accessed and used, notably in areas with lower exposure to formal EdTech systems.

As a whole, these regional trends show that while digital education is expanding nationwide through policies such as Free SHS, GALOP, and the rollout of national platforms, the experience of accessing and benefiting from these systems is patchy. Although progress in device distribution, content availability, and platform development is increasingly visible, the ability to translate these investments into consistent learning experiences still depends on closing infrastructure gaps, improving connectivity, and strengthening local delivery systems across different parts of the country.

5.3.6 Skills, Pathways, and the Shift Toward Employability

The transformation of the education sector increasingly extends into skills development and employment pathways. Programmes such as the ILO SKILL-UP initiative and the Ghana TVET Voucher Project are introducing digital training modules and demand-driven financing, supporting nearly 15,000 beneficiaries in 2024 (ILO, 2024; MoE PBB, 2025). The Ghana TVET Service is building on this by introducing smart classrooms, virtual laboratories, and digital assessment systems (GTVETS, 2026). Moreover, national initiatives such as the One Million Coders programme aim to train one million young Ghanaians in digital skills, while platforms like YOMA connect young people to training, mentorship, and income-generating opportunities (MoCDTI, 2025; UNICEF Ghana, 2026). Figure 43 reinforces this shift. Respondents identify skills-based training, self-paced learning, and curriculum digitisation as areas with strong potential, alongside innovations such as AI-driven personalised learning and online tutoring.

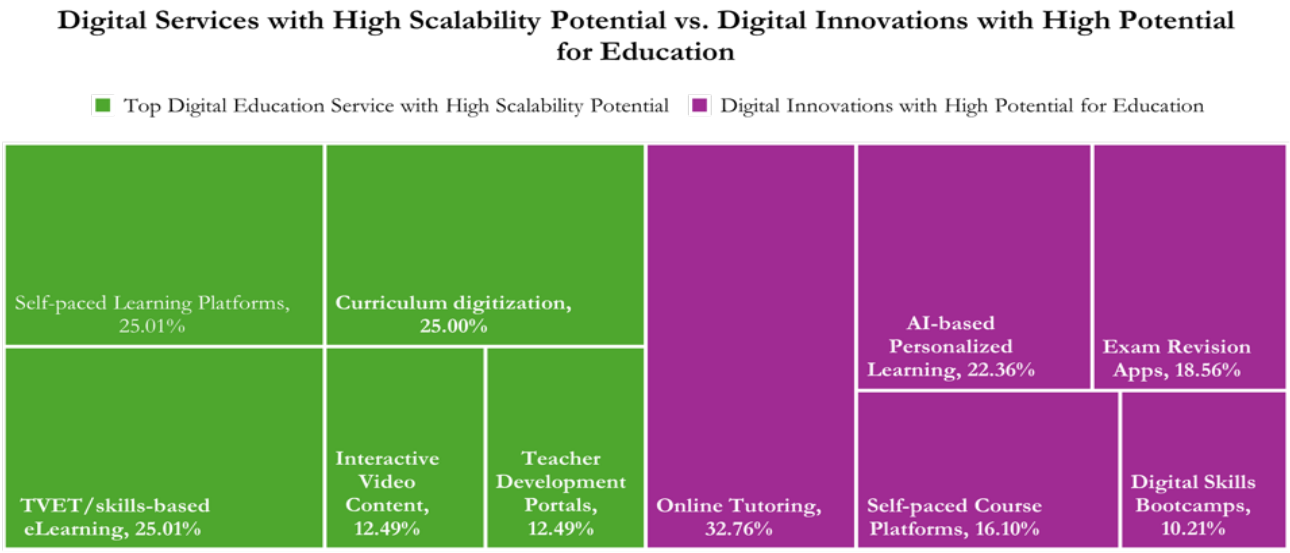


Figure 43: Edtech Services & Innovation with High Scalability Potential

This indicates a gradual transition in the role of digital education, moving from content delivery toward skills development and labour market readiness.

5.3.7 Gender, Inclusion, and Unequal Participation

The education sector presents a near-balanced gender structure among service providers, with women accounting for 51.9% and men 48.1%. Among users, however, women represent 73.7%, indicating strong engagement with digital learning platforms. Tendencies of usage show some variation. Both males and females rely heavily on online course materials, while males show higher engagement in assessments and discussion forums, and females show slightly higher engagement in video-based learning.

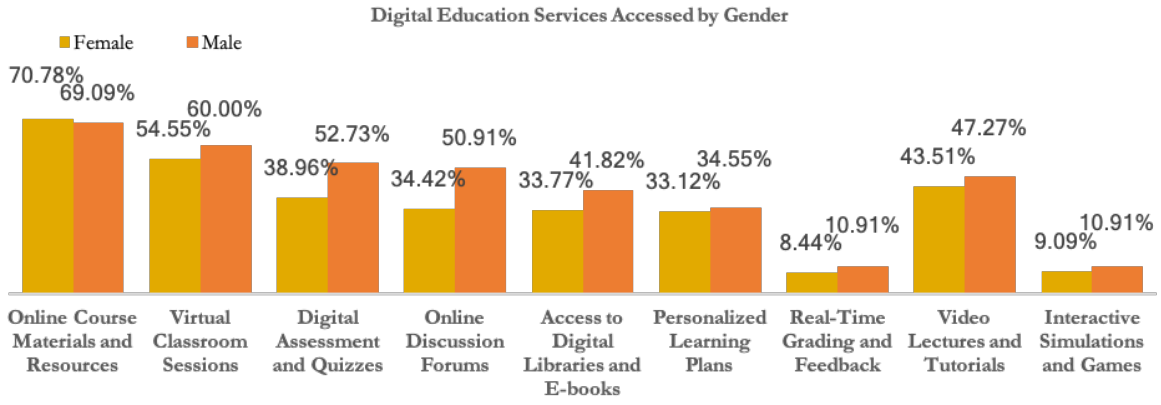


Figure 44: Edtech Services Accessed by Gender

Concurrently, structural gaps persist. Ghana's gender digital literacy gap is still notable, with 77% of men digitally literate compared to 63% of women (GLSS 7, 2018). Programmes such as Girls-in-ICT and Girls-in-STEM have attempted to address this imbalance, training over 100,000 girls in cybersecurity and data privacy and expanding participation across regions (MoCD, 2022). However, barriers including cost, device access, confidence levels, and social expectations continue to shape participation. These findings suggest that access is not only about infrastructure, but also about how broader social and economic conditions influence engagement.

5.3.8 System Constraints and the Pressure Points of Expansion

Despite progress, structural constraints continue to shape how digital education unfolds. Electricity access remains limited, particularly at the basic education level, while connectivity challenges persist in many rural areas (WATHI, 2023). Political discontinuity continues to affect programme implementation, with shifts in government often disrupting ongoing ICT initiatives. Findings from the survey point to similar concerns. High data costs, reported by over 90% of users and providers, stand out as a major challenge. Connectivity issues, device affordability, and skill gaps are also significant, alongside concerns about curriculum alignment and trust in digital content.

Even as this happens, learning outcomes have not improved at the same pace as access. BECE pass rates have remained around 75%, and pupil-teacher ratios have worsened, indicating that digital tools alone are not sufficient to address underlying quality challenges (IMANI Africa, 2025). These pressures point to a system that is expanding rapidly, but still grappling with the conditions required to translate access into outcomes.

5.3.9 Education as a Pipeline for Human Capital and Economic Growth

It is safe to say that the sector is extending beyond schooling into workforce preparation and economic participation. Large-scale access policies, digital platforms, device deployment, and skills initiatives are steadily linking education to productivity and labour market outcomes, positioning the sector as a core investment in Ghana's digital economy. The presence of over 1.4 million students within the Free SHS system, combined with national EdTech platforms and digital skills programmes, is shaping a clear pathway from learning to employment. This is reinforced by the alignment of major interventions such as the Ghana Smart Schools Project, GALOP's nationwide expansion, the Teacher Digital Competency Framework, Channel MOE, the SMART Curriculum, and the One Million Coders Programme. Together, they signal a shift from expanding access to building relevant, work-ready skills.

However, how this translates into real economic value depends on a few persistent gaps. Infrastructure constraints continue to limit effective use of digital tools, while inconsistencies in policy continuity affect long-term implementation. Learning outcomes also lag behind access and usage, and there is a growing disconnect between digital skills training and actual job opportunities. Stakeholders raised concerns that while students generally access all digital learning resources, lecturers are barely keeping pace with evolving technologies like AI. Without adequate awareness, students may exploit technological gaps. Consequently, all lecturers must receive training on emerging technologies and employ monitoring measures. A further challenge requires revising assessment methods to effectively prevent the misuse of AI for academic purposes.

With over 65% of the population under 25, the opportunity is clear. If current initiatives are better aligned with labour market demand and supported by reliable infrastructure, the system can move from training at scale to employment at scale. In that sense, education is no longer just preparing students for the future; it is actively shaping the structure and competitiveness of Ghana's digital and AI-driven economy.

EDUCATION SECTOR STRATEGIC GROWTH OUTLOOK

High-Growth Potential Area	Growth Potential Assessment	Key Challenges & Barriers	Recommended Actions for Stakeholders
Personalized & Student-Centered Learning	a. Transitions from one-size-fits-all to adaptive, needs-based learning pathways. b. Enhances learner engagement and retention. c. Increases academic outcomes through tailored content and pacing.	a. Limited adaptive learning platforms in public institutions. b. High device and connectivity requirements. c. Low teacher capacity to deliver personalized learning at scale.	a. Deploy adaptive LMS across public/private schools. b. Train educators in differentiated instruction and data-driven pedagogy. c. Provide subsidised devices for low-income and underserved community learners.
Artificial Intelligence in Education	a. Enables AI-assisted tutoring, multilingual support, and intelligent content recommendations. b. Supports continuous assessment and feedback loops. c. Potential to address teacher shortages in underserved areas.	a. Lack of AI integration skills among educators. b. Absence of an AI-specific policy/ethics framework. c. Data privacy and security concerns.	a. Launch AI pilot projects in secondary and tertiary institutions. b. Develop national AI in Education guidelines. c. Build AI training modules for teachers and edtech developers.
Industry 4.0 Curriculum	a. Prepares students for emerging tech-driven sectors (automation, robotics, data analytics). b. Aligns education with future workforce needs. c. Strengthens Ghana's competitiveness in the digital economy.	a. Curriculum misalignment with Industry 4.0 skills. b. Insufficient equipment and lab infrastructure. c. Limited industry engagement in curriculum design.	a. Update the national curriculum to embed Industry 4.0 skills. b. Invest in STEM/tech labs in schools. c. Establish industry advisory boards for education policy.
Competency-Based Education (CBE)	a. Focuses on mastery of skills rather than rote learning. b. Ensures graduates possess job-ready competencies. c. Supports lifelong learning pathways.	a. Resistance to change from traditional grading systems. b. Lack of standardised CBE assessment tools. c. Teacher training gaps for competency-based instruction.	a. Develop national CBE frameworks and assessment tools. b. Train educators on skills-based evaluation. c. Incentivise institutions to adopt CBE through funding or accreditation benefits.
Academia–Industry Partnerships	a. Creates pathways for applied learning, internships, and industry-recognised certifications. b. Strengthens graduate employability and career readiness. c. Facilitates technology transfer and curriculum relevance.	a. Weak institutional linkages with industry. b. Limited access to structured internship and apprenticeship programmes. c. Low employer awareness of digital portfolio benefits.	a. Formalise academia–industry collaboration agreements. b. Build a national database for student digital portfolios and certifications. c. Offer tax incentives to companies hosting interns/apprentices.

Figure 45: Summary of Education Sector Strategic Growth Outlook

5.4 BANKING AND FINANCE SECTOR

A total of 89 respondents were surveyed within this sector. This comprises 41 and 48 users and service providers, respectively. The users in this category were individuals who actively engaged with digital financial tools such as mobile money, online banking platforms, fintech applications, credit services, and other electronic payment systems for everyday transactions and financial management. On the supply side, the service providers consisted of commercial banks, fintech firms, mobile money operators, digital lending platforms, microfinance institutions, insurance companies, financial technology platforms, and regulatory agencies overseeing financial service delivery.

The users are mostly female and well-educated, with the majority holding undergraduate degrees and living in urban coastal areas.

In contrast, the service providers are predominantly male and tend to have higher academic or technical qualifications, with a large number holding postgraduate degrees or vocational certifications. While both groups are concentrated in urban centers and the coastal zone, the service providers have a much stronger presence in the middle zone compared to the users.

The data shows a sector where the customer base is largely female and southern-based, while the workforce is majority male and more geographically concentrated in the coastal and middle regions.

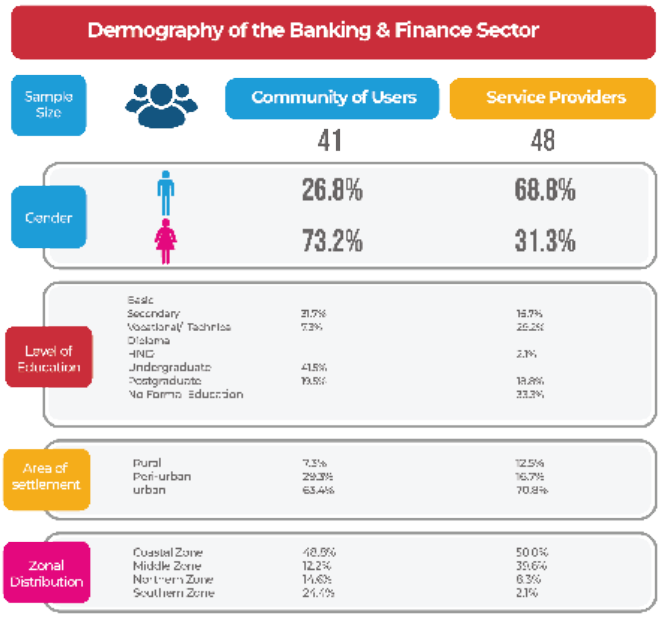


Figure 46: Demography of Banking & Finance Sector

5.4.1 Sector Preview and Shifts

This sector has shifted from a largely cash-driven system into one where digital channels now shape how money moves, how businesses transact, and how individuals interact with financial services in Ghana. This transition has not happened in isolation. It reflects a sequence of infrastructure investments, regulatory decisions, private sector innovation, and user adaptation that have gradually redefined the sector. Mobile money, in particular, has moved from being a complementary service to becoming the dominant access point for financial activity, with transaction values reaching trillions of cedis annually and access extending to nearly the entire adult population (Bank of Ghana, 2024; Business & Financial Times, 2025).

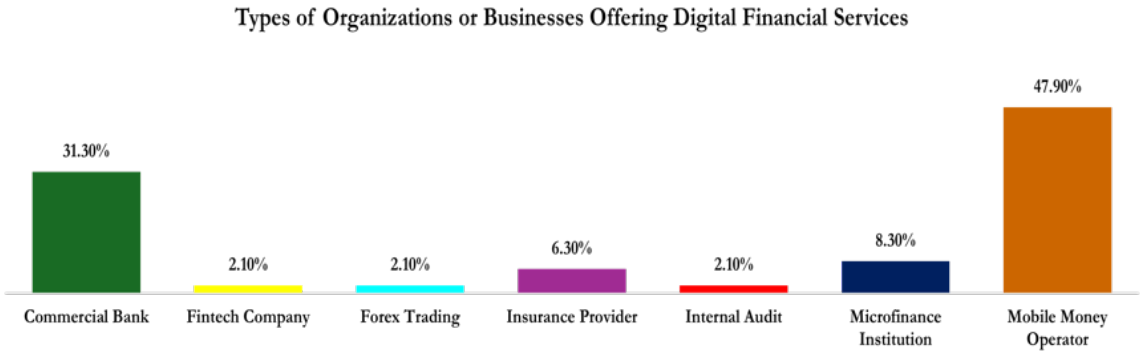


Figure 47 Types of Service Providers Offering Digital Financial Services

What stands out is not only the scale of adoption, but how different systems interact. National infrastructure has matured, platforms have expanded, and users have adapted in ways that are sometimes aligned and at other times fragmented. The result is a system that is advanced in capability, but still shaped by differences in income, education, geography, and trust.

5.4.2 Building the Rails: Payments Infrastructure and System Connectivity

The foundation of Ghana's digital finance system rests on a carefully built national payments architecture. The Ghana Interbank Payment and Settlement Systems (GhIPSS) has, over time, linked banks, mobile money platforms, and financial institutions through a unified switch, enabling transactions to move across systems with minimal friction (Robert Smith Law Group, 2025). The introduction of mobile money interoperability in 2018 marked a decisive shift, breaking down the earlier restriction where transfers were limited within telecom networks and allowing users to transact across platforms and into bank accounts (Business & Financial Times, 2025).

This national-level integration has been instrumental in scaling digital payments (specifically, transactions made through digital channels such as cards, online banking, or apps). Transaction volumes have surged, and the system has proven capable of handling increasing demand. At the operational level, however, service providers point to a more complex picture. What keeps the system running day-to-day is not only the national switch but also the integration of APIs, core banking systems, and fintech platforms that connect multiple actors within the ecosystem.

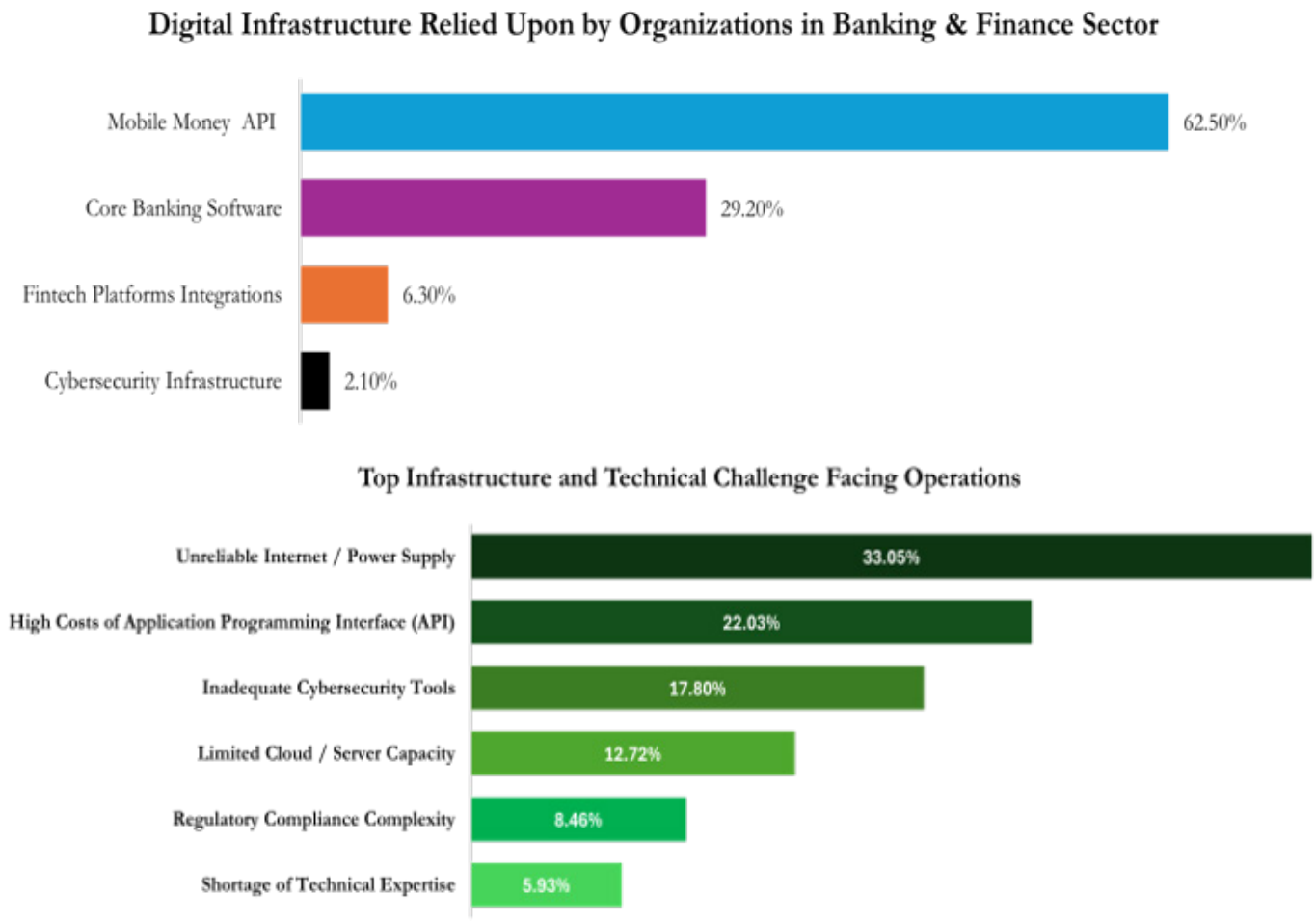


Figure 48: Infrastructure Reliance & Top Challenges Faced by Service Providers in Banking & Finance Sector

These integrations are not without cost or constraint. Providers frequently point to unstable internet and power supply, high API costs, and limited cybersecurity infrastructure as recurring operational challenges. As transaction volumes grow, these issues become more visible, affecting service reliability and user confidence. In several cases, the constraint is not whether a system exists, but whether it performs consistently under pressure.

Geographic differences sharpen this contrast. In urban and coastal areas, stronger connectivity supports a wider range of financial services. In northern and rural areas, network reliability remains a daily concern. Users in these regions rely heavily on basic services such as transfers and cash withdrawals, not necessarily because alternatives do not exist, but because the supporting infrastructure does not always allow for consistent use. The system, in effect, works differently depending on where one is located.

5.4.3 From Access to Usage: Patterns of Financial Inclusion in Practice

Access to financial services in Ghana has expanded to levels that place the country among global leaders. Mobile money has been central to this expansion, offering a simple entry point into the financial system for millions who were previously excluded (BoG, 2024). The shift from bank-based access to mobile-first access has lowered barriers, making it possible to send, receive, and store money with minimal requirements. What becomes evident at the user level is that access does not automatically translate into varied usage. Mobile wallets are prominent in the sector, followed by savings and digital lending products. More complex services, including investments and budgeting tools, attract far fewer users.

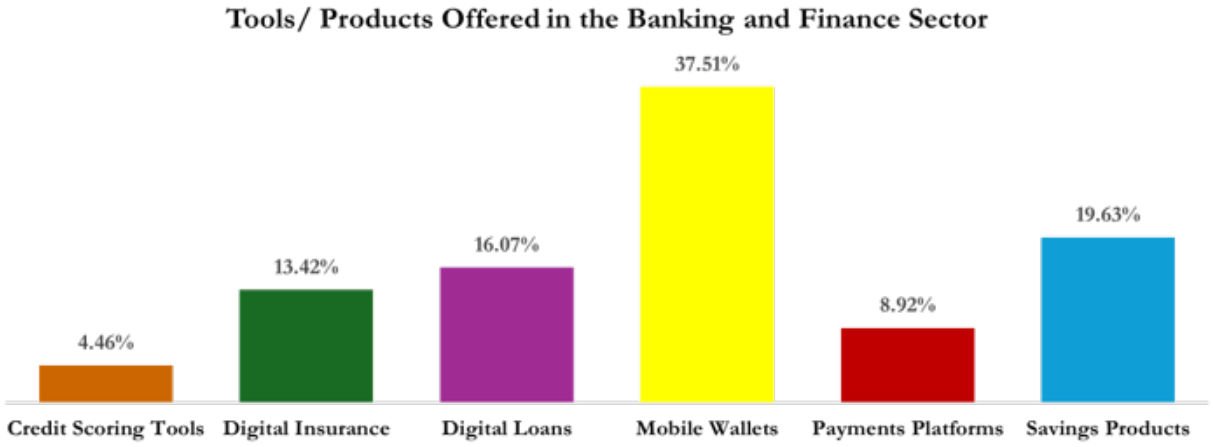


Figure 49: Tools/Products Offered in Banking & Finance Sector

Also, patterns of engagement differ across occupations. Individuals in formal employment tend to use a wider range of services, moving beyond payments into savings, insurance, and occasionally credit. Those in informal employment often stay within a narrower band of services, relying on payments and basic savings. This difference reflects both income stability and familiarity with financial tools.

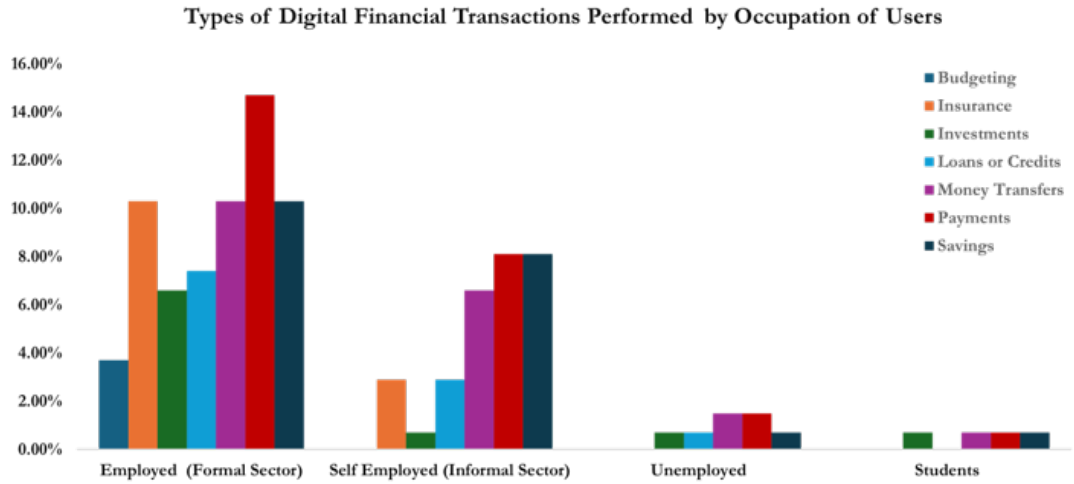


Figure 50: Relationship Between Occupation and Financial Products and Services

Meanwhile, gender introduces another dimension. Women engage actively with digital financial services, particularly those linked to savings and insurance. Their usage patterns suggest a focus on managing household finances and building some level of financial security. Men, on the other hand, show very high engagement in payments and transfers, often using digital platforms as part of daily transactions.

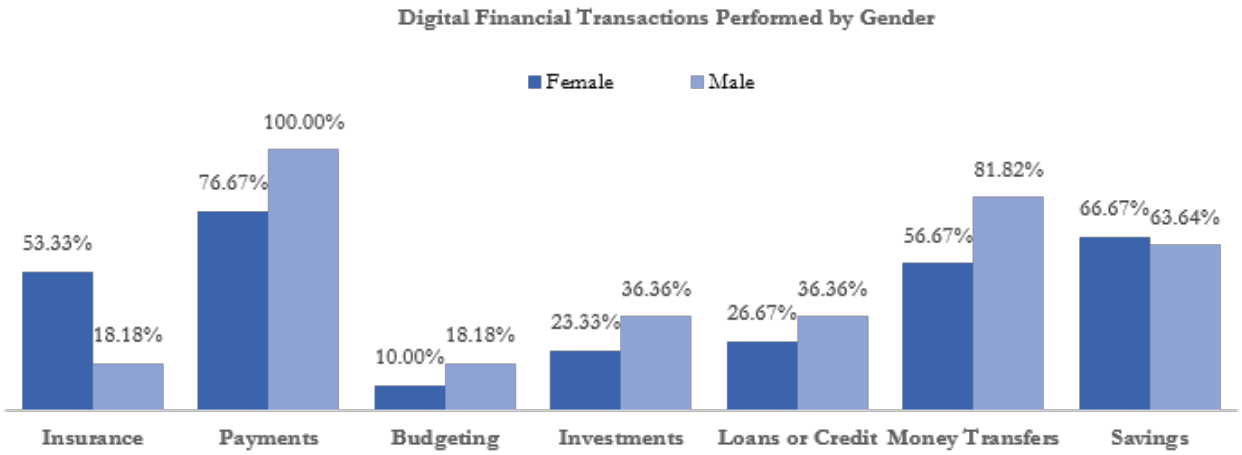


Figure 51: Digital Financial Transactions Performed by Gender

Beneath these patterns sits a structural imbalance. Women form the majority of users but are far less visible among service providers and decision-makers within the sector. This gap raises questions about who designs financial products and whether those products reflect the needs of the dominant user base. Geography continues to shape how inclusion plays out. In coastal areas, users combine multiple services, moving between payments, savings, and insurance with relative ease. In northern regions, activity is concentrated around essential functions such as transfers and savings, with limited engagement in insurance or credit.

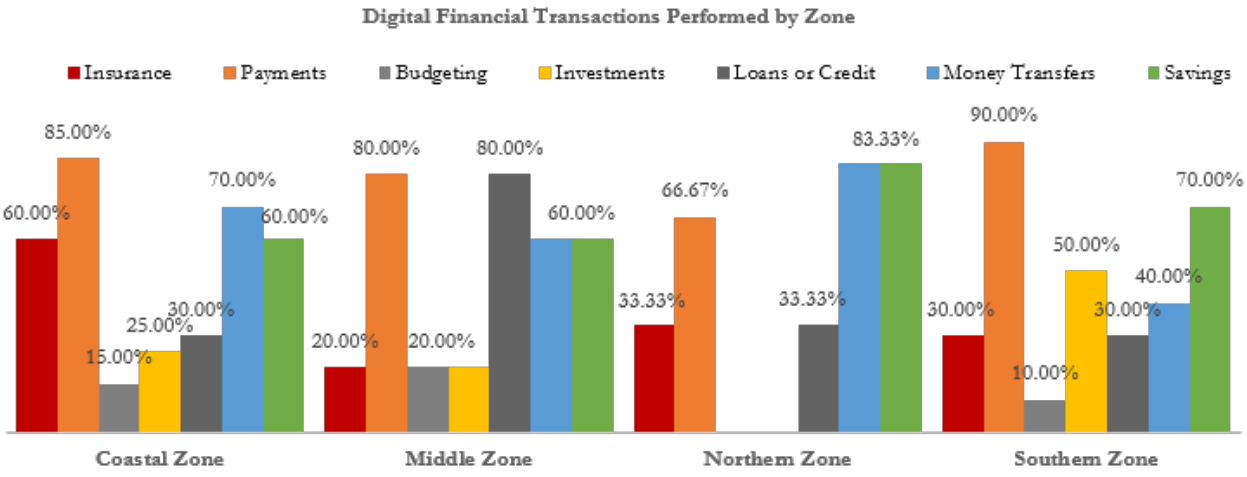


Figure 52: Digital Financial Transactions Performed by Zone

Education further influences how individuals engage with digital finance. Mobile money cuts across all levels of education and serves as a common entry point. Beyond that, differences begin to emerge. Users with higher levels of education tend to combine mobile money with online banking and other tools, while those with less formal education rely almost entirely on mobile platforms.

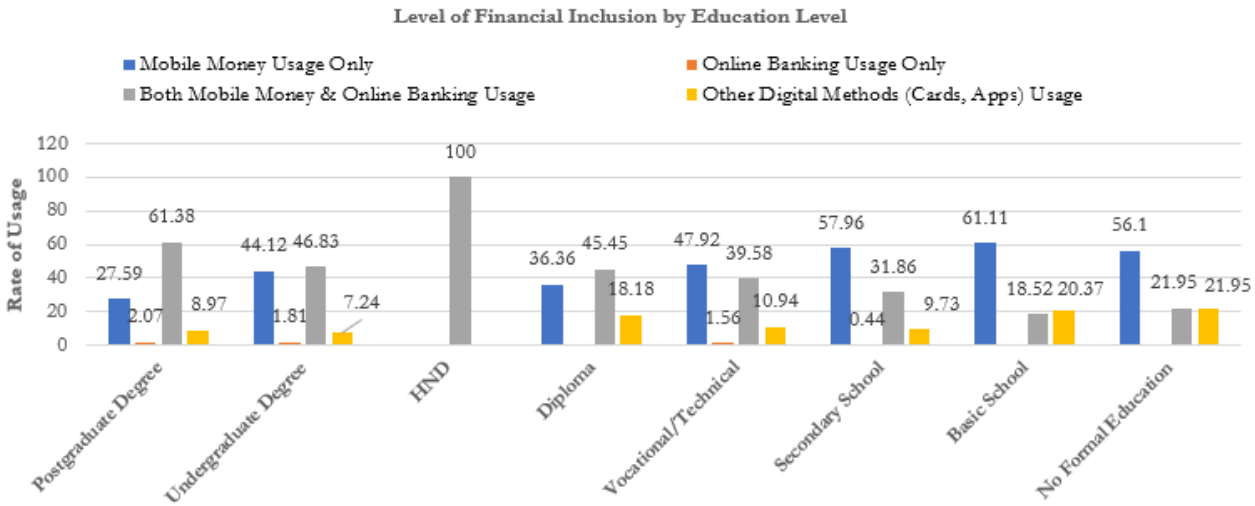


Figure 53: Level of Financial Inclusion by Education Level

This distinction helps explain why access has expanded so widely while more advanced services remain underutilized. Financial literacy continues to shape how far users move within the system, with many staying at the level of basic transactions even when additional services are available (BoG, 2024).

5.4.4 Capabilities Gap: Skills, Literacy, and Confidence in Digital Finance

The ability to navigate digital financial tools varies as much as access to them. While many users are comfortable with sending and receiving money, fewer feel confident engaging with services that require planning, analysis, or risk assessment. This gap becomes more visible when looking at the adoption of investment platforms, budgeting tools, and digital credit.

Interest in improving digital skills is present, particularly among middle-income groups who already use financial services regularly and are looking to expand their capabilities. For lower-income users, the issue is often not interest but access. Training programs, devices, and data all come at a cost, and these costs shape participation.

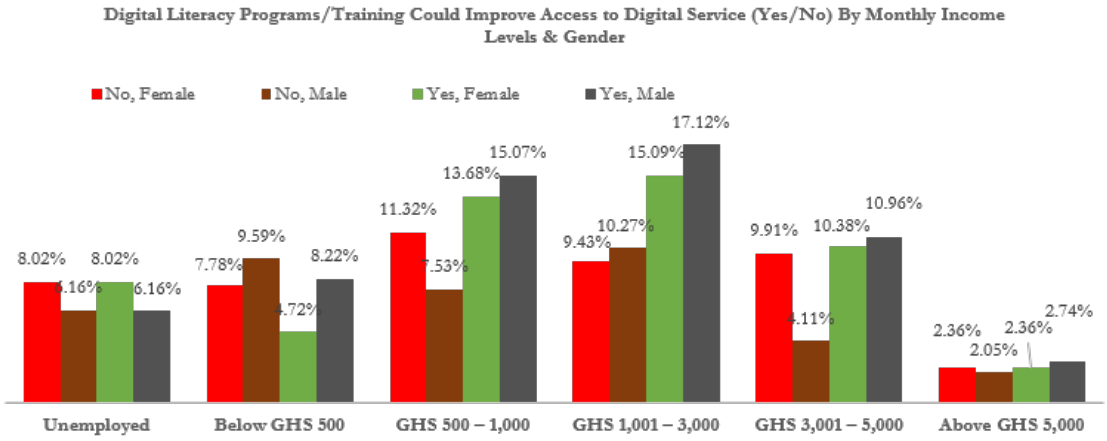


Figure 54: Literacy Programs & Training Could Improve Access to Digital Services by Income Levels & Gender

Gender differences appear again in how these challenges are experienced. Women frequently point to affordability, device access, and gaps in digital knowledge. Men, while generally more active users, report more frequent encounters with system-related issues such as transaction costs and fraud. The two experiences are different, but both limit how fully individuals engage with the system.

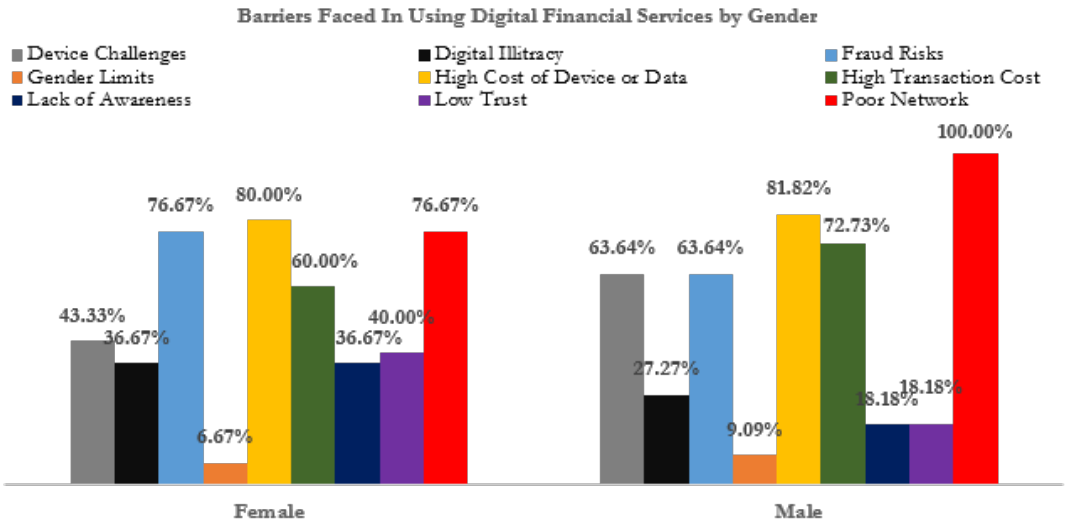


Figure 55: Barriers Faced in Using Digital Financial Services by Gender

The connection between skills and usage becomes clearer when viewed alongside education. As education levels rise, users tend to explore a broader set of financial tools. Where education levels are lower, engagement remains concentrated on familiar services. This pattern suggests that expanding access alone may not shift behaviour unless it is matched with targeted efforts to build confidence and understanding.

5.4.5 Payments as an Economic Engine: Supporting Enterprise and the Digital Marketplace

The expansion of digital payments has reshaped how businesses operate, particularly within the SME and informal sectors. Mobile money has become a practical tool for conducting business, allowing transactions to take place without the constraints of physical cash or bank visits. This shift is visible in retail, logistics, and service delivery, where payments now connect customers, merchants, and service providers in real time.

In e-commerce, digital payments support the entire transaction chain. A customer places an order online, completes payment through mobile money or card, and a delivery rider completes the final step. This model has created opportunities not only for merchants but also for those providing delivery and support services. The growth of fulfilment networks illustrates how financial technology and logistics are increasingly intertwined.

Stakeholder accounts point to how much easier transactions have become. Payments no longer slow down business activity; instead, they facilitate it. The integration of mobile money into POS systems and the growing interest in QR code payments reflect ongoing efforts to simplify transactions further and accommodate different user preferences.

These developments extend beyond urban commerce. In agriculture, digital payments allow farmers to access services, pay for inputs, and participate in digital platforms without relying on intermediaries. In this way, financial technology connects sectors that were previously difficult to integrate.

Employment effects are visible across several layers. Banks and fintech companies employ a growing number of professionals, while mobile money agents provide income opportunities across both urban and rural areas. More broadly, access to finance supports SMEs, which remain the primary source of employment in the country (IRJISS, 2024). The impact is therefore not limited to the financial sector itself but extends into the wider economy.

5.4.6 Innovation Pathways: Data, Credit, and Next-Generation Financial Services

The sector is gradually moving beyond payments into more advanced applications of technology. AI-driven lending platforms, such as those operated by Fido and JUMO, use alternative data to assess creditworthiness, making it possible to extend loans to individuals without traditional banking histories (Fintech Futures, 2025; JUMO, 2025). This approach introduces new possibilities, particularly for small businesses and individuals who have historically been excluded from formal credit systems.

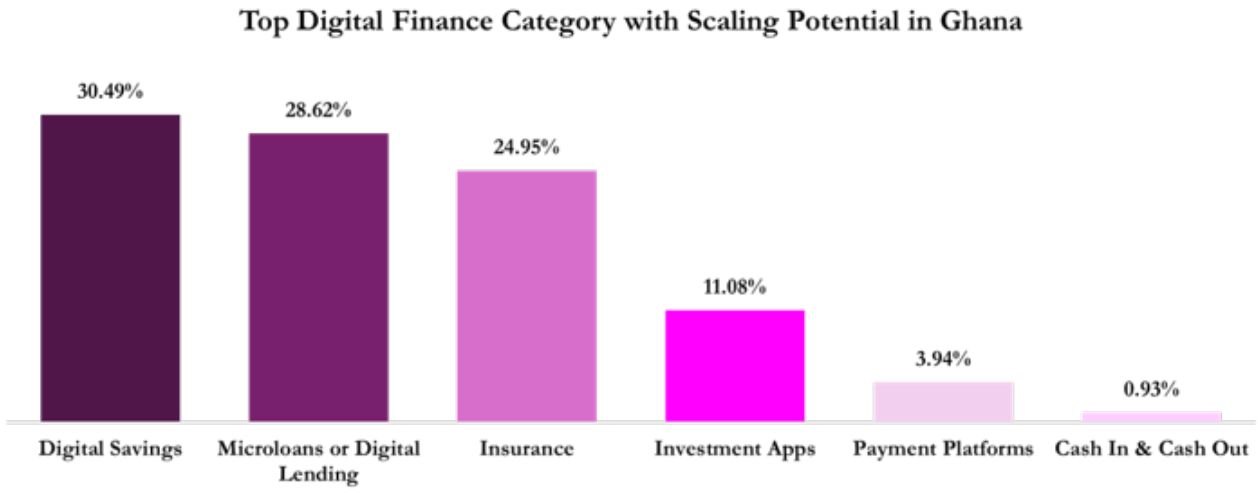


Figure 56: User Interest in Top Digital Finance Services

User interest is beginning to shift in this direction. Digital savings, microloans, and insurance products attract strong attention, reflecting a desire for tools that support financial planning and risk management.

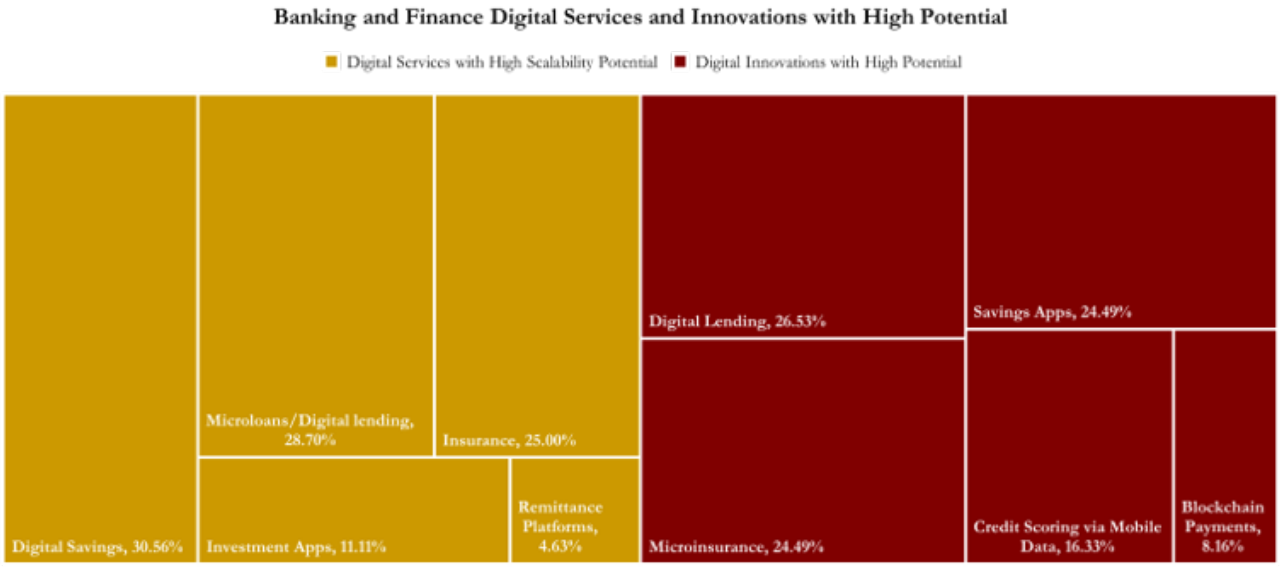


Figure 57: Banking & Finance Digital Services & Innovations with High Scalability

Other specific innovations are gaining ground more gradually. Credit scoring tools, blockchain-based payments, and digital asset platforms are still at an early stage of adoption. Even so, their presence signals where the sector may be heading. QR code payments and biometric authentication are also being explored as ways to improve convenience and security.

The pace at which these innovations develop is influenced by regulation. Ghana's regulatory framework has evolved to accommodate new financial services, with licensing regimes, sandbox environments, and guidelines shaping how innovation enters the market (ICLG, 2025). Service providers, however, often experience this process as slower than the pace of technological change, calling for more flexible and collaborative approaches.

5.4.7 System Frictions: Affordability, Trust, and Operational Constraints

Within the sector, several constraints continue to influence how digital finance is experienced. Affordability affects both access and usage. Devices, data, and transaction fees all shape how frequently and how extensively individuals engage with digital services. For many users, services are accessible but not always affordable enough for regular use.

Infrastructure limitations remain visible, especially in areas with weaker network coverage. Even among active users, poor connectivity can interrupt transactions and reduce confidence in digital systems. Fraud and security concerns add another layer of complexity. A number of users report experiences with fraud or express concerns about the safety of their funds, which affects trust in the system. These challenges vary across regions. In some areas, connectivity is the primary issue. In others, transaction costs or security concerns are more prominent.

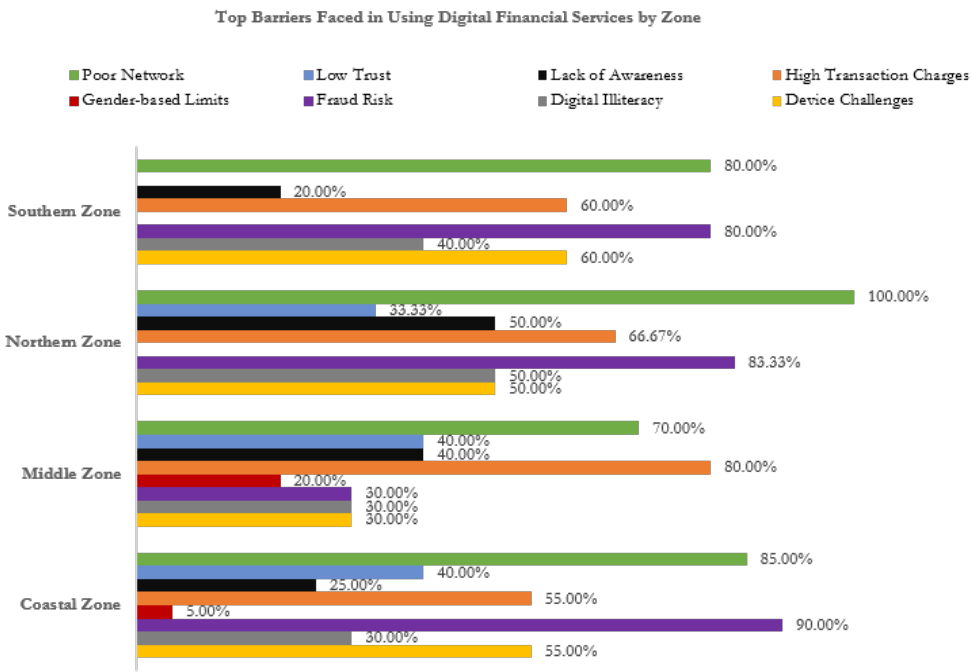


Figure 58: Top Barriers Faced in Using Digital Financial Services by Zone

For service providers, regulatory requirements, integration costs, and infrastructure limitations influence how quickly they can scale or introduce new services. These factors shape not only the supply of financial services but also how those services are delivered.

5.4.8 Sector Direction and Development Implications

The growth of Ghana's banking and finance sector points to a system that has achieved wide reach and strong functionality, while still working through issues of usage depth, system reliability, and equitable participation. Digital finance has made transactions faster, expanded access, and opened new opportunities for businesses and individuals. It has supported employment both directly and indirectly, particularly through SMEs and agent networks.

Differences in income, education, gender, and location continue to shape how benefits are distributed. Some users engage with a wide range of services, while others remain limited to basic functions. Bridging these gaps will depend on how infrastructure, affordability, skills, and trust are addressed in the coming years. Interest in more advanced financial tools suggests that the next phase of growth will move beyond payments into broader financial management and investment services. The direction is clear, even if the pace varies across different parts of the population.

BANKING & FINANCE SECTOR STRATEGIC GROWTH OUTLOOK

High-Growth Potential Area	Growth Potential Assessment	Key Challenges & Barriers	Recommended Actions for Stakeholders
Mobile Money Ecosystem Expansion	a. Already at high penetration b. Potential to deepen usage for merchant payments, bills, and cross-border transfers. c. Aligns with cashless economy goals.	a. Transaction costs. b. Fraud risk. c. Limited rural agent coverage.	a. Reduce transaction fees for micro-payments. b. Expand agent networks. c. Invest in fraud prevention and customer education.
Digital Lending & Credit Scoring	a. Low current penetration (38% loan access digitally) b. Strong potential to expand SME and personal credit. c. AI-driven scoring can reduce default rates.	a. Limited credit history data b. Regulatory caution c. Affordability.	a. Create shared credit information systems. b. Develop responsible lending regulations. c. Offer subsidized interest for priority sectors.
Digital Insurance Products	a. Low adoption (27%) b. Opportunity for micro-insurance in health, agriculture, and asset protection.	a. Low awareness b. Lack of tailored products c. Trust deficits.	a. Run nationwide awareness campaigns. b. Develop low-cost, mobile-first insurance products. c. Partner with telcos for distribution.
Biometric & AI-Driven Security	a. Strong consumer interest (58%). b. Proven to reduce fraud c. Improves trust in digital platforms.	a. High integration costs. b. Need for user education.	a. Offer phased biometric rollout. b. Subsidize hardware integration for smaller service providers. c. Educate consumers on use and benefits.
Merchant Payment Solutions	a. Critical enabler for e-commerce growth. b. Strong SME adoption potential.	a. Interoperability gaps. b. Resistance from cash-preferred merchants.	a. Provide financial incentives for merchant onboarding. b. Improve platform interoperability c. Integrate loyalty programs to encourage use.

