



DIGITAL SERVICES FOR E-GOVERNMENT:

Opportunities and challenges for a future 2.5 billion African demographic market

By Nii Simmonds

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COVER: Dispatchers for the Rescue.co free ambulance service look at computer screens during the coronavirus night curfew in Nairobi, Kenya, June 11, 2020. Source: REUTERS/Baz Ratner

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Preface

The digitalization of public services has been a major trend in recent decades, extending well beyond the richest countries. In fact, the biggest digital revolution of the last twenty years is taking place in Africa.

This emerging and huge African market is being driven by growing connectivity, the development of digital services, and a young population—the youngest in the world—that is enterprising and innovative. As if to compensate for the failures of certain states, it has continued to pave the way by using technology to develop concrete services: in the Republic of Congo, a start-up is creating an application to monitor the pregnancy of isolated women, while young entrepreneurs are using digital technology to find business opportunities for smallholder farmers; and in Kenya, a start-up is providing solar panels. This spirit of innovation is spreading to a very large extent including in: banking, with the increasing banking penetration in the population; academia, with the digitization of teaching; e-commerce; and the political realm, with the voting process for local or national elections. From Kigali to Dakar, artificial intelligence training is multiplying. This revolution is part of the emergence of a larger middle classes as well as the empowerment of individuals, including economically in a continent where the informal sector occupies a massive place.

Already, digital is a new frontier of geopolitics. The United States made its Digital Transformation Program the heart of the US-Africa Leaders summit in December 2022, and India is responding with a vast plan targeting digital public infrastructure in Africa.

This enthusiasm is obviously tempered by the variety of situations from one country to another, but also by the challenges that African markets continue to face, such as problems of access to electricity and connectivity, the price of data, and underinvestment in infrastructure. In addition to the challenges of supply, there are those of demand, combining problems of training, purchasing power, and the protection of users' rights. The digital gap remains a political challenge of inequality among citizens, between the young and the old, those who are trained and those who are not, those who live in cities and those who live in rural areas, and men and women.

Between opportunities and challenges, states are not immune to these questions. Because they are supposed to place citizens at the center of their action, states must adapt their policies and services to an increasingly digital environment. They must

also contribute to the development of their economies, which lack critical infrastructure, while protecting citizens from abuse by protecting consumer data and rights, health data, and tax data—from private and nonprofit entities, and from state agencies themselves. Indeed, through their control of civil status documents and the organization of elections, governments hold vast power: exercise of that power and its legitimacy can only be guaranteed by good governance. We remember, in the context of the COVID-19 pandemic, how digital technology could offer additional opportunities for access to healthcare services, but also be a tool for population control.

In Africa, these questions are more challenging than elsewhere because of two factors. First, the community is the basic cell of African societies and those structures do not mesh well the isolation of people, which is something that a digital society can create. It is important to ensure that the solidarity of African community structures does not implode under the effect of this digital acceleration.

Second, governance in Africa, which is still under construction, is not compatible with the digitalization of the administration when it is not transparent or accountable. The most modern voting machines will be a democratic regression if there is no control of their manufacture and appropriate control of their use by institutions independent of political power.

It is therefore crucial that digitalization and more broadly the development of digital public infrastructure (DPI) be aligned with African values and take into account the specificities of African societies. The successes of Silicon Valley, Estonia, or India cannot be plastered on African realities without precaution. At the level of individuals, it will be up to regulators to ensure that the citizen remains the master of the digital tool and not the other way around. At the national level, it will also be up to governments to ensure that the digital issue remains a democratic issue, subject to the principles of transparency and accountability. Finally, at a time when the Africa of the younger generations is showing a strong desire for sovereignty, African countries will not be able to avoid the question of their digital sovereignty, which requires not only the definition of a regulatory framework, at the national and pan-African level, but also by mastering the technological infrastructures themselves. The formidable digital epics of Africa's brightest minds suggest that Africa has the means to do so.

Ambassador Rama Yade
Senior Director, Africa Center

Introduction

Africa has over 1.4 billion people and a fast-growing middle class, making it one of the world's largest markets for technology services.¹ Technology is making a significant impact on public services in Africa for your average citizen in the area of public digital services. Information and communication technologies (ICTs) are used by government agencies to enhance the delivery of services to citizens under e-government. The global value of e-government services is forecasted to be \$589.8 billion in 2023, an increase of 7.6 percent from \$548.3 billion in 2022.² E-government services refers to the process of providing technology-enabled public services such as accessing healthcare, renewing a driver's license, filing tax returns, and registering a car registration.

In many African countries, service delivery has been hindered by challenges such as inefficient systems, limited personnel, and bureaucratic barriers. However, with the advancement of technology, these challenges are slowly being overcome, and governments are increasingly turning to e-government solutions to improve service delivery. E-government solutions have the potential to revolutionize service delivery in Africa by increasing efficiency, reducing costs, and improving transparency and accountability. The continent's scores on the E-Government Development Index (EGDI)—which takes into account provision of e-services, telecommunication connectivity, and human capacity—have almost doubled from 0.2 in 2003 to 0.3914 in 2020.³ However, despite these improvements, the continent consistently ranks below the world average (0.37 in 2003 and 0.6 in 2020): the disparity between the top and bottom performing countries in sub-Saharan Africa reflects the uneven pace of digital-government transformation.

With a large portion of Africa's population living in rural areas with limited access to traditional government services, technology services are paving the way for unprecedented growth and transformation. With a population set to reach a staggering 2.5 billion inhabitants by 2050, this vibrant continent is buzzing with potential and teeming with opportunities.⁴ In recent years, many African countries have been utilizing emerging technologies to improve public service delivery



Ethiopian journalist from Oromia News Network (ONN) uses the internet at their office studios in Addis Ababa, Ethiopia May 25, 2021. Source: REUTERS/Tiksa Negeri

and provide efficient solutions to their citizens. By embracing digitally enabled services, e-government has emerged as a game changer, providing a range of benefits that enhance both public services and citizens' lives.

Using emerging technologies, public leaders and authorities across the continent can use e-government to improve the lives of millions, from bustling urban centers to remote rural communities. In spite of the challenges associated with electricity shortages and low bandwidth internet in many parts of the continent, e-government offers many opportunities to improve the well-being of African citizens. In this report, we delve into the world of e-government digitalization efforts in Africa, examining its increasing significance, success stories, and obstacles along the way. We also explore the future of digital government and emerging trends both regionally and globally. Additionally, we emphasize the crucial role of enabling infrastructure, data management, cloud technology, and effective policies and strategies for government transformation. Furthermore, we showcase case studies from emerging and frontier markets and provide recommendations for policymakers to support the growth of Africa's population to 2.5 billion people.

1 Andrew Stanley, "African Century: A Demographic Transformation in Africa Has the Potential to Alter the World Order," *Finance & Development*, International Monetary Fund, September 2023, <https://www.imf.org/en/Publications/fandd/issues/2023/09/PT-african-century>.

2 "Gartner Forecasts Worldwide Government IT Spending to Grow 8% in 2023," Gartner Press Release, March 24, 2023, <https://www.gartner.com/en/newsroom/press-releases/2023-05-24-gartner-forecasts-worldwide-government-it-spending-to-grow-8-percent-in-2023>.

3 E-Government Development Index (EGDI)," Department of Economic and Social Affairs, United Nations, 2023, <https://publicadministration.un.org/egovkb/en-us/About/Overview/-E-Government-Development-Index>.

4 "Africa's Population Will Double by 2050," *Economist*, March 26, 2020, <https://www.economist.com/special-report/2020/03/26/africas-population-will-double-by-2050>.