Figure 59: Banking & Finance Sector Strategic Growth Outlook

5.5 E-COMMERCE, RETAIL, AND TRADE SECTOR

Out of the 1,112 sample, 187 respondents were drawn from the e-commerce, retail, and trade sector, consisting of 149 users and 38 service providers. The users were mainly individuals interacting with digital platforms in purchasing and service access contexts, including students, guardians, informal learners, parents, and other individuals using digital education-related services. The service providers comprised institutional and platform actors within the ecosystem, including schools, e-learning platforms, EdTech startups, training institutions, educational NGOs, as well as relevant ministries and government education agencies.

While the users are overwhelmingly female at 83.9%, the service provider group is majority male at 55.3%, suggesting a gendered divide between consumption and service delivery.

Users are more evenly distributed across secondary and vocational levels, whereas a notable 33.3% of service providers hold postgraduate degrees. Geographically, the sector remains heavily centralized, with 59.1% of users and 76.3% of service providers residing in urban settlements, primarily clustered within the Coastal and Middle zones.

These demographics depict an e-commerce sector that is driven by urban, educated participants with a distinct contrast in gender roles between those using and those providing services.

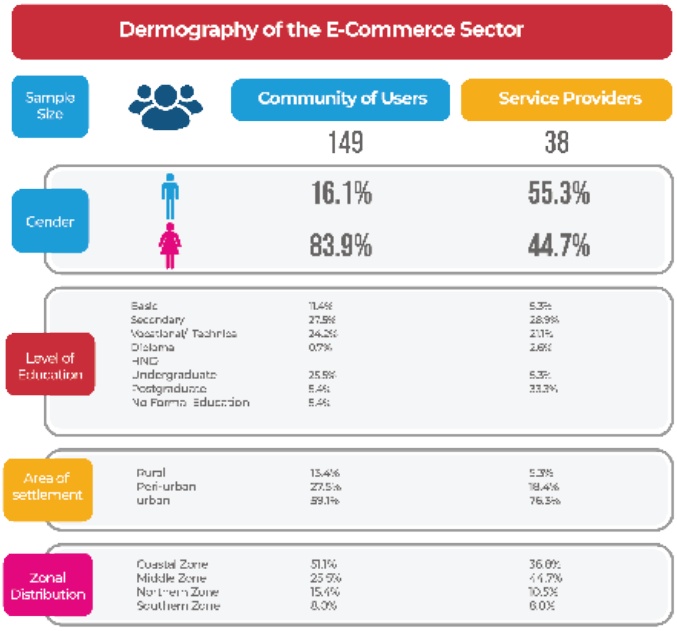


Figure 60: Demography of E-Commerce, Retail, and Trade Sector

5.5.1 Rewiring Commerce Through Infrastructure and Access

Ghana's digital commerce story begins with the systems that quietly made online trade possible at scale. Mobile money sits at the centre of this shift, not simply as a payment option but as the everyday transaction layer connecting consumers, traders, and platforms. With tens of millions of registered accounts and transaction values in the trillions of cedis, mobile money has turned the mobile phone into a marketplace tool, particularly for users who never had access to formal banking channels (DataReportal, 2025; GSMA, 2024). This is reflected in the way service providers themselves describe their operations, with most relying on mobile-first infrastructure as their primary interface with customers.

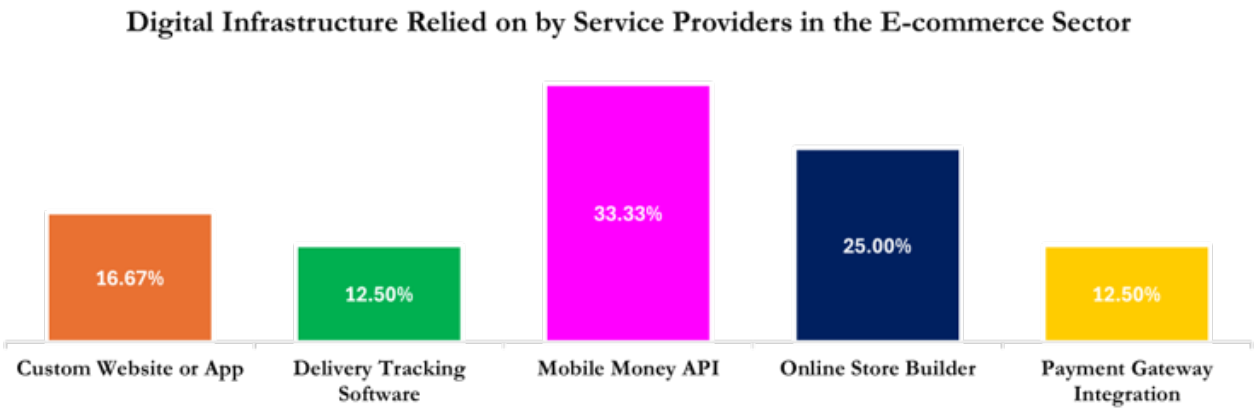


Figure 61: Digital Infrastructure Relied on by Service Providers in the E-commerce Sector

Figure 61 shows that mobile money, internet connectivity, and platform-based tools dominate the infrastructure stack used by firms. What becomes clearer when placed alongside zonal patterns is that access is not uniform in practice. Figure 62 highlights how reliance on these tools shifts across the coastal, southern, middle, and northern zones, pointing to differences in connectivity quality, service availability, and business adaptation. Firms in coastal and southern zones tend to operate with more stable digital infrastructure, while those in the northern zone often combine digital tools with manual processes to sustain operations.

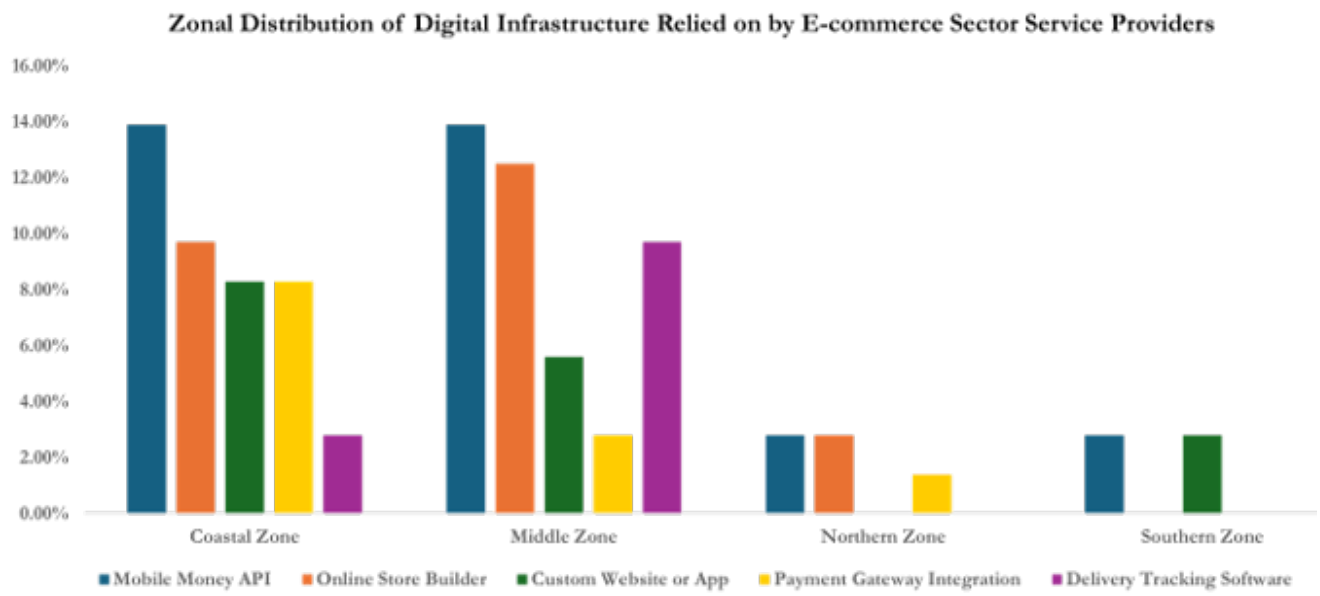


Figure 62: Zonal Distribution of Digital Infrastructure Relied on by E-commerce Sector Service Providers

Addressing and logistics have also shaped how far digital trade can extend. The introduction of GhanaPostGPS in 2017 created a standardised location system that removed one of the most persistent barriers to delivery (Oxford Business Group, 2024). This reform works alongside paperless port operations and the Integrated Customs Management System (ICUMS), which moved customs processes into digital workflows and shortened clearance timelines (ICLG, 2025). These changes have mattered for both large importers and small traders sourcing goods internationally. Still, delivery experiences differ widely. Outside Accra and a few major cities, timelines stretch and reliability drops, a point reinforced by service providers and users who continue to factor delivery uncertainty into their business decisions (EnspireFX, 2024).

5.5.2 Finance, Payments, and the Expansion of Participation

The expansion of digital payments has done more than improve convenience. It has changed who can participate in commerce. E-commerce transactions increasingly reflect a blend of mobile money, bank transfers, and cash-on-delivery, with each method tied to different levels of trust and user familiarity. The persistence of cash-on-delivery is not a sign of resistance to digital systems alone. It reflects caution shaped by prior experiences with fraud, product misrepresentation, and weak refund processes (Texila Journal, 2022; ICLG, 2025).

At the same time, Ghana's broader digital finance architecture has created the conditions for scale. The Payment Systems and Services Act and interoperability frameworks have allowed platforms to integrate payments seamlessly, supporting both domestic transactions and the early stages of cross-border trade (ICLG, 2025). These systems sit behind a market that reached over USD 1 billion in e-commerce revenue by 2025, growing steadily each year and positioning Ghana as a key node in West Africa's digital trade activity.

This expansion has not occurred in isolation from other enabling systems. The rollout of the GhanaPostGPS digital addressing system, alongside integration with the Ghana Card, has made it easier to verify identities and pinpoint delivery locations, which in turn supports transaction completion and reduces failed deliveries (Oxford Business Group, 2024). In practice, payment confirmation, identity verification, and location accuracy increasingly work together within the same transaction flow, strengthening confidence for both buyers and sellers.

What is striking is how this financial layer connects to inclusion. Many small businesses enter digital trade not through formal platforms, but through social channels that rely on mobile payments. This lowers entry barriers but also places more responsibility on buyers and sellers to manage risk. At the fulfilment level, improvements in last-mile delivery, including the use of platform-coordinated riders and courier networks, have made it possible for these transactions to translate into actual exchange of goods, even if service quality differs across locations. The data suggests that while access has widened, confidence in fully digital transactions still varies across user groups, particularly among women and new adopters, and this is closely tied to how reliably payments, identity systems, and delivery processes work together in everyday use.

5.5.3 Skills, Capabilities, and the Quiet Rise of Digital Trade Expertise

Beyond infrastructure and payments, the sector has been shaped by the gradual build-up of skills across different segments of the economy. Ghana's strong performance in digitally delivered services exports, valued at USD 6.2 billion in 2022, reflects a broader capacity in digital skills, particularly in business process outsourcing and IT-enabled services (WTO, 2024). The sector employs between 25,000 and 35,000 people, with growth supported by language advantages, time zone alignment, and stable connectivity.

This capability feeds directly into the e-commerce ecosystem. Platform operators, logistics providers, and digital marketers draw from the same talent pool that powers the BPO sector. The Accra Digital Centre and similar initiatives have provided physical and institutional spaces where these skills can develop further. At the same time, the spread of informal learning through social media, peer networks, and on-the-job experience continues to shape how smaller businesses engage with digital tools. Even so, gaps remain visible. Figure 63 shows the mix of organisations active in the sector, from formal platforms to informal traders.

The diversity of actors brings flexibility, but it also means that digital skills are unevenly distributed.

Smaller traders often rely on basic functionalities such as messaging apps and mobile payments, while more advanced tools for inventory management, analytics, and customer engagement remain underused.

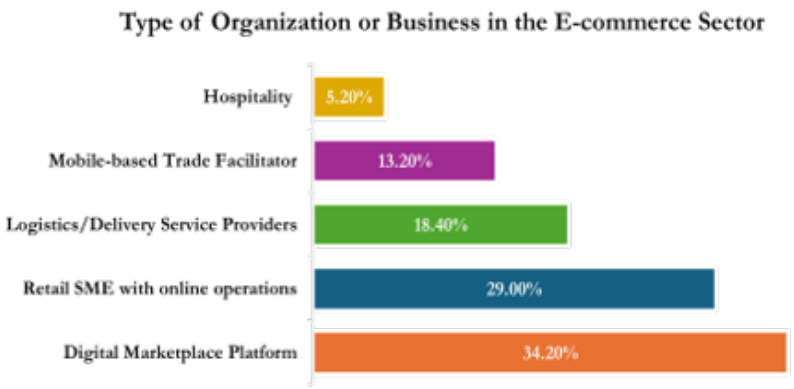


Figure 63: Types of Organizations or Businesses in the E-commerce Sector

5.5.4 Enterprise, Platforms, and the Changing Shape of Trade

E-commerce in Ghana does not follow a single model. It is a mix of structured platforms and informal networks that together form the trading environment. Established marketplaces such as Jumia, Tonaton, and Jiji have provided visibility and scale, each serving different segments of the market (Statista, 2022). Alongside them, platforms like Hubtel have blurred the line between payments and commerce, offering integrated solutions that support both online and offline transactions.

Figure 64 captures how users engage with these platforms, showing a wide range of awareness and usage patterns.

What stands out is that platform participation is not limited to formal businesses.

Individuals, small traders, and service providers all operate within the same digital space, often switching between platforms depending on cost, reach, and convenience.

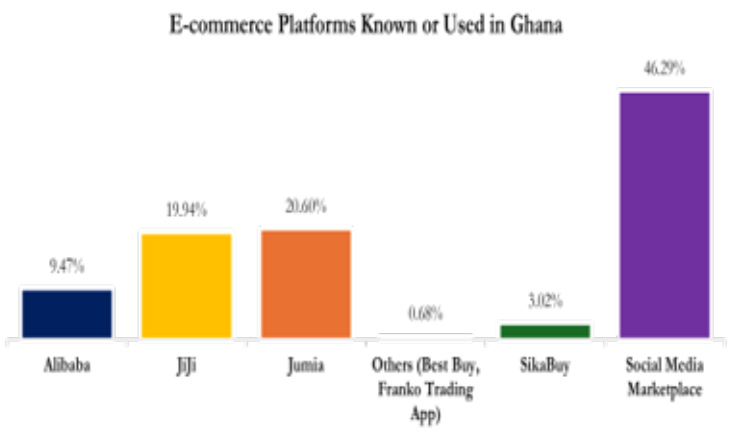


Figure 64: E-commerce Platforms Known or Used in Ghana

Social commerce adds another layer to this picture. Many businesses operate entirely through social media, using it as their storefront, marketing channel, and customer engagement tool. This approach has opened opportunities for entrepreneurs who would otherwise be excluded from formal platforms. It has also contributed to employment growth, with SMEs expanding their customer base and generating income through digital channels (Ghana Statistical Service, 2022).

The nature of what is traded also varies. Figures 65 and 66 highlight variations in goods and services traded online by gender and across zones. These patterns reflect broader social and economic structures, with certain categories of trade more accessible to specific groups based on location, resources, and market demand.

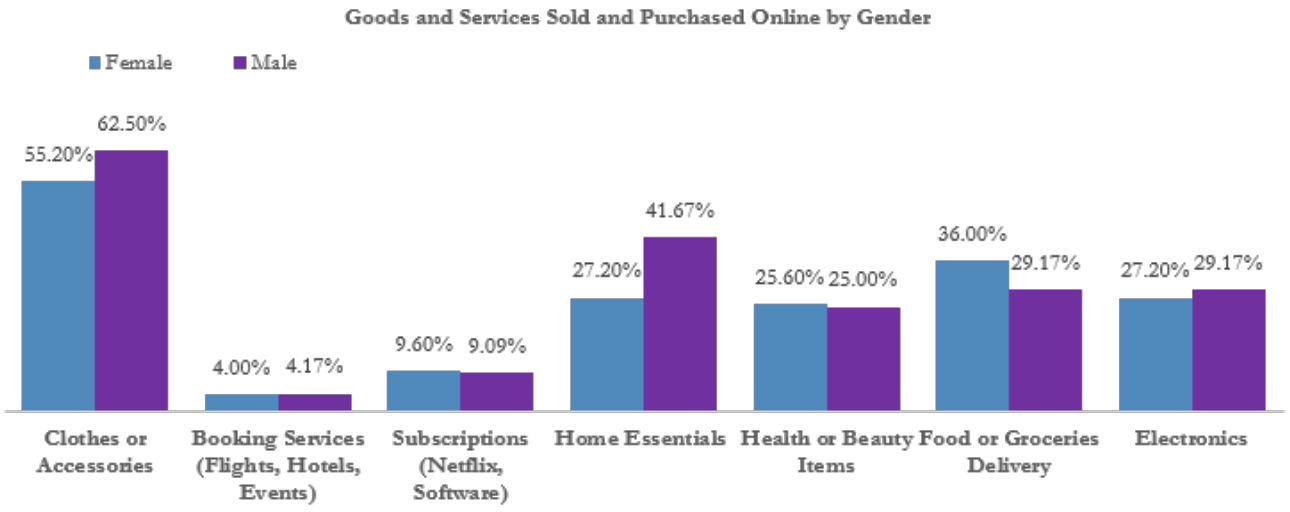


Figure 65: Goods and Services Sold and Purchased Online by Gender

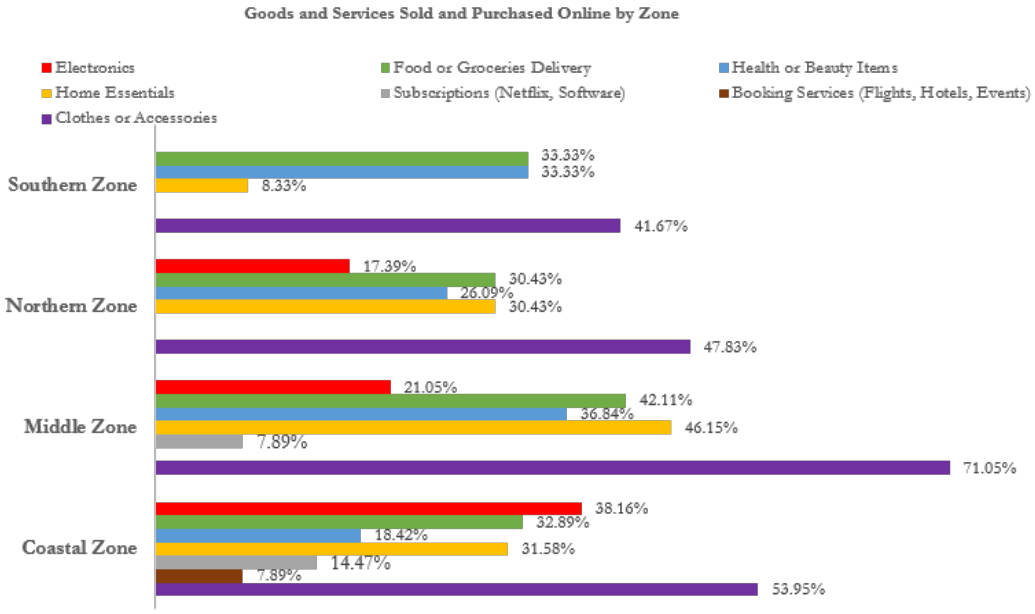


Figure 66: Goods and Services Sold and Purchased Online by Zone

5.5.5 Data, Innovation, and the Next Layer of Digital Trade

As the sector matures, attention is shifting toward how data and innovation can interact to improve efficiency and scale. Innovations in logistics, finance, and platform design are beginning to shape this next phase. Companies such as Jetstream Africa illustrate this convergence, combining freight forwarding, trade finance, and digital tracking into a single platform to reduce friction for importers and exporters. By 2023, the company had facilitated over 700 containers and disbursed more than USD 9 million in trade finance, showing how technology can unlock value across the supply chain (TechCrunch, 2023).

The Ghana Commodity Exchange adds another dimension, introducing digital tools into agricultural trade through warehouse receipt systems and price transparency mechanisms (Springer, 2021). These systems connect farmers to markets and financing in ways that were previously difficult to achieve. Figure 67 shows the types of digital services and innovations considered most scalable within the sector. These range from logistics solutions to platform-based services and digital finance tools. What links them is their ability to operate across multiple markets, suggesting potential for regional expansion under frameworks such as the AfCFTA.

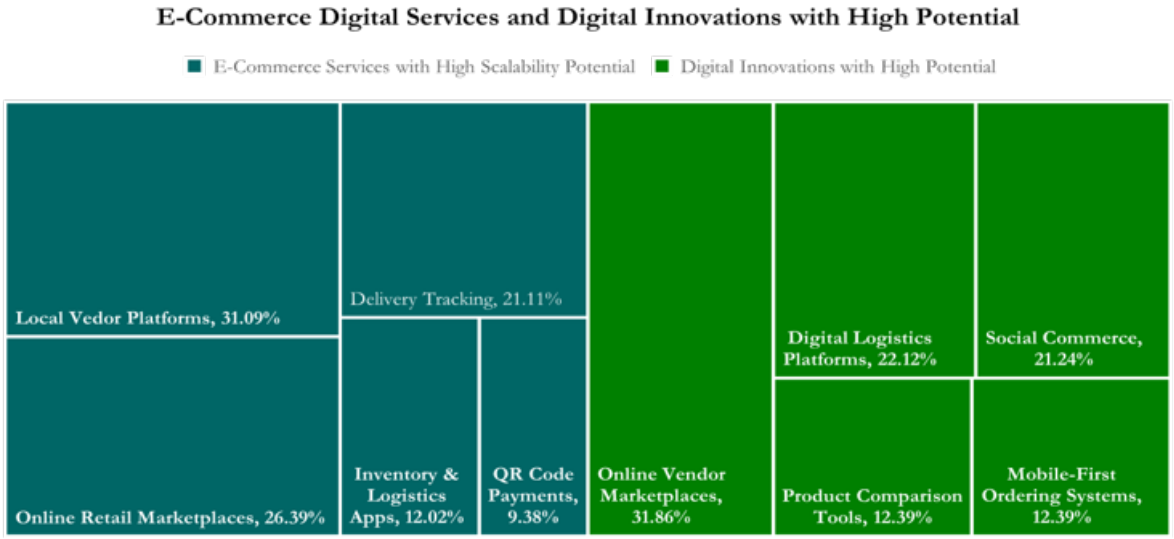


Figure 67: E-commerce Digital Services and Digital Innovations with High Potential

Nonetheless, there is a noticeable gap between policy ambition and market activity. Cross-border trade presents another area where expectations have not fully translated into outcomes. Although Ghana hosts the AfCFTA Secretariat and has implemented digital trade compliance systems, most e-commerce activity remains domestic. Only one of the 21 mapped platforms facilitates cross-border transactions (UNDP, 2024). Businesses cite logistics complexity, payment settlement challenges, and regulatory uncertainty as barriers to expanding beyond national markets.

5.5.6 Frictions, Trust, and the Uneven Experience of Participation

The challenges facing the sector are closely tied to everyday user experiences. Trust continues to shape how people engage with e-commerce. Concerns about fraud, delays, and product quality influence decisions at every stage of the transaction process. These issues are not abstract. They affect whether a customer completes a purchase, whether a trader invests in digital tools, and whether platforms can retain users.

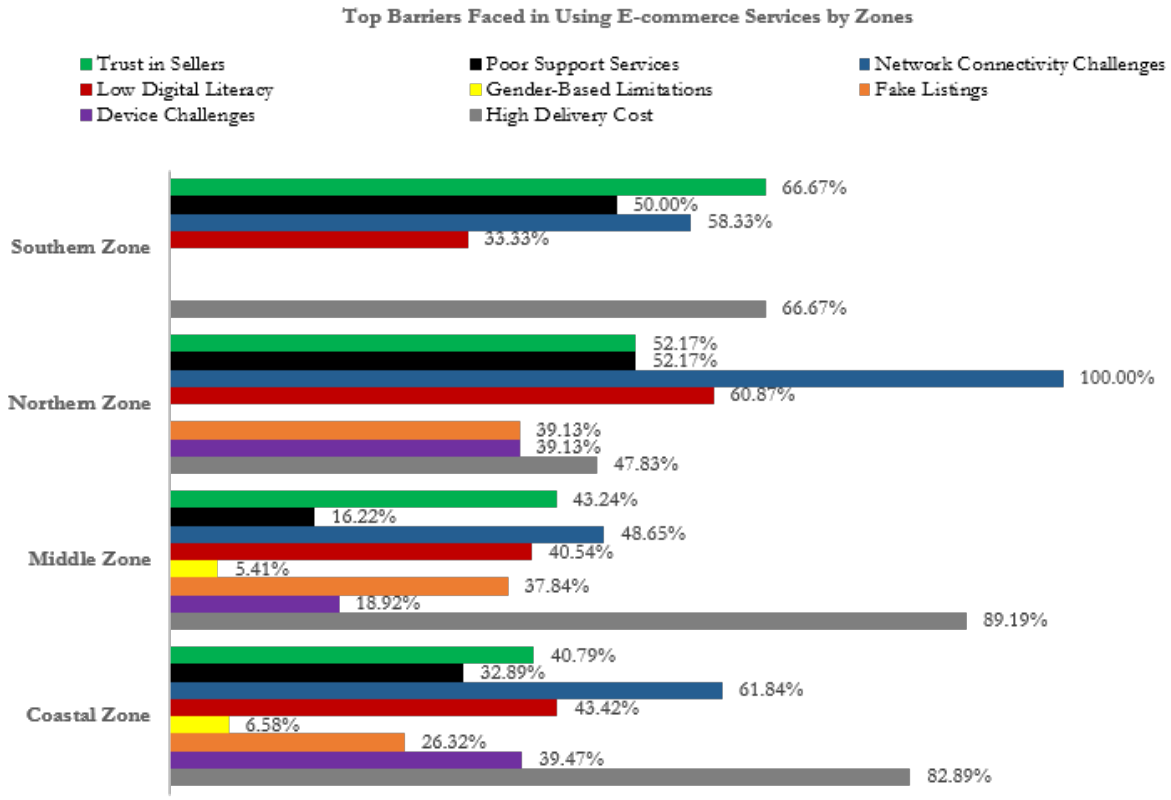


Figure 68: Top Barriers Faced in Using E-commerce Services by Zones

Figure 68 presents the barriers reported across different zones, showing how challenges vary depending on location. Infrastructure constraints, delivery limitations, and cost considerations appear more strongly in some regions than others. Gender adds another dimension. Figure 69 highlights the specific obstacles faced by women, including limited access to devices, low digital skills and literacy, and financial constraints.

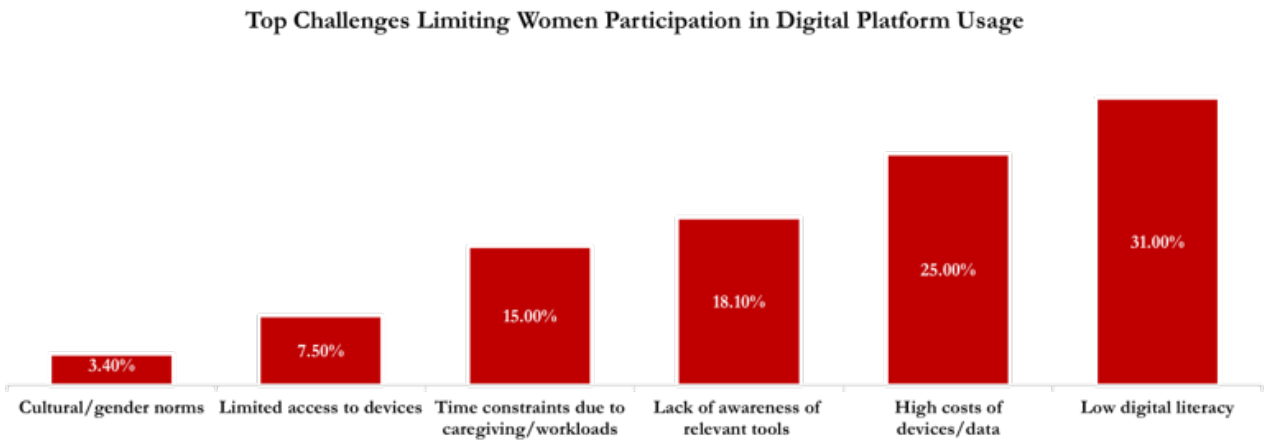


Figure 69: Top Challenges Limiting Women's Participation in Digital Platform Usage

Competition also shapes the operating environment. Ghanaian platforms compete not only with each other but with international players, particularly Chinese e-commerce platforms that offer lower-priced goods. This has introduced new dynamics into the retail sector, influencing pricing, sourcing, and consumer expectations (IMANI Africa, 2025). Policy gaps remain part of the story. While Ghana has built a strong regulatory base for payments and cybersecurity, consumer protection for online transactions is still developing. Issues such as dispute resolution, data flows, and digital identity interoperability continue to affect both local and cross-border trade (WTO, 2025).

5.5.7 Public Policy, Market Signals, and Emerging Priorities

Government interventions over the past decade have shaped much of the sector's direction. From digital payment systems to trade facilitation and regulatory frameworks, these efforts have created the conditions for growth. The introduction of the AfCFTA Hub, participation in the Digital Trade for Africa programme, and reforms to investment regulations all signal a policy environment that is still evolving.

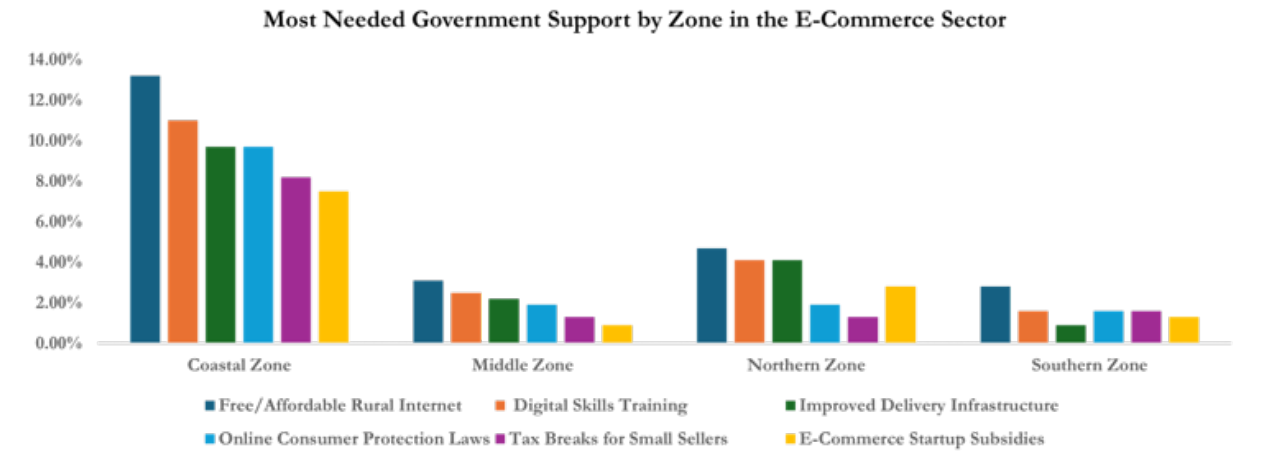


Figure 70: Most Needed Government Support by Zone in the E-Commerce Sector

Figure 70 captures what respondents identify as the most needed forms of government support. These include infrastructure improvements, access to finance, and clearer regulatory frameworks. Figure 71 adds another layer by showing what would encourage wider adoption of e-commerce, pointing to improved delivery and payment systems, user-friendly platforms, trust-building measures, and affordability.

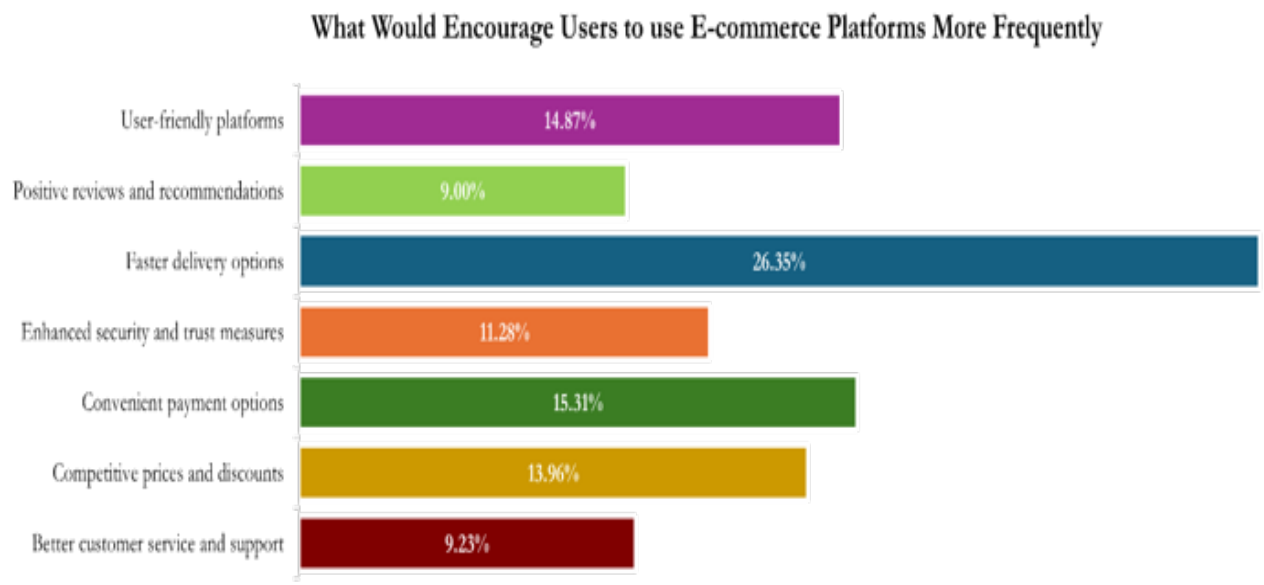


Figure 71: What Would Encourage Users to Use E-commerce Platforms More Frequently

The conversation is also shifting toward future opportunities. The idea of a Digital Export Desk reflects a growing recognition that Ghana's strength in digital services could be extended further into structured export markets. With the right support, this could translate into additional employment and stronger integration into regional trade networks.

5.5.8 Work, Livelihoods, and the Broader Economic Impact

Employment within the e-commerce and digital trade space takes many forms. Formal jobs exist within platforms, logistics firms, and technology companies. Informal and gig-based roles, particularly in delivery and small-scale trading, provide income for many others. At the same time, the broader impact of digital trade can be seen in how it supports SME growth and enables new business models.

The BPO sector remains the largest contributor to digital trade employment, with tens of thousands of workers engaged in services that connect Ghana to global markets (WTO, 2024). This sits alongside the expansion of SME activity, where digital platforms have lowered entry barriers and allowed businesses to scale beyond their immediate locations.

The outlook is one of a sector that is active and expanding, but still finding its balance. Progress is visible in the systems that have been built and the opportunities that have opened up. At the same time, everyday challenges continue to shape how people experience digital trade, from the confidence needed to complete a transaction to the infrastructure required to deliver a product.

▸ PERCEPTIONS ON GOVERNMENT SUPPORT IN KEY SECTORS

In agriculture, most stakeholders feel government backing is insufficient, pointing to long-standing gaps in digital infrastructure and targeted investment. Banking and finance show mixed views, with many uncertain about the level of support, which may reflect limited clarity in policy visibility or awareness among respondents. E-commerce stakeholders also express concerns about weak support, while education stands out as the sector with the most recognition of government effort, linked to initiatives during and after COVID-19. In health, opinions are divided, with some acknowledging progress and others highlighting critical gaps.

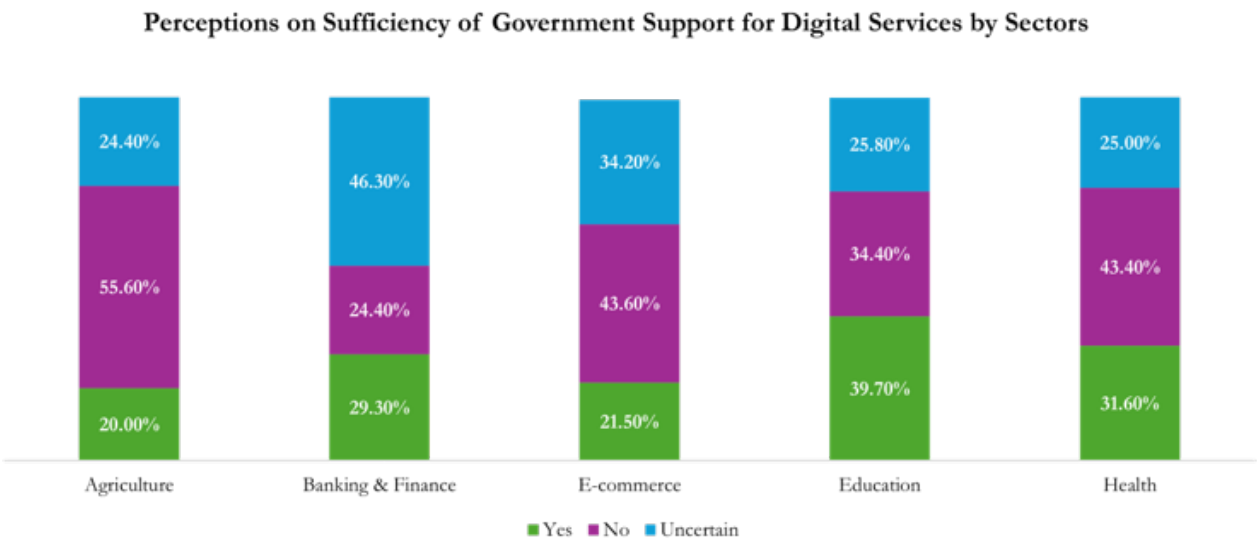


Figure 72: Perceptions on the Sufficiency of Government Support in Key Sectors

These findings suggest that while government initiatives exist, they are not being felt consistently across the key sectors, signaling the need for more targeted, visible, and sector-specific policies to build trust and accelerate digital transformation.

▸ COMPLEMENTARY SECTORS

5.6 MEDIA & ENTERTAINMENT (CREATIVE INDUSTRY)

Respondents for the sector comprise those who consume digital content as well as those involved in its creation and distribution. The media and entertainment sector accounted for 36 users and 21 service providers out of the total sample.

The respondent mix reflects a strong educational base, with undergraduate qualifications held by 47.22% of users and 52.38% of service providers, alongside a notable share of providers (28.57%) with vocational and technical training.

Participation is largely urban, with 75.00% of users and 76.19% of service providers based in cities.

Across regions, users are fairly spread between the Coastal (25.00%) and Northern (25.00%) Zones, while service providers are more concentrated in the Middle Zone (42.86%), pointing to a balance between content demand and production or service hubs.

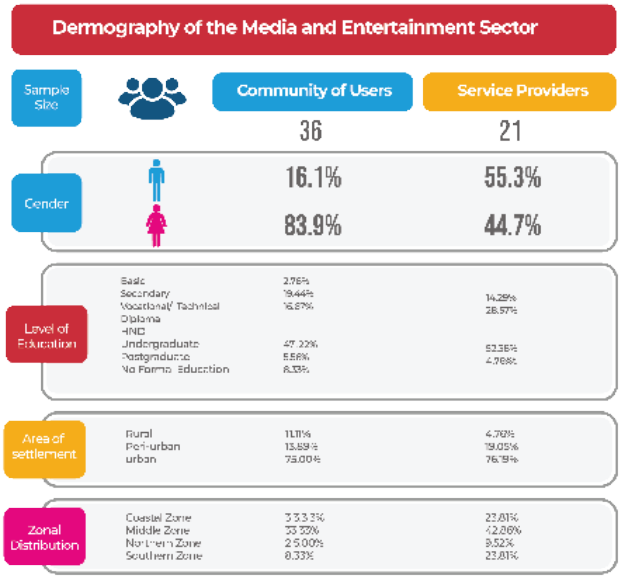


Figure 73: Demography of Media & Entertainment Sector

5.6.1 Expanding Digital Reach and Persistent Connectivity Gaps

Ghana's digital media, entertainment, and creative industries sector has moved from the margins of cultural expression into a measurable contributor to economic activity, supported by a steady build-up of policy attention, infrastructure, and digital participation. In 2025, the sector is reported to have contributed approximately 2.5% to GDP, with the broader Tourism, Culture and Creative Arts segment generating US$4.8 billion in 2024 and attracting around 1.2 million visitors (Ministry of Tourism, Culture and Creative Arts [MoTCCA], 2025). This linkage between culture, tourism, and digital visibility continues to shape how value is created and distributed. Meanwhile, employment figures, estimated at 87,337 in art, entertainment, and recreation, only capture a fraction of actual participation, as digital platforms and informal work arrangements expand the boundaries of who is considered part of the sector (Ghana Statistical Service, 2021). Growth in digital consumption reflects this shift, with music streaming revenues alone projected to reach USD 4.36 million in 2025 and a rapidly expanding base of creators across platforms such as TikTok, YouTube, and Instagram (Statista, 2025; DataReportal, 2025; Modash, 2025).

These outcomes are closely tied to improvements in digital access, although progress is not the same across regions and user groups. Ghana's internet penetration reached 69.9% by early 2025, alongside approximately 7.95 million social media user identities, creating a broad base for digital participation (DataReportal, 2025). This level of access has enabled creative content to circulate widely, supporting both domestic engagement and international reach.
Yet patterns from primary data suggest that access is still shaped by cost and quality constraints. High data usage emerges as a consistent concern across zones, with respondents (100%) in both Northern and Southern areas identifying it as a major barrier, alongside persistent connectivity challenges and the cost of devices or subscriptions. The Southern Zone records near-universal engagement with digital media content, while the Northern Zone follows closely with strong uptake in educational (88.9%) and entertainment (88.9%) content. In contrast, lower engagement with educational media in the Middle Zone points to affordability and awareness gaps rather than a lack of interest. These differences show that while infrastructure expansion has widened access, affordability, and service quality continue to influence how different regions participate in the digital creative economy.

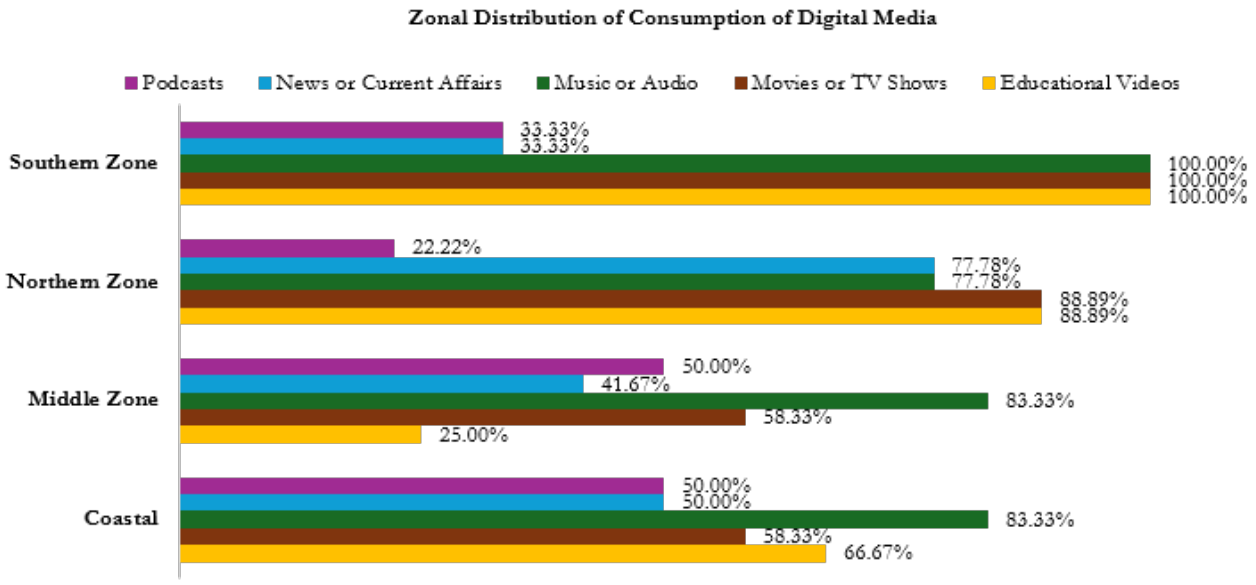


Figure 74: Zonal Distribution of Consumption of Digital Media

5.6.2 Monetisation, Market Access and the Limits of Financial Inclusion

As access expands, the question of who benefits financially becomes more visible. Digital platforms have introduced new income pathways, but monetisation remains often limited. Streaming platforms such as have opened global distribution channels for Ghanaian artists, while local platforms demonstrate early efforts to retain value within domestic systems (Emerging Markets Today, 2025; Statista, 2025). Even so, per-stream revenues are still low and vary by geography, with African streams generating lower payouts than those from more developed markets (SotNews Agency, 2025).

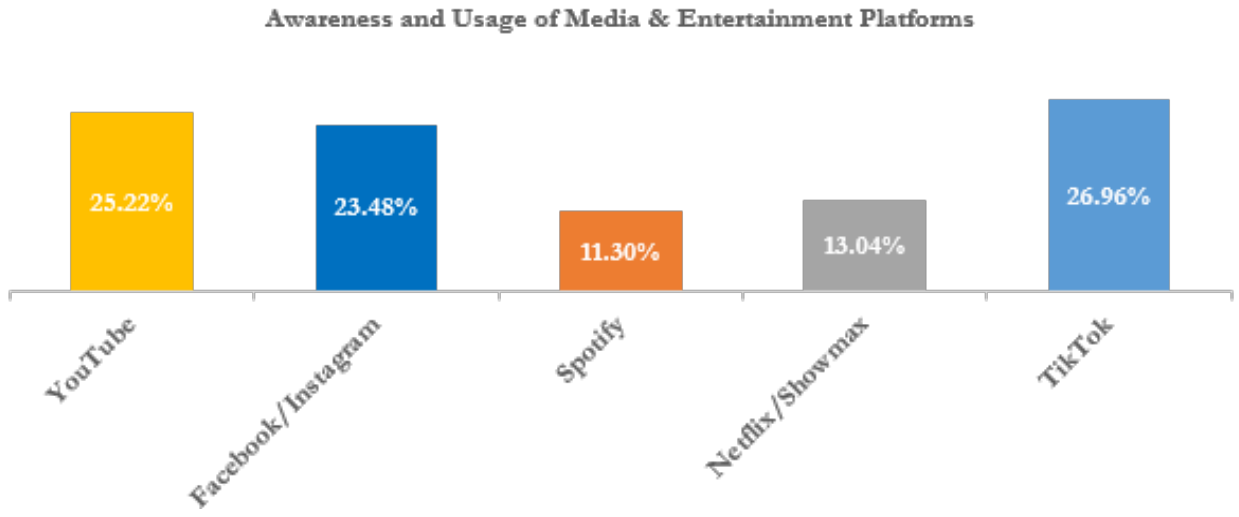


Figure 75: Awareness and Usage of Media & Entertainment Platforms

Figure 75 shows respondents' strong preference for free or low-cost, socially driven platforms, while subscription-based services are used more by a smaller segment. This pattern reflects both affordability pressures and consumption habits built around short-form, shareable content. As a result, a large portion of digital engagement takes place outside formal monetisation systems, limiting revenue capture within the sector.