1. The African market

This market, with its undeniable potential for growth and consumption, presents a thriving frontier for products and services. In the coming years, Africa's demographics are expected to play a significant role in fueling this burgeoning market. The continent is currently home to the youngest population globally, with an average age of just nineteen years old.⁵ This youthful consumer base indicates not only a robust labor force but also an increased purchasing power that will exponentially drive demand in various sectors. With the rapid urbanization taking place across Africa, more people are migrating to cities, leading to rising disposable incomes and changing lifestyles. As these urban dwellers seek convenience and modernity, there is an exponential increase in demand for goods ranging from electronics and fashion to household appliances and healthcare products. Moreover, the spread of internet connectivity has brought about a digital revolution that offers vast opportunities within e-commerce platforms. Young Africans are actively embracing online shopping as well as adopting new technologies at an impressive rate compared to other emerging markets around the world. Through this dynamic landscape, companies can tap into enormous potential arising from this demographic—eager to consume innovative products and services tailored to their needs.

- Egypt stands out as a thriving economic hub with a diverse range of industries expanding rapidly, including manufacturing, tourism, and information technology.
- Nigeria impresses with its vast consumer base and burgeoning sectors such as telecommunications, banking, and agriculture.
- Ethiopia has emerged as an attractive investment destination due to its strategic location bridging Africa to global markets, coupled with sustained economic reforms that facilitate business growth.
- Kenya enjoys robust economic progress fueled by advancements in technology-driven sectors like mobile banking and e-commerce, while also showcasing significant agricultural potential.⁸
- The Democratic Republic of Congo presents an array of untapped opportunities across various sectors such as mining, infrastructure development, and renewable energy initiatives—making it an exciting prospect for those seeking substantial returns on investments in this promising region.

1.1 THE GROWTH POTENTIAL IN AFRICAN MARKETS

The African continent's growth potential is truly remarkable: given the youthful demographic profile, many see a huge market for consumer products and services.⁶ This speaks volumes about the immense opportunities that lie ahead for businesses and investors alike—but there's more. Africa boasts the largest youth population globally, signaling a dynamic workforce brimming with innovative ideas and entrepreneurial spirit. Young Africans are expected to make up 42 percent of the global youth population by 2030.⁷ As we delve into specific countries, it becomes evident that numerous nations within Africa are experiencing notable growth trajectories:

1.2 DEMOGRAPHICS DRIVING CHANGE

The demography of Africa has witnessed a significant transformation in recent years, largely driven by the rapid growth and adoption of technology, internet, and information and communication technologies (ICT) across the continent. As access to these digital tools becomes increasingly widespread among both consumers and enterprises, it is crucial to examine the statistics that highlight this transformation. According to recent reports, Africa's internet penetration rate reached 43 percent in 2022, with nearly half a billion people connected online.⁹ There are several reasons for this surge, including improvements in infrastructure, more affordable smartphones and data plans, and initiatives aimed at improving connectivity. Despite this,

5 "Africa's Median Age Is About 19. The Median Age of Its Leaders Is About 63," Wilson Center, <https://www.wilsoncenter.org/blog-post/africas-median-age-about-19-median-age-its-leaders-about-63>

6 "There's a Strong Chance a Third of All People on Earth Will Be African by 2100," *Quartz*, <https://qz.com/africa/1099546/population-growth-africans-will-be-a-third-of-all-people-on-earth-by-2100>

7 "Why Africa's Youth Hold the Key to its Development Potential," World Economic Forum, September 19, 2022, <https://www.weforum.org/agenda/2022/09/why-africa-youth-key-development-potential/>

8 "Safaricom," <https://www.safaricom.co.ke/personal/m-pesa/m-pesa-journey>

9 Saifaddin Galal, "Internet Penetration Rate in Africa as of June 2022, Compared to the Global Average," Statista, <https://www.statista.com/statistics/1176654/internet-penetration-rate-africa-compared-to-global-average/>



Computer network equipment is seen in a server room in Vienna, Austria, October 25, 2018.
Source: REUTERS/Heinz-Peter Bader

some countries have faced connectivity challenges due to a lack of fiber infrastructure, especially in land-locked countries. In March 2023, Atlantic Council Africa Center Senior Fellow Aubrey Hruby analyzed the current state of the digital transformation in Africa and outlined why affordable and accessible data is imperative for further development.¹⁰ Furthermore, mobile subscriptions have experienced substantial growth, with over one billion mobile connections recorded in Africa during the same period.¹¹ These figures show how rapidly ICT has become an integral part of African society—empowering individuals from diverse backgrounds while providing businesses with new opportunities for growth and innovation.

The *potential impact* of digitalization on various sectors cannot be underestimated; for instance, e-commerce platforms are gaining traction throughout the continent due to their convenience and accessibility, which further fuels economic progress.¹² Yet the case of Jumia, once a pan-African e-commerce darling that operated in more than twenty African countries, is a cautionary tale: it has shuttered most operations due to various challenges.¹³ During Jumia's peak operations, thousands of customers purchased and sold on their e-commerce platform,

utilized their logistics services, and transacted on its payment gateway. As we delve deeper into analyzing technology-related demographics in Africa, it becomes apparent that there are still market challenges to overcome such as closing gender gaps in digital literacy rates or ensuring equitable access across rural areas where connectivity remains limited. A 37 percent gender gap is found in sub-Saharan Africa when it comes to mobile internet use, with more than 190 million women not using it. In a 2018 survey of sixteen countries in eastern and southern Africa, female respondents (48 percent) reported low levels of internet access on their phones.¹⁴ There is a stark difference between urban and rural internet users: 64 percent of urban dwellers versus 23 percent of rural dwellers.¹⁵ Nonetheless, these statistics underscore the immense strides made by African nations toward harnessing technological advancements for inclusive development while laying a solid foundation for future transformative endeavors. Bridging this gap will require concerted efforts from governments, businesses, and nongovernmental organizations alike—ensuring equal access and education for all citizens regardless of location or socioeconomic status is vital for sustainable development across the continent.

10 Aubrey Hruby, *Critical Connectivity: Reducing the Price of Data in African Markets*, Atlantic Council, March 2023, <https://www.atlanticcouncil.org/in-depth-research-reports/report/critical-connectivity-reducing-the-price-of-data-in-african-markets/>

11 GSM Association, *The Mobile Economy Sub-Saharan Africa 2022*, <https://www.gsma.com/mobileeconomy/wp-content/uploads/2022/10/The-Mobile-Economy-Sub-Saharan-Africa-2022.pdf>

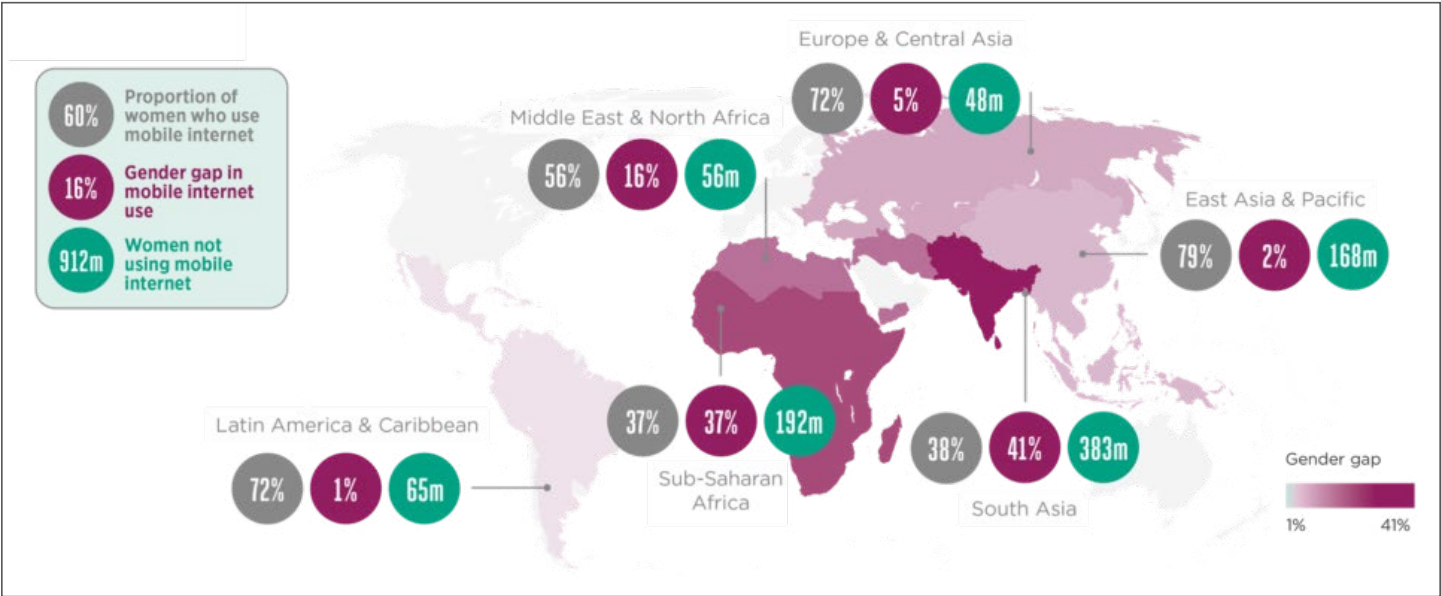
12 Osinachi Ukomadu, "The Third Wave of eCommerce in Africa," guest essay, Techcabal, February 6, 2023, <https://techcabal.com/2023/02/06/the-third-wave-of-ecommerce-in-africa/>