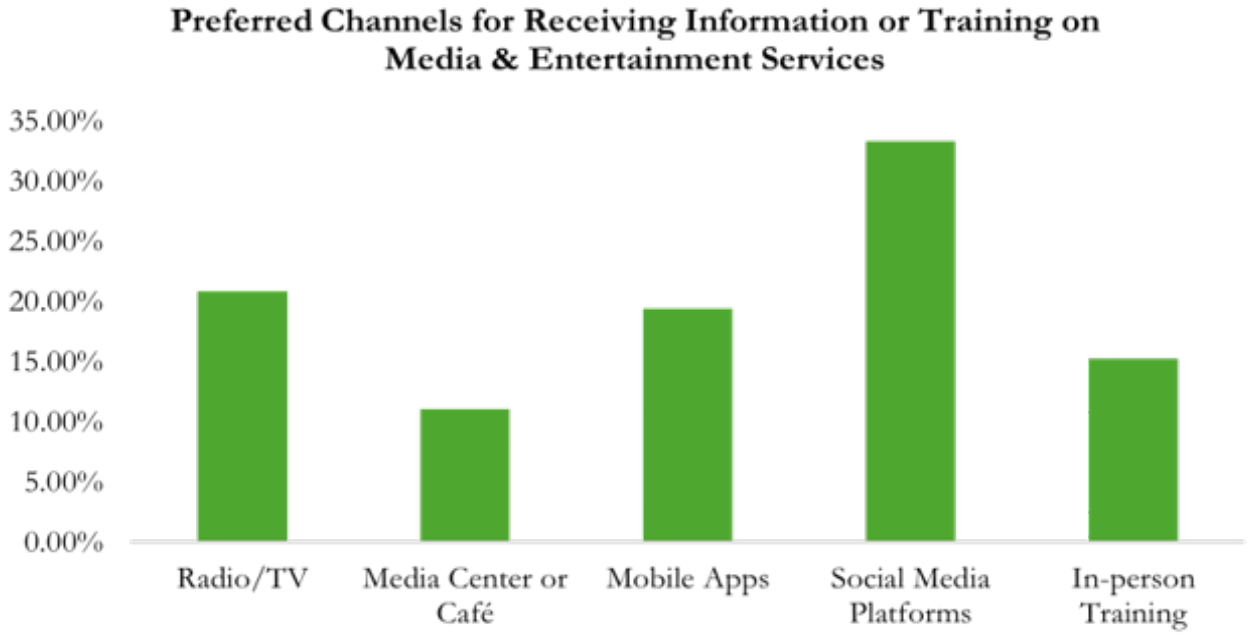


Figure 76: Preferred Channels for Infotainment Access

According to stakeholders, financial inclusion is further constrained by structural issues within the industry. Intellectual property enforcement remains weak, with royalty collection systems still largely analogue and unable to fully capture revenue from global streaming activity. At the same time, approximately 90% of creative enterprises operate informally, restricting access to credit and limiting opportunities for scaling (NewsGhana, 2026). Public and private interventions, including the GH¢40 million allocation to the Creative Arts and Film Fund and initiatives such as Fidelity Bank's Cultural and Creative Fund, signal growing recognition of these gaps, although they remain modest relative to sector-wide financing needs (Ministry of Finance, 2025). These dynamics suggest that while digital platforms have expanded participation, financial systems have yet to fully adapt to support sustainable income generation.

5.6.3 Building Creative Capacity: Skills Development and Digital Literacy Gaps

Institutional reforms have played a central role in building the skills base required for a digital creative economy. The transformation of the National Film and Television Institute into the University of Media, Arts and Communication – Institute of Film and Television (UniMAC-IFT), supported by a €45 million retooling programme, has modernised training facilities and aligned curricula with digital production needs (Citi Newsroom, 2021; GBC Ghana, 2021). This shift has strengthened the pipeline of skilled professionals entering the media and film industries, reinforcing the sector's technical capacity.

At the regulatory level, the establishment of the National Film Authority under the Development and Classification of Film Act, 2016 (Act 935), introduced a formal structure for content classification and industry oversight (Parliament of Ghana, 2016). Its 2025 directive extending licensing requirements to digital streaming content reflects an effort to bring online distribution into the regulatory space (GhanaWeb, 2025). The Creative Arts Agency, created under Act 1048, further expands this framework by formally recognising digital content and the creator economy within national policy (MoTCCA, 2020).

Notwithstanding these achievements, gaps in digital literacy and monetisation knowledge remain evident. Many creators operate outside formal training systems, relying on self-taught approaches and platform-based learning. Primary data suggests that users expect platforms to be simple, affordable, and aligned with local realities, with social media emerging as a key channel for both learning and engagement. However, limited access to equipment, high production costs, and low levels of digital skills continue to affect content quality and competitiveness. This helps explain why strong online visibility does not always translate into sustainable income. Initiatives such as the TikTok–Ministry of Communications Creator Education Day indicate growing recognition of the need to strengthen skills in areas such as algorithm use, metadata management, and revenue optimisation (Entertainment Week Ghana, 2025).

5.6.4 Platform-Driven Enterprise: Growth of the Creator Economy and Digital Entrepreneurship

Digital platforms have reshaped how individuals enter and participate in the creative industries, driving a form of entrepreneurship that is often informal, flexible, and platform-dependent. Ghana's creator economy now includes hundreds of thousands of active participants, with an estimated 828,169 TikTok influencer accounts contributing to a diverse and expanding content ecosystem (Modash, 2025). Social media platforms have lowered entry barriers, allowing individuals to generate income through brand partnerships, advertising, and content monetisation without relying on traditional intermediaries.

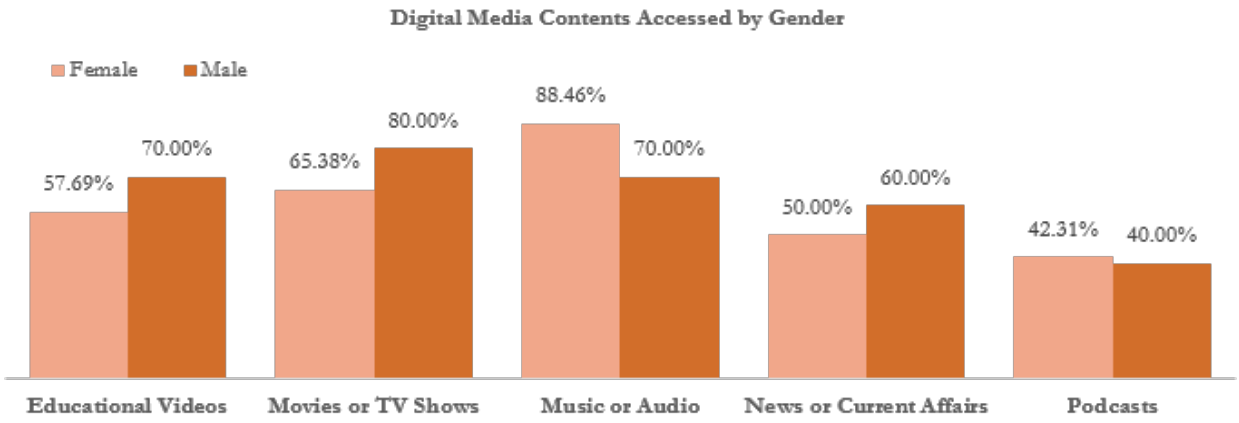


Figure 77: Digital Media Contents Accessed by Gender

Insights from primary data (Figure 77) indicate how this participation varies across demographic groups. Female users show strong engagement with music and audio content, followed by movies and educational videos, suggesting that entertainment and informal learning play a central role in their digital experience. Male users, on the other hand, demonstrate a broader distribution across content categories, including higher engagement with educational and news content. These differences point to opportunities for more targeted content strategies that reflect distinct user preferences and engagement patterns.

Moreover, the industry operates within a hybrid distribution model that combines local innovation with global platform dependence. While Ghanaian creators benefit from access to international audiences through platforms such as YouTube, systemic access to these markets remains limited. Only a small number of films secure placement on global streaming platforms, often on a case-by-case basis rather than through structured distribution channels (The Conversation, 2025). This limits the ability of the sector to consistently convert creative output into export revenue.

5.6.5 Platform Dominance, Content Trends, and the Shifting Digital Media Landscape

The growing importance of data-driven engagement and platform ecosystems is reshaping how content is produced, distributed, and consumed. The dominance of platforms such as TikTok, YouTube, and Facebook/Instagram reflects a shift toward short-form, interactive, and socially driven content. Primary data suggests that users value simplicity, affordability, and cultural relevance, reinforcing the appeal of platforms that prioritise ease of use and shareability.

This trend is influencing the structure of the market. Subscription-based services such as Netflix, Showmax, and Spotify continue to play a role but remain concentrated among smaller, urban user segments. This creates space for local platforms that can combine affordability with culturally relevant content, although competition from global players remains strong. Domestic initiatives such as Aftown demonstrate the potential for local innovation, even as the broader ecosystem remains shaped by international platforms (Emerging Markets Today, 2025).

Seasonal and event-driven dynamics further illustrate how digital engagement translates into economic activity. The “December in Ghana” phenomenon has become a major driver of tourism and cultural consumption, attracting diaspora visitors and generating significant spending across multiple sectors. Visitors are estimated to spend at least $2,589 per trip, with digital platforms amplifying the visibility and reach of these events (Ghanaian Times, 2025; CreativOp, 2025). This interaction between physical events and digital amplification highlights the sector’s broader economic impact.

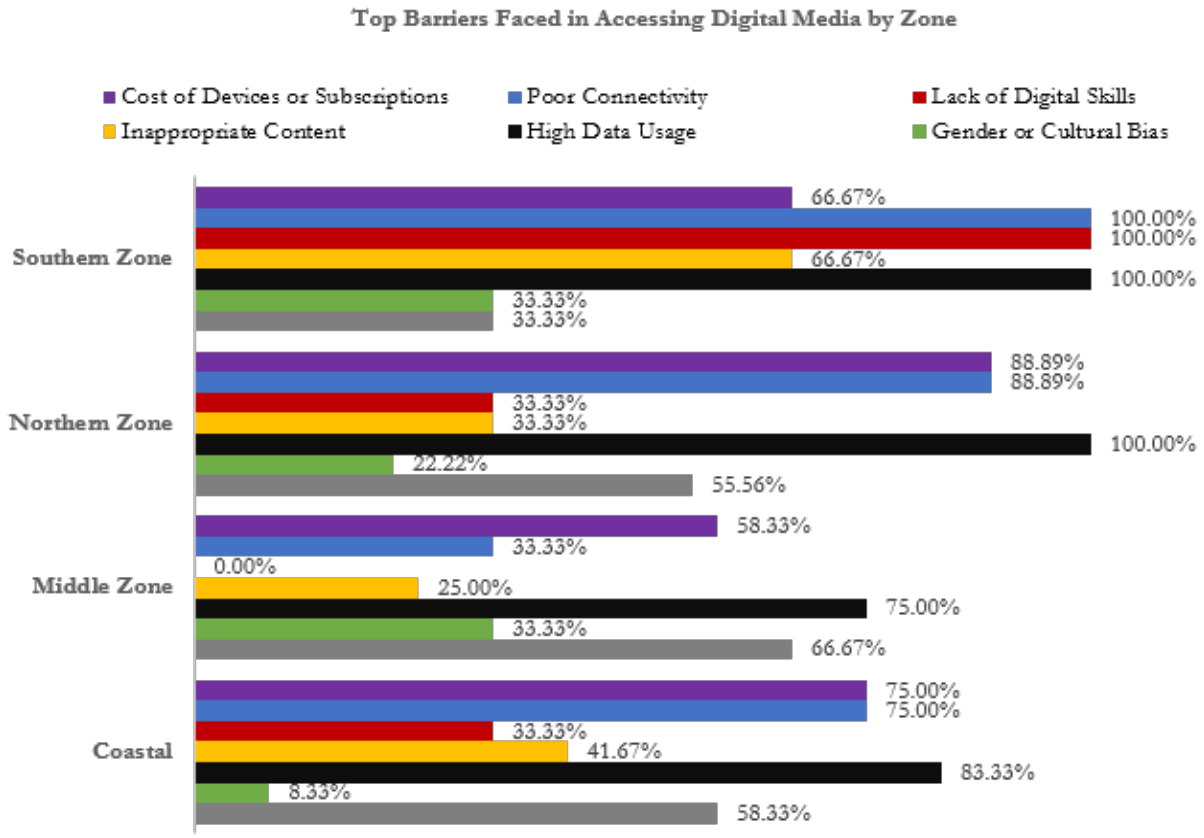


Figure 78: Top Barriers Faced in Accessing Digital Media by Zone

At the same time, barriers within the digital ecosystem are conspicuous. Primary data (as indicated in Figure 78) points to concerns around misinformation, inappropriate content, and low digital literacy, alongside persistent challenges related to high data costs and poor connectivity. These issues suggest that while digital platforms have expanded access and participation, the quality, safety, and sustainability of engagement require continued attention.

5.6.6 Sector Highlights: Momentum, Inclusion Gaps, and Structural Constraints

The combined evidence points to a sector that is expanding in scale and influence, supported by growing digital access, institutional reforms, and rising participation in the creator economy. Government interventions, including regulatory frameworks, institutional restructuring, and targeted funding, have begun to create a more structured environment for growth. Private sector platforms and investments have further accelerated expansion, particularly in content distribution and audience reach.

This growth has translated into broader economic contributions, including linkages with tourism, job creation across formal and informal segments, and new income opportunities for digital creators. However, the benefits of this expansion are not uniform across regions and even across genders. Financial inclusion is limited by weak monetisation systems and informality, while digital skills gaps and infrastructure constraints continue to shape who can participate effectively.

Opportunities remain significant. Expanding affordable access, strengthening monetisation systems, improving intellectual property enforcement, and investing in digital skills could enable the sector to move from high participation to high value creation. Addressing regional and gender disparities would further enhance inclusion, ensuring that growth is not concentrated in specific groups or locations.

The direction of recent policy and investment commitments suggests a gradual shift toward a more coordinated approach. If sustained, this could position Ghana's digital media, entertainment, and creative industries as a stronger pillar of the national digital economy, with the potential to contribute more significantly to economic growth, employment, and cultural exports. The pace of this transition, however, will depend on how effectively structural constraints are addressed alongside ongoing expansion.

5.7 GOVERNMENT SERVICES (E-GOVERNANCE)

Within the overall sample, the government services (e-governance) sector accounted for 59 respondents, made up of 44 users and 15 service providers. The users were citizens who engaged with a range of digital public services, including those registering and applying online, accessing government platforms, receiving digital service outputs, and using official mobile applications. The service providers consisted of public sector institutions and systems responsible for delivering these services, including ministries, departments, and agencies, regulatory bodies, and entities managing digital public service platforms.

The respondent profile is defined by a high level of educational attainment, with a majority of users holding undergraduate degrees (52.27%) and a notable share of service providers holding postgraduate qualifications (46.67%).

Urban areas account for most respondents, representing 61.36% of users and 40.00% of service providers, alongside a visible presence in peri-urban locations.

Regionally, users are more concentrated in the Northern (38.64%) and Coastal Zones (29.55%), while service providers are predominantly based in the Middle Zone (73.33%).

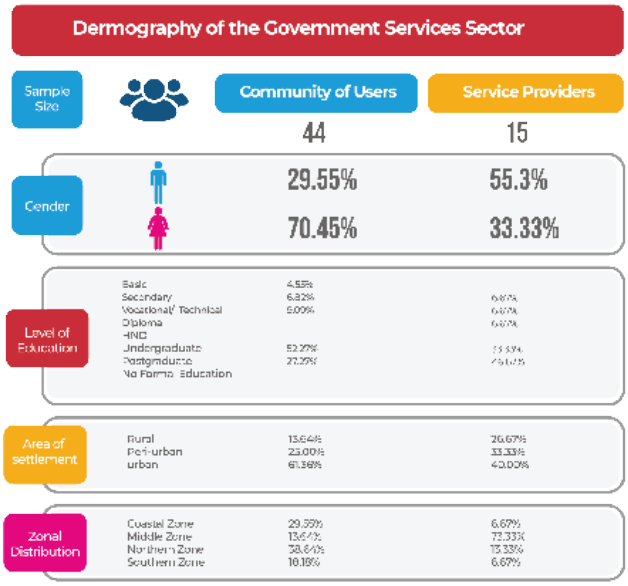


Figure 79: Demography of Government Services (E-governance) Sector

5.7.1 Digital Public Infrastructure and the Reach of Government Platforms

E-governance in Ghana has grown into a central feature of public administration, supported by sustained investment in digital systems, identity platforms, and service delivery channels. Ghana ranked 108th globally on the United Nations E-Government Development Index in 2024, recording a score of 0.6317, an improvement from 0.5624 in 2022 and placing the country among Africa's top ten performers (United Nations, 2024).

This progress sits within a wider expansion of the digital economy, which recorded an average annual growth rate of 19% between 2014 and 2020, supported by infrastructure such as West Africa's only Tier IV data centre (WeAreTech Africa, 2025). Public sector digitalisation continues to play a critical role, with the Ghana.gov platform hosting between 1,500 and 2,000 services and targeting a scale-up to 16,000 services through the World Bank-supported Digital Acceleration Project (World Bank, 2022; Ecofin Agency, 2025).

Institutional systems developed over time have made this level of service delivery possible. The National Information Technology Agency, established under the NITA Act of 2008, coordinates digital systems across Ministries, Departments, and Agencies through the Government Wide Area Network and secure communication frameworks (NITA, 2008; Include Platform Research, 2022). In addition, the National Digital Property Addressing System, implemented through GhanaPostGPS and AsaaseGPS, assigns unique digital addresses nationwide, improving service targeting and administrative coordination (ScienceDirect, 2023).

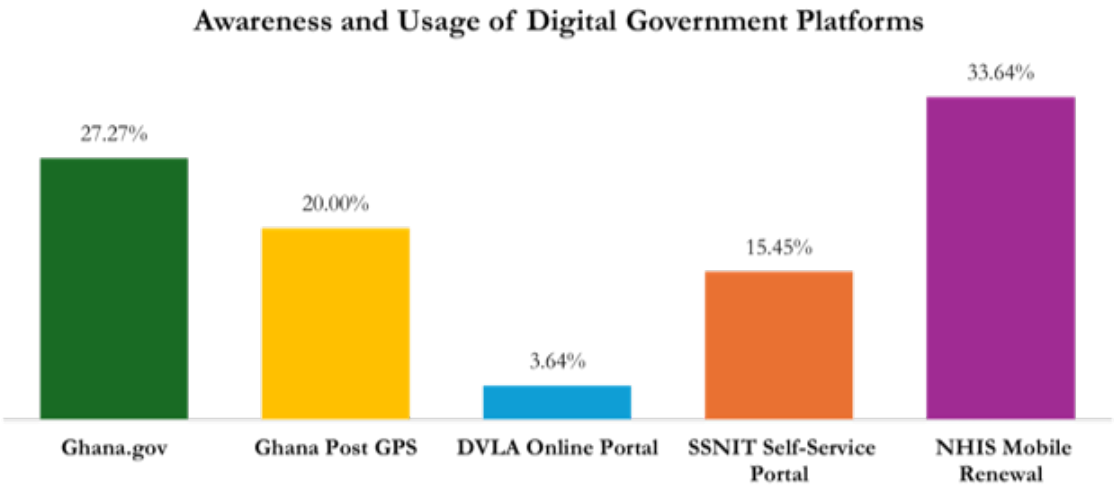


Figure 80: Awareness/Usage of E-Government Platforms

What emerges from the primary data is a clearer picture of how citizens engage with some of these systems in practice. Usage tends to concentrate around essential services, with NHIS Mobile Renewal recording the highest recognition at 33.6%, followed by Ghana.gov at 27.3% and GhanaPostGPS at 20.0%. Platforms linked to more specific administrative processes, such as SSNIT Self-Service and DVLA Online, attract lower engagement. This contrast suggests that while access to platforms has expanded, usage aligns closely with the immediacy of need, ease of navigation, and familiarity with the service.

5.7.2 Digital Revenue Systems, Payments, and the Formalisation of Public Finance

Public finance administration has seen one of the most visible shifts through digitalisation, especially in tax collection and payment systems. The Ghana Revenue Authority has introduced a series of reforms, culminating in the Integrated Tax Administration System in April 2026, which integrates tax data across platforms, supports electronic filing, and enables real-time VAT reporting (NewsGhana, 2026). Earlier policy actions, including the introduction of VAT on digital services in 2022, expanded the tax base to include global digital platforms and contributed to cumulative VAT revenues of GH¢3.213 billion between 2022 and 2025 (Ghana Chamber of Telecommunications, 2026).

At the same time, systems such as ICUMS and the Paperless Port initiative have improved customs processes and reduced administrative delays. Also, the e-Immigration system digitised border management and identity verification, integrated with the Ghana Card for automated processing. These systems form the complete digital border and trade facilitation infrastructure, with ICUMS incorporating AI-powered risk profiling (Publican) as the next evolution (IFS & Ministry of Finance, 2021).

Payment integration has moved to the centre of this transformation. Survey results show adoption levels at 81.8%, indicating strong readiness among citizens to engage in cashless transactions with

government services. This level of uptake reflects growing confidence in digital payment channels and signals an opportunity to deepen financial inclusion through expanded service offerings. Payment systems integrated within platforms such as Ghana.gov allow users to complete transactions in a single flow, reinforcing convenience and efficiency.

The Ghana Card extends this integration further by linking identity verification with financial access. It now functions as a biometric ID, an internationally recognised travel document, and a payment-enabled card following the activation of its integrated wallet in April 2026 (National Identification Authority [NIA], 2026). This combination strengthens the connection between citizens and formal financial systems while supporting more efficient delivery of public services and revenue collection.

5.7.3 Public Sector Capability, Systems Integration, and Service Delivery Capacity

Institutional capacity plays a decisive role in how digital systems perform across government. Ghana's progress reflects a mix of legal frameworks, policy direction, and operational systems that guide implementation. The Electronic Transactions Act (2008), Data Protection Act (2012), and Cybersecurity Act (2020) provide the legal basis for digital transactions, data governance, and infrastructure protection (Parliament of Ghana, 2008; 2012; 2020). These are complemented by strategic programmes such as the Ghana Digital Agenda and the Digital Economy Policy and Strategy, alongside the National AI Strategy, which sets a longer-term ambition for technological leadership (MoCDTI, 2025).

Sector-specific systems illustrate how these policies translate into service delivery. In healthcare, the Lightwave Health Information Management System has digitised records for approximately 21 million citizens, improving coordination and access to medical information (Citi Newsroom, 2024). The Zipline drone delivery system has completed 278,936 flights, delivering over 12 million medical products and strengthening logistics for remote health facilities (Presidency of Ghana, 2022; Kapsule, 2026). Digital tools such as mobile NHIS renewal and emerging e-pharmacy platforms further extend access across the health value chain.

Even with these systems in place, primary data highlights areas where capacity constraints influence outcomes. Staff digital skills gaps, budget limitations, and resistance to new systems continue to affect implementation. These constraints point to the importance of continuous training and institutional support, ensuring that digital systems are not only deployed but effectively used across all levels of government.

5.7.4 Citizen Experience, Trust and Pathways to Adoption

Citizen expectations continue to influence how digital government services evolve. Survey findings indicate that public demand accounts for 35.3% of the push toward digitalisation, closely followed by the need for operational efficiency at 32.4%. This suggests that citizens are not passive recipients but active drivers of change, seeking faster and more convenient service delivery.

User experience centres on speed, trust, and simplicity. Faster service delivery (58.43%) ranks highest among factors encouraging adoption, followed by secure data protection (49.67%), user-friendly platforms (45.51%), and simplified procedures (40.0%). Additional features such as SMS or email reminders and reliable verification systems contribute to user confidence, reinforcing continued engagement with digital platforms.

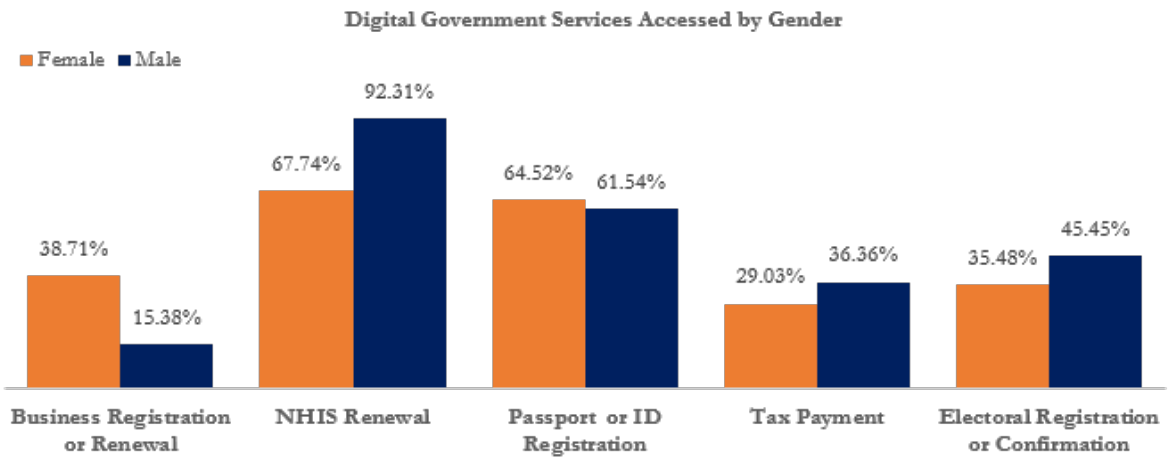


Figure 81: E-Government Services Accessed by Gender

Gender-based insights (Figure 81) offer a more detailed view of participation. NHIS renewal records strong engagement across both groups, with 67.74% of females and 92.31% of males using digital channels. Passport and ID registration also show consistent uptake. In contrast, women demonstrate higher participation in digital business registration, while men record higher engagement in tax payments and electoral services. These differences point to varying levels of exposure, digital confidence, and economic roles, suggesting areas where targeted interventions could support more balanced participation.

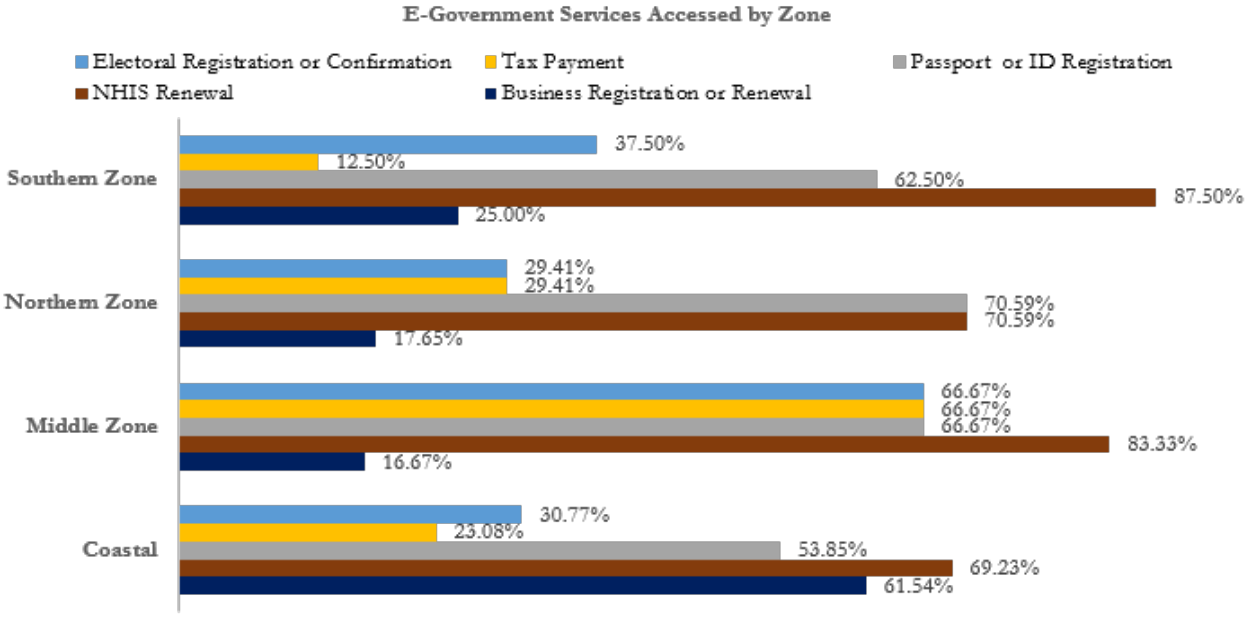


Figure 82: E-Government Services Accessed by Zone

Figure 82 further illustrates how regional engagement with these e-government services differs across the country. NHIS renewal shows consistently high usage across all zones, with figures ranging from 69.23% in the Coastal Zone to 87.50% in the Southern Zone. Passport and ID services follow a similar trend in the Northern and Southern Zones. Other services present a more mixed picture, with business registration more prominent in coastal areas and tax or electoral services showing uneven uptake across regions. These outcomes reflect differences in infrastructure access, economic activity, and levels of digital awareness.

5.7.5 System Performance, User Constraints, and Trust in Digital Governance

As reliance on digital platforms increases, system performance and reliability become central to user experience. Survey findings highlight slow platform response and high internet costs as the most frequently cited barriers across all zones. In the Coastal Zone, 92.31% of respondents identified internet cost as a challenge, while 69.23% pointed to slow response times. The Southern Zone reflects similar concerns, with both issues affecting 75% of users.

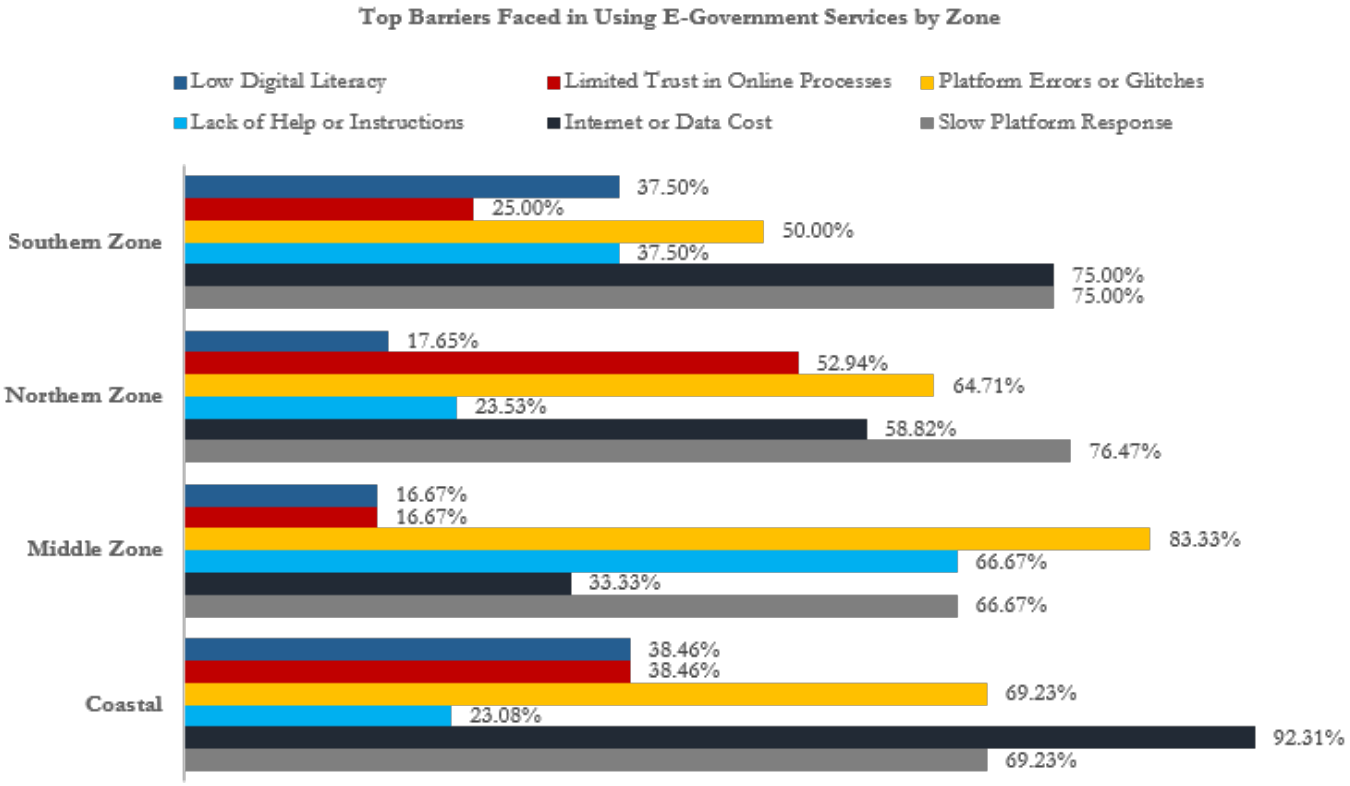


Figure 83: Top Barriers to Using E-Government Services by Zone

Further north and within the middle zones, challenges extend beyond cost and speed. Platform errors, limited trust in online processes, and lack of user guidance emerge as key concerns. In the Northern Zone, 64.71% of respondents report platform errors, while 52.94% express concerns about trust in digital systems. The Middle Zone records high levels of platform errors at 83.33%, alongside a significant share of respondents citing a lack of instructions. These findings suggest that improving technical performance alone will not be sufficient without strengthening user support and communication.

Cybersecurity considerations add another layer of complexity as digital systems expand. Risks associated with data protection and system vulnerabilities continue to grow, requiring sustained investment in security frameworks and oversight (Cyber Security Authority, 2025). At the institutional level, fragmentation across government databases limits interoperability, reducing the efficiency of integrated service delivery (MoCDTI, 2025). Addressing these issues will be critical to strengthening trust and ensuring consistent service performance.

5.7.6 An Integrated, Inclusive, and Responsive Digital Governance

Ghana's e-governance sector reflects a steady move toward integrated and citizen-focused public service delivery. Systems such as the Ghana Card, Ghana.gov platform, and national digital infrastructure have improved access to services and strengthened administrative efficiency. These developments contribute to broader economic outcomes, including improved revenue collection, expanded digital employment opportunities, and stronger links between citizens and formal systems.

Employment effects extend across both direct and indirect channels. Government IT systems, digital tax administration, and cybersecurity services create direct roles, while broader digitalisation supports opportunities in software development, data analytics, and service delivery. Programmes such as the One Million Coders initiative signal a clear intention to build a workforce aligned with future demand (MoCDTI, 2025).

Looking ahead, attention turns to how existing systems can deliver wider impact. Gaps in digital literacy, infrastructure access, and system integration continue to influence who benefits from digital services. Differences across gender and regions highlight the need for targeted approaches that address specific barriers to participation.

There is clear scope to deepen progress. Expanding affordable connectivity, improving platform performance, strengthening cybersecurity systems, and investing in both citizen and public sector digital skills would enhance the effectiveness of existing platforms. Stronger coordination across institutions and improved data integration would also support more seamless service delivery.

Current policy direction and ongoing investments point toward a more connected and inclusive digital governance framework. Continued focus on these priorities could strengthen Ghana's position as a leading example of e-governance in Africa, with the capacity to deliver efficiency, transparency, and inclusive growth across the wider economy.

5.8 ENERGY & UTILITIES SECTOR

From the total sample, the energy and utilities sector is represented by 12 users and 16 service providers. The respondents include everyday consumers of electricity, water, LPG, and solar services, including prepaid and postpaid meter users and mobile utility app users, alongside service providers such as electricity and water companies, LPG vendors, solar energy companies, and digital utility platform operators.

The profile points to a relatively well-educated group, with half of users holding undergraduate degrees, while service providers reflect a broader mix that includes vocational and technical training.

Most respondents are located in urban areas, accounting for 58.33% of users and 62.50% of service providers.

In terms of the geographic spread, users are concentrated in the Coastal Zone (58.33%), whereas service providers are more present in the Middle Zone (50.00%), suggesting a distribution that may be shaped by both access and technical service presence.

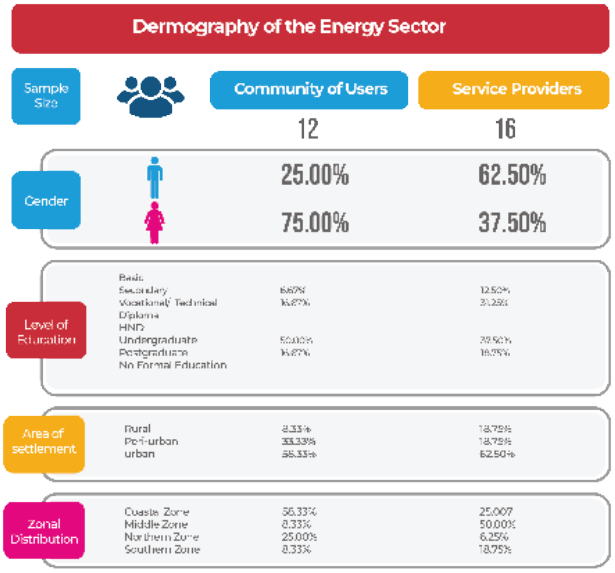


Figure 84 Demography of Energy & Utilities Sector

5.8.1 Expanding Power Supply Amid Persistent Reliability Pressures

As the provider of the power infrastructure on which every digital service, platform, device, and sector depends, Ghana's energy and utilities sector has grown in capacity over the past decade, although reliability continues to define how that capacity is experienced in practice. Installed generation reached 5,260 MW as of November 2024, while dependable capacity stands lower at 4,856 MW due to operational and fuel constraints (Trade.gov, 2025; ICLG, 2025). Electricity access now reaches 89% of the population, reflecting steady progress in grid extension and rural electrification (World Bank, 2024; Ministry of Energy, 2025). This expansion has strengthened Ghana's role in the West African Power Pool, where it exported 2,527 GWh of electricity in 2023 (Enerdata, 2023).

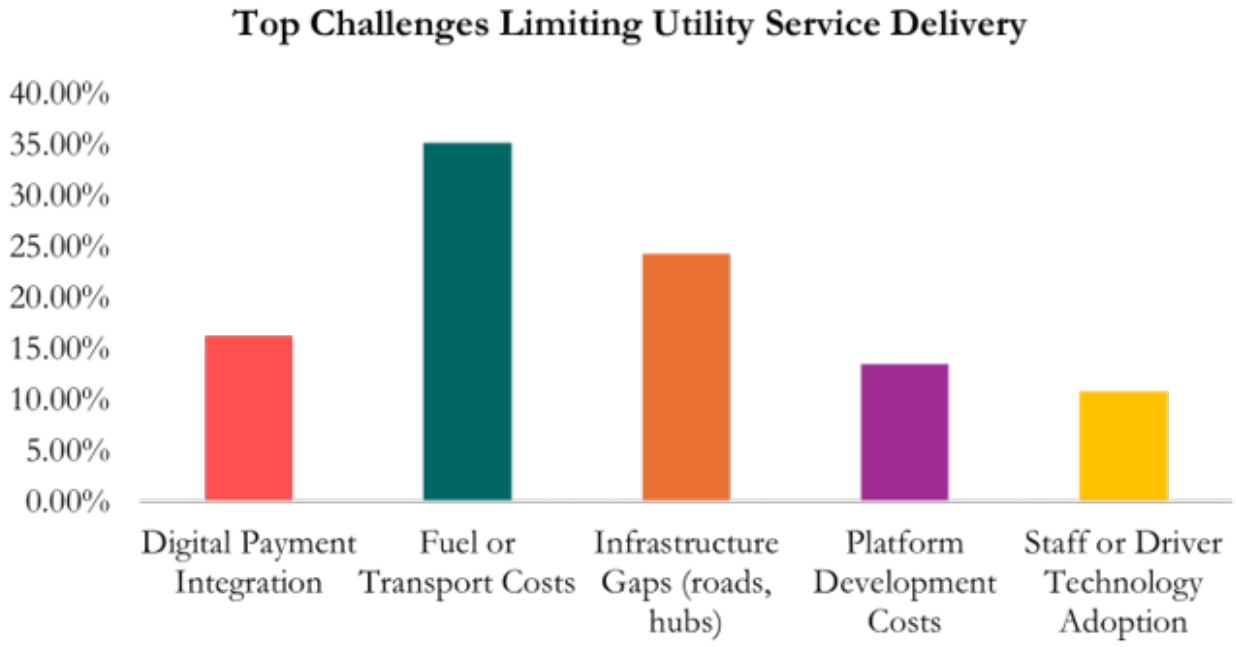


Figure 85: Top Challenges Limiting Digital Energy & Utility Services

Even so, internal pressures continue to influence how effectively this supply meets demand. The sector carries a growing debt burden projected to exceed USD 9 billion, limiting investment capacity and affecting service delivery (World Bank, 2025). Furthermore, survey data (indicated in Figure 85) highlight some of the internal pressures encountered by service providers. These constraints feed directly into operational realities, where power reliability still affects households and businesses. The broader economic cost remains significant, with unreliable electricity estimated to reduce national output by up to 6% of GDP each year (World Bank, 2024). This tension between expansion and system stress frames the direction of reform across the sector.

5.8.2 Cross-Border Electricity Trade and the Digital Coordination of Power Flows

In that regard, electricity transmission has moved beyond national distribution to support cross-border energy trade and regional integration. The National Interconnected Transmission System, managed by GRIDCo, links Ghana to neighbouring countries and facilitates electricity exchange within the West African Power Pool (Lexology, 2023; Enerdata, 2023). Investments such as the 330 kV Kumasi–Bolgatanga line (which was probably the most significant domestic transmission infrastructure investment of the decade) have improved internal transmission, closed the grid gap between central and northern Ghana, and enabled the evacuation of renewable energy from the north (Enerdata, 2023).

This expanding network requires tighter coordination, and digital systems now play a more visible role in managing both operations and financial flows. Mechanisms such as the Cash Waterfall Mechanism and the Natural Gas Clearing House organise payments across the value chain, improving transparency and reducing inefficiencies in revenue distribution (Ministry of Finance, 2023). These systems introduce structure into a sector that has long struggled with payment imbalances.

At the user level, this shift is reflected in how services are accessed. Survey responses show strong awareness and usage of the Electricity Company of Ghana's mobile app and USSD services, which allow customers to interact with the system without visiting physical offices. The Ghana Water Company has introduced similar platforms, although usage remains lower, suggesting that scale, familiarity, and service reliability influence adoption. The broader picture is that digital access points are becoming part of everyday interaction with utilities, even as traditional systems continue to operate alongside them.

5.8.3 Revenue Gaps and Metering Reform: Confronting Losses in Electricity Distribution

The distribution segment continues to present the most persistent challenge within the electricity value chain. The Electricity Company of Ghana and the Northern Electricity Distribution Company report losses exceeding 30%, alongside revenue collection gaps that leave nearly half of the billed amounts unpaid (Graphic Online, 2025; World Bank, 2024). These inefficiencies weaken the financial position of utilities and slow down reinvestment into infrastructure.

Efforts to address this problem are increasingly tied to digital solutions. The rollout of smart meters through the Meter Management System introduces real-time monitoring, remote tamper detection, and mobile-based prepaid systems (ICLG, 2025). These tools provide utilities with better visibility into consumption and payment behaviour, which in turn improves accountability. Implementation is still expanding, with one million meters targeted within a much larger customer base, so the full impact will take time to materialise (World Bank, 2024; Ministry of Energy and Green Transition, 2025).

Consumer behaviour already reflects the influence of these systems. Electricity token purchases through digital channels have become widespread, reaching near-universal levels in several regions

according to survey findings. This level of uptake shows that when services are simple and tied directly to daily needs, adoption follows naturally.

5.8.4 Household Energy Access in Practice: Digital Payments, Service Channels and User Behaviour

Digital platforms are changing how households manage their utility needs, although adoption follows a practical logic rather than a complete shift away from traditional methods. Applications such as the ECG PowerApp and shortcode services allow users to purchase electricity, report faults, and monitor accounts through mobile devices (ECG, 2025). These tools extend access across both smartphone and feature phone users, widening participation.

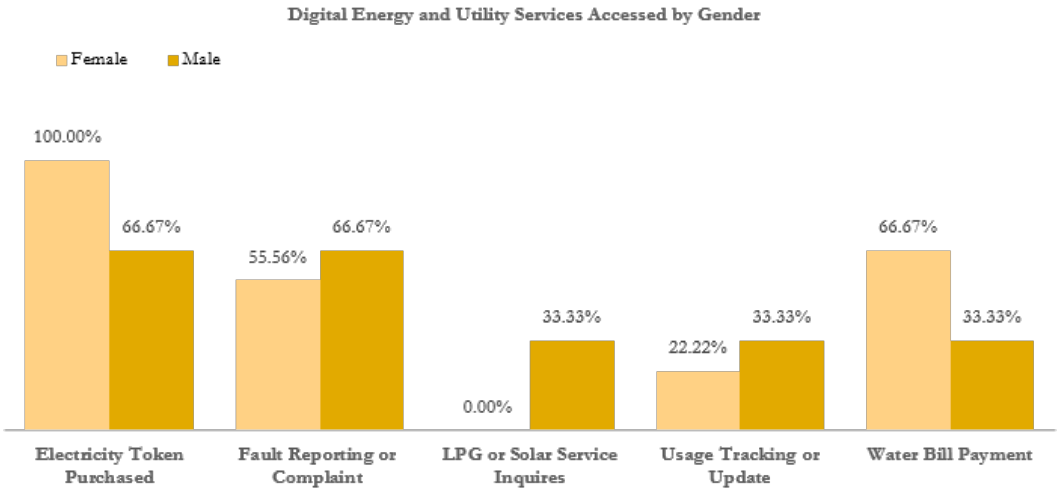


Figure 86: Digital Energy and Utility Services Accessed by Gender

Figure 86 shows electricity payments as the entry point into digital engagement. All female respondents reported using digital channels to purchase electricity tokens, while many also used them for water bill payments and service complaints. Male respondents show a wider spread of engagement, including interest in solar services, LPG inquiries, and usage tracking. This suggests that while women are highly active in essential service payments, men are more likely to explore additional energy-related services.

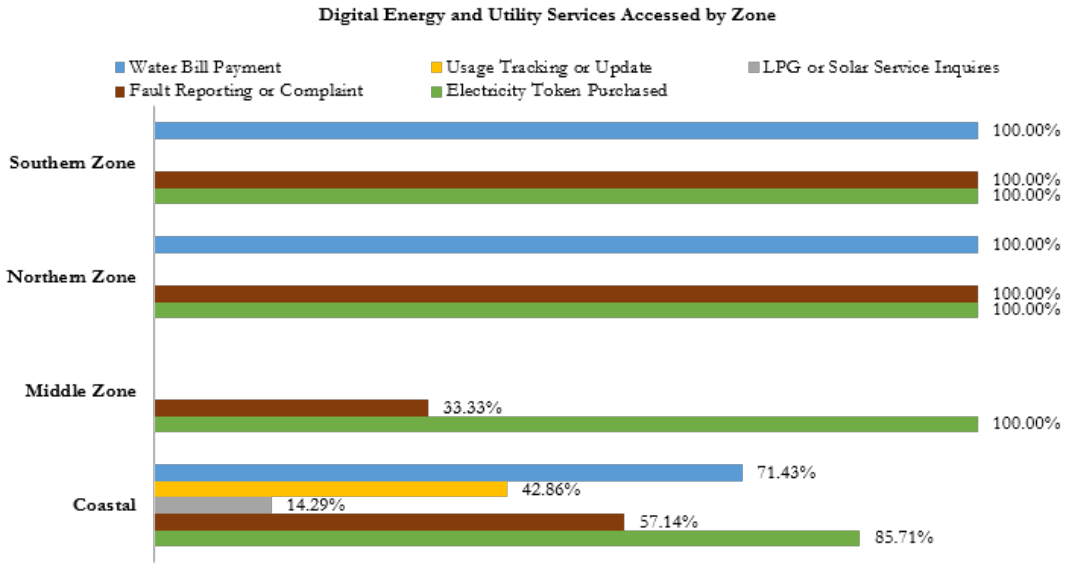


Figure 87: Digital Energy and Utility Services Accessed by Zone

Regional differences (as indicated in Figure 87) add further context. Electricity token purchases dominate across all zones, with especially high uptake in the Northern, Middle, and Southern Zones. Coastal areas show broader engagement, including fault reporting, usage tracking, and water payments. Other regions tend to focus on core services, which may reflect differences in awareness, infrastructure, or availability of advanced features.

5.8.5 Renewable Energy Ambitions and Market Realities in Power Diversification

Renewable energy is gaining attention within Ghana's energy mix, although its share is relatively modest. Current penetration stands at around 2%, which falls short of the 10% target set for 2030 (Climate Policy Lab, 2025; Mordor Intelligence, 2026). Still, several initiatives show what is possible. The Bui Power Authority has implemented projects such as a hydro-solar hybrid system and a floating solar installation, demonstrating both technical capability and local expertise (Bui Power Authority, 2024; Africa Energy Portal, 2025).

Private investment is also increasing, with projects like the Dawa Industrial Park solar development pointing to growing confidence in renewable energy opportunities (SolarQuarter, 2025; Africa Energy Portal, 2025). Businesses are turning to solar solutions in response to rising tariffs and supply inconsistencies, contributing to growth rates exceeding 39% annually in the commercial and industrial segment (Mordor Intelligence, 2026). Off-grid solutions extend these efforts into underserved communities. Pay-as-you-go solar systems and mini-grids provide flexible alternatives for households beyond the reach of the national grid (GOGLA, 2024; PV-Tech, 2023). These systems support local economic activity and improve access to essential services such as education and healthcare (World Bank, 2024; Trade.gov, 2025).

Progress, however, is influenced by several constraints. Grid integration challenges, financing requirements, and concerns within distribution utilities about revenue impacts continue to slow adoption (Climate Policy Lab, 2025; IntechOpen, 2020). Past delays in feed-in tariff payments have also affected investor confidence, while existing contracts in the thermal energy space influence how quickly alternatives can be scaled (News Ghana, 2025; Mordor Intelligence, 2026).

5.8.6 User Experience in Utility Services: Affordability, Connectivity, and Platform Design

The effectiveness of digital utility services is closely tied to user experience, where cost and performance play a decisive role. Survey findings identify high data costs, service delays after payment, and unreliable connectivity as the most common challenges across all zones. In both the Northern and Southern Zones, every respondent reported high data costs and service delays, indicating widespread frustration with affordability and service consistency.