13 Tage Kene-Okafor, "Jumia Quit Food Delivery Because of Deep-pocketed 'Aggressive' Rivals, CEO Says," *TechCrunch*, December 18, 2023.

14 Victoria Kwakwa, "Accelerating Gender Equality: Let's Make Digital Technology Work for All," World Bank (blog), March 7, 2023, <https://blogs.worldbank.org/african/accelerating-gender-equality-lets-make-digital-technology-work-all>.

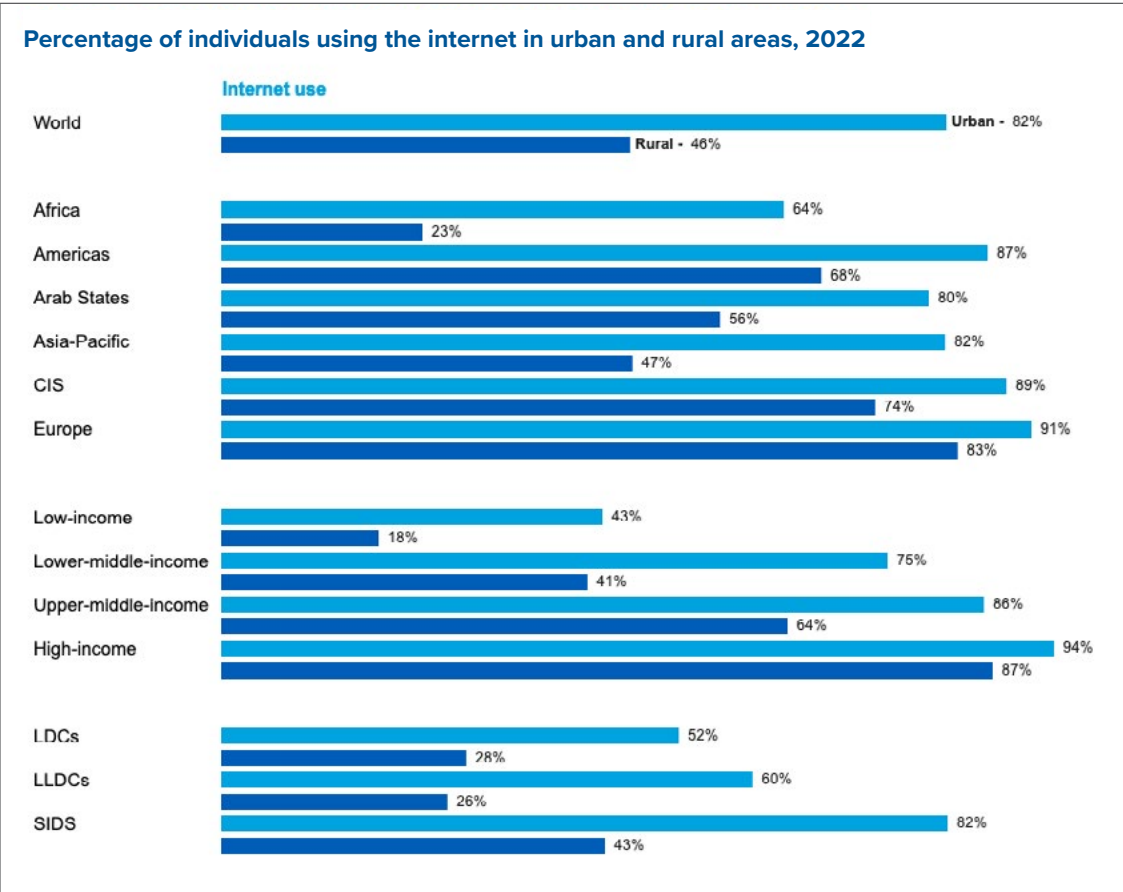
15 "Internet Use in Rural Areas Is Slowly Catching Up with Urban Areas," International Telecommunications Union (ITU), accessed November 10, 2023, <https://www.itu.int/itu-d/reports/statistics/2022/11/24/ff22-internet-use-in-urban-and-rural-areas/>

Figure 1: Gender Gap in Mobile Internet Use in Lower and Middle Income Countries, By Region



Source: The Mobile Gender Gap Report 2022, GSMA, 2022

Figure 2: Urban and Rural Internet Use Pattern (International Telecommunication Union data)



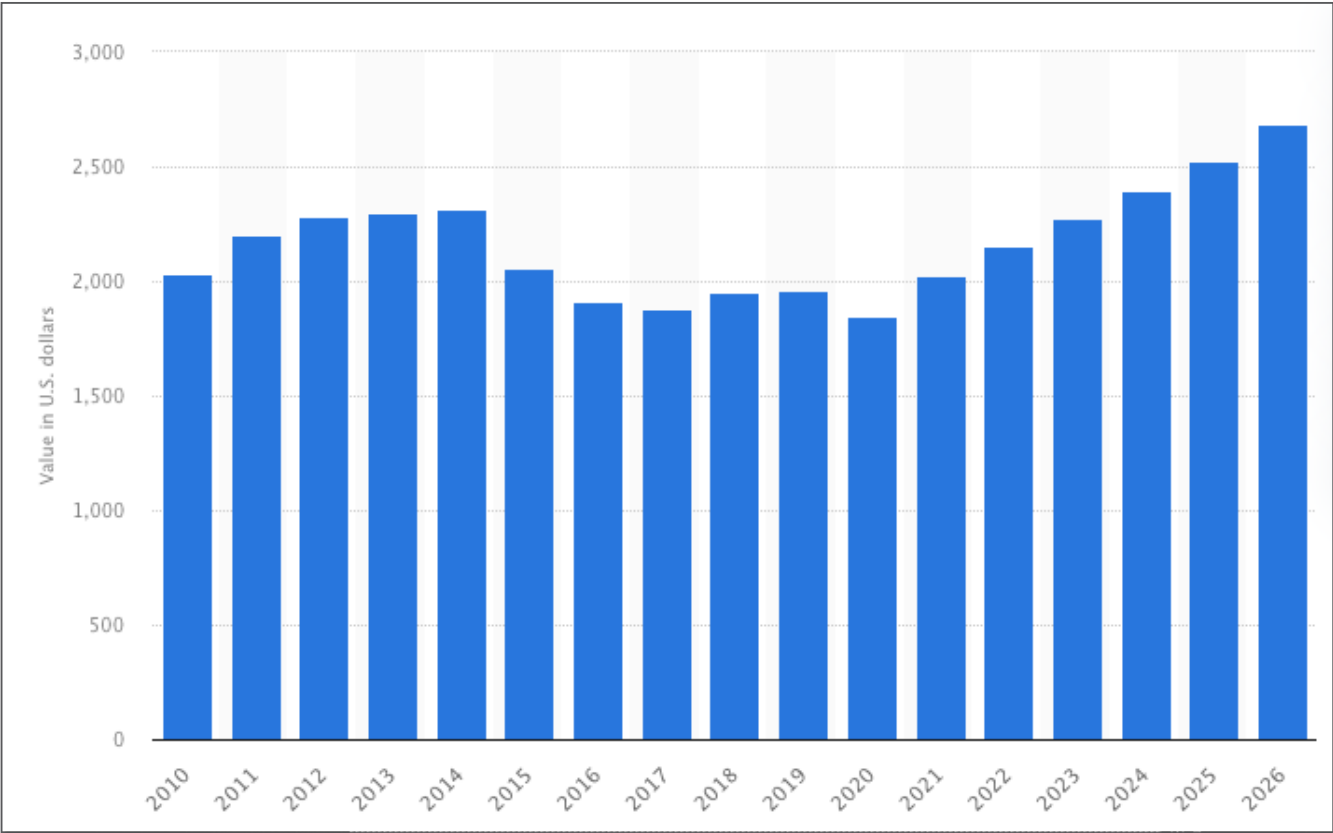
Source: ITU

1.3 DISPOSABLE INCOME GROWTH

Examining data on disposable income—a key indicator that sheds light on the economic well-being and purchasing power of individuals—and buying patterns in Africa, several intriguing trends emerge. One cannot overlook the significant strides made in recent years, as Africa's disposable income has witnessed substantial growth. Positive factors include favorable macroeconomic conditions, improved governance, rising foreign direct investment (FDI), and expanding middle-class populations across several countries. As a result, Africans are now able to allocate more funds toward discretionary spending after covering essential expenses like housing, food, education, and healthcare. In addition, gross domestic product (GDP) per capita has increased significantly since the early 2000s—from US\$2,000 in 2000 to US\$3,532 in 2018.¹⁶ Consequently, this

surge in disposable income has fueled noteworthy shifts in buying patterns across the continent; Africans have exhibited an inclination toward consumer durables such as automobiles and electronics while also indulging in leisure activities like travel and entertainment. Additionally, there has been a noticeable rise in demand for premium goods within certain segments of society prioritizing quality over price sensitivity. However, it is crucial to bear in mind that these trends vary significantly by country due to disparities in economic development levels and cultural preferences among nations within Africa's diverse landscape. Nonetheless, analyzing statistics on African disposable income provides valuable insights into the evolving purchasing behaviors of its people—an exciting prospect for businesses seeking opportunities within this dynamic market.