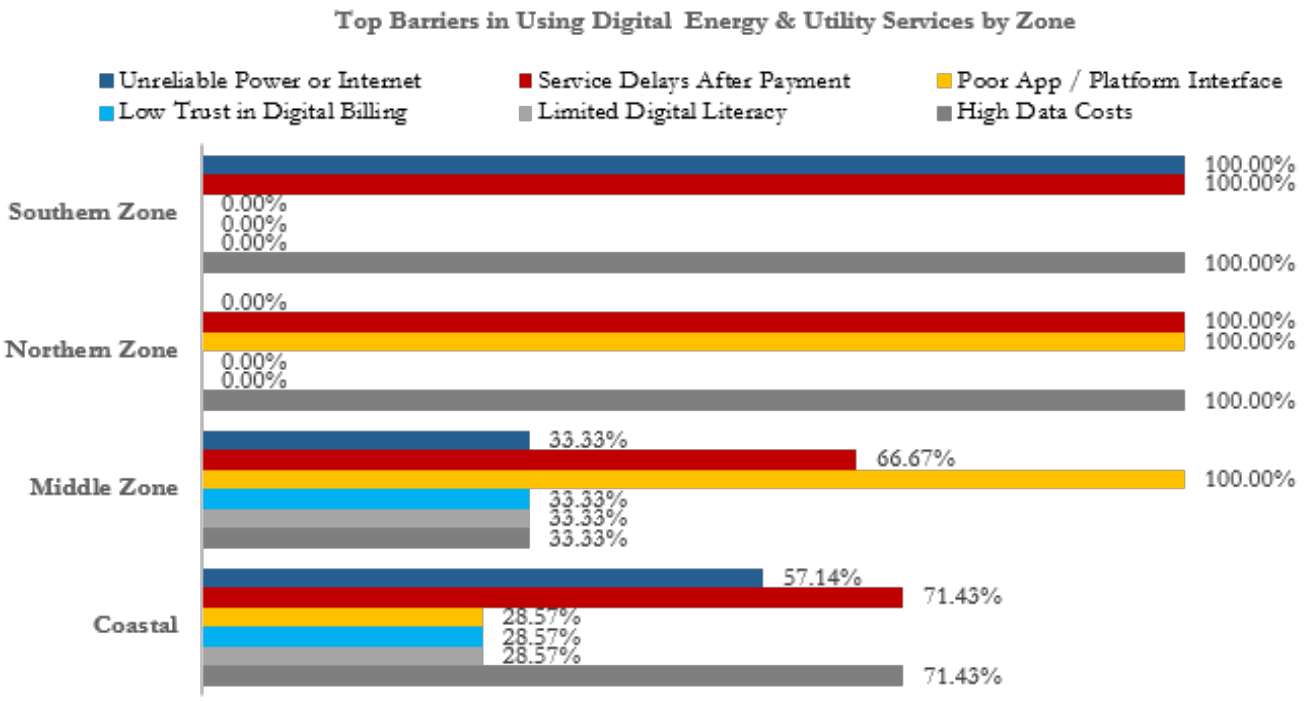


Figure 88: Top Barriers in Using Digital Energy & Utility Services by Zone

Platform usability also affects engagement. Users in the Northern Zone highlight service delays and poor app interfaces as a major issue, while respondents in the Middle Zone point to similar concerns around system design. In the Coastal Zone, attention shifts slightly toward billing transparency and digital literacy, although cost and connectivity still dominate the conversation. These findings suggest that improving digital service delivery may require more than expanding access. Reliable networks, intuitive platform design, and clear communication all influence whether users continue to engage with digital systems. Without these elements, adoption slows, even where infrastructure exists. Figure 89 gives a clearer overview of what respondents believe are the critical factors to encourage more frequent adoption and use of digital energy and utility services.

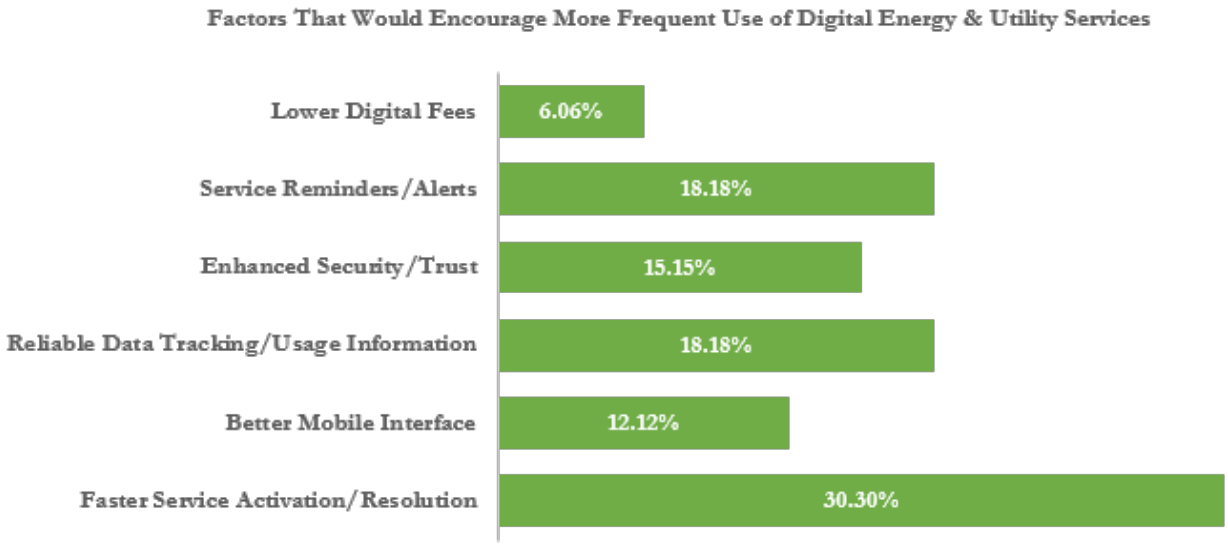


Figure 89: Factors That Would Encourage More Frequent Use of Digital Energy & Utility Services

5.8.7 Evolving Skills and Job Pathways in a Digitising Energy Economy

Changes within the sector are gradually influencing employment and skill requirements. Traditional roles within utilities continue to provide a stable base, particularly in generation, transmission, and distribution (VRA, 2025). New areas of work are emerging alongside digital and renewable energy systems. Smart meter deployment is increasing demand for technicians and data specialists who can manage digital infrastructure and interpret consumption data (ICLG, 2025). The expansion of solar energy is creating opportunities in installation, maintenance, and system design, while rural electrification projects generate jobs at the community level (Mordor Intelligence, 2026; Ministry of Energy and Green Transition, 2025). These shifts point to a workforce that is gradually adapting to new technologies and service models.

5.8.8 Reconciling Financial Viability with Digital and Energy Transition Goals

The direction of Ghana's energy and utilities sector will depend on how effectively financial pressures, service delivery, and energy transition are addressed together. Infrastructure expansion, regional electricity trade, and private sector participation provide a strong foundation for future growth. Digital tools are improving how services are delivered and managed, while renewable energy presents new opportunities for sustainability and access.

Progress will rely on targeted action. Strengthening revenue collection, reducing distribution losses, and improving service reliability are central to stabilising the sector. Expanding smart metering, improving digital platforms, and investing in rural connectivity would enhance both efficiency and inclusion. Aligning these efforts with policy frameworks such as the Energy Sector Recovery Programme and the National Energy Transition Framework will also be important (Ministry of Energy, 2025; Climate Policy Lab, 2025). The sector is moving toward closer integration between infrastructure and digital systems, with each reinforcing the other. Continued focus on these areas can support economic growth, create new employment opportunities, and improve access to reliable energy across Ghana.

5.9 INDUSTRY & MANUFACTURING SECTOR

Of the 1,112 respondents, 49 users and 23 service providers are drawn from the industry and manufacturing sector. The users include factory workers, machine operators, SME owners, artisans, and informal manufacturing workers who engage with digital tools, while the service providers consist of manufacturing companies, industrial service providers, factory managers, and firms offering digital solutions for production processes.

The profile reflects a workforce with varied educational backgrounds, where secondary education (34.69%) and vocational or technical training (39.13% among service providers) are more prominent.

Respondents are distributed across rural, peri-urban, and urban areas, although urban locations account for 38.78% of users and a higher 60.87% of service providers.

The Coastal Zone holds the largest share of participants (61.22% of users and 39.13% of providers), with additional representation across the Middle and Northern Zones, reflecting the sector's link to production hubs and industrial activity.

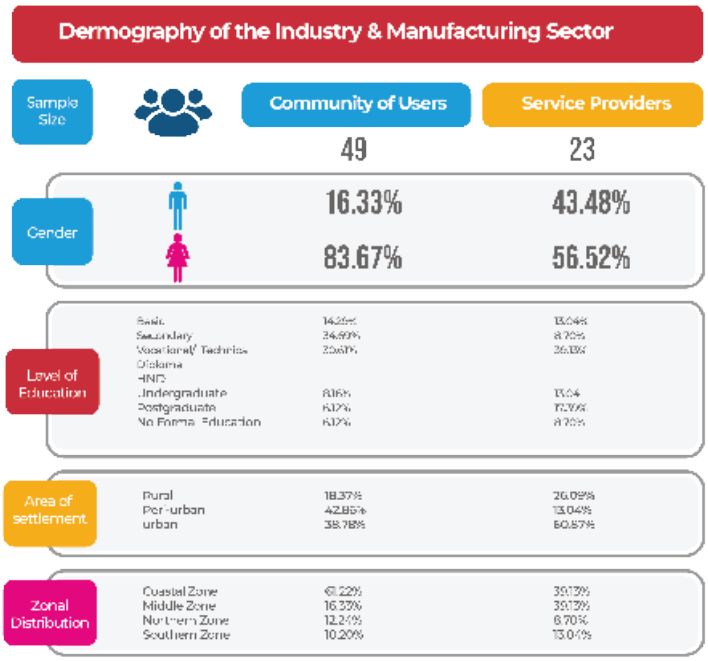


Figure 90: Demography of Industry & Manufacturing Sector

5.9.1 Industrial Structure and Market Reach: SME-Led Growth in a Continental Trade Context

Industry contributes about 32% of GDP, with manufacturing alone generating GHS 20.6 billion (approximately USD 1.4 billion) in 2023. Much of this activity is driven by small and medium-sized enterprises, which make up roughly 85% of all businesses and contribute close to 70% of national output while employing 16.5% of the working population (Ghana Statistical Service, 2020). This composition shapes how the sector functions in practice. Stakeholders asserted that a handful of large firms does not drive growth, but rather the collective performance of thousands of smaller businesses, each dealing with constraints around finance, infrastructure, and technology.

This domestic structure connects directly with Ghana's position in continental trade. Since trading began under the African Continental Free Trade Area in January 2021, local manufacturers have had access to a 54-country market of 1.2 billion people with a combined GDP of about USD 2.5 trillion (AfCFTA Secretariat, 2025). According to stakeholders, the introduction of the AfCFTA Digital Trade Protocol in February 2025 adds another layer, making it possible for firms to engage through e-commerce systems, digital payments, and shared data frameworks. For many Ghanaian manufacturers, the opportunity is no longer limited by geography but by their ability to produce competitively and meet standards across borders.

Recent policy efforts bring these elements together more deliberately. The 24-Hour Economy Programme, launched in July 2025, promotes continuous production as a national model. Around the same period, the Solar for Industries 1 GW project began its first phase, focusing on stable and lower-cost power for industrial users. Alongside these, the UN Joint SDG Fund MSME Digital Transformation Programme (2024–2027) targets 25,000 MSMEs with digital skills and tools. When viewed together, these initiatives show a clearer connection between production, energy, and digital capability. GSMA estimates suggest that digitalisation in manufacturing alone could create about 440,000 jobs and add GH¢40 billion to the economy by 2029, which places firm-level digital readiness at the centre of future growth (GSMA, 2025).

5.9.2 Industrial Ecosystems in Transition: Infrastructure, Energy, and Innovation Platforms

In order to understand how these ambitions translate into production, attention shifts to the systems that support industrial activity. Ghana's manufacturing base is still concentrated in established zones such as the Tema Industrial Area, where many of the country's largest firms operate. Newer developments like the Dawa Industrial Enclave are beginning to alter this distribution by offering purpose-built environments designed around modern production needs. These enclaves bring infrastructure and energy supply closer to the point of production, with projects such as Solar for Industries aiming to reduce uncertainty around electricity cost and reliability (Ministry of Trade, Agribusiness and Industry, 2025; Africa Sustainability Matters, 2025).

Digital and innovation platforms are gradually reinforcing this physical infrastructure. Stakeholders' insights support that the Accra Digital Centre provides ICT facilities, training, and incubation support, while Ghana Tech Lab focuses on building digital skills and supporting startups that can integrate into industrial value chains. These platforms are helping firms experiment with new tools and approaches, narrowing the gap between technology development and manufacturing applications, even as this connection is still developing.

Financing conditions continue to influence how far firms can go. The Venture Capital Trust Fund, supported by the Ghana Economic Transformation Project with USD 40 million, offers one of the few structured sources of long-term capital for SMEs. Even so, this support falls short of the estimated USD 15 billion financing gap faced by SMEs, which affects decisions around expansion, equipment upgrades, and digital adoption (AllAfrica, 2023; Business and Financial Times, 2024). The Ghana Economic Transformation Project addresses part of this challenge by combining financing with business support and digital skills development, treating Information Technology in Business as a core requirement rather than an optional add-on (Ghana Enterprises Agency, 2024; Oxford Business Group, 2024).

5.9.3 Scaling Industrial Output: From Local Production Drives to Regional Market Integration

Efforts to expand industrial capacity have taken different forms over the past decade. The One District One Factory initiative has supported 321 projects across sectors such as agro-processing, manufacturing, and recycling, generating more than 156,000 jobs while extending industrial activity beyond major urban centres (Ministry of Trade and Industry, 2022; YAFO Institute, 2024). The introduction of Business Resource Centres and Technology Solution Centres reflects an effort to support firms with services that go beyond physical infrastructure.

Operational experience within these factories offers insight into the conditions required for sustained production. Many firms have faced difficulties operating at full capacity, often linked to financing structures, high interest rates, and exchange rate pressures. These lessons have informed more recent approaches, including the 24-Hour Economy Programme, which places greater emphasis on continuous production supported by reliable inputs and services (YAFO Institute, 2024). While domestic initiatives focus on expanding output, AfCFTA introduces a broader market dimension. The Digital Trade Protocol allows firms to transact across borders using digital systems, opening access to new customers. Early trade trends, however, indicate that a huge share of goods traded online are imports, suggesting that access to markets is expanding faster than domestic production capacity (Ghana Business News, 2026; ODI, 2024). Within this evolving environment, digital financial tools have become part of everyday business operations.

Mobile money platforms enable transactions that are fast and traceable, while platforms like Hubtel and Oze support payments, record-keeping, and financial management. For many SMEs, these tools provide an entry point into more structured business practices (Ghana Statistical Service, 2020; ITU, 2022).

5.9.4 Digitalisation on the Factory Floor: Front-End Progress and Operational Gaps

Digital adoption within manufacturing reflects a contrast between customer-facing functions and internal production systems. Mobile money and online platforms are widely used for transactions and communication, while more structured systems such as production planning and inventory management tools are less common, with fewer than 10% of firms adopting formal digital solutions (GSMA, 2025; ITU, 2022).

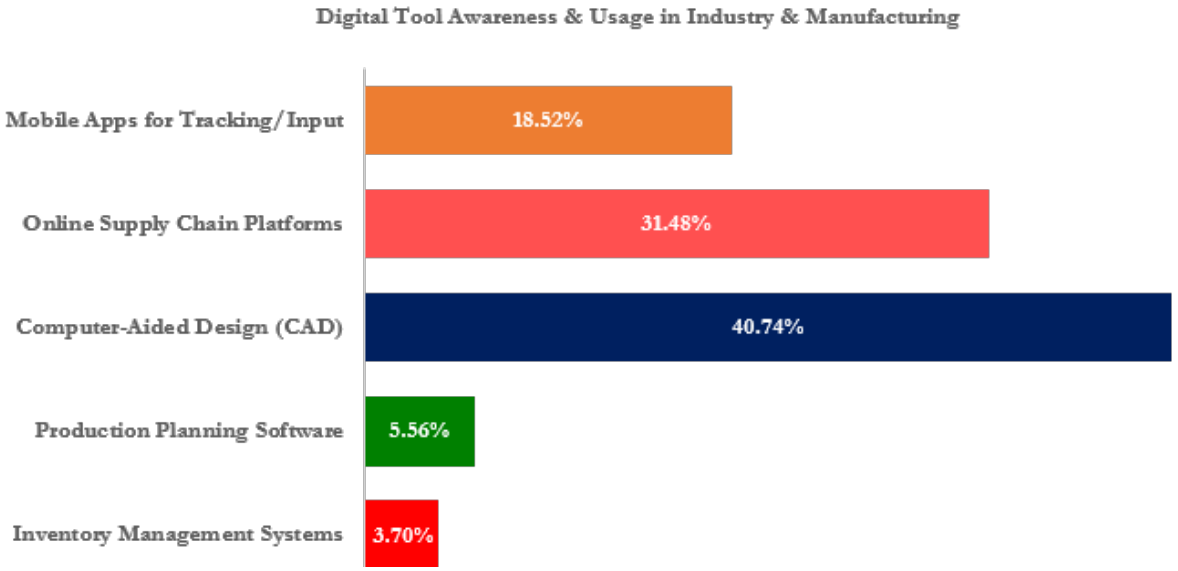


Figure 91: Digital Tool Awareness & Usage in Industry & Manufacturing

Primary data reinforces this divide. Adoption is strongest in design-related functions, where CAD systems and digital prototyping tools are more widely used. Online supply chain platforms also show growing uptake, indicating that firms are engaging more actively with digital procurement and logistics. Internal processes tell a different story. Limited use of production planning, inventory management, and predictive maintenance tools suggests that efficiency gains within factories are still developing.

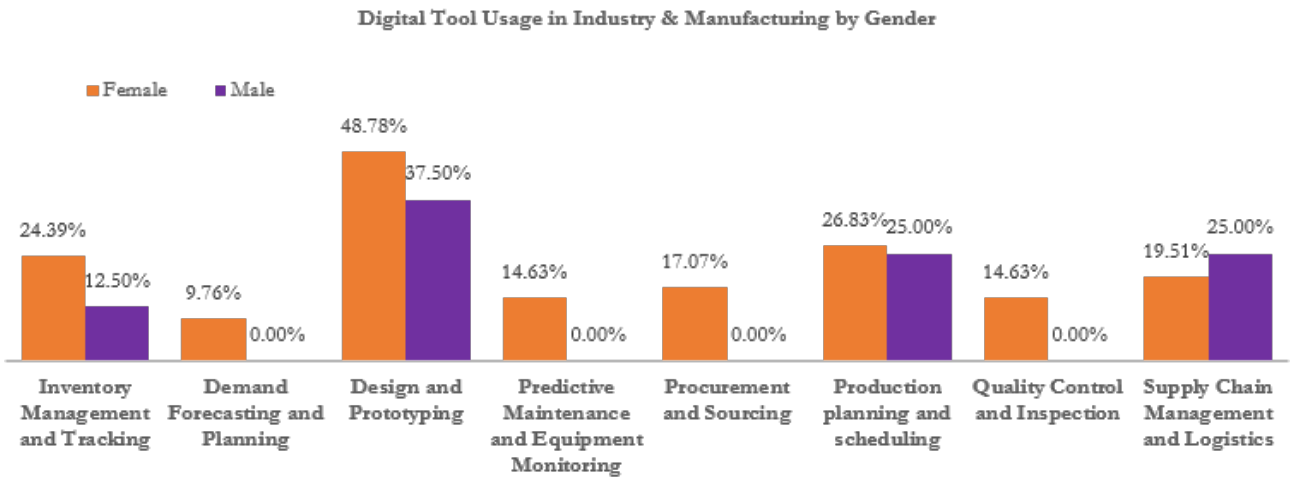


Figure 92: Digital Tool Usage in Industry & Manufacturing s by Gender

Gender-based insights add further depth. Female respondents report higher engagement across most digital manufacturing processes, particularly in design and prototyping (48.8%), production planning (26.8%), and inventory management (24.4%). Male respondents show more selective engagement, with notable activity in design (37.5%) and supply chain management (25%), but limited use in areas such as predictive maintenance and demand forecasting. These findings point to opportunities for strengthening inclusive participation across different segments of industrial digitalisation.

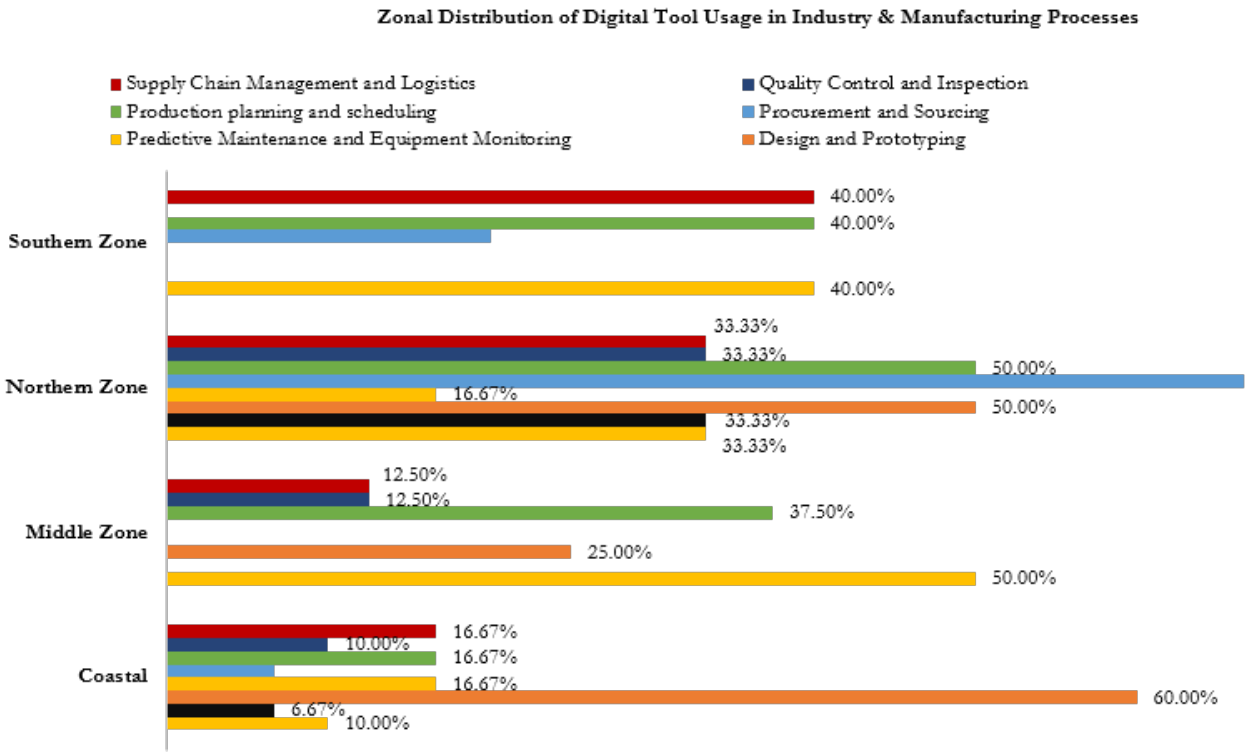


Figure 93: Zonal Distribution of Digital Tool Usage in Industry & Manufacturing Processes

Across the zones, the Coastal Zone shows strong use of design tools, reflecting a concentration of innovation-driven industries. The Middle Zone focuses more on inventory management and production planning, pointing to an emphasis on operational efficiency. The Northern Zone presents a broader spread of digital tool usage across procurement, design, and production functions, suggesting a more integrated approach. The Southern Zone shows emerging adoption in logistics and production management, with less engagement in advanced or data-driven applications. These variations indicate that digital transformation within manufacturing is influenced by local industrial structures, infrastructure, and access to skills.

5.9.5 Quality Standards, Data Systems, and Export Readiness

As firms expand into regional and global markets, quality infrastructure becomes increasingly important. The Ghana Standards Authority and the National Accreditation Service provide the systems needed for testing, certification, and compliance with both domestic and international standards. Improvements in these systems, including digitisation of processes, are helping firms move more efficiently toward export readiness (Ministry of Trade and Industry, 2022; Oxford Business Group, 2024). Digital tools support this process by improving traceability, documentation, and communication across supply chains. For firms participating in cross-border trade, the ability to meet standards consistently becomes as important as production capacity. This reinforces the link between digital adoption and market access, where technology supports both compliance and competitiveness.

5.9.6 Operational Pressures: Energy, Finance, and the Cost of Production

Production within the sector continues to be shaped by a set of persistent operational challenges. Energy remains one of the most immediate concerns, with high tariffs, supply interruptions, and distribution inefficiencies increasing costs and affecting output. Many firms rely on backup generators, which adds further expense. The Solar for Industries project is designed to ease these pressures by providing more stable and affordable power, particularly within industrial enclaves (Africa Sustainability Matters, 2025; Mordor Intelligence, 2026).

Financial constraints present another layer of difficulty. High interest rates and short repayment periods limit the ability of firms to invest in machinery and digital systems. Currency depreciation further complicates operations, particularly for firms that depend on imported inputs (Business and Financial Times, 2024; YAFO Institute, 2024; GhanaWeb, 2025).

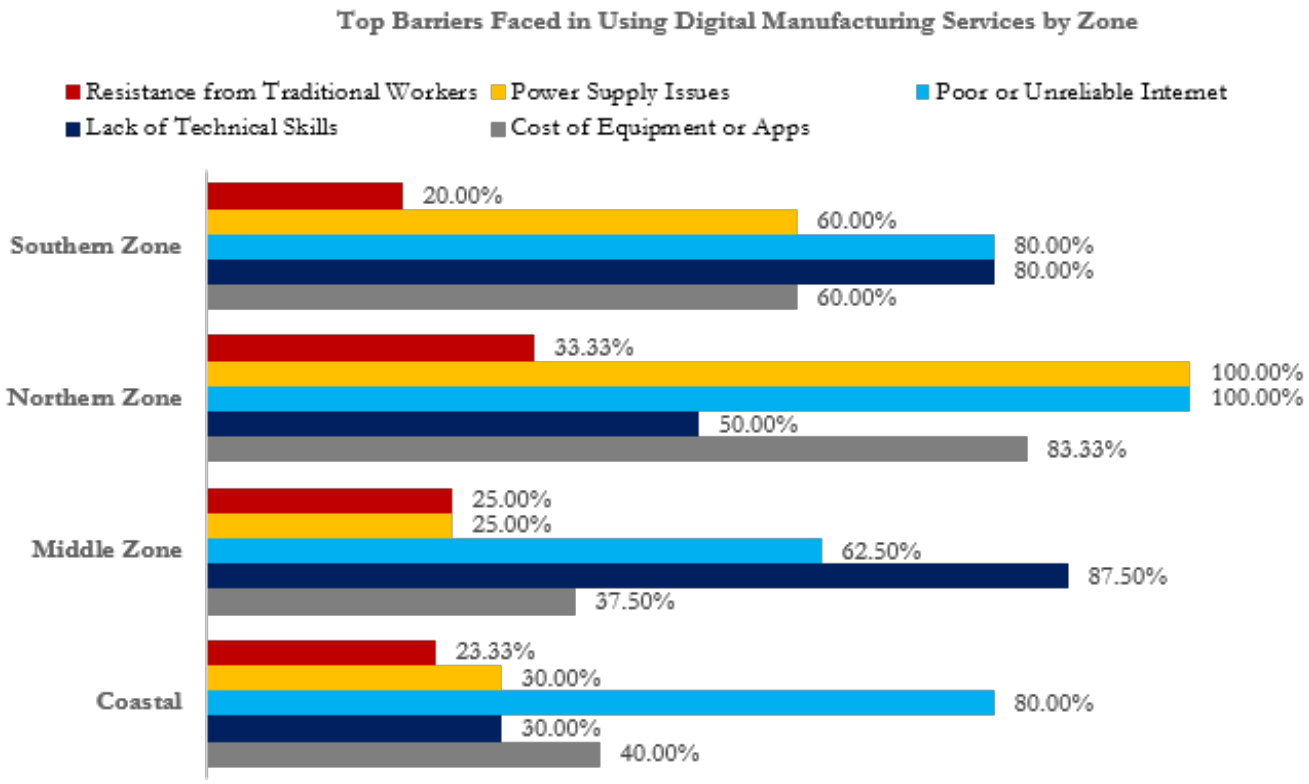


Figure 94: Top Barriers Faced in Using Digital Manufacturing Services by Zone

Primary data highlights additional barriers linked to digital adoption. Across zones, a lack of technical skills and poor internet connectivity are consistently reported as major constraints, with rates exceeding 60% in responses. In the Northern Zone, power supply issues and internet challenges reach universal levels, while the cost of equipment remains a significant concern. Similar issues appear in the Southern Zone, where affordability and reliability continue to affect adoption. The Middle and Coastal Zones show a combination of skill gaps and connectivity challenges, indicating that both human capacity and infrastructure influence how digital tools are used. Survey findings suggest that having platforms that are user-friendly, more affordable, and improving connectivity would go a long way to encourage the frequent adoption and use of digital tools within the sector.

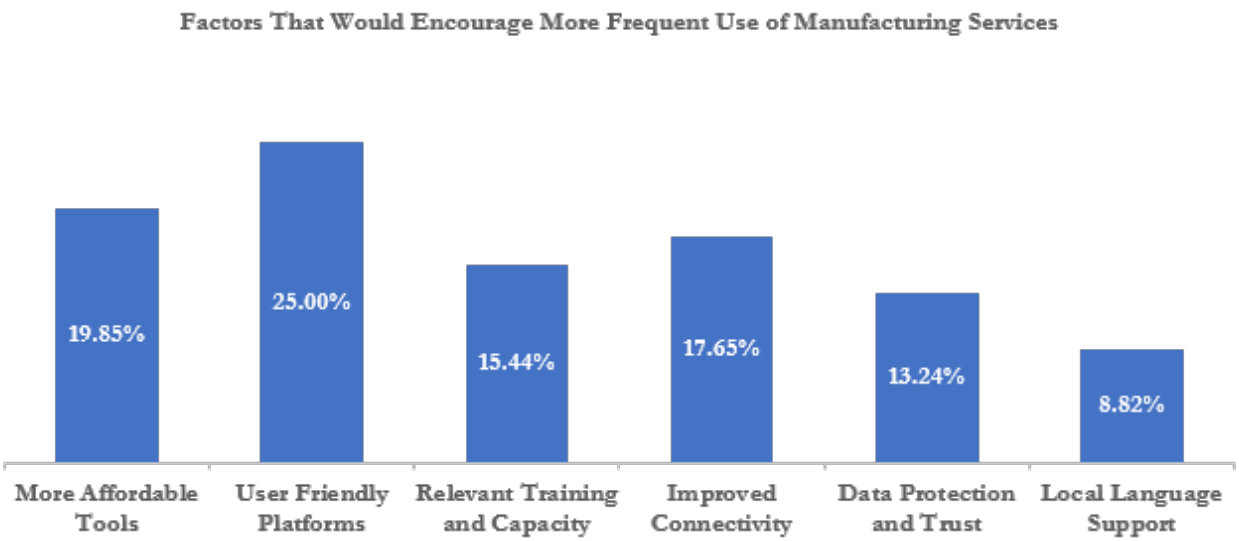


Figure 95: Factors That Would Encourage More Frequent Use of Manufacturing Services

5.9.7 Industrial Employment and the Shift Toward Digital Capabilities

According to the Ghana Statistical Service (2022), industry provides employment for a significant share of Ghana's workforce, with 16.5% of working-age individuals engaged in the sector. Initiatives such as 1D1F and investments supported by the Venture Capital Trust Fund have contributed to job creation, while projections linked to digitalisation suggest further expansion. GSMA estimates indicate that digital transformation in manufacturing could generate up to 440,000 additional jobs by 2029 (GSMA, 2025).

The nature of work within the sector is gradually changing. Traditional roles in production are still important, but there is a growing demand for skills related to data management, digital platforms, and supply chain coordination (Africa Sustainability Matters, 2025). Energy-related projects introduce technical roles in installation and maintenance, while the 24-Hour Economy Programme expands opportunities in logistics, transport, and continuous operations. These shifts suggest that industrial employment is becoming more closely linked to digital capability and technological adaptation.

5.9.8 Converting Market Access into Competitive Industrial Production

Recent developments point to a more connected industrial system, where energy supply, production capacity, and market access are increasingly addressed together. Initiatives such as the 24-Hour Economy Programme, the Solar for Industries project, and the AfCFTA Digital Trade Protocol reflect a coordinated effort to strengthen the sector's foundations.

The next phase will depend on how these efforts translate into daily operations for firms. Reliable energy, accessible financing, and practical digital skills will determine whether businesses can expand production and compete effectively in regional markets. Survey findings suggest that firms are already responding to customer demand and operational pressures, adopting digital tools where they offer clear value. However, gaps in infrastructure, skills, and internal systems continue to limit the pace of transformation.

Closing these gaps would allow the sector to move beyond incremental progress. Strengthening digital adoption within core production processes, improving access to finance, and addressing infrastructure constraints would support higher productivity and broader participation. If these elements come together, Ghana's industrial sector is positioned to expand its contribution to economic growth, job creation, and regional trade.

5.10 TRANSPORTATION & LOGISTICS SECTOR

Out of the total respondents surveyed, the representation for this sector included 30 users and 15 service providers. The target users were active end-users of transport and logistics services, comprising passengers, drivers, logistics clients, courier customers, fleet operators, and ride-hailing users. The service providers were largely operational and managerial actors within the industry, including transport companies, logistics firms, courier services, fleet managers, and digital transport platform providers.

The profile shows a blend of educational backgrounds, where 30.00% of users hold undergraduate degrees, and service providers lean more toward vocational and technical training (40.00%), reflecting the operational nature of the sector.

Urban areas account for a larger share of respondents, representing 53.33% of users and 66.67% of service providers.

With regards to their regional spread, users are primarily based in the Coastal Zone (50.00%), while service providers are more visible in the Middle Zone (46.67%), suggesting a link between movement corridors, service delivery points, and areas of higher economic activity.

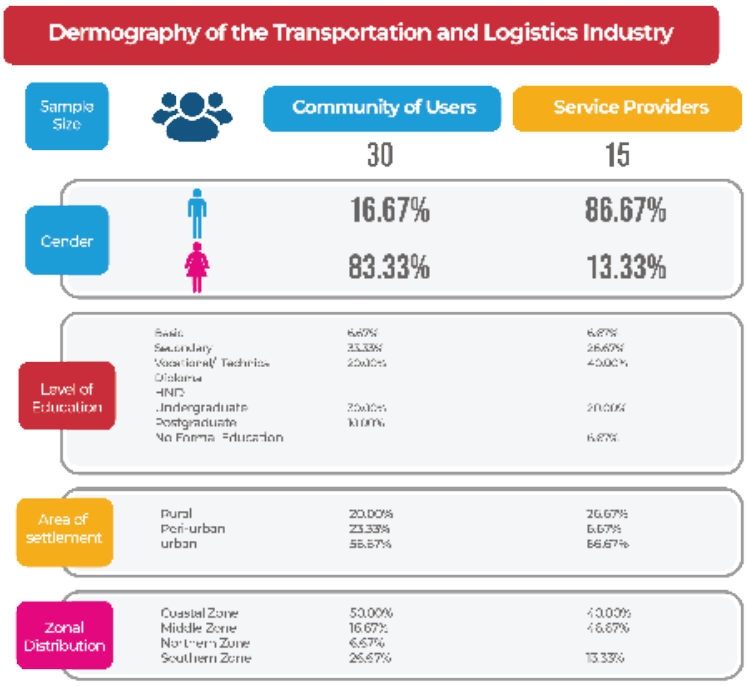


Figure 96: Demography of the Transportation & Logistics Sector

5.10.1 Cost, Efficiency, and the Everyday Reality of Moving Goods and People

Transport and logistics are critical to both economic opportunity and structural constraint. With a score of 2.68, Ghana placed fifth in Sub-Saharan Africa on the World Bank Logistics Performance Index, an outcome that points to steady progress in trade facilitation while also hinting at persistent inefficiencies (World Bank, 2023). What stands out more sharply is the cost burden: moving goods accounts for between 50% and 75% of retail prices, a range frequently cited in sector analyses and one that continues to shape business decisions, pricing, and competitiveness (Ecofin Agency, 2025). This cost reality comes through clearly when viewed alongside user behaviour in the primary data. Demand for digital transport services is rising, particularly in ride-hailing and courier delivery, but user expectations are tightly tied to price, reliability, and speed. Convenience alone is not enough. High service costs were reported as a leading barrier across multiple zones, with figures reaching 80% in the Northern Zone and 60% in the Coastal Zone. The implication is that even as digital platforms expand access, the underlying economics of transport continue to determine adoption.

The sector therefore operates within a dual condition – infrastructure and digital systems are improving access and coordination, while cost pressures continue to filter through to end users, limiting how far those improvements translate into widespread efficiency gains.

5.10.2 Tema Port and the Expanding Gateway Economy

The transformation is perhaps most visible at Tema. The port, located about 30 kilometres from Accra, has evolved into one of West Africa's most advanced maritime gateways following the expansion of Terminal 3 under a public-private partnership involving the Ghana Ports and Harbours Authority and Meridian Port Services (Oxford Business Group, 2024). The terminal's 1.4-kilometre quay wall and ability to receive vessels of up to 18,000 TEU place it among the most capable container terminals in the region (APM Terminals, 2024). Operational improvements are beginning to change how cargo moves through the port. Its 24-hour operations, combined with the Truck Appointment System that regulates vehicle entry, have eased congestion within the port enclave and improved turnaround times for cargo handling (MPS, 2023). These changes align with broader regional trends, where container volumes have increased by close to 50% over the past decade (Oxford Business Group, 2024).

Even with these improvements, efficiency at the port does not automatically translate into efficiency across the entire logistics chain. Qualitative insights indicated that while digital systems in structured environments such as ports are functioning more effectively, users still report delays linked to network failures and coordination challenges once services extend beyond controlled infrastructure. This gap between high-performing nodes and weaker connecting systems continues to define overall sector performance. Given 77% respondents also raised concerns about delivery costs, investing in micro-fulfilment centres linked to e-commerce corridors and building local hubs will be critical in terms of reducing per-parcel cost and delivery time.

5.10.3 Customs Digitalisation and the Compression of Clearance Time

Alongside physical upgrades, customs digitalisation has reshaped how goods move through Ghana's ports. The introduction of the Integrated Customs Management System (ICUMS) in June 2020 marked a shift from fragmented, paper-heavy processes to a single-window platform that integrates declaration, valuation, risk assessment, and payment (Ghana Ports and Harbours Authority, 2020). Operated by Ghana Link Network Services in partnership with CUPIA, the system reduced the number of inspection agencies from thirteen to three, cutting duplication in the clearance chain (Oxford Business Group, 2024).

Early operational data showed that ICUMS generated GH₵1.2 billion in revenue in its first month, matching peak collections under the previous system while also enabling faster processing (Ghana Revenue Authority, 2020). In some cases, customs agents reported clearance times of about four hours, while the broader system continues to work toward the formal 24-hour clearance target introduced in 2022 (Sander, 2025). The estimated 40% reduction in clearance time illustrates how digital systems can directly influence trade efficiency.

Still, the benefits of faster clearance depend on what happens after goods exit the port. The primary data shows that network delays and limited platform availability persist across regions, with 100% of respondents in the Middle Zone reporting network failures. This suggests that while customs processes have improved significantly, downstream logistics systems have not reached the same level of digital maturity.

5.10.4 From Corridor Vision to Operational Reality: Rail and Inland Logistics

Rail development adds another layer to this evolving system. The inauguration of the 97-kilometre Tema–Mpakadan standard gauge railway in November 2024 marked Ghana's first major rail investment in decades (Railway Gazette, 2024). Built with financing from India's Exim Bank and executed by Afcons Infrastructure, the line links the port to inland transport routes along Lake

Volta (ConstructAfrica, 2024). Its design introduces a multimodal logistics corridor that connects maritime, rail, and inland water transport. This corridor is expected to extend further through the planned Ghana–Burkina Faso railway, positioning Ghana as a transit route for Sahelian economies (Ghana Railway Development Authority, 2024). Complementary investments such as the Boankra Integrated Logistics Terminal, designed to handle up to two million tonnes of freight annually, and the inland ports at Mpakadan and Debre reinforce this direction (Business and Financial Times, 2025; Ecofin Agency, 2025; Oxford Business Group, 2024).

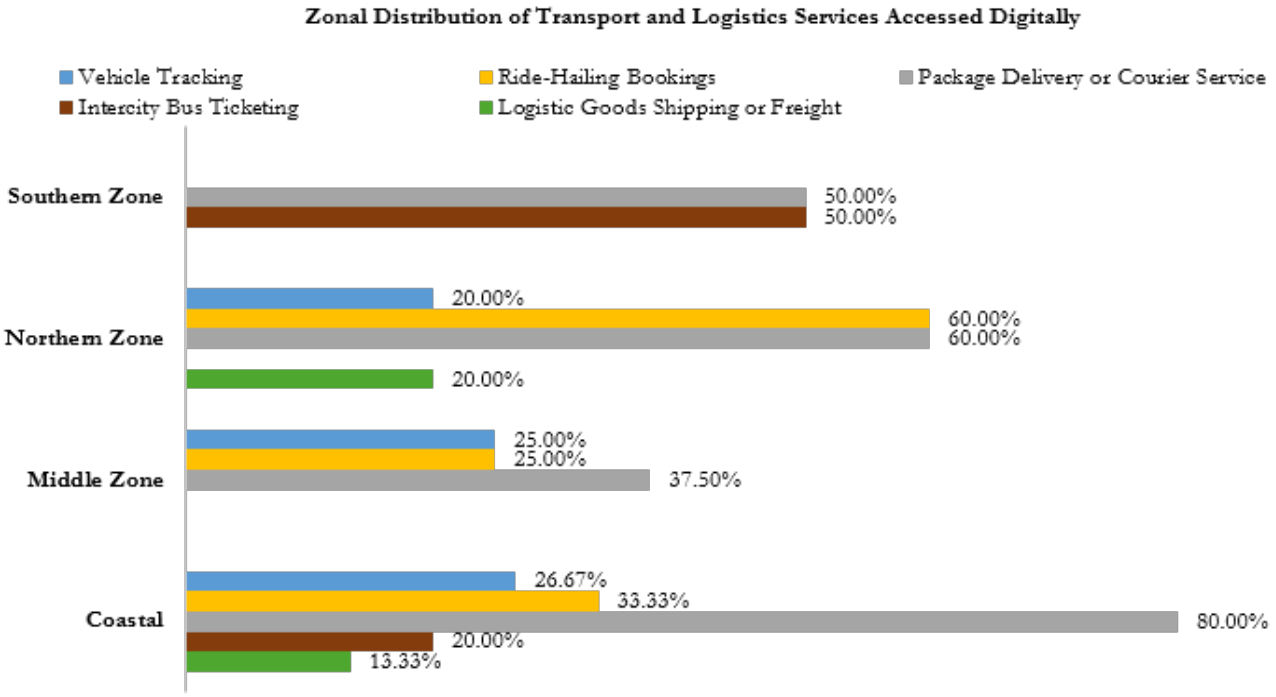


Figure 97: Zonal Distribution of Transport and Logistics Services Accessed Digitally

What becomes clear, however, is that infrastructure on its own does not guarantee system-wide efficiency. Figure 97 highlights uneven adoption of digital logistics services across zones. While the Coastal Zone records high engagement in package delivery (80%) and ride-hailing, the Middle Zone shows far lower usage rates, and the Northern Zone shows interesting usage engagement in ride-hailing and courier services. This uneven uptake suggests that the benefits of multimodal infrastructure will depend on how effectively digital services and user access scale alongside physical investments.

5.10.5 Platform Mobility and the Reordering of Urban Transport

Urban mobility and last-mile logistics present a different dimension of transformation, driven largely by platform-based services. Ride-hailing platforms such as Uber, Bolt, and Yango have expanded rapidly since 2016, with penetration reaching about 42%, one of the highest rates on the continent (Sagaci Research, 2024). These platforms have introduced digital payments, route optimisation, and pricing transparency into everyday transport.

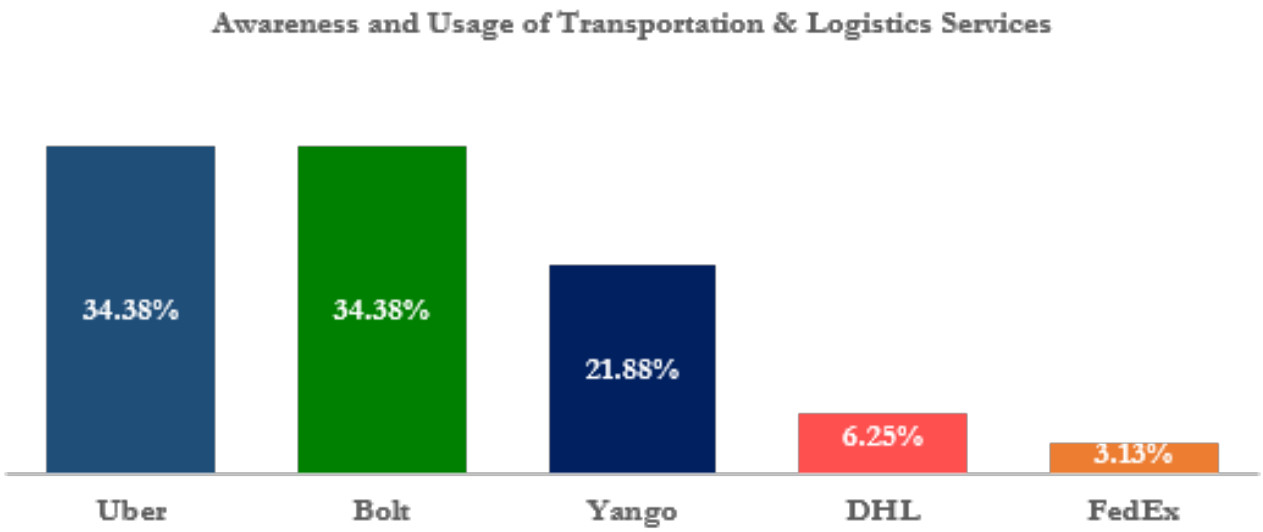


Figure 98: Awareness and Usage of Transportation & Logistics Services

The primary data reinforces this shift, showing that Uber and Bolt command roughly a third of market awareness and usage each, while Yango continues to expand through pricing and localisation strategies. Adoption is shaped less by regulation and more by user preference for convenience, affordability, and predictability. Male users show particularly strong engagement in ride-hailing (60%), while female users engage more heavily with courier services (64%), indicating different but complementary demand drivers.

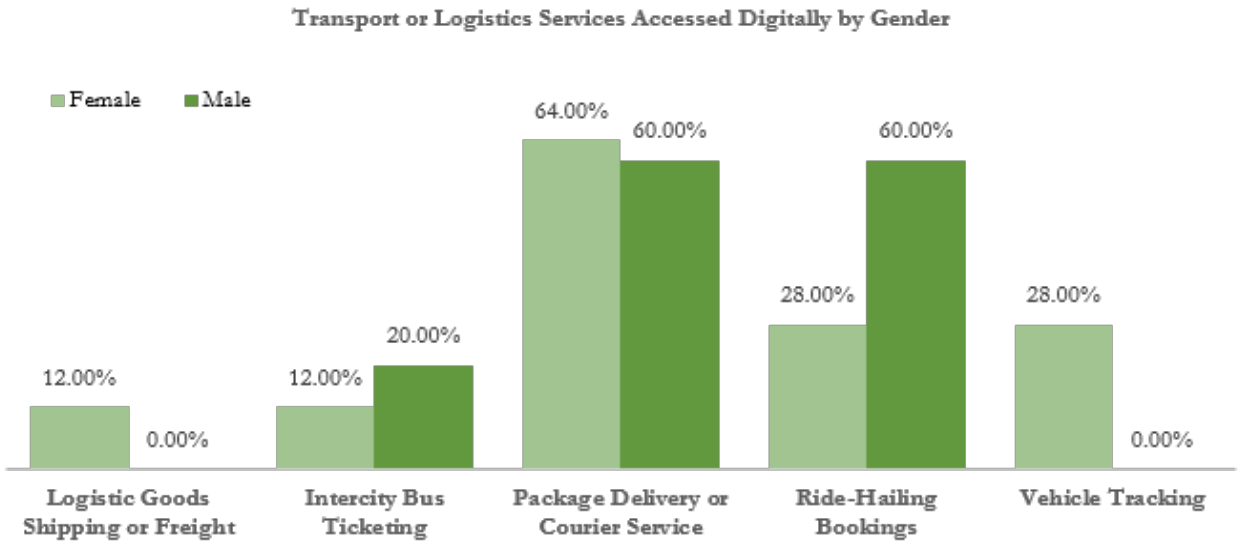


Figure 99: Transport or Logistics Services Accessed Digitally by Gender

Even so, stakeholders mentioned that operational challenges continue to influence how these platforms perform. Fuel price volatility, fragmented payment systems, and limited driver familiarity with digital tools affect service delivery. These constraints align with broader structural issues identified in the literature, including road dependency and cost pressures (Ecofin Agency, 2025).

5.10.6 Last-Mile Logistics, Digital Addressing, and E-commerce Linkages

A similar shift is taking place in food delivery and last-mile services. Platforms such as Bolt Food continue to operate in a market projected to reach USD 291 million by 2029, even as earlier entrants

such as Glovo and Jumia Food exited (Statista, 2025). New entrants like Chowdeck are adding competitive pressure and expanding delivery networks across major cities (TechCrunch, 2025). These services rely heavily on digital addressing systems, particularly GhanaPostGPS, which assigns unique codes to locations and enables navigation in areas without formal addresses (ScienceDirect, 2023). The connection between digital identity, location systems, and logistics is becoming more pronounced, particularly for e-commerce.

As indicated in Figure 99, the majority of women use courier and delivery services, while adoption of logistics shipping and vehicle tracking remains limited across both genders. This suggests that while last-mile delivery is gaining traction, more complex logistics services have yet to reach the same level of accessibility or awareness.

5.10.7 Fragmentation in Freight and the Limits of Digital Scale

Freight logistics continues to face structural fragmentation. A large share of trucking operators own fewer than five vehicles, which limits their ability to invest in fleet management systems or adopt digital tools (MEST Africa, 2025). Platforms such as Jetstream Africa and Truckr are attempting to bridge this gap by offering digital booking, tracking, and documentation services (Sander, 2025). These platforms introduce visibility into supply chains, but their reach remains limited compared to the scale of informal trucking networks. As a result, efficiency gains achieved at the ports through systems like ICUMS are often diluted once goods move into domestic transport networks.

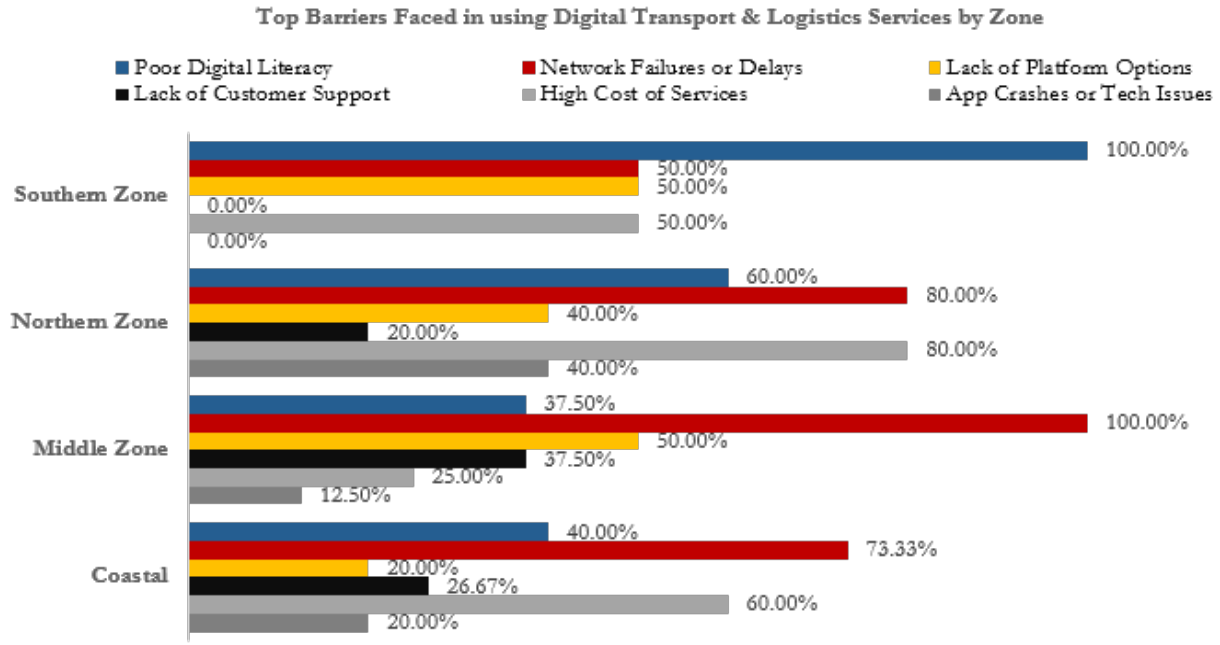


Figure 100: Top Barriers Faced in Using Digital Transport & Logistics Services by Zone

As shown in Figure 100, the primary data aligns with this reality. Limited platform availability and weak customer support are cited as barriers, especially in the Middle and Southern Zones. This suggests that scaling digital freight solutions will require more than platform development; it may depend on onboarding smaller operators and addressing structural fragmentation within the sector and across the regions.

5.10.8 Public Transport Reform and the Digitalisation Gap

Public transport reform adds another dimension to digital integration. Metro Mass Transit introduced the Tap n' Go system in 2024, allowing passengers to pay fares using reloadable cards or mobile

applications (Ghana News Agency, 2024). The system integrates with mobile money platforms and the national identification framework, offering a shift away from cash-based fare collection. Even with these developments, the broader urban transport system continues to rely heavily on informal trotro services, many of which operate without digital tracking or fare systems (Climate Chance, 2025). Traffic congestion in Accra continues to limit productivity, reinforcing the gap between targeted digital interventions and system-wide transformation (Copenhagen Consensus, 2025).

Primary data highlights an additional constraint: digital literacy. In the Southern Zone, 100% of respondents identified low digital literacy as a key barrier (as shown in Figure 100). This reinforces the idea that digital systems alone cannot transform public transport without parallel investments in user capability and accessibility.

5.10.9 Policy Direction, Labour Shifts, and System Coordination

Government policy has played a steady role in shaping sector development. Interventions have moved from early digital customs systems under GCNet to more integrated platforms like ICUMS, alongside investments in ports, railways, and inland logistics facilities (Oxford Business Group, 2024). The Ghana Railway Masterplan outlines a long-term vision for a 3,844-kilometre network connecting all regional capitals, with an estimated cost of USD 30 billion (Ghana Railway Development Authority, 2020). More recent initiatives, including the 24-hour economy and "Big Push" programmes, aim to link transport efficiency directly to industrial productivity by enabling round-the-clock operations (Ministry of Trade and Industry, 2025). These efforts signal a shift toward treating transport as a core economic enabler rather than supporting infrastructure.

Employment trends reflect this broader shift. Port operations, customs services, and shipping activities continue to support a large formal workforce, while ride-hailing and delivery platforms provide income opportunities for thousands of drivers and riders (Sagaci Research, 2024). Infrastructure projects such as the Tema–Mpakadan railway and the Boankra inland port contribute to both construction and long-term operational jobs (Business and Financial Times, 2025). Digital logistics startups add a further layer, introducing new roles linked to technology and supply chain management.

5.10.10 Closing the Gap Between System Expansion and Everyday Efficiency

What it means is that Ghana's transport and logistics sector is moving through a period of visible change, where infrastructure expansion and digital systems are improving capacity and coordination. Ports are more efficient, customs processes are faster, and platform-based services are reshaping how people and goods move. However, the full benefits are still tied to how these systems connect in practice. High transport costs, network reliability issues, limited digital literacy, and fragmented service delivery continue to influence user experience across regions. Primary data reinforces this reality, showing that demand for digital services is strong, but adoption depends on affordability, reliability, and usability.

The next phase will depend on integration. Completing the multimodal corridor linking Tema, Boankra, and inland regions, strengthening digital connectivity across zones, and improving coordination between formal and informal operators will determine how much of the sector's potential translates into real economic efficiency. Until these elements align, progress will continue to be visible but not fully realised.

▸ HIGH-GROWTH SECTORS IN GHANA'S DIGITAL ECONOMY

As elaborated in the broad digital economy and sectoral outlook, these transformations are increasingly shaping the structure, efficiency, and reach of economic activity across multiple sectors. Insights from stakeholders broadly point to seven (7) sectors that demonstrate strong growth potential based on

observable increases in usage, transaction volumes, innovation activity, and participation. According to stakeholders, these sectors reflect both current momentum and future scalability within Ghana's digital ecosystem and thus require urgent policy attention to unlock their potential.



Figure 101: High-Potential Areas in Ghana's Digital Ecosystem

A defining characteristic across these sectors is their reliance on foundational digital infrastructure, particularly mobile connectivity, broadband access, and digital payment systems. With mobile subscriptions exceeding 40 million and penetration above 130%, alongside internet usage approaching 70%, Ghana presents a conducive demand environment for digital services expansion (NCA, 2023; ITU, 2022). Within this context, stakeholder perspectives provide insights into how these sectors are evolving in practice, while secondary data offers the validation needed to situate these observations within broader economic trends.

▸ **Fulfilment services have emerged as a critical enabler of digital trade, particularly within the expanding e-commerce ecosystem.** Stakeholders consistently highlighted the role of fulfilment centres and last-mile delivery systems in ensuring the viability of online transactions. The increasing penetration of smartphones and the widespread use of social media platforms for commerce have created a surge in demand for delivery services, positioning fulfilment as an essential link between merchants and consumers. This confirms broader evidence indicating that logistics and delivery systems represent one of the largest cost components in digital commerce across emerging markets (International Finance Corporation, 2021).

In Ghana, the fulfilment ecosystem comprises both formal operators regulated by the Postal and Courier Services Regulatory Commission and a growing informal segment dominated by independent delivery riders. The integration of fulfilment services into ride-hailing platforms has further expanded capacity, while large e-commerce platforms continue to develop their own delivery networks. This hybrid structure supports expansion but also introduces concerns around regulation, safety, and

service reliability. As stakeholders noted, inefficiencies driven by manual processes and capacity constraints often limit service quality, especially during peak demand periods. In response, the government has begun taking steps to formalize segments of the informal courier and motorcycle delivery space licensing, registration, and identification systems for commercial riders, to legalize and regulate operations. These efforts, complemented by the use of the national digital ID system for rider traceability, signal a shift toward integrating informal delivery riders into a more structured transport and logistics value chain, with implications for improving service standards, strengthening trust in e-commerce, and expanding employment within the gig economy.

- **E-commerce and digital trade stand out as one of the most visible manifestations of Ghana's digital transformation.** Stakeholders emphasized that the relatively low infrastructure requirements for establishing online platforms enabled by existing telecommunications networks and digital payment systems have contributed to online businesses. This observation is reinforced by global projections suggesting that Africa's e-commerce market could reach US$75 billion by 2025, with countries like Ghana benefiting from favorable conditions such as high mobile penetration and expanding digital financial services (International Finance Corporation, 2021).

However, the growth projection of e-commerce in Ghana reflects a complex interaction between opportunity and constraint. While internet penetration and smartphone usage continue to expand, consumer behavior remains strongly anchored in traditional retail experiences. Trust deficits, related to online fraud and inconsistent service delivery, continue to affect adoption. Stakeholders also highlighted operational constraints, including limited working capital for small businesses and inadequate delivery capacity, which often results in unmet demand. These findings are consistent with other studies indicating that ecosystem inefficiencies, especially in logistics and trust infrastructure, represent major barriers to scaling digital commerce. Addressing these constraints through improved consumer protection systems, integrated payment solutions, and logistics investments will be critical for sustaining growth.

- **The financial services sector represents the most vibrant and deeply integrated component of Ghana's digital economy.** Stakeholder insights on the widespread use of mobile money, especially within the informal sector, are strongly supported by empirical data. Mobile money transaction values increased from GH¢155 billion in 2018 to approximately GH¢1.9 trillion in 2023, with over 60 million registered accounts and more than 20 million active users (Bank of Ghana, 2023). This scale of activity reflects high adoption and indicates that digital financial services have become integral to everyday economic transactions.

A notable dimension of this growth is its inclusivity. Stakeholders reported that a substantial proportion of users operate within the informal sector, including market women, farmers, and small-scale traders. This aligns with broader data showing that over 60% of mobile financial service users are drawn from previously underserved populations. However, while access to financial services has expanded significantly, with over 68% of adults having some form of financial access, usage remains concentrated in basic payment services, with limited uptake of more products such as credit, investment, and insurance (World Bank, 2022). This gap between access and depth highlights the next frontier for growth in the sector.

Regulatory innovations, including sandbox initiatives by the Bank of Ghana and the National Communications Authority, are creating pathways for new entrants and product experimentation. Stakeholders emphasized that these frameworks enable smaller innovators to test solutions in areas such as SME financing, micro-insurance, and savings products. Strengthening consumer protection

systems, reducing transaction costs, and expanding product diversity will be essential to deepen financial inclusion and sustain the sector's growth trajectory.

▸ **Agriculture, while traditionally viewed as a primary sector, is increasingly being reshaped by digital technologies, positioning it as a high-potential area for transformation.** Contributing approximately 20% of GDP and employing over 30% of the workforce, agriculture offers a huge scope for productivity gains through digital innovation (Ghana Statistical Service, 2023). Evidence from the Food and Agriculture Organization indicates that digital advisory tools and mobile-based extension services can increase farm productivity by up to 20–25% (FAO, 2022), highlighting the potential impact of AgriTech solutions.

Stakeholder perspectives highlight both the promise and the constraints of digital adoption in agriculture. While there is growing interest in digital platforms for market access, weather information, and input distribution, adoption is still not uniform, particularly in rural areas where internet connectivity is weaker. This observation is consistent with other evidence showing disparities in rural and urban digital access. As such, the sector's growth potential is less constrained by the effectiveness of digital tools and more by the scale of their deployment. Expanding rural connectivity, strengthening digital literacy among farmers, and supporting private sector innovation will be critical to unlocking agriculture's full digital potential.

▸ **The education sector is undergoing a gradual but important digital transition, driven by increasing demand for flexible, technology-enabled learning solutions.** Stakeholders identified e-learning platforms, digital content creation, and remote learning tools as key growth areas, particularly in response to a youthful population seeking relevant digital skills. This demand is supported by broader trends in internet usage and the growing importance of digital competencies in the labor market. Data from the International Telecommunication Union shows that expanding internet access is supporting the use of digital learning platforms (ITU, 2022).

Digital education is increasingly seen not only as a tool for expanding access but also as a mechanism for improving quality and aligning skills with emerging economic opportunities. Stakeholders emphasized the role of EdTech in preparing the workforce for fields such as data analytics, artificial intelligence, and software development. However, infrastructure gaps in underserved and rural schools continue to limit adoption. While secondary data on EdTech remains less extensive compared to finance or commerce, the convergence of demographic trends, connectivity improvements, and labor market needs suggests strong medium- to long-term growth potential. For example, global estimates indicate that the EdTech market in Africa is growing steadily, supported by investments in digital skills and remote learning solutions (World Bank, 2020).

▸ **The creative industry, comprising media, entertainment, and digital content production, is experiencing a transformation driven by the expansion of online platforms and changing consumer preferences.** Stakeholders noted that traditional media organizations are increasingly establishing dedicated digital units to distribute content online, engage audiences, and generate revenue through advertising and subscriptions. The ability to track audience engagement in real time and reach diaspora markets has further strengthened the sector's digital orientation.

According to DataReportal (2023), Ghana has millions of active social media users, with platforms such as Facebook, Instagram, and YouTube serving as key channels for content distribution and advertising. The United Nations Conference on Trade and Development also notes that digital platforms are opening new markets for creative goods and services (UNCTAD, 2022). One of the dynamic aspects of this transformation is the emergence of the influencer economy, where individuals leverage

social media platforms for content creation and brand partnerships. This has created new income streams and expanded opportunities within the gig economy. The sector's growth is closely tied to telecommunications infrastructure, as reliable internet access underpins content distribution and consumption. While comprehensive quantitative data on the creative digital economy remains limited, the fast expansion of social media usage and digital advertising suggests strong scalability.

- **The health sector, through the emergence of e-health and telemedicine services, represents another important frontier in Ghana's digital transformation.** Stakeholders identified fragmented health data systems and limited access to primary healthcare as key drivers of demand for digital health solutions. The absence of interoperability between health information systems means that patient data is often inaccessible across facilities, reducing efficiency and continuity of care. According to the World Health Organization (2021), digital health technologies can improve access to care, reduce costs, and support early diagnosis.

Telemedicine has gained traction as a response to these challenges, particularly in urban and peri-urban areas with adequate internet connectivity. By enabling remote consultations and expanding access to healthcare services, digital health platforms have the potential to improve early diagnosis, reduce congestion in health facilities, and enhance overall service delivery. However, the lack of an integrated national health data infrastructure continues to constrain the sector's full potential. Addressing these systemic challenges will be essential for scaling e-health solutions and improving healthcare outcomes.

Across all identified sectors, a consistent pattern emerges that growth is being driven by a combination of increasing digital access, evolving consumer behavior, and innovation in service delivery. At the same time, structural constraints, including infrastructure gaps, regulatory challenges, trust deficits, and capacity limitations, continue to shape the pace and distribution of this growth. The integration of stakeholder insights with empirical evidence highlights not only where growth is occurring, but also what conditions are necessary to sustain and scale it.

In this context, high-growth sectors in Ghana's digital economy are not defined solely by their current performance, but by their ability to translate digital adoption into broad-based economic impact. Strategic investments in infrastructure, policy frameworks that encourage innovation while protecting users, and targeted support for underserved groups will determine how effectively these sectors contribute to inclusive and sustainable digital transformation.

Spotlight on Critical Tools and Technologies Driving the Digital Ecosystem

Figure 102 shows a set of critical tools and technologies that cut across sectors and directly influence how businesses operate and how services are delivered. What stands out is not just their adoption but how they are being adapted to local conditions, constraints, and opportunities.

- **Artificial intelligence and related technologies emerged as one of the most visible tools being applied across sectors. Stakeholders pointed to practical use cases rather than abstract potential.** In agriculture, AI is already being used to deliver extension services in local languages, allowing farmers to access guidance without relying on physical call centres. Some platforms provide round-the-clock support across multiple Ghanaian languages, addressing both cost and access barriers. This reflects a broader shift toward localized digital solutions, which is critical in a country with diverse linguistic groups. Existing studies support this direction, noting that digital advisory tools can improve farm productivity when access barriers are addressed (FAO, 2022).

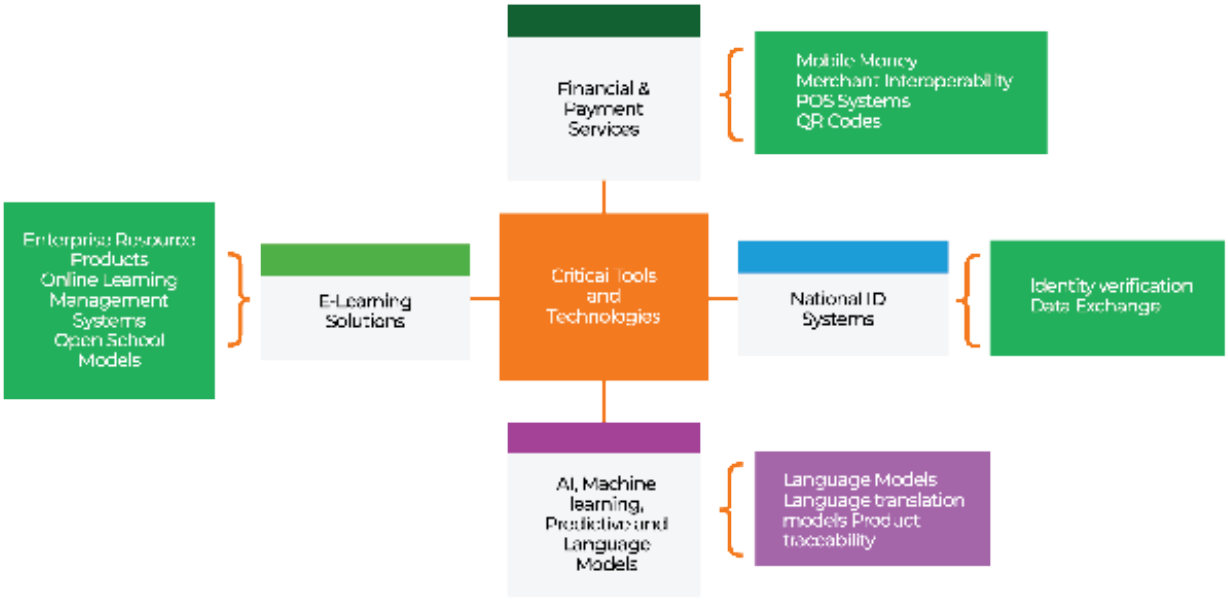


Figure 102: Critical Tools and Technologies Driving the Digital Ecosystem

In e-commerce and fulfilment, the study found that AI is being used to manage customer interactions, organize delivery flows, and support targeted marketing. These applications are helping businesses respond to high demand despite limited operational capacity. In health, stakeholders highlighted early use of AI in supporting clinical decisions and improving how patient data is handled, although this remains constrained by weak system integration. In education, AI tools are being introduced to support personalized learning and automate administrative processes. Across these sectors, the common issue raised was that most AI systems are not trained on Ghana-specific data, which limits their effectiveness and reinforces the need for local model development.

- **The national ID system stood out as a uniquely important tool within Ghana's context.** Stakeholders consistently described it as central to building trust in digital transactions. Before its introduction, verifying identities in online transactions was difficult, contributing to fraud and low confidence in digital platforms. The national ID has changed this by providing a reliable means of verification across services. Its impact is visible in e-commerce, financial services, and fulfilment operations, where identity verification is now embedded into onboarding and transactions.

- **The study also found that the national ID is shaping the gig economy.** Delivery riders and other informal workers can now be identified and tracked, which improves accountability and allows more of these roles to be integrated into formal systems. This aligns with global findings that digital ID systems support financial inclusion and strengthen participation in digital economies (World Bank, 2021), but in Ghana, their role in enabling trust within e-commerce and logistics is more pronounced.

- **Stakeholders emphasized the dominance of mobile money as the primary transaction tool across sectors.** This is supported by national data showing substantial growth in transaction volumes and user adoption (Bank of Ghana, 2023). What the study highlights is how deeply integrated mobile money is in everyday activity, especially within the informal sector. It is not just a payment tool but a bridge connecting businesses, customers, and service providers.

- **Interoperability between payment platforms has further strengthened this system, making it easier for users to transact across networks.** This has direct effects on e-commerce, agriculture, and the creative industry, where seamless payments are essential. While access is widespread,

stakeholders noted that usage still leans heavily toward basic transactions, with less engagement in credit or insurance products. This reflects broader trends in Ghana's financial sector (World Bank, 2022).

- **In education, the study found growing adoption of digital learning platforms, driven by demand for flexible and skills-based learning.** The shift is more visible in urban areas and among private providers, where institutions are integrating online tools into teaching and content delivery. While secondary data shows increasing use of digital learning platforms across developing countries (UNESCO, 2021), the Ghana-specific insight is the strong link between digital education and employability. Stakeholders see these tools as a pathway to preparing young people for roles in technology, business services, and the broader digital economy.

- **Stakeholders described a shift by media houses toward digital platforms, not just to distribute content but to generate revenue and track audience engagement.** At the same time, individual content creators are using social media platforms to build audiences and earn income through advertising and partnerships. Data on rising social media usage in Ghana supports this shift (DataReportal, 2023). What stands out in the study is how this has created a growing base of independent digital workers, contributing to the expansion of the gig economy.

Stakeholders pointed to fragmented patient data systems as a major challenge, where records are not easily shared across facilities. This has created space for digital health solutions such as telemedicine and e-prescription systems. One example highlighted in the study is the use of mobile-linked prescriptions with one-time password verification, which improves accuracy and reduces misuse. While global studies show that digital health tools can improve access and efficiency (WHO, 2021), the Ghana-specific finding is that adoption is being driven by system gaps rather than system design.

- **Language and localization technologies also emerged as an important layer across sectors.** The study found that tools capable of translating and delivering services in local languages are helping to extend digital access to populations that would otherwise be excluded. This is especially relevant in agriculture and education. Supporting literature shows that language barriers remain a key constraint to digital adoption in Africa (GSMA, 2022), reinforcing the importance of these tools in Ghana's context.

- **Finally, data systems and emerging technologies such as blockchain and cloud infrastructure are beginning to shape how information is stored, shared, and used.** In agriculture, stakeholders pointed to growing interest in traceability systems, especially for export markets where buyers demand transparency on product origin. In health, the lack of interoperable data systems continues to limit progress. These gaps highlight the importance of building an integrated data infrastructure to support digital services across sectors.

UNLOCKING SCALE: WHERE DIGITAL INNOVATION MEETS POLICY REALITY

What comes through strongly from the survey is not just a list of promising technologies or desired reforms, but a more grounded story about how stakeholders see digital transformation actually taking shape across complementary sectors. There is a quiet consistency in the responses. People are not chasing abstract or futuristic ideas; they are pointing to practical systems that make existing processes work better, faster, and more transparently. Also, there is a clear recognition that these innovations do not expand on their own. Their ability to grow depends heavily on whether the policy environment reduces friction or quietly reinforces it.

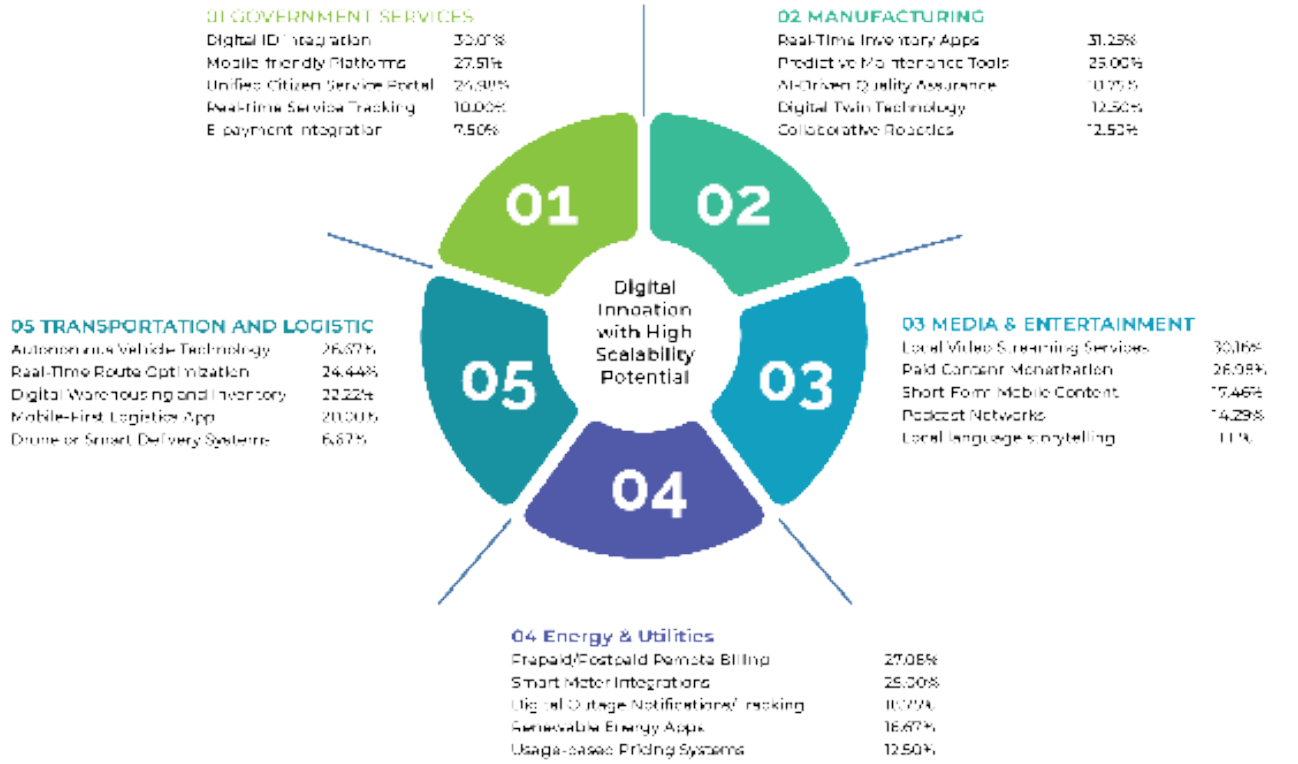


Figure 103: Digital Innovation with High Scalability Potential

In Government Services, the conversation around scalability gravitates toward integration rather than expansion. Respondents seem to be saying, in effect, that many of the building blocks are already in place, but they are not yet speaking to each other in ways that create a seamless experience for citizens. Digital ID systems, mobile-accessible platforms, and unified service portals are seen less as isolated tools and more as pieces of a broader architecture that needs to be connected. This helps explain why improvements like real-time tracking or payment integration, while important, feel secondary in comparison. Without a well-integrated backbone, these additions risk remaining surface-level improvements rather than transformative shifts.

A similar logic plays out in Manufacturing, although the focus shifts from service delivery to operational efficiency. The emphasis here leans toward tools that quietly but consistently improve day-to-day production, systems that track inventory in real time or anticipate equipment failure before it disrupts operations. These are not necessarily the most headline-grabbing technologies, yet they are the ones businesses can adopt without completely overhauling their workflows. More advanced solutions, including AI-driven quality checks or digital replicas of production systems, are acknowledged but seem to sit slightly further from immediate reach, often due to cost or technical complexity. What ties the responses together is a practical mindset. Firms are looking for technologies that pay for themselves through efficiency gains.

In Media and Entertainment, the tone shifts again, reflecting a sector where scale is closely tied to audience reach and content relevance. Here, the emphasis falls on platforms and formats that can travel easily, from video streaming to mobile-first content and monetization models that allow creators to earn directly from their work. There is also an undercurrent that speaks to identity and culture. The interest in local language storytelling suggests that growth is not only about expanding access but also about deepening engagement. Content that resonates locally has a different kind of staying power, and digital platforms make it possible to distribute that content widely.

The Transportation and Logistics sector offers a more operational perspective, where efficiency and coordination sit at the center of digital innovation. The technologies highlighted, ranging from route optimization to automated systems, reflect an effort to make movement more predictable and less resource-intensive. There is an underlying sense that even modest improvements in routing, tracking, or inventory management can ripple across the entire value chain, reducing delays and lowering costs. More experimental solutions, such as drone-based delivery, appear in the conversation but feel more aspirational than immediate, shaped by the realities of infrastructure and regulation.

In Energy and Utilities, the narrative becomes closely tied to reliability and accountability. The technologies that stand out are those that make consumption visible and billing more predictable. Remote metering, digital billing systems, and outage notifications are not just technical upgrades; they reshape the relationship between providers and users by introducing greater transparency. At the same time, there is a growing awareness of how digital tools can support the transition toward renewable energy, even if that transition is still unfolding gradually.

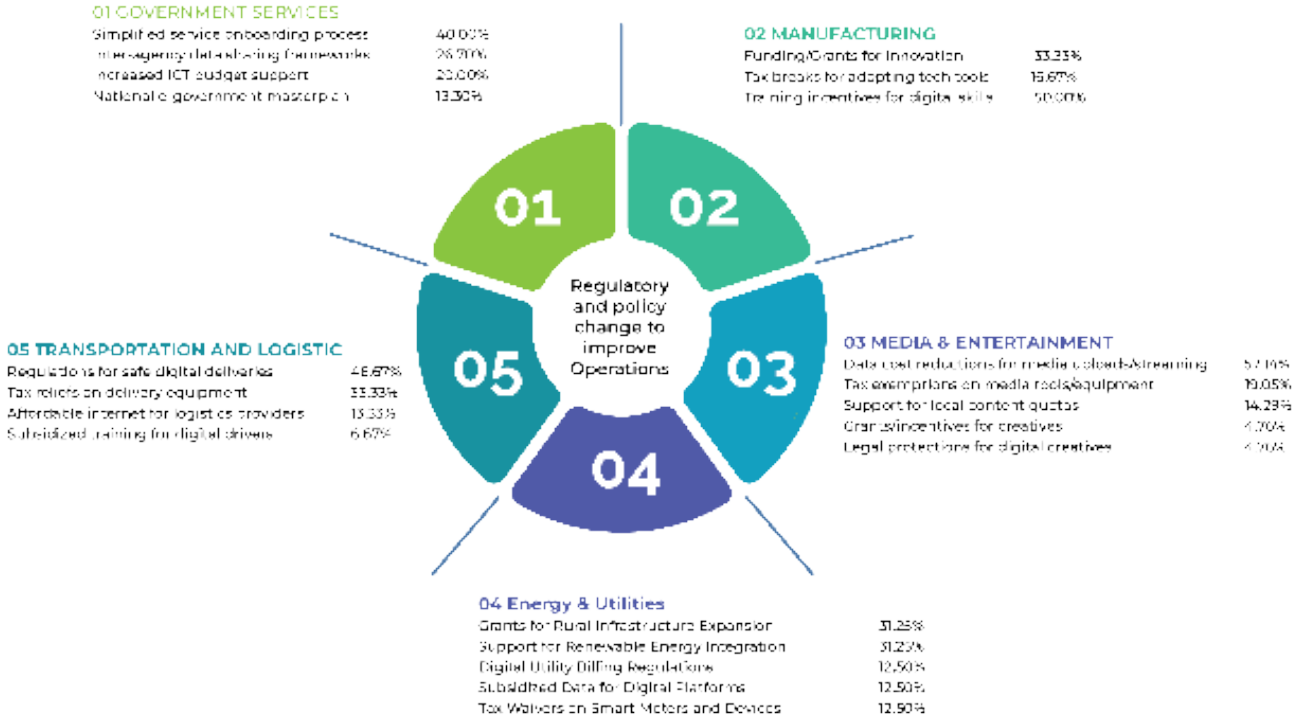


Figure 104: Regulatory and Policy Change to Improve Operations

When the focus shifts to regulation and policy, the tone of the conversation becomes more direct. In Government Services, the need to simplify onboarding processes and enable data sharing across institutions stands out as a central concern. These are not minor administrative adjustments. They shape whether digital systems can function as a unified whole or remain fragmented across agencies. The call for sustained ICT investment reinforces the idea that integration requires long-term commitment, not one-off interventions.

In Manufacturing, the policy discussion returns to the realities of adoption. The strongest signals point toward skills development and financial support. There is a recognition that even the most practical technologies cannot take hold if firms lack the capacity to use them or the resources to invest in them. This places workforce readiness and access to funding at the center of the sector's digital progress.

For Media and Entertainment, cost emerges as the defining issue. The emphasis on reducing data costs highlights how the affordability of digital infrastructure shapes what creators and platforms can realistically achieve. When distribution becomes expensive, scale becomes difficult, regardless of how strong the content may be. Measures that ease the cost of production tools or provide targeted support for local content begin to address this constraint, but the underlying issue of access remains central.

In Transportation and Logistics, the policy concerns revolve around clarity and cost structures. Stakeholders are looking for a regulatory environment that makes it easier to deploy digital solutions without navigating uncertainty or excessive expense. Issues such as equipment taxation, connectivity, and operational guidelines all point to the same underlying need for a system that supports innovation rather than slowing it down. Meanwhile, Energy and Utilities presents a more balanced set of policy priorities, reflecting the sector's dual challenge. There is a clear push to expand infrastructure, particularly in underserved areas, alongside efforts to modernize billing systems and support renewable energy integration. These priorities are interconnected. Expanding access without improving system efficiency would strain existing resources, while digital upgrades without broader access would limit overall impact.

Looking across all five sectors, a pattern begins to take shape. The most promising digital innovations are not necessarily the most complex. They are the ones that fit naturally into existing systems while improving how those systems function. What determines whether they scale is less about technological readiness and more about the environment in which they are deployed. High data costs, fragmented regulations, limited access to financing, and gaps in digital skills all act as subtle constraints on progress. When these issues are addressed, the innovations highlighted in the survey have a much clearer path to expansion.

What this ultimately implies is a relationship between innovation and policy that is deeply intertwined. The technologies identified by respondents already point toward viable pathways for growth across sectors. The policy changes, in turn, outline what needs to shift for those pathways to remain open. When read together, the two sets of responses do more than highlight opportunities. They map out the conditions under which those opportunities can move from isolated successes to widespread impact.

ZONAL & REGIONAL ANALYSIS



6.0 ZONAL AND REGIONAL OUTLOOK

Digital transformation has extended across all regions, but the pace and depth of progress also differ from one zone to another. Secondary data point to steady progress in connectivity, financial inclusion, and digital adoption, but the progress does not translate uniformly across the country. Variations in infrastructure, income levels, education, and economic structure continue to influence how each zone participates in the digital economy. Evidence from field-based data reinforces this scenario, showing that while access to digital tools is increasingly widespread, the ways individuals and businesses engage with these tools differ meaningfully by age group, education level, gender, and income distribution, among other factors.

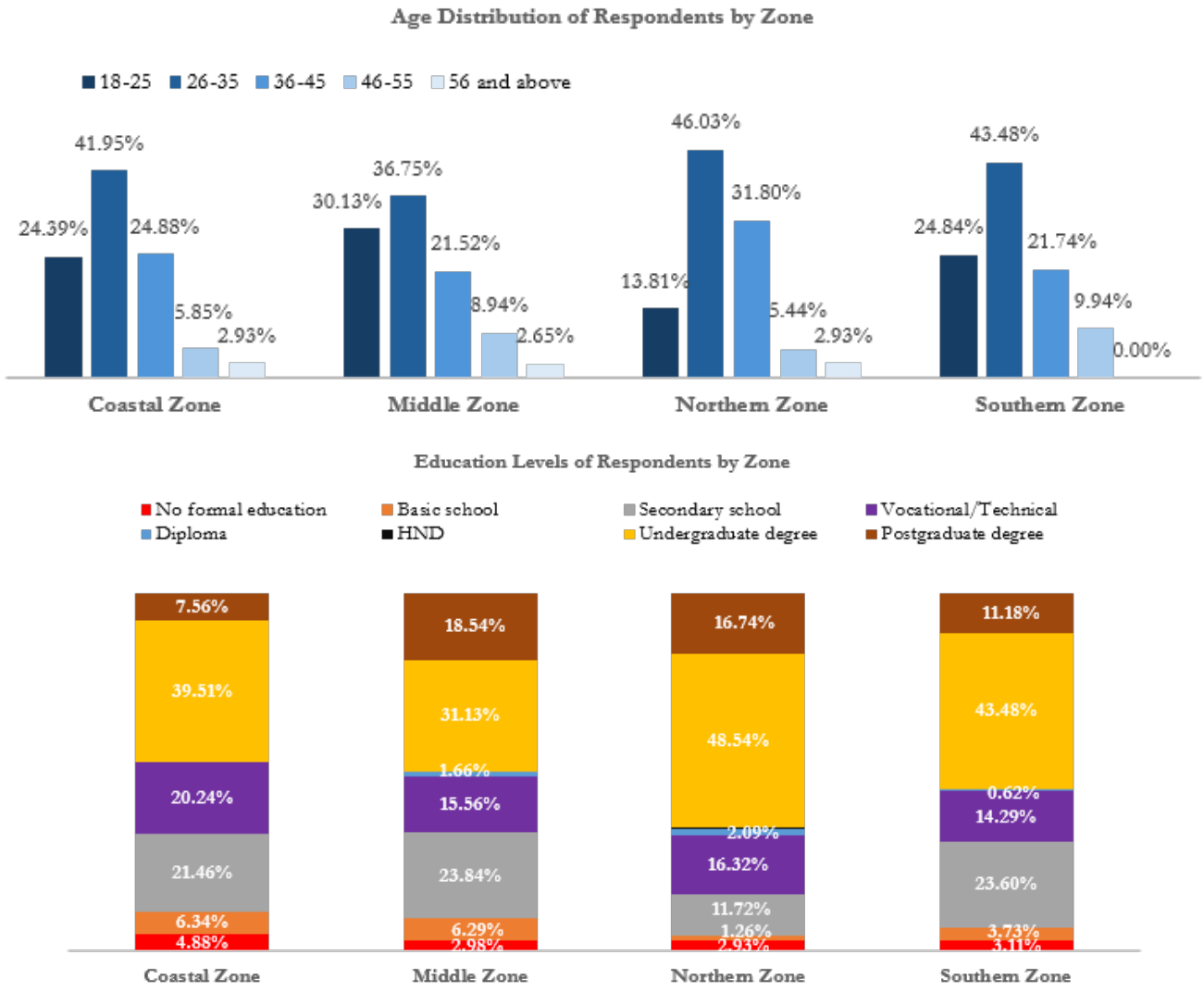


Figure 105: Age Distribution & Level of Education of Respondents by Zone

A clearer picture emerges when these differences are examined through the core drivers of transformation: access, usage, skills, enterprise activity, and innovation. Collectively, these elements reveal a gradual shift in intensity across zones, with the Coastal Zone at the forefront, the Southern and Middle Zones advancing with mixed outcomes, and the Northern Zone still building foundational capacity. Micro-level evidence further suggests that these differences are not only structural but also demographic, shaped by patterns in age distribution, gender participation, and sectoral engagement that influence how digital technologies are adopted and applied in everyday economic activities.

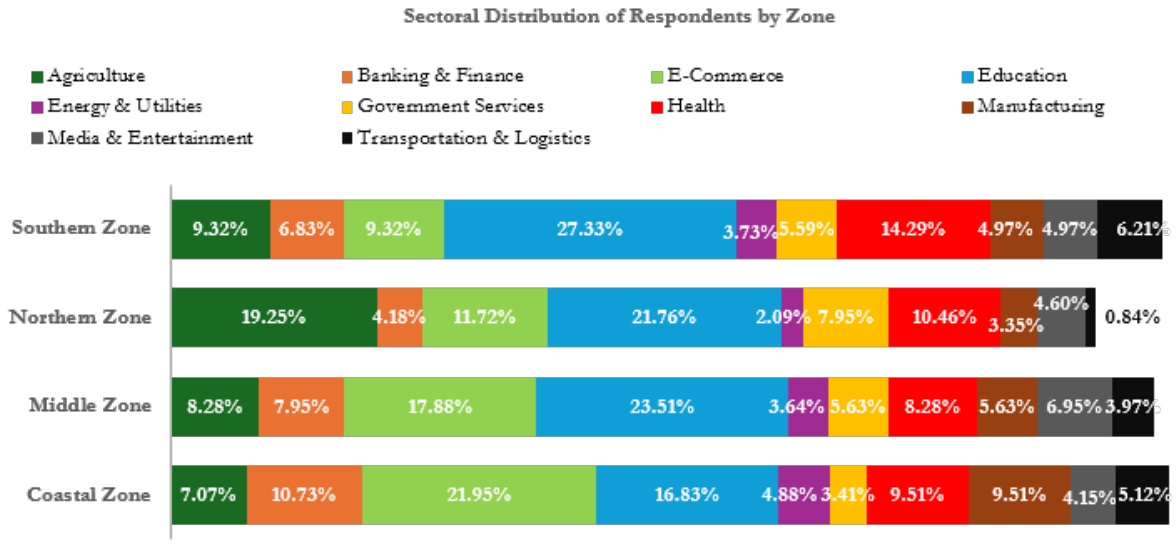


Figure 106: Sectoral Distribution of Respondents by Zone

6.1 ACCESS FIRST: INFRASTRUCTURE IS EXPANDING, BUT NOT EQUALLY

Digital infrastructure has expanded nationwide, but the quality and reliability of access differ markedly across zones. About 34% of individuals use the internet, but this figure rises to over 60% in Greater Accra, emphasizing a clear spatial divide (Ghana Statistical Service, 2023). Data from the National Communications Authority further show that broadband subscriptions and internet traffic are concentrated in urban areas, particularly within the Coastal Zone (NCA, 2023). At the same time, field evidence indicates that device ownership is no longer the primary constraint. Device ownership, especially smartphones, exceeds 90% in the Coastal Zone and remains above 85% across other zones, suggesting that the basic tools for connectivity are widely available.

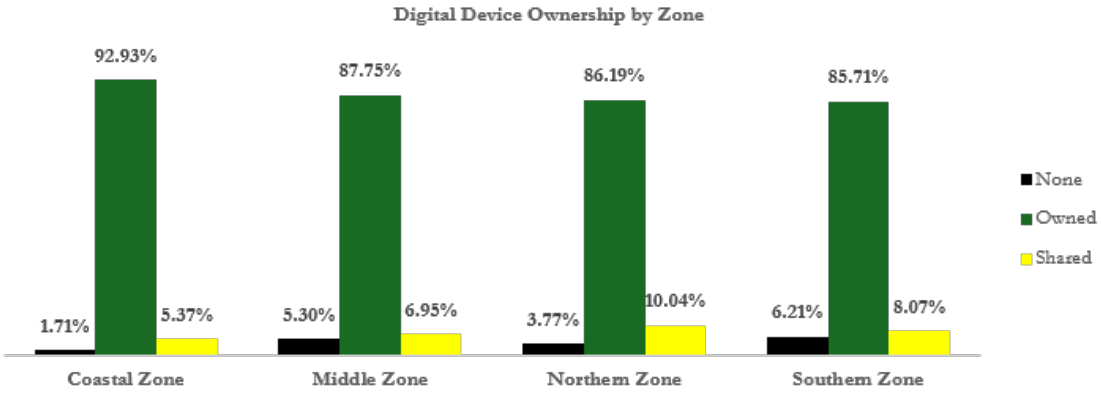


Figure 107: Digital Device Ownership by Zone

This concentration reflects both the availability of infrastructure and the ability to pay for services. The Coastal Zone benefits from dense network coverage, higher household incomes, and stronger commercial demand, all of which reinforce access. In parts of the Southern Zone, especially Volta and Western North, weaker network reach and cost constraints slow adoption despite geographic proximity to more connected areas (GSS, 2023). Survey data (Figure 108) further highlight that access is shaped by settlement patterns, with urban and peri-urban areas, particularly in the Middle Zone, where urban participation exceeds 70%, experiencing more stable connectivity than rural communities.

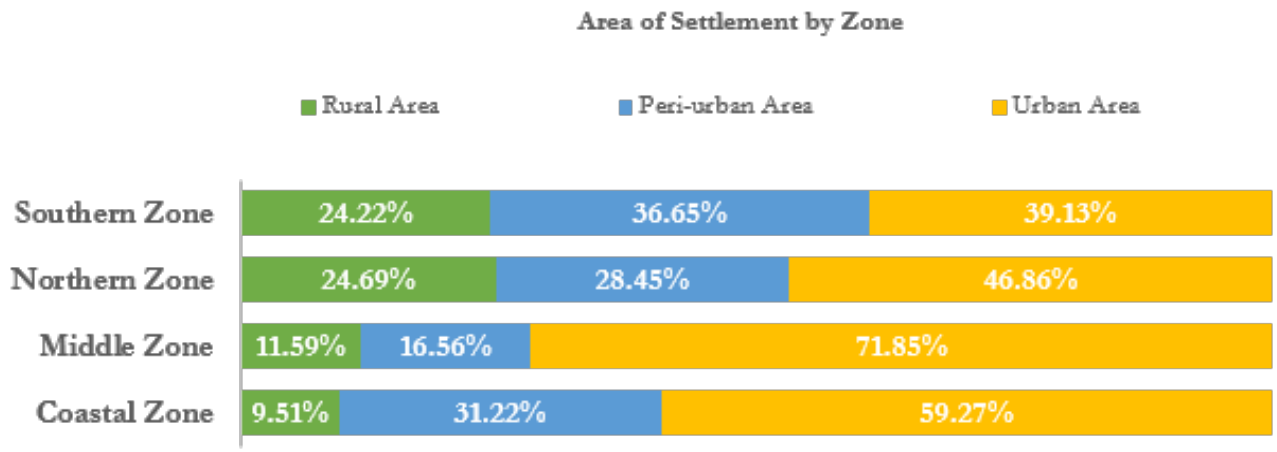


Figure 108: Settlement Distribution of Respondents by Zone

The Middle Zone illustrates a transitional stage. Ashanti Region records relatively high internet usage, driven by Kumasi's urban concentration, while areas such as Oti continue to face gaps in broadband expansion. Although mobile phone ownership is widespread, often exceeding 70%, this does not always translate into active internet use, pointing to constraints beyond device availability (GSS, 2023; World Bank, 2020). Primary data reinforce this gap. Figure 109 shows that a notable share of users rely on devices primarily for personal use rather than productive or business-related activities, indicating that access alone does not ensure meaningful digital participation.

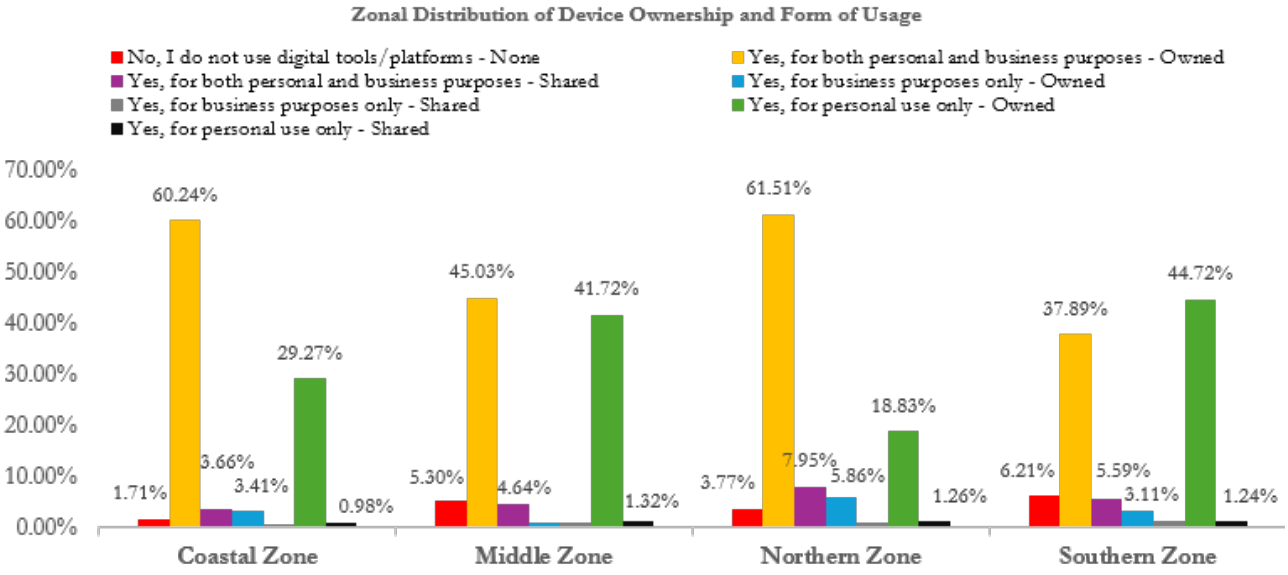


Figure 109: Zonal Distribution of Device Ownership and Form of Usage

In the Northern Zone, connectivity indicators are the lowest in the country. Internet penetration falls below 20% in Upper West and Upper East, with even lower figures in rural districts (GSS, 2023). While mobile network coverage has expanded and provides a basic entry point, the shift toward stable, high-quality broadband capable of supporting economic activity is still developing. Field insights show that shared device usage is more common in this zone, reflecting affordability constraints that can limit consistency of access, particularly for women and low-income households.

6.2 USAGE IS GROWING FAST, LED BY DIGITAL FINANCE

Even with differences in infrastructure, digital financial services have spread widely across all zones. Mobile money has become the most visible example of this expansion. Transaction values exceeded GHS 1.9 trillion in 2023, reflecting strong uptake in both urban and rural communities (Bank of Ghana, 2023). This widespread adoption is mirrored in primary data, where usage rates exceed 90% in both the Northern and Coastal Zones, confirming that mobile money has become the foundation of digital participation across the country.

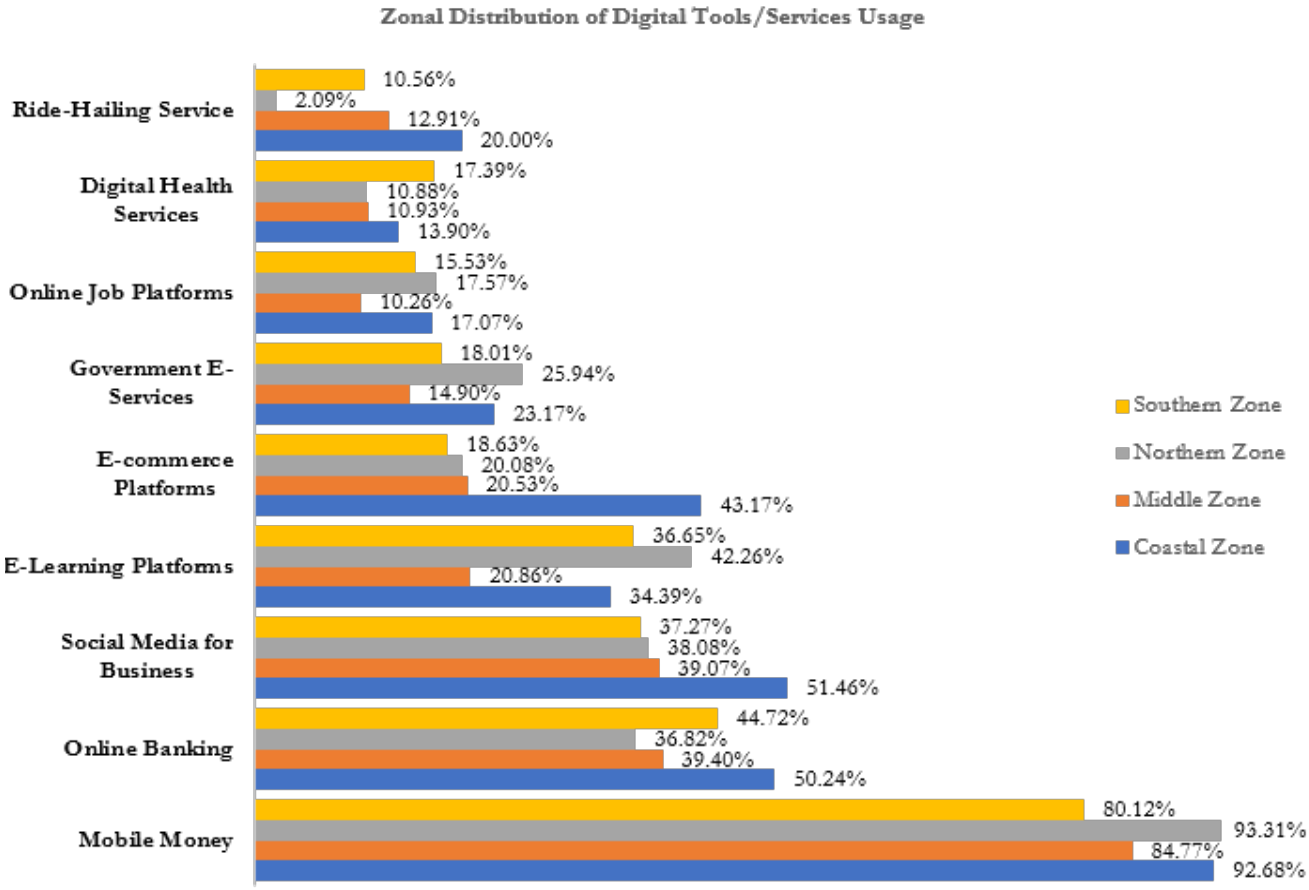


Figure 110: Zonal Distribution of Digital Tools/Services Usage

What differs across zones is not access to mobile money, but how it is used. In the Coastal Zone, digital finance supports a broad range of activities, including savings, credit, and business transactions. Higher income levels and a more active private sector encourage deeper engagement. This is further reflected in stronger use of complementary services such as online banking, e-commerce, and business-oriented social media platforms. At the same time, affordability continues to shape usage among low-income groups, as data and transaction costs still take up a notable share of household income (Alliance for Affordable Internet, 2022).

Across the Southern and Middle Zones, mobile money has become a practical tool for households and small businesses. The expansion of agent networks into smaller towns has improved access, yet usage tends to center on basic services such as transfers and bill payments. Survey findings indicate that a large proportion of users in these zones still engage with digital tools primarily for personal purposes, suggesting that the transition from consumption to production remains incomplete.

Lower income levels and gaps in financial literacy make it harder for users to engage with more advanced financial products.

The Northern Zone presents a distinct narrative. Mobile money adoption has accelerated vastly, often serving as a substitute for traditional banking. In many communities, agents act as the primary point of financial interaction. This has strengthened digital financial inclusion, especially for underserved populations like women entrepreneurs in the informal sector, youth, and persons with disabilities. However, the absence of services such as digital credit and insurance narrows the broader economic impact, keeping usage largely at a foundational level. At the same time, relatively higher engagement with e-learning and government digital services suggests that usage patterns in this zone are shaped not only by financial needs but also by public and developmental service access.

6.3 SKILLS DETERMINE WHETHER ACCESS TRANSLATES INTO VALUE

Access and usage alone do not guarantee meaningful participation in the digital economy. Digital skills play a decisive role, and their distribution across Ghana varies widely. An estimated 5.1 million people are digitally excluded, lacking either access or the skills required to use digital technologies effectively (GSS, 2023). Evidence from field data shows that most users fall within the intermediate skills category, indicating a growing but still evolving capacity to engage productively with digital tools.

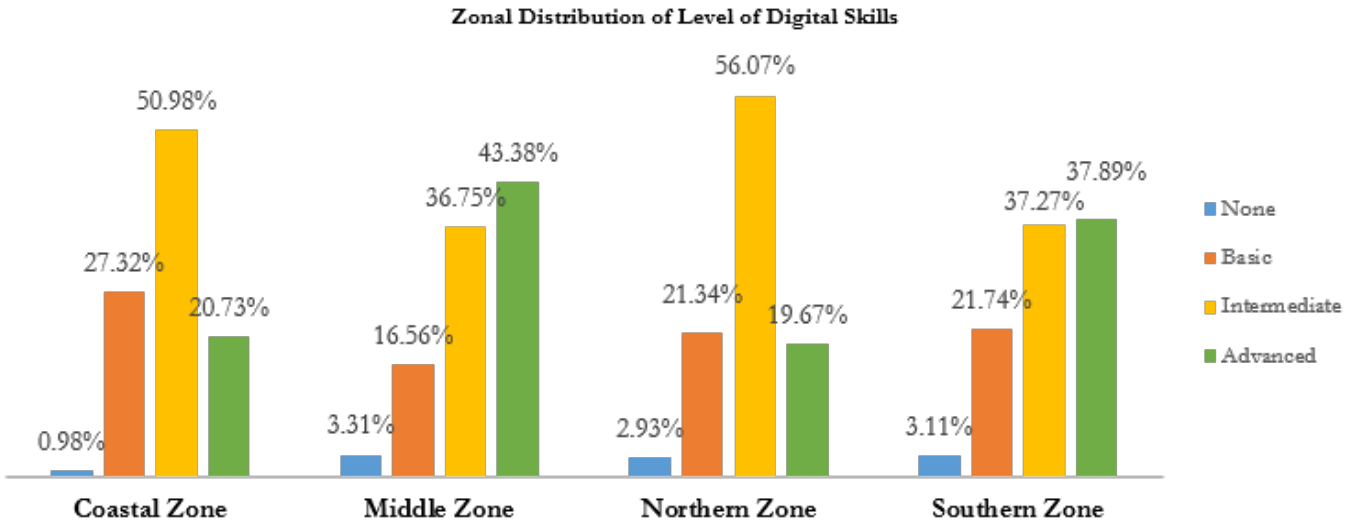


Figure 111: Zonal Distribution of Level of Digital Skills

The Coastal Zone benefits from a stronger base of human capital. Higher levels of education, wider exposure to ICT, and the presence of training institutions contribute to a workforce that can use digital tools more productively. Universities, private training providers, and corporate demand for digital expertise reinforce this advantage. This aligns with observed usage patterns, where users are more likely to uniformly engage with basic to advanced services and business applications.

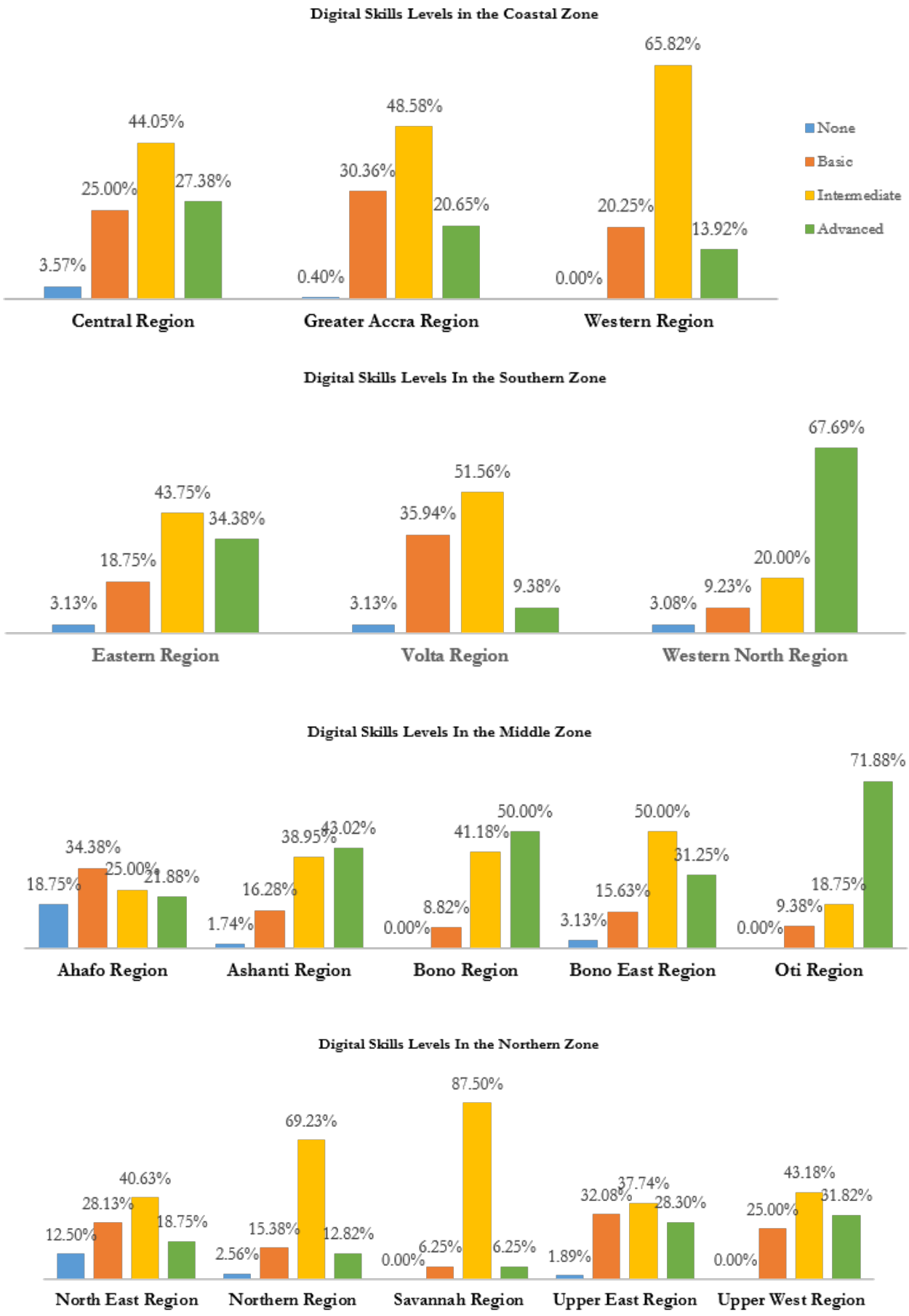


Figure 112: Regional Distribution of Levels of Digital Skills

In the Southern and Middle Zones, digital skills are developing but not yet consistent across regions. Ashanti Region stands out due to its educational institutions and emerging technology ecosystem, while Eastern Region benefits from its proximity to Accra. Primary data indicate that the Middle Zone records one of the highest shares of advanced users, suggesting a growing capacity for innovation and enterprise adoption. In contrast, areas such as Oti, Bono East, and Western North continue to face constraints, particularly in rural communities where access to structured training is less common.

The Northern Zone faces the most pronounced challenges in this area. Lower levels of formal education and fewer ICT training opportunities contribute to limited digital literacy. Human development data consistently place northern regions below national averages, which directly affects their ability to adopt and use digital technologies effectively (UNDP, 2022). Survey evidence shows that skills in this zone are concentrated at the intermediate level, reinforcing the need for structured pathways to move users toward more advanced capabilities.

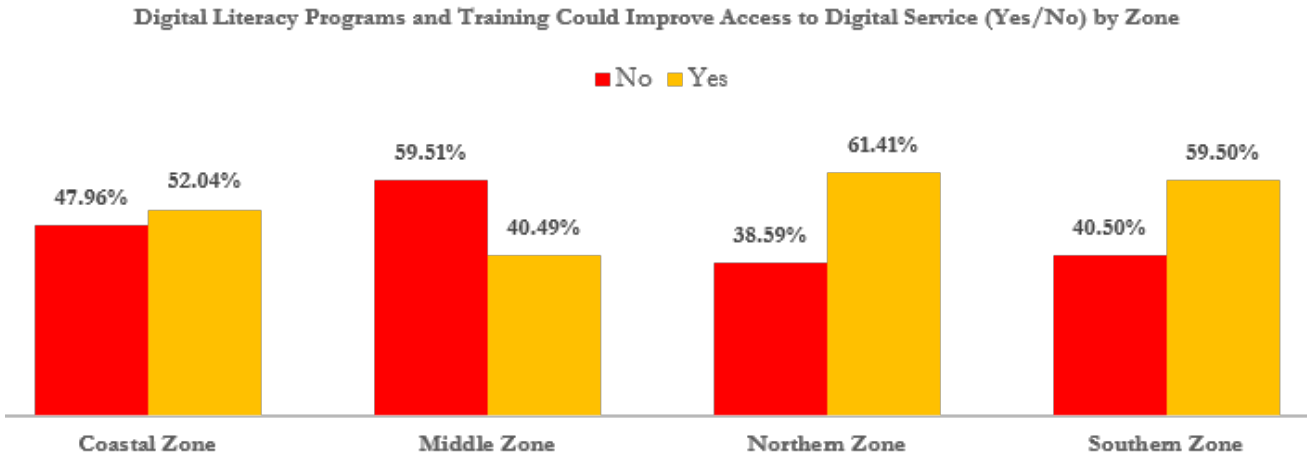


Figure 113: Zonal Distribution of Digital Literacy Programs & Training to Improve Access to Digital Services

Across all zones, gender perspectives highlight a shared recognition of the importance of digital skills (Figure 113). Both men and women express strong support for digital literacy initiatives, with over half of respondents in each group (Figure 114) identifying training as a key enabler of improved digital access and use. This suggests that skill gaps are systemic rather than gender-specific, even though the application of these skills often differs across economic roles.

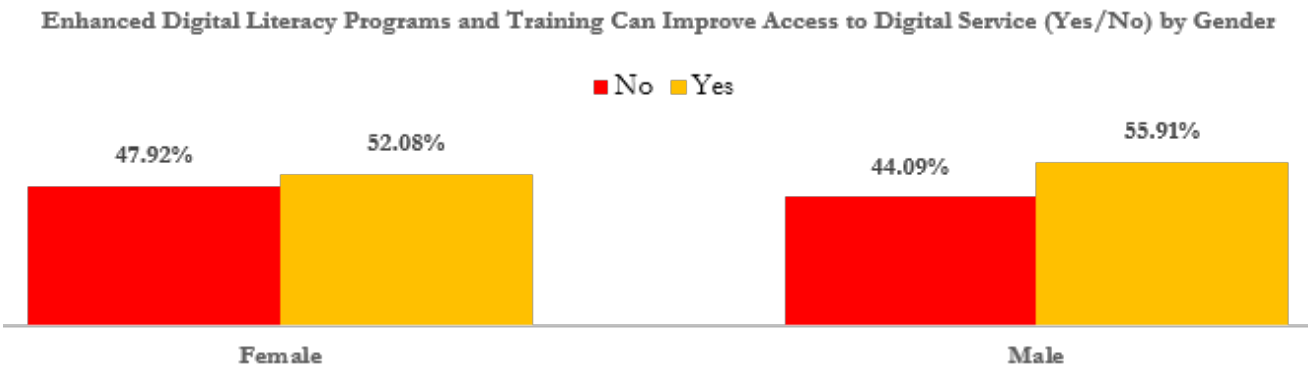


Figure 114: Gender Distribution of Enhanced Digital Literacy Programs & Training

6.4 ENTERPRISE ADOPTION IS CONCENTRATED IN KEY URBAN HUBS

The extent to which businesses integrate digital tools into their operations is a key driver of economic impact, and this integration is growing, though it is still concentrated in a handful of regions. For instance, the Coastal Zone stands at the center of this activity – Greater Accra functions as the hub for e-commerce platforms, digital startups, and logistics networks. Businesses here seem more inclined to use digital tools for sales, marketing, and customer engagement, supported by established payment systems and delivery infrastructure. This is reflected in sectoral participation patterns, where e-commerce and service-based activities feature prominently within the zone.

The Middle Zone, especially the Ashanti Region, represents the next layer of activity. Kumasi has developed a growing ecosystem of small and medium-sized enterprises that are gradually incorporating digital tools into their operations, although at a slower pace compared to Accra. In the Southern Zone, adoption is emerging, especially in the Eastern Region, but progress varies due to infrastructure and logistics constraints. Education and commerce dominate sector participation in these zones, indicating strong potential for digital integration within existing economic structures.

In the Northern Zone, digital trade is still at an early stage. Businesses face a combination of barriers, including lower internet usage, concerns about online transactions, and weak delivery networks. At the same time, agriculture remains a significant sector of engagement, reinforcing the importance of tailored digital solutions that align with local economic activities. Evidence indicates that fewer than 15% of SMEs outside major urban centers actively use digital platforms for business operations, which limits the contribution of digital trade to broader economic growth (World Bank, 2020).

6.5 INNOVATION AND DATA SYSTEMS ARE STILL CENTRALIZED

The use of data-driven systems and emerging technologies is gradually taking shape in Ghana, but it is heavily centered in the Coastal Zone. Greater Accra hosts most of the country's digital infrastructure, including platforms for identification, payments, and public service delivery, as well as a concentration of innovation hubs and technology firms.

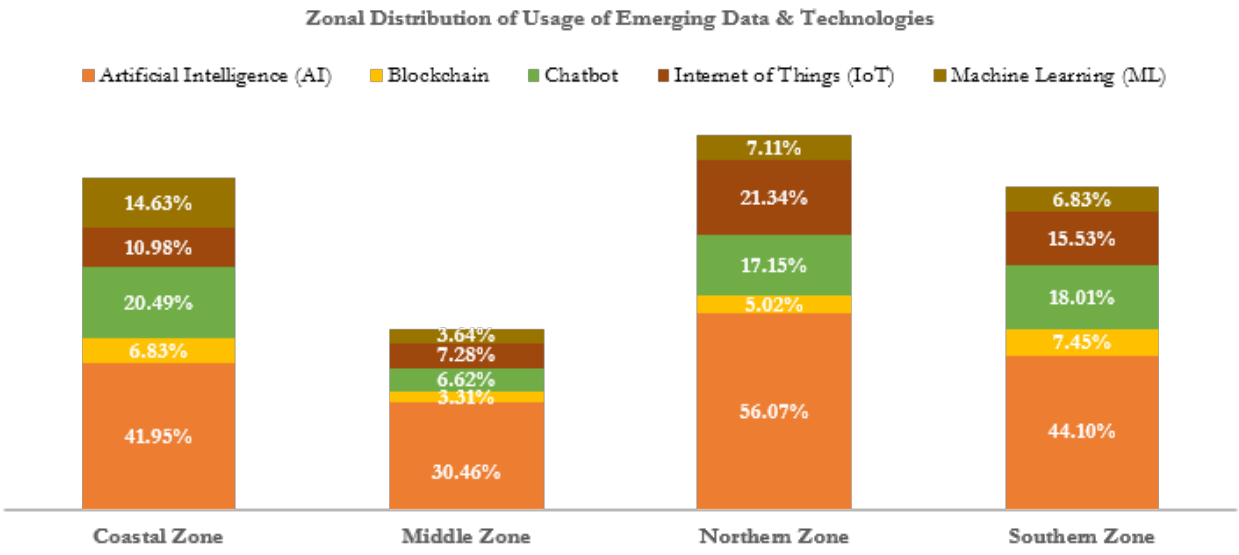


Figure 115: Zonal Distribution of Usage of Emerging Data & Technologies

In the Southern and Middle Zones, adoption is beginning to take hold in specific sectors such as agriculture and health. Some regional institutions are integrating digital systems into service delivery, though progress is slowed by capacity constraints and gaps in infrastructure. Field evidence suggests that while a majority of users report some level of interaction with emerging technologies, this engagement often occurs through existing platforms rather than through direct development or deployment.

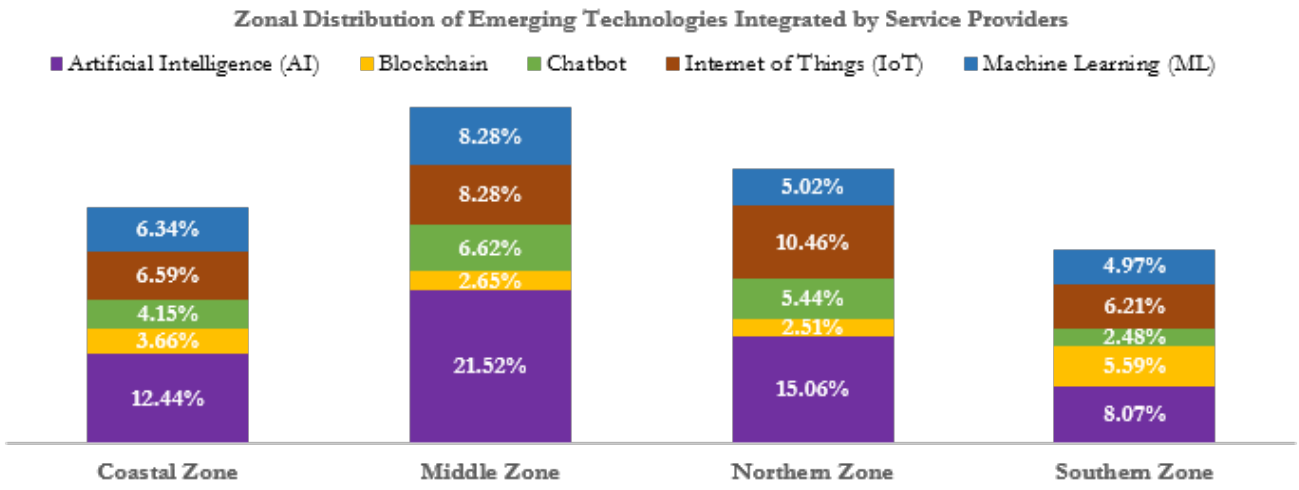


Figure 116: Zonal Distribution of Emerging Technologies Integrated by Service Providers

In the Northern Zone, engagement with more complex technologies is minimal. Most digital activity is still focused on communication and financial transactions. The absence of advanced infrastructure and a limited pool of skilled professionals restricts the uptake of more sophisticated technologies. While technologies such as artificial intelligence are frequently cited, their use is often basic or indirect, and adoption of more complex innovations such as blockchain remains low across all zones.

6.6 WHAT THIS MEANS: STRUCTURAL DIFFERENCES SHAPE OUTCOMES

When these elements are considered together, a consistent picture emerges. The Coastal Zone is more digitally advanced across infrastructure, skills, enterprise activity, and innovation. The Southern and Middle Zones are moving forward, though progress varies across regions. The Northern Zone continues to face deeper structural constraints, even as progress in digital financial inclusion through mobile money becomes more visible.

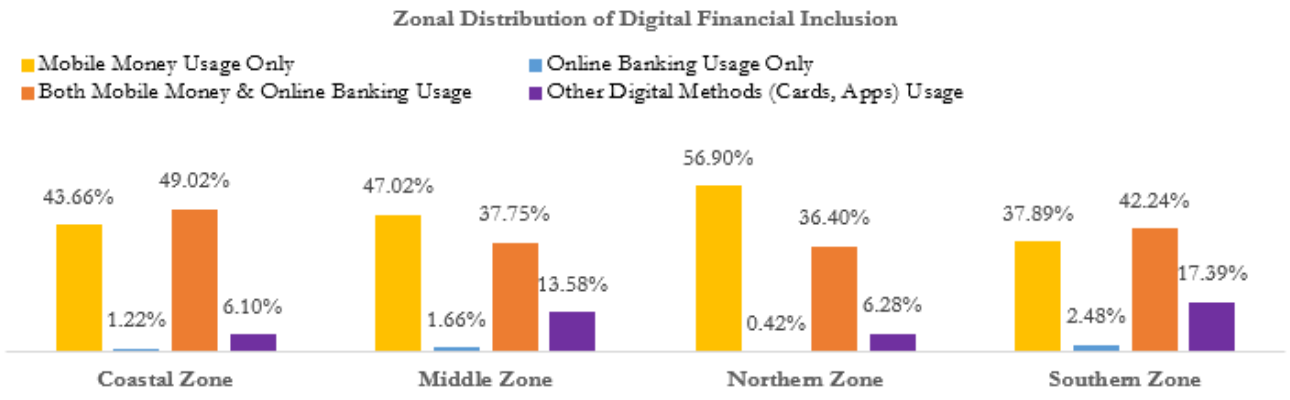


Figure 117: Zonal Distribution of Digital Financial Inclusion

These differences are closely tied to underlying economic and social conditions. Regions with stronger education systems, better infrastructure, and higher levels of economic activity are better positioned to adopt and benefit from digital technologies. This creates a reinforcing dynamic in which digital readiness supports growth, and growth, in turn, enables further investment in digital systems (World Bank, 2020). Primary data reinforce this relationship, showing that income levels, employment status, and age distribution shape both access to and use of digital tools, with younger, economically active populations more likely to engage in productive digital activities.

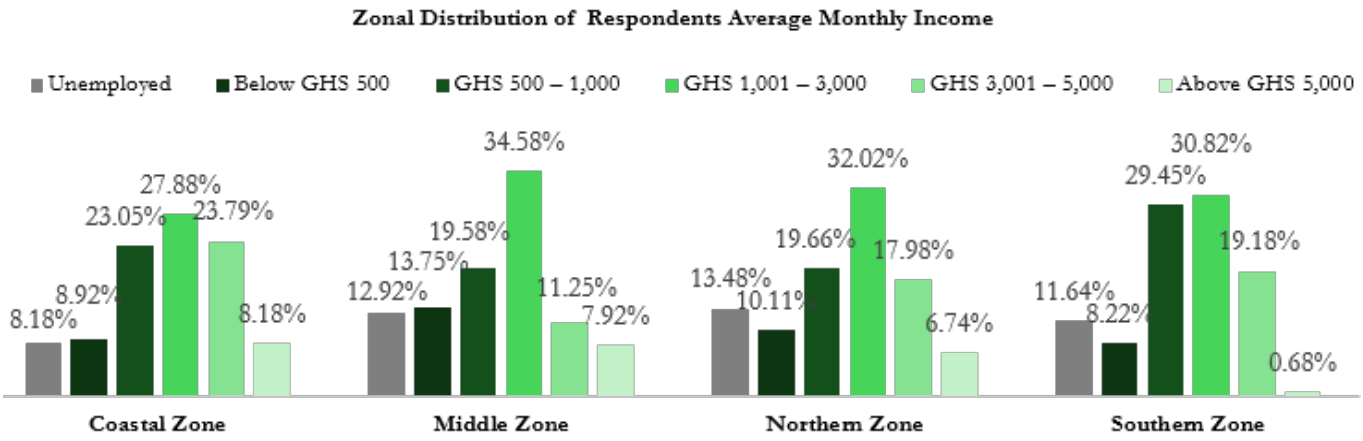


Figure 118: Zonal Distribution of Respondents' Average Monthly Income

6.7 LINKING REGIONAL DIGITAL PROGRESS TO ECONOMIC OUTCOMES

Building on this, the connection between digital transformation and economic outcomes becomes clearer. While digital investments are already contributing to growth, productivity, and inclusion, the scale of impact varies across zones.

In the Coastal Zone, digital adoption is closely tied to economic performance. Greater Accra contributes over 25% of the national GDP, reflecting its dominance in services, finance, and ICT (GSS, 2022). High levels of internet usage and advanced digital engagement support business efficiency, innovation, and job creation. At the same time, disparities within the zone affect inclusiveness, as affordability constraints continue to shape participation among lower-income groups (Alliance for Affordable Internet, 2022).

The Southern Zone shows clear potential for inclusive digital growth. Digital tools are increasingly supporting agriculture and trade, improving market access and strengthening household resilience. Evidence suggests that digital financial services help households manage income shocks and reduce vulnerability (UNDP, 2022). However, gaps in infrastructure and skills still constrain the scale of these benefits.

The Middle Zone is positioned to expand its digital economic footprint. Ashanti Region, in particular, benefits from a strong SME base and growing adoption of digital tools, which supports productivity and job creation. Research indicates that firms using digital technologies tend to achieve better performance outcomes (World Bank, 2020). Survey evidence suggests that where digital tools are used for business purposes rather than personal consumption, the economic impact is more pronounced.

Meanwhile, mobile money usage in the Northern Zone may have also improved financial access, enabling households to participate in basic economic activities and manage financial risks (Bank of Ghana, 2023; World Bank, 2020). However, constraints in infrastructure, skills, and digital usage continue to limit broader transformation.

6.8 CONCLUSIVE INSIGHT: GROWTH IS VISIBLE, INCLUSION IS THE NEXT FRONTIER

The evidence shows that Ghana's digital economy is already contributing to economic expansion, productivity gains, and improved financial access. However, these positive outcomes are distributed unevenly across the country. Regions with stronger digital foundations are capturing a larger share of the benefits, while others are still building the conditions needed to participate fully.

Mobile money stands out as the most far-reaching driver of inclusion so far, extending financial access across all zones. At the same time, the broader pattern that emerges from both literature and field evidence is that access is no longer the primary constraint; rather, the depth and productivity of digital use now define the next phase of transformation. Differences in skills, income, gender roles, and economic structure continue to shape how digital tools are applied in practice.

The broader implication is that Ghana's digital economy has the capacity to drive job creation, reduce poverty, and support national growth. Achieving this potential will require a shift toward more targeted, region-specific strategies that address the unique constraints within each zone. Without such an approach, digital progress will continue, but its benefits will be concentrated rather than widely shared.

REGULATORY & POLICY TRANSFORMATION



7.0 REGULATORY AND POLICY TRANSFORMATION

Ghana's digital economy reached its current state through successive waves of reform that balanced domestic needs with global technological shifts. This journey began in earnest during the 1987 Structural Adjustment Programme, which ended state control of the telecommunications sector. By 1992, nearly 40 private firms entered the market to provide equipment and maintenance, marking a departure from the legacy model managed by the Ghana Post and Telecommunications Corporation (Kpessa-Whyte & Dzisah, 2022). This liberalization invited the private investment necessary to build a modern network.

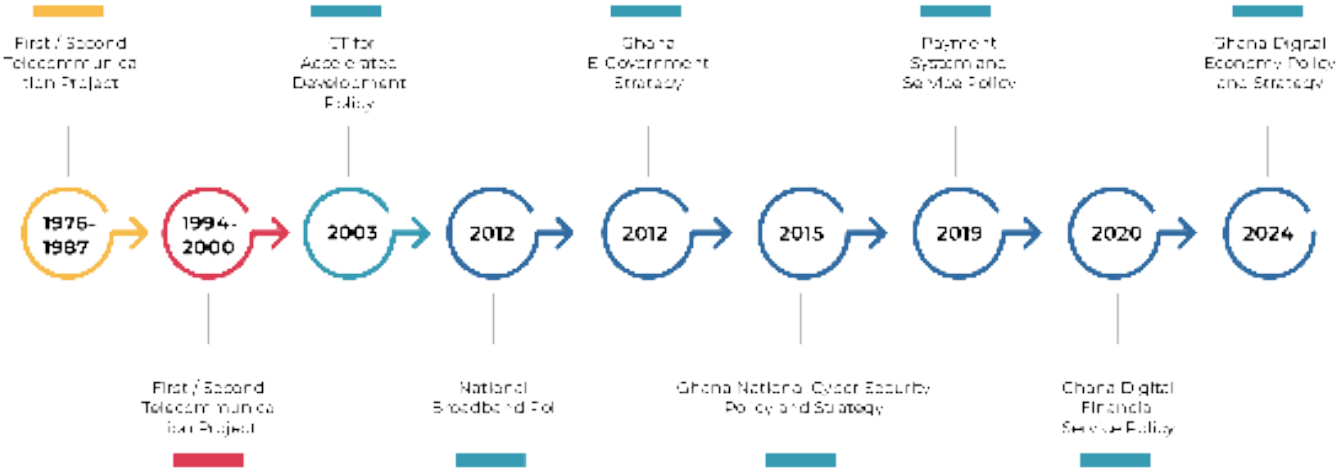


Figure 119: Policy Trends in Ghana's Digital Transformation Journey

These early steps cleared the path for the Accelerated Development Program, which partially privatized Ghana Telecom and introduced direct competition (Osei-Owusu, 2017). By 2003, the ICT for Accelerated Development (ICT4AD) Policy shifted the national focus toward integrating technology across all public institutions. This policy created the foundational pillars of Ghana's digital governance, including the National Information Technology Agency (NITA), the Data Protection Commission, and the Cyber Security Authority. These bodies now standardize and secure the digital services that citizens use daily.

Subsequent initiatives focused on making these services accessible to the broader population. The 2012 National Broadband Policy aimed to bring high-speed internet to 50% of the country while cutting costs by 80% (Alliance for Affordable Internet, 2014). Even with notable progress, the gap between urban centers and rural communities persisted. This disparity proved that infrastructure alone cannot bridge the digital divide without addressing affordability and local needs.

The recent strategy has moved away from isolated projects toward a unified approach. The 2024 Ghana Digital Economy Policy and Strategy combines digital skills, entrepreneurship, and data privacy into a single framework (MoCD, 2024). This shift favors public-private partnerships and community involvement over a purely state-led model. A collaborative environment ensures that the legal protections for digital trade and privacy remain robust as technology evolves. The legal foundation for this new economy rests on several key statutes (as indicated in Table 2). The Electronic Transactions Act of 2008 (Act 772) legalized digital commerce, while the Data Protection Act (Act 843) and the Cybersecurity Act (Act 1038) established necessary safeguards for user privacy.

On the technical side, the 2018 launch of the Mobile Money Interoperability Platform allowed money to move seamlessly across different networks. This change significantly increased transaction volumes and deepened financial inclusion (Bank of Ghana, 2024).

Law/Regulation	Objective
National Communication Authority Act 2008 (Act 769)	Establishes the National Communications Authority as the regulator of communication services.
Data Protection Act 2012 (Act 843)	Establishes the Data Protection Commission to regulate and enforce privacy and personal data protection.
Cybersecurity Act 2020 (Act 1038)	Establishes the Cyber Security Authority to regulate, promote, and coordinate cybersecurity activities.
Electronic Communications Act 2008 (Act 775)	Regulates electronic communications, broadcasting, and spectrum use.
Electronic Transactions Act 2008 (Act 772)	Provides legal recognition and security for electronic transactions and communications.
National Information Technology Agency Act 2008 (Act 771)	Establishes NITA to regulate and promote ICT development.
Communication Service Tax Act 2008 (Act 754, as amended)	Imposes a tax on the use of communication services.
Payment Systems and Services Act 2019 (Act 987)	Regulates payment systems, electronic money, and service providers.
Electronic Transfer Levy Act 2022 (Act 1075)	Imposes a levy on electronic money transfers.
Subscriber Identity Module Registration Regulation	Mandates SIM card registration by network operators.
Mobile Number Portability Regulation	Allows subscribers to retain their numbers when switching networks.
Electronic Communications Tribunal Regulation	Provides mechanisms for appeals against NCA decisions.
Electronic Communications Regulation	Governs fair access, competition, network security, privacy, and industry development.

Table 2: Legal Frameworks Governing the ICT Sector

Even so, stakeholders cautioned that the policy agenda must become more adaptive. Success depends on closing the rural-urban divide through targeted subsidies for devices and internet access. Policymakers are also exploring regulatory sandboxes for artificial intelligence and blockchain to encourage innovation without compromising security. Ghana is transitioning from foundational development toward a mature ecosystem that prioritizes integration and safety.

7.1 THE INFLUENCE OF POLICY ON GHANA'S DIGITAL ECONOMY

Clear regulations have driven the rapid expansion of mobile and internet use across the country. By 2024, Ghana recorded over 38.95 million active mobile connections, achieving a penetration rate of 113%, the highest in West Africa (GeoPoll, 2024). This growth relies on infrastructure like the National Fibre Optic Backbone, which connects rural communities to the digital grid. Such investments ensure that the digital economy is a national asset rather than an urban luxury.

Internet usage has followed a similar path, with nearly 24 million users online by 2024 (Statista, 2024). This connectivity supports essential public services such as Ghana.gov, e-procurement systems, and the e-pharmacy platform. These tools have moved from small pilot programs to national systems that improve transparency and simplify how citizens interact with the state. By digitizing these processes, the government has removed many of the traditional bottlenecks in public service.

The financial technology sector highlights the direct economic impact of these policy choices. Mobile money transaction volumes grew from GHS 1.1 trillion in 2022 to GHS 1.9 trillion in 2023 (Bank of Ghana, 2023). The 2018 interoperability reforms were the catalyst for this surge, as they allowed consumers to trust that their digital money could be used anywhere, regardless of their service provider. This trust is the invisible engine of the digital market. Notwithstanding these successes, inequalities remain. Low-income households still struggle to afford quality devices and data. A huge skills gap also prevents many small businesses from fully utilizing digital tools. Gaps in enforcing data governance and consumer protection also affect how much people trust these services. Addressing these barriers is the next priority for the regulatory framework.

7.2 STAKEHOLDER INSIGHTS AND INSTITUTIONAL FRAMEWORKS

Policy reforms over the last decade have strengthened digital governance by creating clear accountability for how technology serves the public. Strategic frameworks like the National Data Sharing Policy and the Artificial Intelligence Strategy have provided the direction needed to build specialized agencies. For example, the creation of the Data Protection Commission and the Cyber Security Authority ensures that specific experts handle complex issues like privacy and cyber defense. Specialized oversight builds the credibility necessary for a stable business environment.

Infrastructure improvements are also tied directly to specific policy choices. Stakeholders point to the "shared infrastructure" model as a major success. By investing in the Eastern Corridor fibre network and opening it to all operators, the government brought connectivity to areas that were previously not profitable for private firms. Similarly, the Ghana Investment Fund for Electronic Communication (GIFEC) uses solar-powered base stations to expand rural network access. These projects allow competing companies to use a single tower, reducing costs and expanding coverage.

National data centers have further supported this expansion by offering primary and secondary storage for both the public and private sectors. These facilities were built with excess capacity so

that private companies can lease space rather than building their own expensive infrastructure. This reduces capital burdens on startups and allows them to scale as they grow. It also supports the localization of government services, with nearly 80% of state digital platforms now hosted within Ghana.

The enforcement of the national ID card has added a vital layer of security to these digital solutions. By providing a single source for identity verification, stakeholders explained that the Ghana Card reduces fraud and builds trust in both banks and e-commerce platforms. This identity system facilitates secure data transfers between government agencies and gives domestic and international investors more confidence in Ghanaian online transactions.

7.3 SKILLS AND ENTREPRENEURSHIP

Capacity building remains the critical link in the digital chain. Figures 120 and 121 highlight key areas in policy design and implementation to build the requisite skills and capacity of Ghanaians for the digital economy. Initiatives like the One Million Coders program and the Girls in ICT project target the skills gap directly. At the community level, the Kofi Annan Centre of Excellence trains local master trainers to deliver ICT education in local languages. These efforts ensure that women and small business owners can move beyond basic social media use and begin leveraging digital platforms for actual trade and marketing.

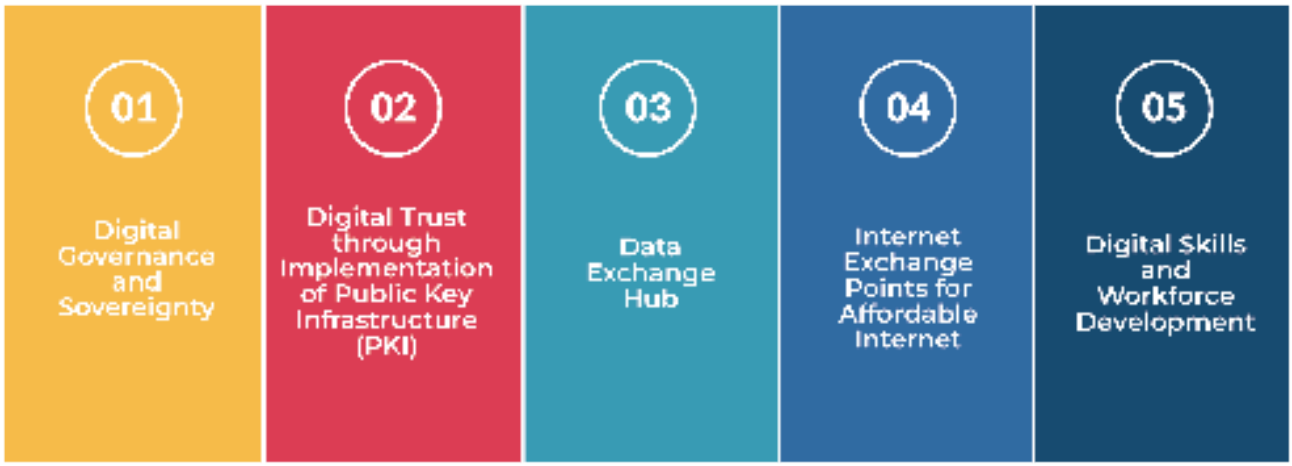


Figure 120: Key Areas of Ghana's Digital Economy Policy and Strategy Outlook

Digital entrepreneurship has flourished under this supportive environment. The Ghana Digital Centres serve as hubs for innovation and Business Process Outsourcing (BPO). Stakeholders from the FGDs and KIIs asserted that two major BPO providers at the Accra Digital Centre alone have created approximately 6,000 jobs. Nationwide, these initiatives have generated roughly 15,000 jobs, proving that Ghana can compete as a regional hub for digital services. These centers provide the co-working spaces and mentorship that tech startups need to survive their early years.

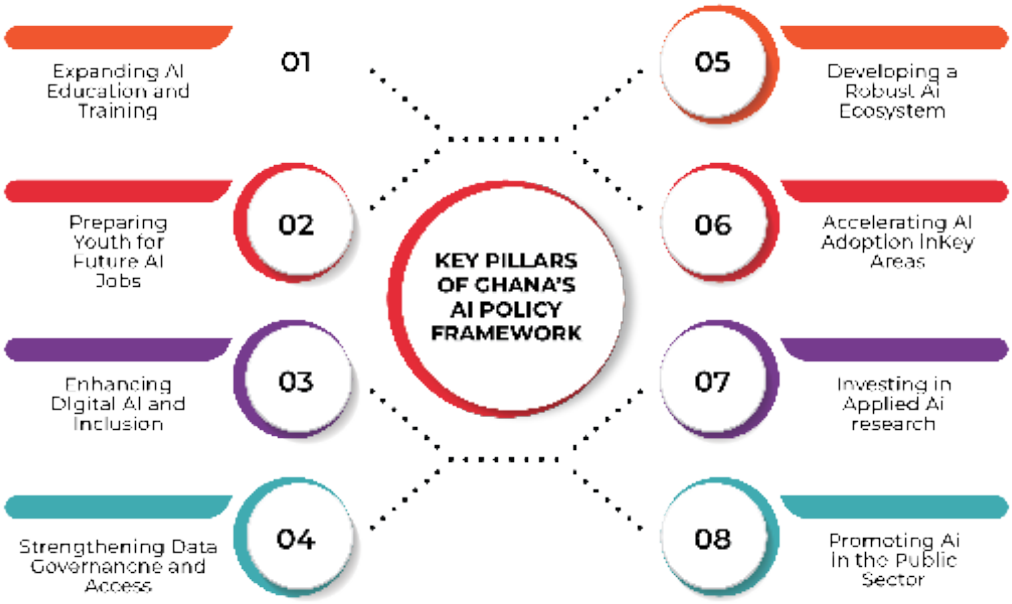


Figure 121: Key Pillars of Ghana's AI Policy Framework

However, the path forward is not without friction. Some stakeholders report a lack of clarity in the overlapping roles of NITA, the NCA, and GIFEC. For instance, a recent debate over who should regulate data centers highlighted the need for better legislative harmony. Without clearer divisions of responsibility, infrastructure investments may remain uncoordinated. There is also a need for the MoCDTI to be more involved in the sectoral regulation of tech equipment to prevent fragmented standards.

Figure 122 visually presents the high-level problems identified through the KIIs and FGDs. The diagram categorizes the numerous issues under four main root causes (the "bones"): Weak Policy Enforcement, Slow Digital Infrastructure Development, Regulatory Gaps, and Weak Data Exchange in the Public Sector. Specific challenges, such as the lack of a fibre policy, poor inter-agency coordination, and underutilization of national data centers, branch off these four categories to illustrate the systemic factors contributing to the overall challenges in Ghana's digital ecosystem.

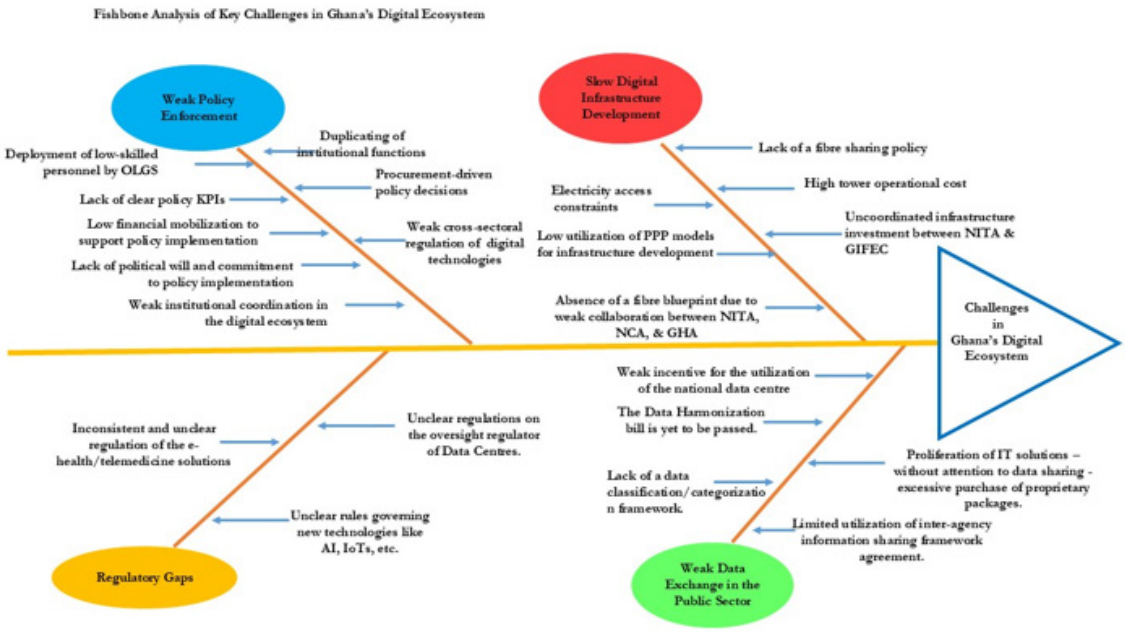


Figure 122: Fishbone Analysis of Key Challenges in Ghana's Digital Ecosystem

Consequently, the government is currently addressing these gaps through a massive overhaul, with 15 new bills in various stages of development. These include the Emerging Technologies Bill and the Ghana Innovation and Startup Bill. These laws aim to align Ghana with global standards like the UN Global Digital Compact while securing the domestic environment. If implemented effectively, these reforms will ensure that Ghana's digital growth remains inclusive, secure, and globally competitive.

No.	Bill	Access Link
1	Ghana Domain Name Registry Bill, 2025	View/Download
2	National Communications Authority Bill, 2025	View/Download
3	Cybersecurity (Amendment) Bill, 2025	View/Download
4	Data Harmonisation Bill, 2025	View/Download
5	Data Protection Bill, 2025	View/Download
6	Ghana Meteorological Authority Bill, 2025	View/Download
7	Digital Economy and Innovation Development Fund Bill, 2025	View/Download
8	Ghana-India Kofi Annan Centre of Excellence in ICT Bill	View/Download
9	Misinformation, Disinformation, Hate Speech, and Publication of Other Information (Mdhi) Bill, 2025	View/Download
10	Electronic Communications Bill, 2025	View/Download
11	Electronic Transactions Bill, 2025	View/Download
12	Postal, Courier and Logistics Services Commission Bill 2025	View/Download
13	National Information Technology Authority Bill, 2025	View/Download
14	Emerging Technologies Bill, 2025	View/Download
15	Ghana Innovation and Startup Bill, 2025	

Table 3: List of Relevant Bills

These policy transformations have fundamentally reshaped Ghana's digital environment by strengthening governance, expanding infrastructure, and equipping the workforce with essential skills (as indicated in Figure 123). These reforms moved beyond simple regulation to drive both public and private sector innovation, establishing the digital public infrastructure and stronger institutions that build a climate of digital trust essential for long-term economic stability. This strategic evolution opened up opportunities across key and complementary sectors as mapped out in the sectoral framework.



Figure 123: Policy Transformation and Ghana's Digital Ecosystem

As highlighted throughout the report, creating a coherent and consistent policy environment remains a very critical factor for sustaining this momentum and ensuring the digital economy serves as a reliable engine for inclusive national prosperity.

DIGITAL TRANSFORMATION ON ECONOMIC GROWTH



8.0 IMPACT OF DIGITAL TRANSFORMATION ON ECONOMIC GROWTH

8.1 IDENTIFYING KEY INDICATORS FOR EFFECTIVE POLICY DESIGN

This section examines the relationship between key digital economy indicators and Ghana's overall economic performance, quantifying their contribution to GDP and identifying high-leverage drivers for sustainable growth. Using predictive modelling techniques applied to national data from 2014 to 2024, refer to Table 4, the analysis evaluates how variables such as ICT sector growth, broadband penetration, mobile money transaction activity, and data affordability influence both the proportional and absolute value of the digital economy.

This study uses two key variables to measure the economic contribution of Ghana's digital sector. The first variable is the percentage contribution of the Information and Communication Technology (ICT) sector to Gross Domestic Product (GDP), referred to as ICT GDP Contribution Pct. This indicator shows the share of the country's total GDP that comes from ICT-related activities. It is commonly used in economic studies to evaluate how much a specific sector contributes to the overall economy (Kurniawati, 2022). The second variable measures the total monetary contribution of the digital economy to GDP, referred to as Digital GDP Contribution USD. Unlike the first indicator, which focuses on percentage share, this variable measures the actual economic value generated by digital activities in monetary terms. Together, these two indicators provide a broader understanding of how the digital sector contributes to Ghana's economic growth.

Variables	Description
MoMo Volume	Total volume of mobile money transactions
MoMo Value	Total value (in GHS) of mobile money transactions
MoMo Avg Value	Average transaction value per mobile money use
Bank Acc Pct	% of adults (15+) with bank accounts
MoMo Acc Pct	% of adults (15+) with mobile money accounts
Digital Loan Use	% of population using digital lending services
Loan Penetration	Formal financial credit penetration rate
Fintech Adoption	Adoption rate of fintech services
Broadband Pct	Broadband internet penetration rate
Mobile 4G Coverage	% of mobile users with access to 4G coverage

Internet Use Pct	% of the population using the internet
ICT Growth	Annual growth rate of the ICT sector
Egov Index	UN's e-Government Development Index score
Retail Penetration	Share of retail transactions occurring online
Digital Trade Vol	Volume of digital financial transactions (ATM, POS, Mobile, etc.)
Digital Trade Val	Total value (GHS) of digital financial transactions
Internet Access Pct	% of population with basic internet access
Regions 4G Coverage Pct	Regional average of 4G mobile coverage
Data Affordability Index	Relative affordability of mobile/internet data
Energy and Utility (Electricity) Access ICT	% of ICT operations with electricity access
ICT Fintech Regulations	Number of ICT and fintech regulations enacted
Digital Policy Agencies	Number of governmental digital policy bodies
PPP Investments USD	Public-Private Partnership investment in digital sectors (in USD)
ICT GDP Contribution Pct	Target Variable – ICT contribution to GDP (in %)
Digital GDP Contribution USD	Target Variable – Estimated contribution of the digital economy to GDP (USD)

Table 4: Data Variables & Description

8.1.1 Results

A Spearman rank correlation matrix was computed (Figure 124) to examine how the different digital indicators are related. The results show that Mobile money metrics, including MoMo_Volume, MoMo_Value, and MoMo_Avg_Value, are highly correlated. This indicates that transaction volume, total value, and average value move closely together over time, reflecting the internal consistency of the mobile money sector. Digital financial transactions and digital trade measures show strong positive correlations with Digital_GDP_Contribution_USD. This suggests that the intensity of digital transactions is closely linked to the nominal size of the digital economy, highlighting the importance of both mobile payments and digital trade in driving economic value.

Indicators such as broadband penetration, 4G coverage, and internet usage form a tightly interrelated group. The Data_Affordability_Index is often negatively correlated with these coverage measures, which aligns with the expectation that better network coverage and market competition tend to reduce relative data costs. Care should be taken in interpreting this for policy, given the index's directionality.

Variables reflecting the digital policy environment, such as the presence of Digital Policy Agencies and ICT/Fintech regulations, show moderate positive correlations with infrastructure indicators. This pattern suggests that policy frameworks and investments tend to move together, although correlation alone does not imply causation.

A machine learning feature selection approach further identified the most important predictors of Ghana's digital economy outcomes. The results (Figure 125) provide important insights into the most influential digital indicators for each economic outcome. For ICT_GDP_Contribution_Pct, the analysis shows that ICT_Growth is the most influential predictor by a wide margin. This is followed by Broadband_Pct, while Data_Affordability_Index, MoMo_Avg_Value, and Regions_4G_Coverage_Pct make relatively smaller contributions to explaining changes in ICT's share of GDP.

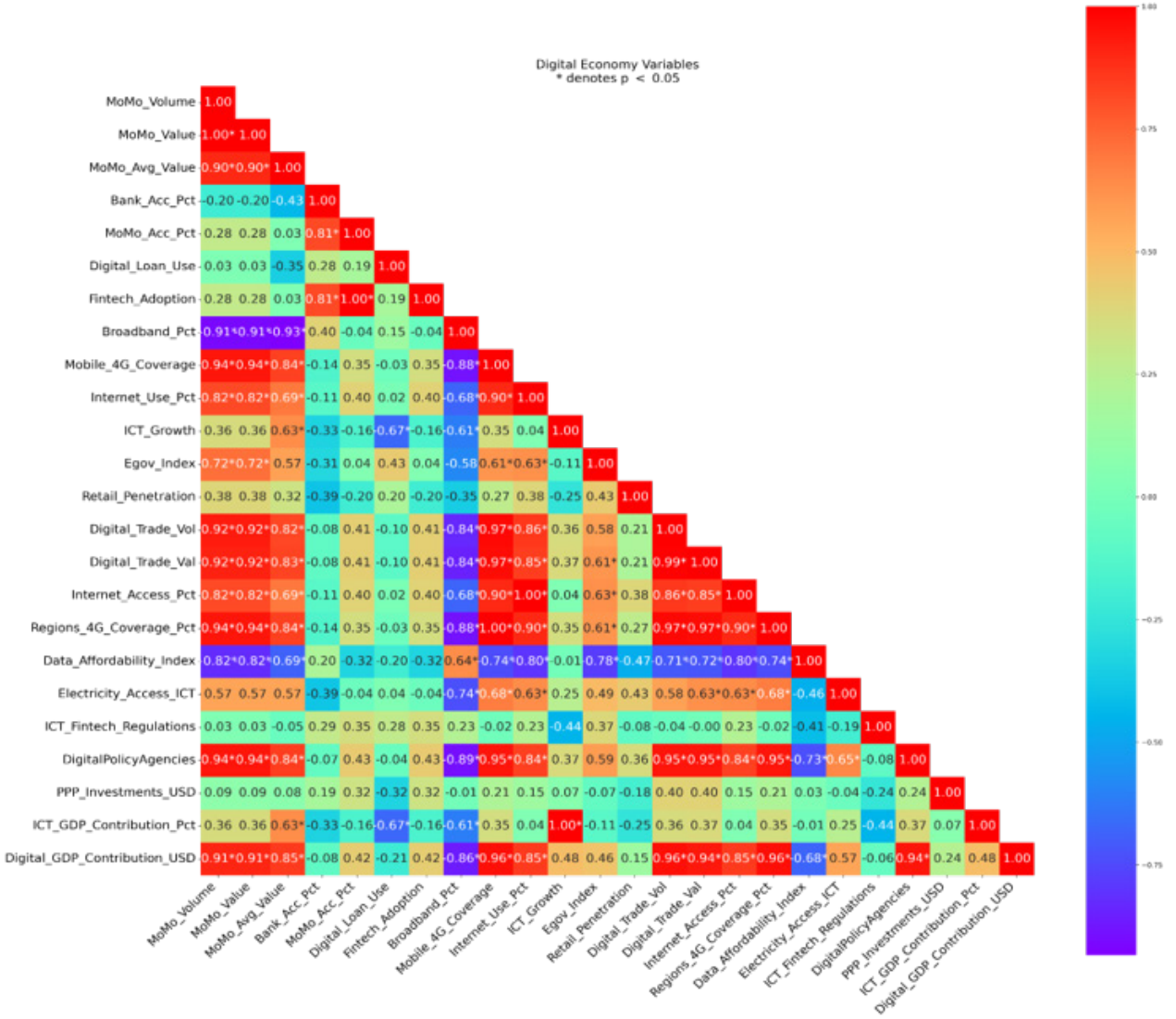


Figure 124: Heatmap of Spearman Rank Correlation Coefficients

For the second target variable, Digital_GDP_Contribution_Pct, the analysis highlights MoMo_Avg_Value and Digital_Trade_Value as the most influential predictors. This finding underscores the economic significance of mobile money transactions and cross-border digital commerce in driving the growth of Ghana's digital economy. Together, these indicators show that both the financial and trade aspects of the digital economy are key drivers of its contribution to GDP.

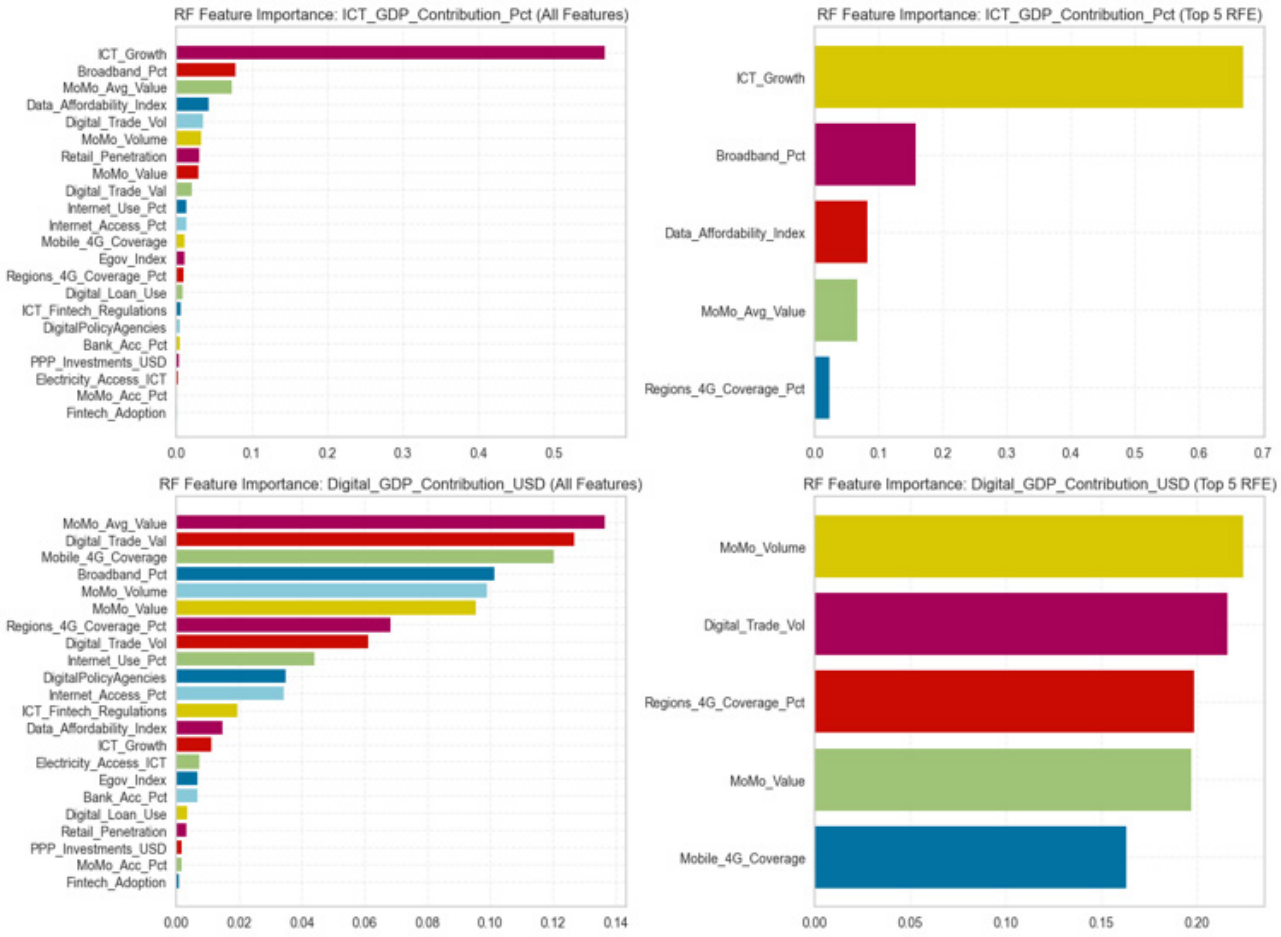


Figure 125: Random-forest feature importances for two GDP targets

Top row: ICT GDP contribution, (a) full feature set; (b) after RFE retained the top five predictors. Bottom row: Digital GDP contribution, (c) full feature set; (d) after RFE retained the top five predictors.

These rankings provide a clear empirical basis for identifying high-leverage drivers of digital economic growth. Such evidence is vital for policymakers in resource-constrained environments, enabling strategic targeting of investments toward the most impactful areas, whether that be enhancing ICT infrastructure, improving affordability, or stimulating transaction volumes in digital finance and trade. This targeted approach aligns policy priorities with empirically validated pathways to economic expansion in the digital era.

8.1.2 Summary of Key Insights

- From these analyses, three core insights emerge:
  a. Digital infrastructure is a structural enabler, but its benefits are limited if data affordability is not addressed.
  b. Mobile money scale is strongly associated with digital GDP, emphasizing the importance of expanding transaction density and merchant adoption.
  c. Proactive regulatory and institutional frameworks correlate with stronger infrastructure deployment and higher digital usage, underscoring the role of coordinatedpolicy.

- The findings carry clear implications for stakeholders:
  a. For the government, targeted expansion of broadband and 4G networks, interventions to improve affordability, and integrated policy coordination are recommended.
  b. For the private sector, monitoring mobile money metrics, regional coverage, and data pricing trends provides actionable market insights.
  c. For regulators, the results highlight the importance of interoperability, infrastructure sharing, and transparent affordability monitoring.

These insights suggest that investments in affordable digital infrastructure, combined with policies to scale digital payments and digital trade, provide the most effective pathway to maximizing the ICT sector's contribution to Ghana's GDP.

8.2 THE ROLE OF ICT IN SERVICE-SECTOR PERFORMANCE AND NATIONAL GDP (2014–2022)

This section examines ICT's growth and how it correlates with other sectors. The goal is to move beyond headline statistics to uncover the underlying dynamics, identify leverage points, and recommend evidence-based policies that can amplify ICT's multiplier effects across the entire economy. The dataset underpinning this report spans the period 2014 to 2022 and includes annual growth rates for key economic sectors: agriculture, manufacturing, trade, transport and storage, education, finance and insurance, power and utility (electricity), and ICT, alongside real GDP growth.

8.2.1 Presentation and Analysis of Results

The Sector Growth Correlation Matrix (Figure 126) demonstrates that ICT growth is largely uncorrelated with most other sectors. The correlation coefficient between ICT and GDP is a mere 0.03, indicating virtually no linear association over the period. Similarly, ICT exhibits weak or even negative correlations with critical sectors, including Finance & Insurance (-0.78), Manufacturing (-0.63), and Trade (-0.66). This suggests that ICT's expansion has not been synchronised with the performance of traditional drivers of growth. In contrast, strong positive correlations exist between GDP and sectors like Trade (0.88) and Transport & Storage (0.37), reinforcing their role as stabilising pillars of the economy.

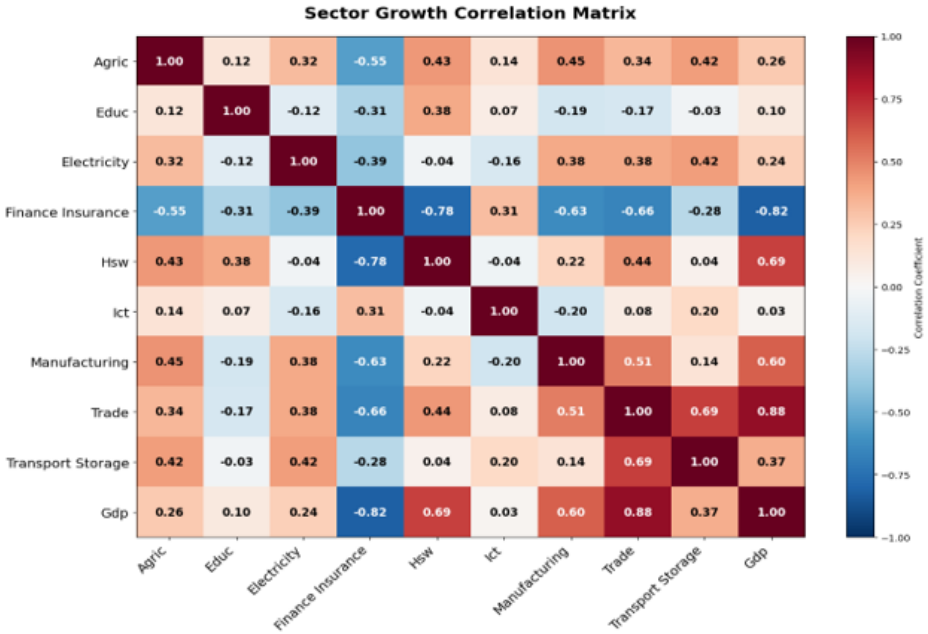


Figure 126: Sector Growth Correlation Matrix (2014–2022).

The correlation matrix reveals that ICT growth is largely uncorrelated with most other sectors, including GDP (correlation = 0.03). Strong negative correlations exist between ICT and Finance & Insurance (-0.78) and Trade (-0.66), suggesting limited integration or even competitive displacement. In contrast, GDP shows strong positive links with Trade (0.88) and Transport & Storage (0.37), highlighting their stabilising role in the economy.

The 2D Kernel Density Plot and Rolling Correlation Chart (top right in Figure 127) illustrate the non-linear and evolving nature of the ICT-GDP relationship. The kernel density plot indicates that high ICT growth (i.e., above 30%) often coincides with moderate GDP growth (approximately 3-6%), but rarely with very high GDP growth. More critically, the 3-year rolling correlation between ICT and GDP growth shifted dramatically: from negative values (-0.785 in 2016) to strongly positive (0.919 in 2020), before moderating to 0.740 in 2021. This implies that the linkage between ICT and GDP is not static; it has strengthened in recent years, possibly due to pandemic-induced digital adoption, but remains fragile and context-dependent.

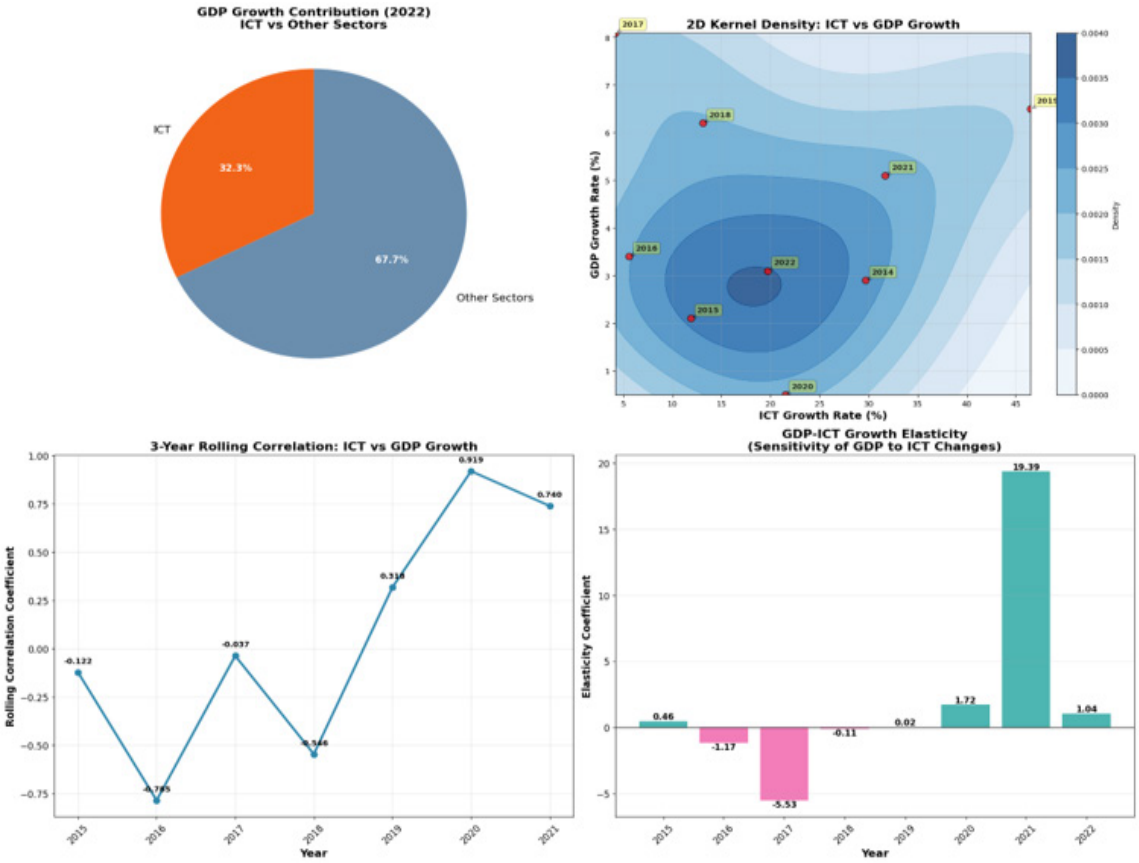


Figure 127: Multi-Panel Analysis – ICT vs GDP Dynamics (2014–2022)

This panel illustrates the evolving and often volatile relationship between ICT and GDP growth. The pie chart (top left) shows ICT contributed 32.3% to GDP growth in 2022 significant but still secondary to "Other Sectors." The 2D kernel density plot (top right) reveals that high ICT growth rarely coincides with very high GDP growth. The rolling correlation (bottom left) shows a dramatic shift from negative to strongly positive linkage since 2019, while the elasticity chart (bottom right) highlights extreme sensitivity in 2021 (elasticity = 19.39), indicating episodic rather than sustained macroeconomic impact.

The Elasticity and Contribution Charts (bottom right in Figure 128) quantify ICT's marginal impact on GDP. The elasticity chart shows that in 2021, a 1% increase in ICT growth was associated with a 19.39% increase in GDP growth, a massive multiplier effect, but this was an outlier. In most years, including 2017 (-5.53) and 2016 (-1.17), the elasticity was negative, meaning ICT growth actually coincided with slower GDP growth. The pie chart for 2022 confirms that ICT contributed only 32.3% to GDP growth, despite its large value-added base, underscoring its limited macroeconomic influence relative to its size.

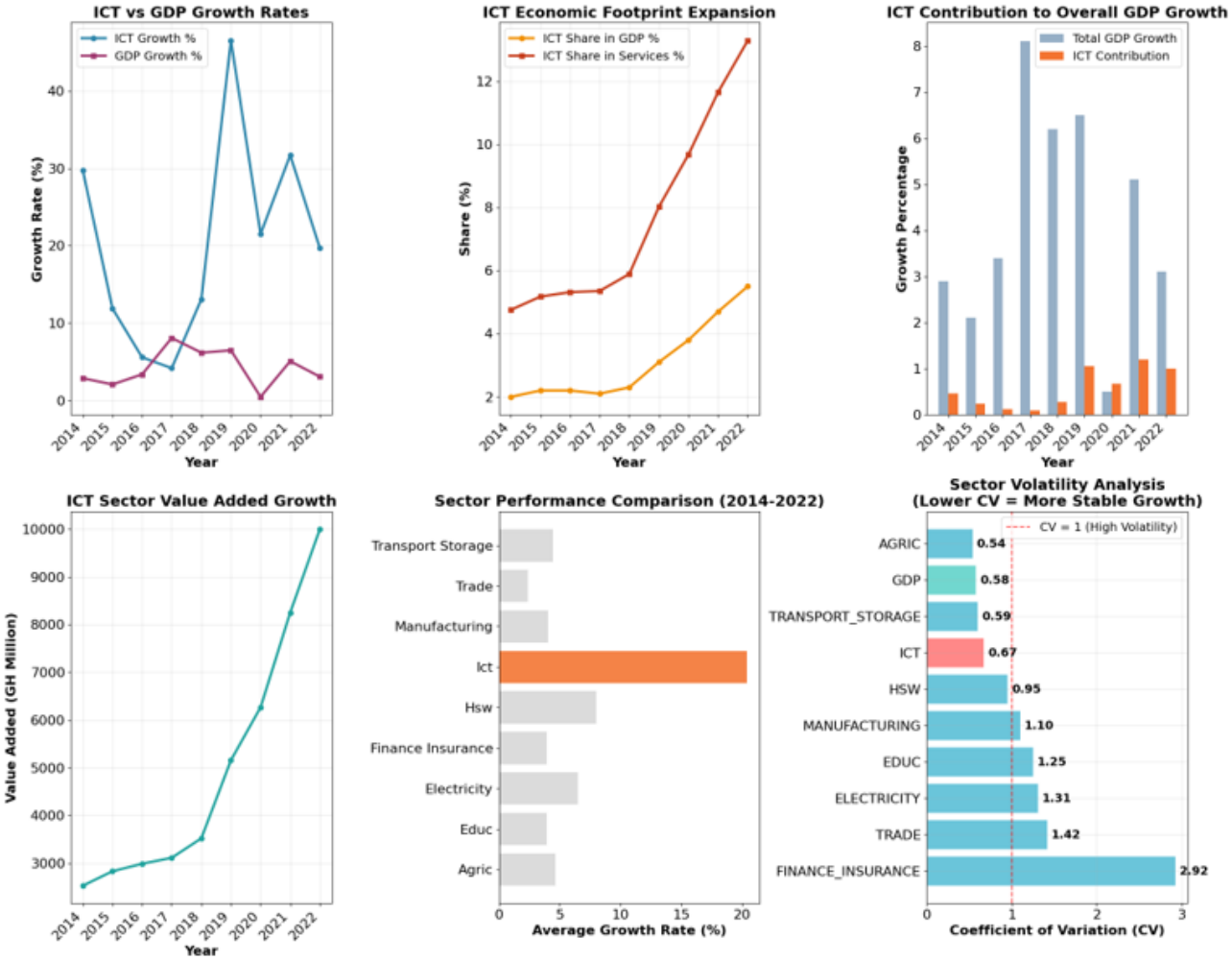


Figure 128: Growth Trends, Value Added, and Volatility Profile of the ICT Sector (2014–2022).

ICT has been the fastest-growing sector (avg. 20.5%) but also one of the most volatile (CV = 0.67), trailing only Finance & Insurance (CV = 2.92) in instability. While its share in GDP and services has risen steadily (left panels), its contribution to GDP growth remains modest (≤1.2 percentage points annually). The bar chart comparing average growth rates confirms ICT's dominance, yet the volatility analysis warns that without stabilisation mechanisms, this growth may remain episodic rather than structural.

The Trend and Volatility Analyses displayed in Figure 128 paint a picture of explosive but unstable growth. ICT's average growth rate (20.5%) far outpaces all other sectors, but its coefficient of variation (CV = 0.67) is higher than stable sectors like Agriculture (0.54) or GDP itself (0.58), indicating greater instability.

Predictive modelling provides forward-looking insights into ICT's trajectory through 2025, offering both opportunities and warnings for policymakers. The results, as displayed in Figure 129, suggest continued upward trajectories for ICT's share in GDP and value-added, potentially reaching 6–10% of GDP and GH¢15–20 billion by 2025 (Figure 129). However, the growth rate projection shows significant divergence among models, highlighting uncertainty about future sustainability.

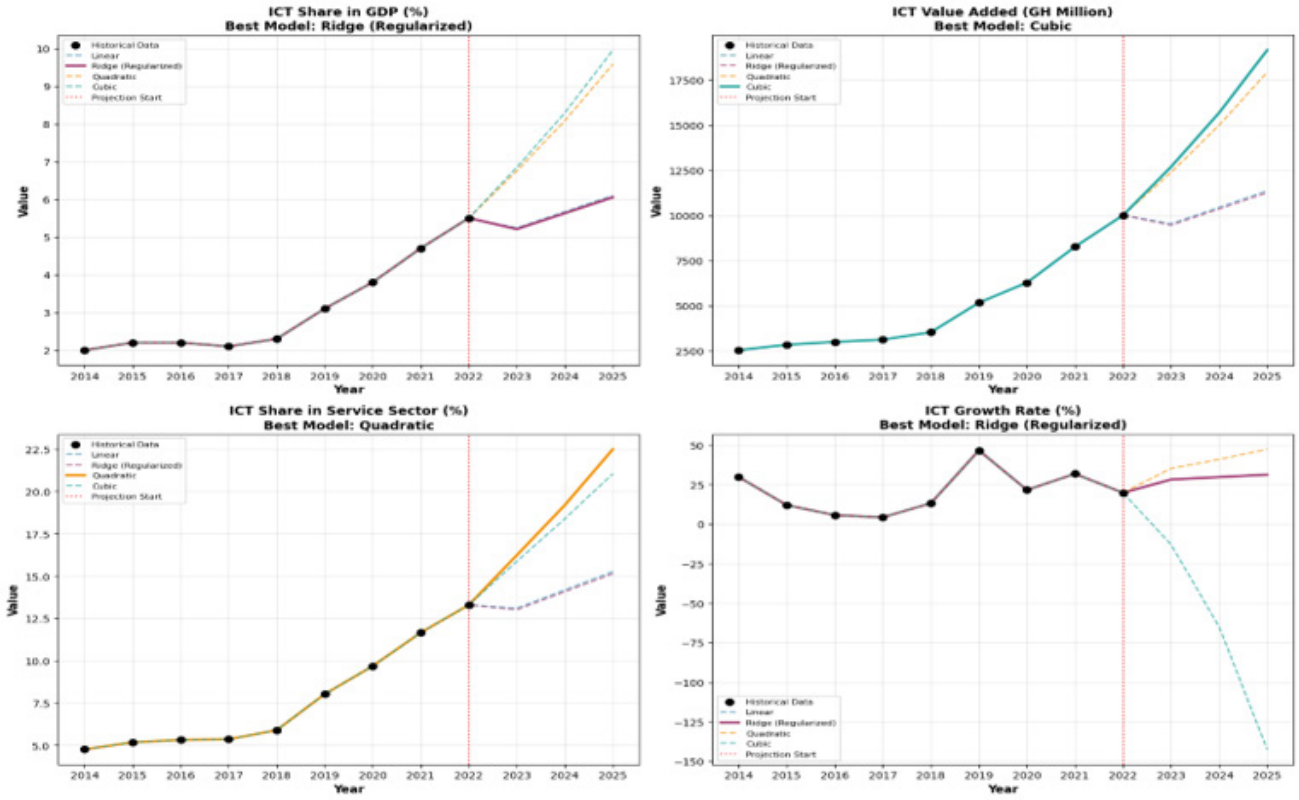


Figure 129: Projections of ICT Economic Indicators (2014–2025)

Projections using best-fit models (Ridge, Cubic, Quadratic) suggest continued expansion of ICT's economic footprint through 2025. ICT's share in GDP could reach 6–10%, and value-added may exceed GH¢15 billion. However, growth rate projections diverge sharply after 2022, reflecting uncertainty about sustainability. Policymakers should treat these forecasts as scenarios requiring active intervention to ensure stable, inclusive growth.

8.2.2 Discussion of Findings

The findings collectively point to a paradox: ICT is simultaneously Ghana's fastest-growing sector and one of its least integrated with the broader economy. Its explosive growth is real and measurable, reflected in soaring value-added and expanding market shares. Yet, its contribution to GDP growth remains inconsistent and often negligible, suggesting that ICT's benefits are concentrated within its own ecosystem rather than diffusing outward to boost productivity in agriculture, manufacturing, or formal finance.

The low correlation between ICT and other sectors is particularly concerning. It implies that ICT-led innovations, such as mobile money, digital payments, or e-commerce platforms, are not yet effectively embedded into the production processes of other industries. For instance, while trade grew robustly (at an average annual rate of 5.1%), its correlation with ICT was negative (-0.66), suggesting that

digital tools have not yet become a primary enabler of trade efficiency. Similarly, the strong negative correlation between ICT and Finance & Insurance (-0.78) may reflect regulatory fragmentation or competition between fintech and traditional financial institutions, rather than synergy.

The volatility of ICT growth further complicates its role as a reliable engine of development. High growth rates in 2019 and 2021 were likely driven by specific events (e.g., fintech booms, pandemic-induced digitisation), but these were not sustained. The sharp drop in 2020 (to 4.7%) and 2022 (to 19.7%) underscores the sector's sensitivity to external shocks and policy environments. Without mechanisms to smooth this volatility, such as supportive regulation, skills development, or infrastructure investment, ICT's growth may remain episodic rather than structural.

Finally, the projections offer both promise and caution. While models predict continued expansion of ICT's economic footprint, the wide divergence in growth rate forecasts signals uncertainty about whether this growth will be self-sustaining or dependent on temporary factors. Policymakers must therefore focus not just on sustaining ICT's momentum, but on building the institutional and infrastructural foundations that allow its benefits to permeate the wider economy.

8.3 POLICY DIRECTION AND RECOMMENDATIONS

To transform ICT from a standalone growth story into a systemic driver of inclusive and resilient development, Ghana must adopt a policy strategy focused on integration, stability, and capacity-building:

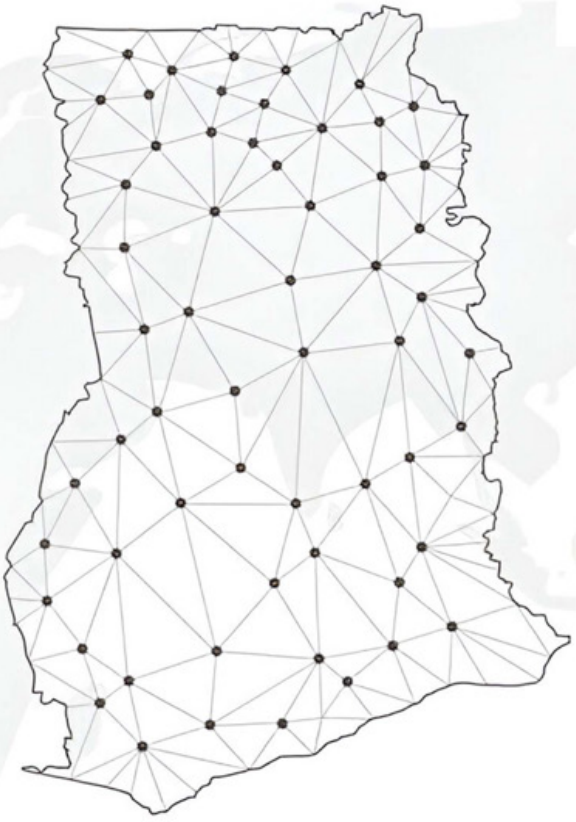
a. Foster Sectoral Linkages Through Targeted Innovation Hubs: Establish sector-specific digital innovation hubs (e.g., AgriTech, FinTech, EdTech) to co-develop solutions that directly address productivity bottlenecks in agriculture, manufacturing, and education. These hubs should involve public-private partnerships and be mandated to measure and report on cross-sectoral spillovers.
b. Strengthen Regulatory Coordination to Reduce Fragmentation: Create a unified digital economy task force under the Ministry of Finance or the Office of the President to harmonise regulations across ICT, finance, transport, and commerce. This would reduce regulatory arbitrage and encourage synergies, for example, by aligning fintech licensing with financial inclusion goals.
c. Institutionalise Data Collection on ICT Spillovers: Mandate the Ghana Statistical Service to develop a quarterly "Digital Economy Multiplier Index" that tracks not just ICT growth, but its contribution to productivity, employment, and output in other sectors. This would provide real-time feedback for policy adjustment.
d. Invest in Human Capital and Digital Literacy Beyond Urban Centres: Expand digital skills training programs to rural areas and informal sector workers, ensuring that the benefits of ICT are not confined to urban elites. Integrate basic digital literacy into secondary and vocational curricula.
e. Implement Counter-Cyclical Stabilisation Mechanisms for ICT: Given the sector's high volatility, introduce fiscal buffers (e.g., a Digital Sector Stabilisation Fund) to support SMEs during downturns and incentivise long-term investment through tax credits for R&D and export-oriented digital services.
f. Leverage Predictive Modelling for Strategic Planning: Use the projection models presented here to set realistic medium-term targets for ICT's share in GDP and value-added, and tie budgetary allocations to achieving these targets. Prioritise investments in infrastructure (e.g., broadband, data centres) that underpin sustained growth.
g. Promote Export-Oriented Digital Services: Develop a national strategy to position Ghana as a

regional hub for digital services (e.g., software development, business process outsourcing), targeting markets in West Africa and beyond. This would diversify revenue streams and reduce domestic dependency.

The data unequivocally show that ICT has become a defining feature of Ghana's economic landscape.

The path forward requires a fundamental shift in policy orientation from viewing ICT as a sector to be developed in isolation to seeing it as a platform to be integrated into every facet of economic life. By fostering cross-sectoral linkages, reducing regulatory fragmentation, investing in human capital, and institutionalising data-driven monitoring, Ghana can ensure that its digital revolution delivers not just technological advancement, but genuine, widespread, and sustainable economic prosperity.

BENCHMARK REPORT



9.0 BENCHMARKING AND COMPARATIVE ANALYSIS

The study utilized the Digital Economy Index (DEI) to compare five Sub-Saharan African countries: Rwanda, Nigeria, Ghana, South Africa, and Kenya. These countries were chosen because they each have different experiences with digitalization. South Africa, for example, is among the most advanced digital economies on the continent, with relatively high internet access and strong ICT infrastructure. Kenya is known globally for its leadership in mobile money and digital finance. Ghana has steadily improved access and expanded digital services. Rwanda, although a smaller economy, has undertaken ambitious government-led digital projects such as the Smart Rwanda Master Plan. Nigeria, Africa's largest economy by both population and GDP, has a vibrant tech sector but still faces issues with infrastructure and inclusive access.

The construction of a composite DEI enables us to systematically and comparably capture these differences. The index combines multiple indicators reflecting key aspects of the digital economy, including internet use, mobile connectivity, e-government readiness, digital financial inclusion, and secure digital infrastructure. Each of these variables plays an essential role: internet and mobile connectivity indicate how well populations can access digital services; e-government readiness demonstrates the ability of governments to provide online public services; digital finance assesses financial inclusion through technology; and secure servers represent the technical capacity for safe and reliable online transactions.

9.1 OBJECTIVES FOR BENCHMARKING

Benchmarking is particularly important in this context. By creating a composite index, countries can be assessed not only in isolation but also in relation to their peers. The benchmarking is aimed at:

a. Identifying the relative strengths and weaknesses of these countries. For instance, Kenya's high performance in digital finance can serve as a learning model for Nigeria, while South Africa's progress in infrastructure investment may guide Rwanda and Ghana.
b. Allowing policymakers to track progress over time and evaluate whether national digital strategies are yielding the desired results when compared to regional and global best practices (World Bank, 2020).

The study provides a more holistic picture of digital transformation in the selected countries by combining these variables into a single index. This approach avoids the limitations of focusing on a single indicator and instead highlights the multidimensional nature of digital development. The DEI thus serves as a tool to assess comparative strengths and weaknesses, offering insights into how different policy approaches, investments, and innovations are shaping the digital economy in Sub-Saharan Africa. By presenting a comparative analysis through the DEI, the study contributes to ongoing discussions about how African countries can harness digitalization to drive inclusive and sustainable economic growth.

9.2 DIGITALIZATION FRAMEWORK ON ECONOMIC PERFORMANCE

The simplified framework in Figure 130 illustrates the pathway through which digitalization influences economic performance.

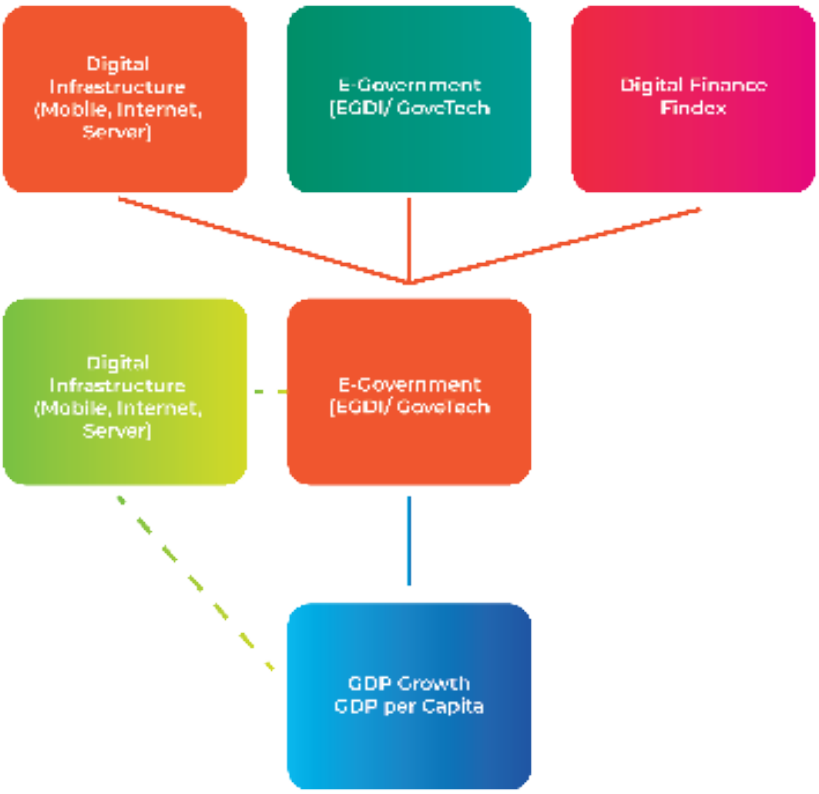


Figure 130: Digital Economy Inputs Aggregated into the DEI & Linked to GDP Growth

The simplified framework illustrates the pathway through which digitalization influences economic performance. Three key pillars constitute the foundation of the Digital Economy Index (DEI):

a. Digital infrastructure (internet penetration, mobile connectivity, and secure servers)
b. E-government readiness (captured by the EGDI and GovTech indices)
c. Digital finance adoption (proxied by indicators from the Global Findex database).

These pillars are aggregated to provide a composite measure of the digital economy, enabling cross-country benchmarking and comparability. The DEI is subsequently linked to GDP growth and GDP per capita, which serve as measures of economic performance. In addition, a set of control variables, including education, trade openness, foreign direct investment, inflation, and urbanization, is incorporated, as they may simultaneously influence both digital development and economic outcomes. This framework, therefore, underscores the expectation that improvements in digital infrastructure, government digitalization, and financial inclusion contribute positively to economic growth while accounting for other macroeconomic and structural drivers.

By situating the study within this conceptual framework, the analysis not only highlights the multiple dimensions of the digital economy but also justifies the need for a composite index approach. The framework serves as a bridge between the background discussion and the empirical analysis, ensuring that the selection of indicators and their aggregation into the DEI are theoretically sound, policy-relevant, and empirically testable. This transition from conceptual design to applied measurement provides the foundation for assessing how Rwanda, Nigeria, Ghana, South Africa, and Kenya compare in leveraging digital transformation for economic growth.

9.2.1 Indicators and Data Sources

Six variables were selected based on their relevance and availability for the most recent periods (2021–2023).

Indicators	Source
Internet Use (% of population, 2022)	World Bank World Development Indicators
Mobile Connectivity Index (MCI, 2022)	GSMA Intelligence
E-Government Development Index (EGDI, 2022)	United Nations E-Government Survey
GovTech Maturity Index (GTMI, 2022)	World Bank GovTech Global Report
Digital Finance Adoption (2021):	Global Findex Database, share of adults with digital payments or mobile money accounts.
Secure Internet Servers (2023):	World Bank, log-transformed per million people.

Table 5: Digital Economy Index Indicators

9.2.2 Index Construction

- Each indicator was normalized using min-max scaling:

$$X_i^* = \frac{X_i - \min(X)}{\max(X) - \min(X)}$$

- where X_i is the original value, and X_i^* is the normalized score between 0 and 1. The composite index was then computed as a weighted sum:

- *DEI* = 0.15·Int. Use∗+0.15·MCI∗+0.15·EGDI∗+0.15·GTMI∗+0.25·Dig. Fin.∗+0.15·Sec. Ser.∗

Weights were chosen to balance infrastructure, governance, and inclusion dimensions, with higher emphasis on digital finance due to its transformative role in Sub-Saharan Africa.

Country	Internet	MCI	EGDI	GTMI	Finance	Servers	DEI
Rwanda	0.000	0.000	0.181	0.25	0.658	0.000	0.229
Nigeria	0.120	0.083	0.000	0.00	0.000	0.261	0.070
Ghana	0.453	0.250	0.059	0.10	0.438	0.159	0.263
South Africa	1.000	1.000	1.000	1.00	0.877	1.000	0.969
Kenya	0.188	0.500	0.590	0.50	1.000	0.411	0.578

Table 6: Digital Economy Composite Index (Normalized Scores and Final Index, 2021–2023 data)

Note: Values are normalized using min–max scaling. A value of 0.000 does not indicate the absence of the indicator in reality; it simply represents the country with the lowest observed score among the five countries in the dataset. For example, Rwanda's 0.000 for Internet use means it had the lowest penetration rate in the sample, not zero internet access.

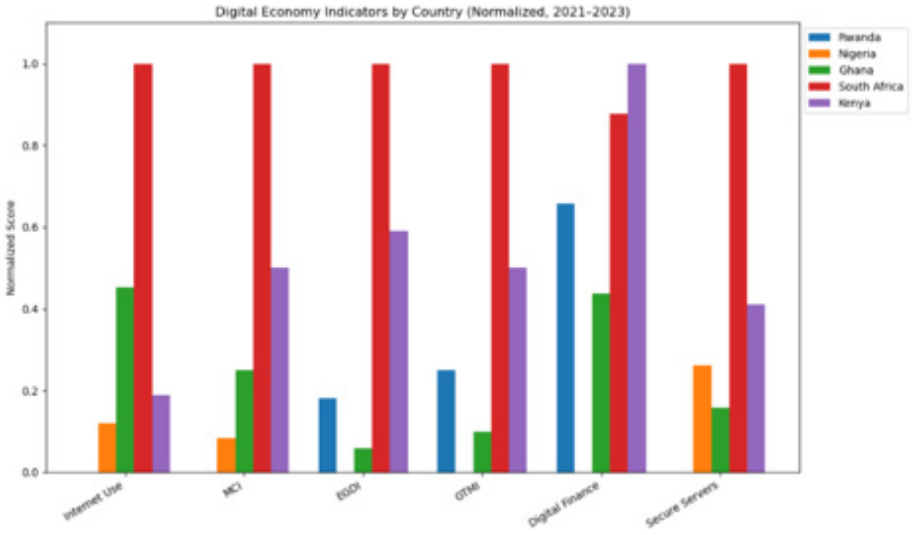


Figure 131: Digital Economy Indicators by Country (Normalized, 2021–2023)

Figure 131 illustrates the comparative DEI scores across the five countries. The bar chart highlights South Africa's leading position, followed by Kenya, while Nigeria lags considerably.

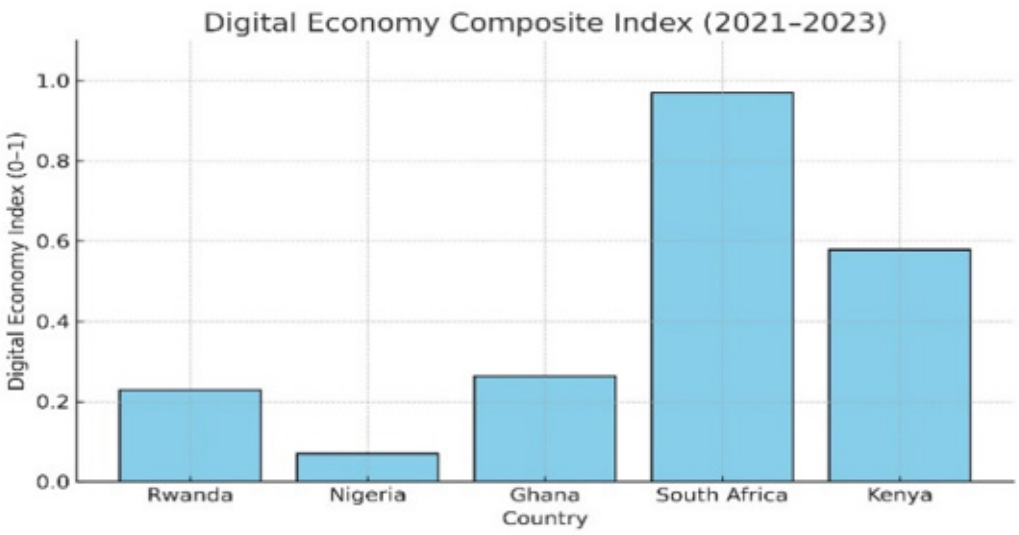


Figure 132: Digital Economy Composite Index (2021–2023)

The results of the Digital Economy Composite Index highlight important differences across the five countries: Rwanda, Nigeria, Ghana, South Africa, and Kenya. These results show how well each country is progressing in using digital technologies to support economic growth, based on indicators such as internet use, government readiness, financial technology, and digital infrastructure. First, South Africa stands out as the clear leader across almost all indicators. The country has the highest internet penetration, strong digital infrastructure, and advanced e-government services. It is also projected to lead Sub-Saharan Africa in smartphone connections by 2030 and remains the only country to set a timeline to phase out 2G and 3G networks by 2027 (GSMA Intelligence, 2024).

It also performs very well in mobile connectivity and secure internet servers, which are critical for safe online transactions. The strong performance reflects South Africa's relatively mature ICT sector and long-standing investments in digital technology. This can be attributed to the country serving as a landing point for the numerous submarine cables, such as Google's Equiano, 2Africa, SAT-3/WASC, SAFE, SEACOM, amongst others, which not only connect the country to the rest of the world but also position South Africa as a regional hub for digital traffic in Africa.

Kenya comes second overall, driven mainly by its global reputation in mobile money and digital finance. Kenya has earned the nickname "Silicon Savannah" due to its digital prowess. Kenya scores the highest in mobile-based digital finance thanks to systems like M-Pesa, which has revolutionized how people transfer and save money. The number of registered mobile money accounts more than tripled from 25 million to 77 million between 2013 and 2023, reflecting a penetration of 60% to 150% (GSMA, 2025). Although Kenya lags behind South Africa in areas such as internet penetration and digital infrastructure, its strong performance in digital finance has helped it achieve a competitive position. Initiatives such as the Digital Superhighway Project and the Kenyan Digital Economy Acceleration Project (KDEAP) seek to expand infrastructure further, create smart village hubs, improve digitization of government services, and develop skills for the digital economy.

Ghana ranks in the middle of the group. The country has made progress in expanding internet access and improving its government digital services. Mobile voice and data penetration stood at 114% and 75.42%, respectively, at the end of Q2 2024 from the three mobile network operators in Ghana, namely AT, MTN, and Telecel. MTN maintains its position as the market leader for both voice (75.41%) and data subscriptions (80.50%), followed by Telecel and AT in second and third positions. (National Communications Authority, 2024). Its performance is not as high as South Africa's or Kenya's, but it still shows positive movement in building a more digital-friendly economy. For instance, Ghana's mobile money sector is growing fast, providing opportunities for financial inclusion, even though secure digital infrastructure is less developed compared to leading countries. Between 2020 and 2023, the number of registered mobile money accounts in Ghana grew from 39 million to 66 million, reflecting a penetration increase from 130% to 200% (GSMA, 2025).

Rwanda presents a mixed picture. On one hand, the government has shown a strong commitment to digital transformation through initiatives such as the Smart Rwanda Master Plan. This explains its relatively better performance in e-government readiness. On the other hand, the country still struggles with low internet penetration and limited secure digital infrastructure, which reduces its overall digital economy score. Despite near-universal mobile broadband coverage (99%), actual internet use remains low due to limited smartphone ownership and high costs, especially for low-income groups (Bermeo & Santoro, 2025). This suggests that while Rwanda has strong policy ambitions, it still faces structural challenges in implementation.

Finally, Nigeria scores lower than expected despite being Africa's largest economy by population and GDP. The results show gaps in government digital readiness and weak progress in secure online services. Internet penetration is largely driven by mobile connections, which account for over 140 million subscriptions, yet broadband services reach only about 48% of the population (NCC, 2025). Despite these challenges, the telecom industry has become a major economic driver, contributing between 13% and 16% of Nigeria's GDP over the past five years (NCC, 2024). Although Nigeria has a vibrant tech start-up ecosystem, the lack of widespread digital infrastructure and limited government digital capacity hold back its overall digital economy performance.

In summary, these results show that South Africa leads the group with a well-rounded digital economy, followed by Kenya, which excels in digital finance but lags in infrastructure, and Ghana, which

shows balanced but moderate progress. Rwanda and Nigeria face more challenges, especially in infrastructure and security services. However, Rwanda benefits from strong government commitment, while Nigeria has the potential of its large tech sector if infrastructure gaps are addressed. This comparison suggests that while Sub-Saharan Africa is making progress in digital transformation, the speed and depth of change vary significantly. Policymakers can learn from each other: for example, Kenya's success in mobile finance could be adapted in Rwanda or Nigeria. At the same time, South Africa's infrastructure strategies may offer lessons for Ghana and Kenya.

9.3 BEST PRACTICES IN DIGITAL TRANSFORMATION

The comparative analysis of the Digital Economy Indicators highlights several best practices from across the African region.

a. South Africa emerges as the leading performer across most dimensions, particularly internet penetration, secure servers, and overall readiness. This reflects the global best practice that strong digital infrastructure and policy alignment are critical drivers of transformation.
b. Kenya's outstanding performance in digital finance, driven by mobile money innovations, illustrates how inclusion-oriented financial technologies can accelerate adoption and economic participation. Similar approaches have been successfully implemented in other global contexts, where mobile-based solutions bridge financial gaps for underserved populations.
c. Rwanda's emphasis on leveraging mobile platforms for service delivery also underscores the importance of adaptability and innovation in resource-constrained environments.

9.4 RECOMMENDATIONS FOR GOVERNMENT AND STAKEHOLDERS

Based on the findings, the following actionable recommendations are proposed to enhance digital transformation efforts:

a. Expand Internet Access (Rwanda & Nigeria): Internet use scores are critically low (0.000 and 0.120, respectively). Investment in affordable broadband, last-mile connectivity, and public-private partnerships is essential to expand digital inclusion.
b. Strengthen e-Government and Digital Governance (Ghana): Despite moderate internet access, Ghana's EGDI score is low (0.059). Lessons can be drawn from South Africa and international cases such as Estonia by integrating digital ID systems, citizen portals, and transparent online services.
c. Leverage Digital Finance Success (Kenya): Kenya's top score in digital finance (1.000) demonstrates the transformative potential of fintech innovation. Other countries should replicate mobile money models, scale up fintech ecosystems, and promote cross-border payment frameworks.
d. Invest in Cybersecurity and Secure Servers (Rwanda & Nigeria): Both countries recorded near-zero scores in secure servers. Strengthening cybersecurity infrastructure, promoting data protection frameworks, and building trusted e-commerce platforms are vital for sustainable growth.
e. Promote Digital Skills Development (All Countries): Infrastructure alone is insufficient without human capacity. Digital literacy, coding, data science, and AI training programs should be mainstreamed into education systems and workforce development.
f. Enhance Regional Cooperation: South Africa's leadership provides a benchmark. Sharing best practices and aligning strategies under the African Union Digital Transformation Strategy will accelerate regional innovation and help close gaps across countries.

▸ BOX 1

Benchmark Key Highlight

South Africa demonstrates the effectiveness of infrastructure-led growth, Kenya highlights financial inclusion as a catalyst, and Ghana illustrates the need to bridge e-government gaps. At the same time, Rwanda and Nigeria emphasize the importance of foundational internet access and cybersecurity infrastructure.

FUTURE OUTLOOK



10.0 FUTURE OUTLOOK

10.1 GHANA'S DIGITAL INVESTMENT PRIORITIES

A macro-level analysis of the data reveals a clear consensus on how Ghana should prioritize its digital investments. The most striking finding is the overwhelming focus on human capital. "Digital Skills and Research" and "Digital Infrastructure" rank as the top two priorities across almost every economic sector. This shows a national recognition that a competitive digital economy requires both a capable population and the physical networks to support them.

10.1.1 Sectors Prioritizing Digital Skills

Ghana's primary asset is its people, and the data suggests that the most urgent need is human capability rather than hardware. Agriculture (24.13%), Health (23.88%), Education (23.86%), Banking (23.60%), and E-Commerce (23.13%) all cite skills development as their primary requirement. This demand creates a strong case for national-scale training programs. A skilled workforce is the only way to convert digital potential into actual economic value, addressing a gap that the World Bank previously identified as a major constraint on local productivity.

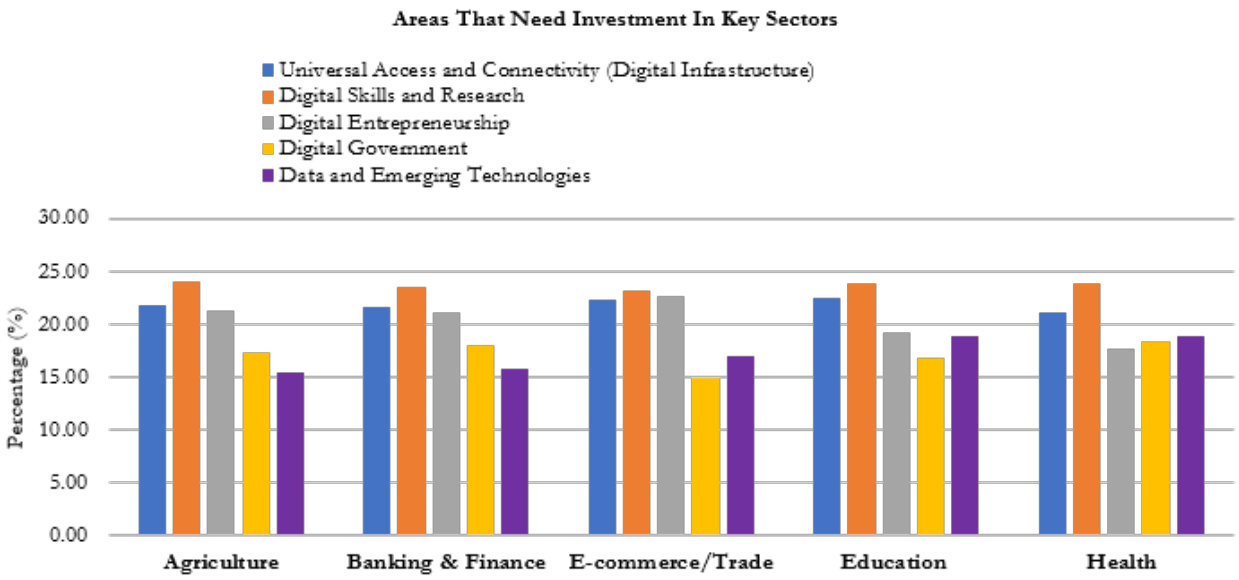


Figure 133: Areas Needing Investment in Key Sectors

10.1.2 Sectors Prioritizing Infrastructure

While most focus on skills, a critical subset identifies infrastructure as the most pressing bottleneck. These sectors typically have large physical footprints and rely on constant connectivity to function. Education (22.18%), Manufacturing (22.57%), and Transport & Logistics (22.78%) report that a lack of reliable internet directly limits their ability to adopt modern tools. The problem is most acute in rural areas where penetration remains far below urban levels. By targeting these specific connectivity gaps, the government can boost GDP and create jobs in underserved communities.

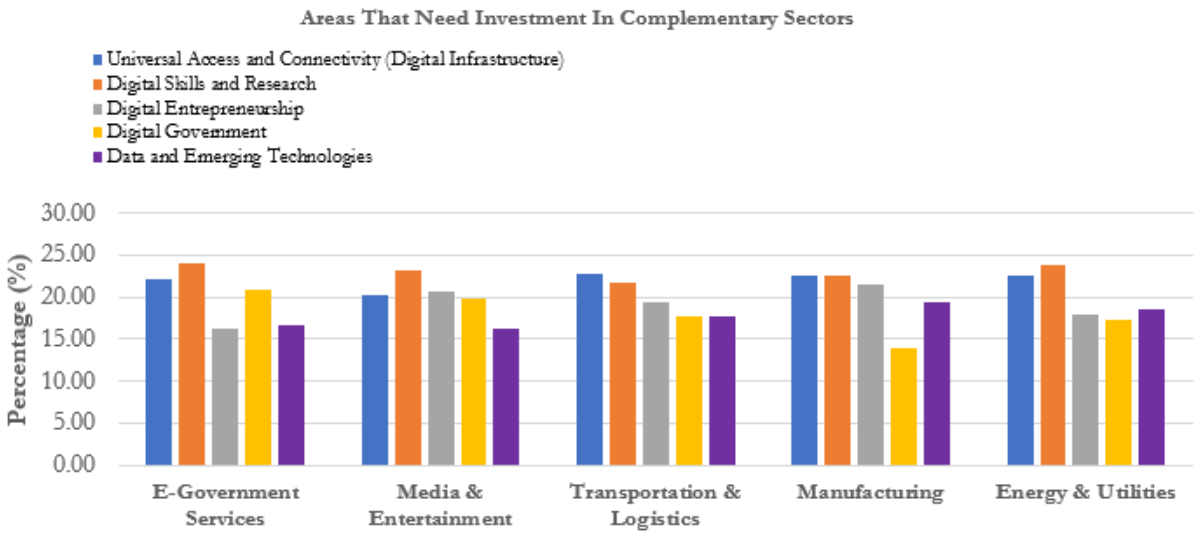


Figure 134: Areas Needing Investment in Complementary Sectors

10.1.3 Other Investment Priorities

Beyond the top two needs, "Data and Emerging Technologies" is emerging as a secondary priority. This trend shows that sectors like E-commerce (16.98%), Health (19.30%), and Government Services (21.50%) are moving beyond basic digitization to explore AI, analytics, and blockchain. Digital entrepreneurship also ranks highly in Media (20.18%) and Agriculture (20.39%), reflecting the role of startups as engines of innovation. Meanwhile, "Digital Government" is viewed less as a direct investment area and more as an essential background function that enables everything else.

▸ BOX 2

DIGITAL INVESTMENT PRIORITIES HIGHLIGHTS

Digital skills & research is the top priority across most of the economic sectors, confirming that human capital is the base of transformation. Infrastructure follows closely, especially for sectors with high physical operations. High-growth opportunities now exist for those ready to use AI or join the startup ecosystem.

10.2 UNDERSERVED DIGITAL SOLUTIONS BY ZONE

Demand for digital services varies significantly across the country, revealing specific gaps where the current supply falls short. These unmet needs (Figure 88) highlight the most viable entry points for new investment and policy action across the zones.

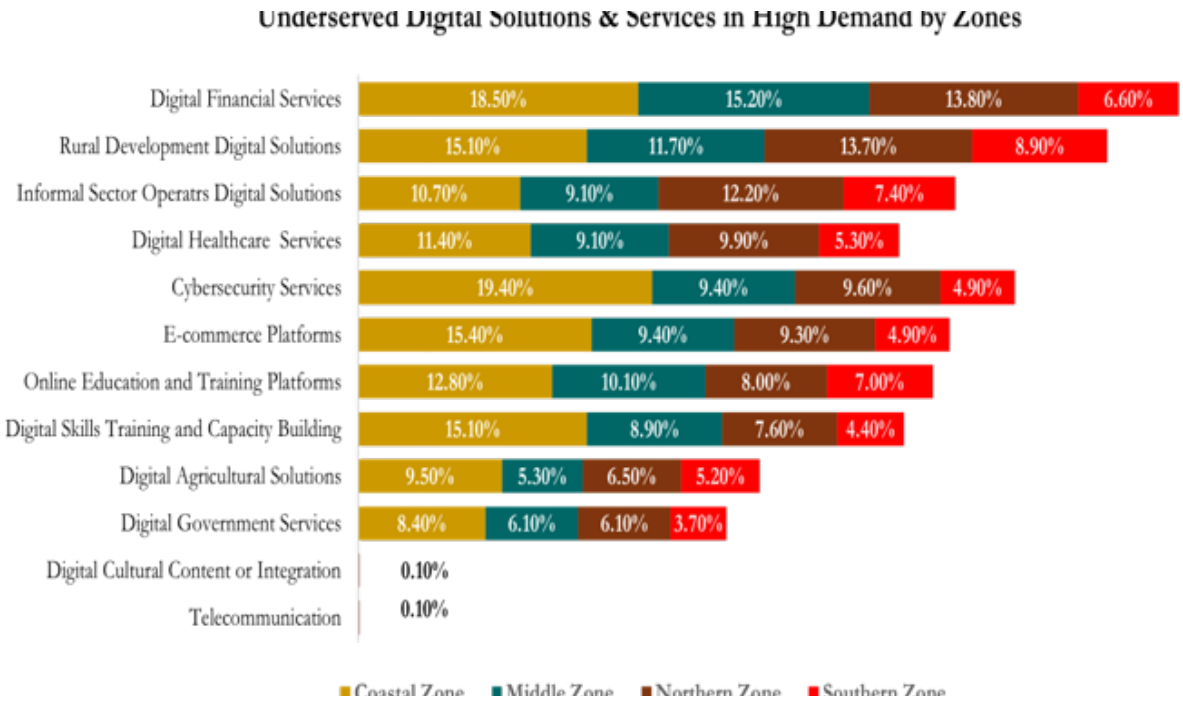


Figure 135: Underserved digital solutions and services in high demand by zones

The Coastal Zone seems like a primary hub for advanced digital services, where high transaction volumes have created a sophisticated but vulnerable market. This maturity is reflected in the zone's intense demand for cybersecurity at 19.40%, followed closely by fintech and e-commerce at 18.50% and 15.40%, respectively. Such figures may indicate that as digital adoption deepens, the focus naturally shifts toward protecting assets and securing the digital exchange of value against fraud.

Moving inland, the Middle Zone presents a different set of priorities centered on balanced infrastructure and social transition. Here, the most obvious gaps appear in rural development solutions at 11.70% and online education at 10.10%, pointing to a workforce eager to bridge the divide between traditional labor and the modern economy. This suggests that residents in these areas may actively seek the digital skills and agricultural tools necessary to improve their livelihoods in a changing landscape.

Further north, the focus shifts even more heavily toward basic economic inclusion and the needs of the underserved. The Northern Zone shows concentrated demand for financial services at 13.80% and rural development at 13.70%, highlighting a large unbanked population currently operating outside formal systems. The demand for informal sector solutions at 12.20% confirms that people in this region are looking for alternative, digitally enabled ways to save, borrow, and participate in trade.

Comparatively, the Southern Zone reports the most modest demand across these categories, led by rural development and informal sector solutions at 8.90% and 7.40%. The relatively low demand for financial services, at just 6.6%, implies that this region either enjoys better existing inclusion or represents an emerging market that is only beginning to find its digital footing. Together, these zonal variations demonstrate that a single national strategy must be flexible enough to address both the high-end security needs of the coast and the foundational access requirements of the interior.

10.3 SYNTHESIS OF RESPONDENT RECOMMENDATIONS

Respondents suggest several clear paths to accelerate the digital economy. First, they emphasize that the high cost of data and devices remains a major barrier. They suggest tax reforms and subsidies to make access more affordable, alongside investments in national fiber networks and solar-powered connectivity for rural areas.

Second, there is a dominant call for human capital development. This includes making digital literacy compulsory from basic school to university/TVET and retooling teachers for a digital age. Respondents also recommend setting up innovation hubs to provide practical training for small businesses, women, and youth.

Third, trust and governance are major concerns. Weak enforcement of data laws and the rise of cyber fraud require a stronger regulatory response. Building trust will require transparent platforms and public campaigns that keep citizens informed about digital initiatives.

Finally, digital inclusion must be equitable. Policies must intentionally target marginalized groups, including rural populations and persons with disabilities. The consensus is that transformation must improve the livelihoods of everyone, not just those in urban centers. This means integrating digital tools for inclusive digital entrepreneurship, which the OECD (2023) explains as a strategy to offer all people an equal opportunity to create a successful business regardless of gender, age, or personal characteristics.

Failing to address these barriers creates a “missing” entrepreneurs challenge, which is largely a gender issue. According to the OECD (2023), if all societal groups were as active in starting and managing businesses as men aged 30 to 49, there would be an additional 34.1 million early-stage entrepreneurs across member nations. Because nearly three-quarters of these missing entrepreneurs are women, the lack of inclusive policy costs economies significant opportunities for job creation, growth, and innovation.

10.3.1 Spotlight: Inclusive Digital Entrepreneurship

Ghana’s startup ecosystem is growing, yet structural barriers still limit the participation of small businesses. The Ghana Statistical Service (2024) reports that the number of business establishments in the country tripled over the last decade, rising from 638,235 in 2014 to 1,867,695 in 2024. However, this surge in quantity has not translated into high survival rates; micro-sized businesses now account for 90.4% of all establishments, and approximately 70% of these small ventures fail within their first three years of operation due to systemic constraints (GSS, 2024; Business Coach Chris, 2025).

A major hurdle remains the difficulty in transacting globally. Even as the ecosystem records growth with 243 active startups now representing 12% of the West African market (StartupBlink, 2025), entrepreneurs often ask why the government has not created a system that allows them to receive payments from anywhere in the world easily. Skilled workers in the translation sector, for example, struggle to get paid for remote work, which restricts their ability to compete internationally. This friction in financial infrastructure is a key reason why many youth-led ventures struggle to scale, as current evidence suggests only 12% of such businesses remain active after three years (The High Street Journal, 2026).

Regulatory gaps also hurt growth. Policies exist, but without consistent enforcement, businesses face constant uncertainty. Weak oversight reduces investor confidence and makes it harder for small ventures to attract capital. Furthermore, poor service design in utilities where apps for payments are not linked to actual meters erodes trust and discourages people from using digital services.

The short-term outlook of some stakeholders also hinders progress. Entrepreneurs often face resistance because local partners focus on immediate costs rather than long-term gains. This environment makes it hard for startups in health or education to find early adopters, and many fold before they can prove their business model works.

The Ghana Innovation and Startup Bill, 2025, provides a roadmap to fix these issues. By creating a dedicated agency and a "startup labelling" system, the Bill offers tax breaks and specialized funding for verified businesses. It also reserves spots in incubators for women and rural founders, ensuring that digital growth spreads beyond Accra.

▸ BOX 3

DIGITAL INVESTMENT PRIORITIES HIGHLIGHTS

The Bill seeks to:

- Establish National Innovation and Startup Agency.
- Create a labeling system to officially recognize eligible startups for incentives.
- Offer tax relief and funding access for labeled enterprises.
- Improve coordination between government, schools, and private firms.

10.4 THE PULSE OF THE DIGITAL ECONOMY: A SPECTRUM OF PERSPECTIVES

Most respondents (63.94%) are optimistic about the future. They see digitalization as an engine for job creation, especially through fintech and mobile money. Government programs like "1 Million Coders" have built confidence by showing a clear commitment to literacy. This optimism is reinforced by the rapid changes seen in e-commerce and digital health.

However, nearly 27% of people are taking a "wait-and-see" approach. Their caution is born from poor internet quality, high costs, and a digital divide that leaves rural areas behind. They worry about the sustainability of current policies and the risks of online fraud. A small group (9.08%) is openly pessimistic. They believe Ghana relies too heavily on foreign technology, which they argue prevents the growth of a self-reliant local industry. For them, the digital divide is not just a gap but a systemic failure that hinders innovation from within. Addressing these concerns about trust, cost, and local ownership will determine if Ghana's digital potential becomes a permanent reality.

▸ BOX 4

SPECTRUM OF PERSPECTIVES HIGHLIGHTS

A majority are optimistic due to job growth and fintech success. However, concerns about digital divide affecting rural areas, issues with poor internet quality and high costs, reliance on foreign technology and a perceived lack of consistent government and private sector support for local innovation, and trust due to cybersecurity risks raise doubt of positive future outlook.

For Policymakers: Focus on foundational infrastructure and digital literacy to ensure growth is inclusive.

For Investors: Fintech and mobile money offer high potential. Opportunities also exist in solving rural connectivity and security gaps, and developing user-friendly digital applications.

11.0 CONCLUSION

Ghana's digital economy rests on genuine foundations. Mobile penetration exceeds 100% of the population, mobile money transaction volumes grew from GHS 1.1 trillion in 2022 to GHS 1.9 trillion in 2023, and the ICT sector now contributes an estimated 4% of GDP directly, with economy-wide spillovers pushing that figure to approximately 8%. These are not small achievements. They represent decades of deliberate policy effort, sustained private investment, and the adaptive ingenuity of Ghanaian entrepreneurs and citizens.

Yet this study arrives at a finding that demands honest acknowledgement. The economic modelling conducted across the period 2014 to 2022 reveals that ICT growth correlates negatively with Finance and Insurance at -0.78 and with Trade at -0.66, two of the traditional pillars of national economic activity. The ICT sector's correlation with overall GDP stands at a near-negligible 0.03. Ghana's digital economy is expanding in its own lane while the broader economy drives in another. That is the central challenge this report has worked to surface, and it defines the work that must now follow.

The evidence from the five foundational pillars is consistent on this point. Infrastructure is broadly in place, with 92.5% of respondents accessing services via smartphone, but data affordability and power instability keep much of that hardware operating below its productive potential. Digital finance has achieved near-universal mobile money adoption, but with 82.9% of users reporting fraud exposure and only 7.3% feeling very secure online, the platform on which the entire ecosystem rests is operating under a ceiling of eroded trust. Digital skills are widespread at 97.7% basic competency, but only 29.1% of respondents reach advanced proficiency, and 69.1% remain unaware of emerging technologies, meaning the diffusion gap between Ghana's most capable digital workers and the general workforce is widening.

E-commerce is active and growing, particularly through social commerce channels where women are disproportionately entrepreneurially engaged, but last-mile logistics costs and the absence of a national consumer protection framework keep adoption concentrated rather than mass market. Emerging technology adoption is high in enthusiasm but low in local grounding, with most AI tools deployed on datasets and models that do not reflect Ghanaian contexts, languages, or challenges.

The zonal analysis confirms that access is no longer the primary constraint for most of the country. The defining frontier is now the depth and productivity of digital use. The Northern Zone needs infrastructure and agritech integration as co-equal priorities. The Middle Zone needs SME financing and advanced skills deepening. The Southern Zone needs connectivity and human capital investment to proceed in parallel. The Coastal Zone needs fraud mitigation and platform reliability to sustain the digital trust on which its advanced ecosystem depends.

The path forward is clear from the data. The government must enact the fibre-sharing policy, resolve data centre oversight ambiguities between NCA and NITA, and pass the data classification framework that will allow public institutions to share rather than duplicate data. The private sector must invest in consumer protection, rural agent network expansion, and locally trained AI tools. Development partners must finance the infrastructure gaps that commercial markets will not close on their own. Educational institutions must make practical digital skills a genuine curriculum priority from basic school to the tertiary level.

Ghana is not building toward a digital economy. It is building toward a digitally integrated nation, one where digital tools are so embedded in agriculture, manufacturing, trade, health, and public administration that the distinction between the digital economy and the economy itself disappears. The foundations for that ambition are real. What is now required is the governance discipline, the institutional coordination, and the equity commitment to convert them into economy-wide gains. That is the work this Outlook was built to support.

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APPENDICES

APPENDIX A

SECTOR-SPECIFIC PRIORITIES

Sector	What Must Be Done	Key Participating Institutions	Expected Outcomes
Health	a. Finance & integrate digital health into mainstream systems	MoH, GHS, NHIA, NITA, Private e-health firms, World Bank/WHO	a. Improved access & efficiency in healthcare delivery b. Reduced out-of-pocket expenses c. Stronger health data for planning d. Expanded reach of telemedicine e. Improved productivity of the workforce
	a. Enforce health data governance	MoH, DPC, NITA	a. Protection of sensitive health data b. Trust in digital health c. Better interoperability across health platforms
	a. Prioritize last-mile connectivity for facilities	MoCDTI, NCA, Telcos, GIFEC, Development partners	a. Reduction in rural-urban health gap b. Greater equity in health outcomes c. Support for digital diagnostics.
	a. Fund sustainable scale (beyond pilots)	MoH, MoF, Donors, Private investors	a. Avoid donor-dependency b. Sustained innovations reaching national scale
Banking/Fintech	a. Tighten cybersecurity and fraud mitigation	BoG, CSA, Fintechs, Telcos	a. Greater consumer trust b. Reduced fraud losses c. Higher uptake of mobile money & digital banking

	Strengthen KYC/consumer protection and mechanisms to redress fraud cases	BoG, NCA, Consumer Protection Agency	a. Improved financial inclusion b. Reduced exclusion of vulnerable groups; higher adoption rates.
	Adaptive sandbox regulation	BoG, SEC, NCA	a. Faster innovation cycles b. Regulatory agility c. More fintech startups scaling responsibly
	Expand agent networks in low-density areas	Fintechs, Telcos, MFIs	a. Rural financial inclusion b. Access to savings/credit c. Reduced cash dependency d. Women's participation boosted
E-commerce/ Trade	Upgrade last-mile logistics	MoT, Ghana Post, Private logistics firms	a. Increased efficiency b. Reduced delivery costs c. Expansion of MSME reach
	Marketplace integrity & consumer protection	GSA, CPA, MoTAI	a. Increased trust in online markets b. Reduced counterfeit goods c. Stronger MSME competitiveness
	Lower onboarding costs for MSMEs	MoTAI, GEA, AfDB/World Bank MSME programs	a. Growth in MSME participation b. Job creation in retail & services c. Enhanced women/youth-led entrepreneurship
Education	Guarantee school connectivity & reliable power	MoE, GES, MoCDTI, GIFEC, ECG	a. Equal access to digital learning b. Reduced rural-urban education gap c. More digitally skilled graduates
	Equip teachers with digital pedagogy	MoE, Teacher Unions, EdTech firms	a. Improved teaching outcomes b. Stronger pipeline of digital-ready workforce

	Subsidize devices & platforms	MoE, MoF, Telcos, Donors	a. More inclusive access b. Reduced education inequality c. Higher youth employability
Agriculture	Expand rural broadband & energy	MoFA, MoCDTI, GIFEC, Energy Commission, Telcos	a. Improved access to market info b. Greater adoption of agritech c. Increased farmer incomes
	Bundle advisory + payments + credit/ insurance	MoFA, BoG, Fintechs, Agritech startups	a. Stronger farmer resilience b. Expanded financial inclusion c. Reduced poverty in rural areas
	Vernacular content & agent density	MoFA, NGOs, Farmer cooperatives	a. Higher digital adoption among smallholders b. Reduced digital literacy barriers
	Scale beyond donor pilots	MoFA, Agritech firms, Donors	a. Long-term sustainability of farmer-facing platforms b. Greater contribution of agriculture to GDP
E-Government Services	Integrate digital ID, tax, and service portals under a single interoperable framework.	MoCDTI, NITA, NCA, GRA, NIA, MDAs/ OHLGS	a. Seamless and unified citizen service delivery b. Reduced duplication of government systems c. Improved tax compliance
	Strengthen data protection, cybersecurity, and citizen trust frameworks.	MoCDTI, CSA, DPC, NITA	a. Increased citizen trust b. Secure public data systems c. Resilient e-governance infrastructure
	Build digital capacity of civil servants.	MDAs/OHLGS, Public Services Commission, NITA	a. Digitally competent workforce b. Efficient service workflows c. Improved policy implementation

Media & Entertainment	Support local digital content creation and monetization.	MoI, Creative Arts Agency, Private platforms	a. Growth of local digital content b. Increased creative sector revenue c. Exportable Ghanaian media products
	Strengthen IP rights enforcement and digital royalties framework.	Copyright Office, GIBA, MoJ	a. Fair compensation for creators b. Reduced piracy c. Increased investment in creative industries
	Expand broadband and digital broadcasting infrastructure.	NCA, MoI, Private media firms	a. Broader digital coverage b. Improved content accessibility c. Growth of regional media ecosystems
Transportation & Logistics	Digitize transport regulation, ticketing, and tracking systems.	MoT, DVLA, NRSA, NITA	a. Efficient fleet monitoring b. Reduced administrative bottlenecks c. Transparent transport operations
	Expand smart mobility & GPS infrastructure.	MoT, GIS, Private mobility firms	a. Improved traffic management b. Safer transport systems c. Enhanced logistics efficiency
	Integrate logistics platforms with e-commerce ecosystems.	MoT, MoTAI, Ghana Post, Private tech firms	a. Faster order fulfillment b. Lower logistics costs c. Strengthened e-commerce growth
Manufacturing	Promote Industry 4.0 adoption (automation, IoT, robotics)	MoTAI, AGI, GEA	a. Increased automation and productivity b. Modernized industrial base c. Reduced production costs
	Build digital skills for the industrial workforce	MoTAI, CTVET, GEA	a. Skilled technical labour b. Improved process efficiency c. Adoption of smart manufacturing practices
	Incentivize MSME digitization in production chains	MoTAI, GRA, Donors	a. Integration of SMEs into digital supply chains b. Increased competitiveness c. Job creation

Energy & Utilities	Expand smart metering & grid digitization.	ECG, GRIDCo, Energy Commission	a. Improved revenue collection b. Accurate energy consumption data c. Reduced technical losses
	Integrate renewable energy monitoring and digital payments.	MoEn, VRA, PURC, Fintechs	a. Easier payment and service access b. Better renewable energy tracking c. Increased consumer engagement
	Strengthen data management for energy planning.	Energy Commission, MoEn, NITA	a. Data-driven policy decisions b. Efficient resource allocation c. Improved energy forecasting

Table 7: Sector-Specific Priorities

▸ TARGETING BY ZONE

S/N	Zone	What Must Be Done	Key Participating Institutions	Expected Outcomes
1	Northern	a. Infrastructure-first (coverage + reliable power) b. Assisted onboarding, and c. Agent/logistics density	MoCDTI, NCA, MoFA, GIFEC, Energy Commission, Telcos, NGOs	a. Increased rural inclusion b. More digital jobs c. Improved access to markets & health/ education services
2	Middle	a. SME finance for digital tools & skills deepening b. Provider capital to scale services	GEA, MoTAI, BoG, MoF, Donors	a. Growth of digitally enabled SMEs b. Job creation in services & light industry c. Financial inclusion
3	Southern	a. Affordability & connectivity for schools/workplaces b. Practical digital skills for MSMEs.	MoE, GEA, MoTAI, Telcos	a. Reduced digital divide b. More youth employability c. MSME productivity gains

4	Coastal	a. Focus on quality, security, resilience (fraud control, uptime, redress)	BoG, CSA, NCA, CPA	a. Sustained high-usage digital ecosystems b. Resilience against cyber/fraud risks c. Investor confidence

Table 8: Targeting By Zone

▸ EXECUTION PRINCIPLES (EP)

S/N	Principle	What Must Be Done	Key Participating Institutions	Expected Outcomes
EP1	Sequencing	Power & connectivity → trust & consumer protection → advanced services	MoCDTI, MoEn, NCA, BoG	a. Faster, inclusive rollout of digital services b. Higher national productivity.
EP2	Financing	Blend USAF reforms, PPPs, and catalytic funds	MoF, BoG, Donors, Private investors	a. Sustainable financing of rural broadband, school connectivity, and logistics hubs.
EP3	Measurement	Zone-specific KPIs, quarterly dashboards	MoC, GSS, NCA, MoF	a. Transparency b. Accountability c. Better investment targeting d. Continuous improvement.
EP4	Inclusion-by-Design	Gender & youth integrated in all programs	MoGCSP, MoYS, NGOs	a. Narrowed gender gap b. Youth-led digital entrepreneurship c. Inclusive growth.

Table 9: Execution Principles (EP)

ACTION MATRIX: RECOMMENDATIONS FROM ORIGINALITY OF STUDY

S/N	Thematic Area	Recommendation	Responsible Actors & Expected Outputs
1.	Infrastructure & Connectivity	Introduce a fibre-sharing policy to reduce under-utilization, ease capital costs, and expand affordable coverage.	**Actors:** MoCDTI, NCA, Telcos. Outputs: National fibre-sharing policy; reduced network deployment costs; expanded rural broadband access.
		Clarify regulatory oversight of data centres by resolving overlaps between NCA and NITA.	**Actors:** MoCDTI, NCA, NITA, Parliament. Outputs: Clear mandate for data centre oversight; streamlined regulation; increased national data centre utilization.
2.	Data Governance & Interoperability	Develop and pass a national data classification and harmonization framework.	**Actors:** MoCDTI, Data Protection Commission, Parliament. Outputs: Comprehensive data governance framework; secure inter-agency data exchange; improved public sector efficiency.
		Adopt interim **inter-agency data-sharing agreements** to reduce silos until national framework is ready.	**Actors:** Public sector MDAs/MMDAs, NITA. Outputs: Signed agreements; improved collaboration; reduced duplication.
		Provide reliable year-on-year public data to MSMEs and startups.	**Actors:** Ghana Statistical Service (GSS), NITA, MoCDTI. Outputs: Annual open datasets; evidence-based decision-making; enhanced innovation by MSMEs.
		Collect sector-specific impact data (agriculture, informal economy, etc.)	**Actors:** GSS, Ministry of Finance, MoCDTI. Outputs: Annual sector reports linking digital adoption to GDP, jobs, poverty reduction.
3.	Innovation, Entrepreneurship & Emerging Technologies	Scale regulatory sandboxes to support fintech, startups, and BPO growth.	**Actors:** Bank of Ghana (BoG), NCA, GhIPSS. Outputs: More fintech/BPO startups; job creation in gig and outsourcing sectors.
		Leverage payment systems and national ID to formalize gig jobs.	**Actors**: MoCDTI, BoG, National Identification Authority (NIA), E-commerce platforms. Outputs: Expanded formal gig economy; improved fraud prevention; increased financial inclusion.

		Invest in local dataset creation to train AI and emerging technologies on Ghanaian realities.	**Actors:** MoCDTI, universities, AI labs, private sector. Outputs: Locally relevant AI solutions; AI adoption in health, agriculture, and education.
4.	4. Human Capital & Institutional Capacity	Align IT personnel deployment to MDAs/MMDAs with technical needs and improve retention.	**Actors:** Office of Local Government Service, MoCDTI, Public Service Commission. Outputs: Better-skilled IT staff in MDAs; reduced outsourcing costs; stronger digital service delivery.
		Build digital skills for gig and BPO economies.	**Actors:** MoCDTI, CTVET, MoE, private training providers. Outputs: Trained youth in logistics, online commerce, outsourcing; increased employability.
5.	Inclusion, Trust & Policy Stability	Expand gender-sensitive digital financial products and strengthen cybersecurity for women.	**Actors:** Telcos, BoG, MoCDTI, CSOs. Outputs: Increased women's access to savings, credit, insurance; improved digital safety.
		Strengthen national cybersecurity and anti-fraud frameworks.	**Actors:** Cyber Security Authority, BoG, Telcos. Outputs: Reduced cyber fraud; increased public trust in digital platforms.
		Ensure consistency and continuity in digital policies with robust M&E frameworks.	**Actors:** MoCDTI, NDPC, Parliament. Outputs: Fewer abandoned projects; sustainable policy outcomes; institutionalized monitoring & evaluation.

Table 10: Action Matrix: Recommendations from Originality of Study

▸ STAKEHOLDER RECOMMENDED ACTION-POINTS

Stakeholder Category	Thematic Area / Sector	Recommended Action-Points	Expected Outcomes
Executive-Level	Data & Governance	a. Develop and pass a National Data Classification and Harmonization Framework through MoCD-led consultations and parliamentary approval to ensure secure and interoperable data exchange. b. Implement inter-agency data-sharing MOUs under NITA's coordination as an interim step before the legal framework matures. c. Institutionalize M&E units within MDAs to track policy execution and prevent project discontinuity.	a. Strengthened data governance and policy continuity. b. Reduced duplication and siloed systems. c. More efficient cross-sector digital planning.
	Innovation & Entrepreneurship	a. Expand sandbox-driven innovation programs through partnerships between the BoG, MoCDTI, and private accelerators. b. Use national ID and payment infrastructure to verify users and build trust in gig work and e-commerce. c. Fund locally trained AI datasets through competitive grants and university–industry collaborations.	a. Inclusive and trusted innovation ecosystem. b. Creation of BPO and gig-economy jobs. c. Culturally relevant AI applications.
	Infrastructure & Connectivity	a. Enact and enforce a national fibre-sharing policy under NCA oversight to reduce duplication and lower telco costs. b. Define a clear mandate separation between NCA and NITA for data centre management to improve accountability. c. Conduct a skills audit of MDAs and reassign IT personnel based on technical needs to minimize outsourcing.	a. Broader, affordable connectivity. b. Optimized use of national ICT assets. c. Improved institutional efficiency.

	Human Capital & Inclusion	a. Develop gender-sensitive digital finance policies that incorporate cybersecurity awareness campaigns. b. Mandate annual MSME and startup digital performance surveys by GSS in collaboration with MoTAI and NBSSI. c. Establish a national digital impact database to track sectoral contributions to GDP and jobs.	a. Gender-inclusive growth. b. Reliable data for planning. c. Data-driven economic measurement.
Industry & Business Leaders	Agriculture	a. Partner with telcos and GIFEC to co-finance rural connectivity pilots in agricultural production corridors. b. Use MoMo platforms to integrate payments, input purchases, and micro-credit for smallholders. c. Develop localized AI chatbots in local languages for farmer extension services and weather alerts. d. Support blockchain-enabled traceability systems for export crops in collaboration with GSA and COCOBOD.	a. Reduced rural connectivity gaps. b. Increased agritech adoption. c. Enhanced farmer productivity and exports.
	Banking & Finance (Fintech)	a. Expand rural agent networks via cost-sharing models between banks and mobile operators. b. Deploy AI-based alternative credit scoring using telco and utility data to assess MSME creditworthiness. c. Build a shared fraud-prevention and secure API platform through a fintech consortium. d. Introduce gender-targeted financial products (e.g., microinsurance, savings) through female agent networks.	a. Increased access to credit and savings. b. Reduced fraud and transaction risk. c. Strengthened women's financial inclusion.
	Education	a. Partner with telcos to offer subsidized student data bundles and device-lending schemes for schools. b. Fund teacher upskilling programs that integrate LMS and digital pedagogy. c. Develop AI-based adaptive learning kits that work offline for rural schools. d. Collaborate with universities to create local edtech and micro-certification content.	a. Expanded access to digital education. b. Improved teaching quality and relevance. c. Greater equity in rural learning outcomes.

	Health	a. Fund EHR interoperability projects that align with national data standards under MoH leadership. b. Partner with telecom firms to deploy broadband and edge servers in rural hospitals. c. Pilot AI-based diagnostic tools through regulatory sandboxes managed by FDA and MoH. d. Integrate telemedicine and microinsurance bundles via mobile payment systems.	a. Improved patient data integration. b. Greater healthcare accessibility. c. Faster AI adoption in clinical settings.
	E-Commerce & Trade	a. Develop regional fulfilment hubs with logistics partners and cold-chain solutions. b. Implement seller verification, escrow, and BNPL models with clear consumer protection rules. c. Build analytics dashboards and onboarding support for SMEs transitioning from social to formal e-commerce platforms.	a. Enhanced consumer trust. b. More efficient delivery systems. c. Growth in SME participation.
	E-Government Services	a. Co-develop interoperable GOV–BIZ APIs for registration, tax, and e-procurement systems. b. Fund secondments of private-sector ICT experts to MDAs to strengthen in-house capacity. c. Host critical digital services in national data centres through PPPs for reliability and sustainability.	a. Seamless government–business interaction. b. Strengthened ICT capacity in MDAs. c. Efficient service delivery.
	Transportation & Logistics	a. Establish AI-based route optimization systems across courier networks. b. Create micro-fulfilment hubs in key zones for faster delivery. c. Implement digital rider contracts and insurance schemes to formalize gig logistics. d. Support drone delivery corridors through PPPs.	a. Lower logistics costs. b. Safer and more professional gig work. c. Improved rural delivery access.

	Media & Entertainment	a. Build creator monetization platforms supporting mobile micropayments. b. Develop digital copyright and licensing systems to formalize influencer earnings. c. Sponsor data upload subsidies for creators. d. Partner with global streaming services to export local content.	a. Fair creator compensation. b. Increased digital content exports. c. Strengthened creative industries.
	Energy & Utilities	a. Implement smart meter rollouts integrated with MoMo payments for efficient billing. b. Deploy IoT-based monitoring systems at substations to detect faults early. c. Partner with private investors to install solar microgrids at telecom towers and rural ICT hubs.	a. Improved power reliability. b. Reduced OPEX for digital infrastructure. c. Stronger digital–energy linkage.
	Manufacturing	a. Create Industry 4.0 grant funds for SMEs to adopt automation and IoT. b. Build digital B2B marketplaces linking manufacturers with suppliers. c. Design re-skilling programs and apprenticeship pathways in collaboration with TVETs. d. Pilot predictive maintenance and digital twins in large factories.	a. Higher industrial efficiency. b. Stronger supply chain integration. c. Increased MSME competitiveness.
Technical-Level	Digital Infrastructure	a. Establish regulatory fibre-sharing marketplaces under NCA. b. Expand shared Radio Access Network (RAN) and solar-powered connectivity pilots with GIFEC and telcos. c. Introduce micro-leasing models with fintechs to finance devices. d. Develop 5G pilot zones in agriculture, logistics, and health.	a. Broader affordable connectivity. b. Improved access to devices. c. Early 5G readiness.

	Data & Interoperability	a. Build sector-specific data frameworks (agriculture, SME, health) through joint MoCDTI–NITA taskforces. b. Implement blockchain-based interoperability pilots for national health data. c. Convert national data centres into SME cloud service hubs with clear governance.	a. Unified, high-quality datasets. b. Secure health data linkages. c. Enhanced SME data access.
	Innovation & Ecosystem	a. Expand regional BPO hubs beyond Accra using the Accra Digital Centre model. b. Fund local AI dataset creation for agriculture, health, and commerce. c. Create cyber-safety and innovation hubs for women offering low-cost finance and training. d. Build digital IP monetization systems for creative industries.	a. Job creation in digital services. b. Localized AI innovation. c. Empowered women innovators.
Capacity-Building	Digital Skills & Inclusion	a. Launch nationwide teacher and youth digital literacy programs through GES, MoE and GTEC. b. Develop industry-led training curricula in AI, data science, and cybersecurity. c. Support women-focused digital mentorships and scholarships. d. Fund inclusive edtech startups creating accessible, low-data tools.	a. Skilled digital workforce. b. Increased female participation. c. Inclusive education ecosystem.

Table 11: Stakeholder Recommended Action-Points

APPENDIX B

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