Figure 3: GDP per capita in Africa from 2010 to 2026 (Actual and Projected)



Source: Statista, 2022 (release date), accessed January 19, 2024, <https://www.statista.com/statistics/1300864/gdp-value-per-capita-in-africa/>.

16 "GDP per capita, 2000 to 2018," Our World in Data, using data from Maddison Project Database 2020 (Bolt and van Zanden, 2020), <https://ourworldindata.org/grapher/gdp-per-capita-maddison?tab=chart&time=2000..latest®ion=Africa&country=~Sub-Saharan+Africa+%28MPD%29>

GLOBAL AND REGIONAL MEGATRENDS

At a global level, e-government has gained significant momentum due to its potential for enhancing governance structures while bolstering economic growth. Several nations have successfully deployed comprehensive digital strategies aimed at maximizing efficiency in public administration. For instance, Singapore's Smart Nation vision seeks to leverage digital technologies such as AI and data analytics to create seamless government-citizen interactions and personalize public services according to individual needs. This holistic approach ensures that citizens can readily navigate through various governmental procedures without being bogged down by time-consuming paperwork or bureaucratic bottlenecks. Regionally speaking, certain areas have shown remarkable progress in adopting e-government solutions that are tailored for local requirements. Estonia is one of the pioneers in establishing secure electronic identification systems that enable seamless access not only within

government agencies but also across private sectors, such as banking or healthcare, making everyday transactions significantly more convenient for citizens.

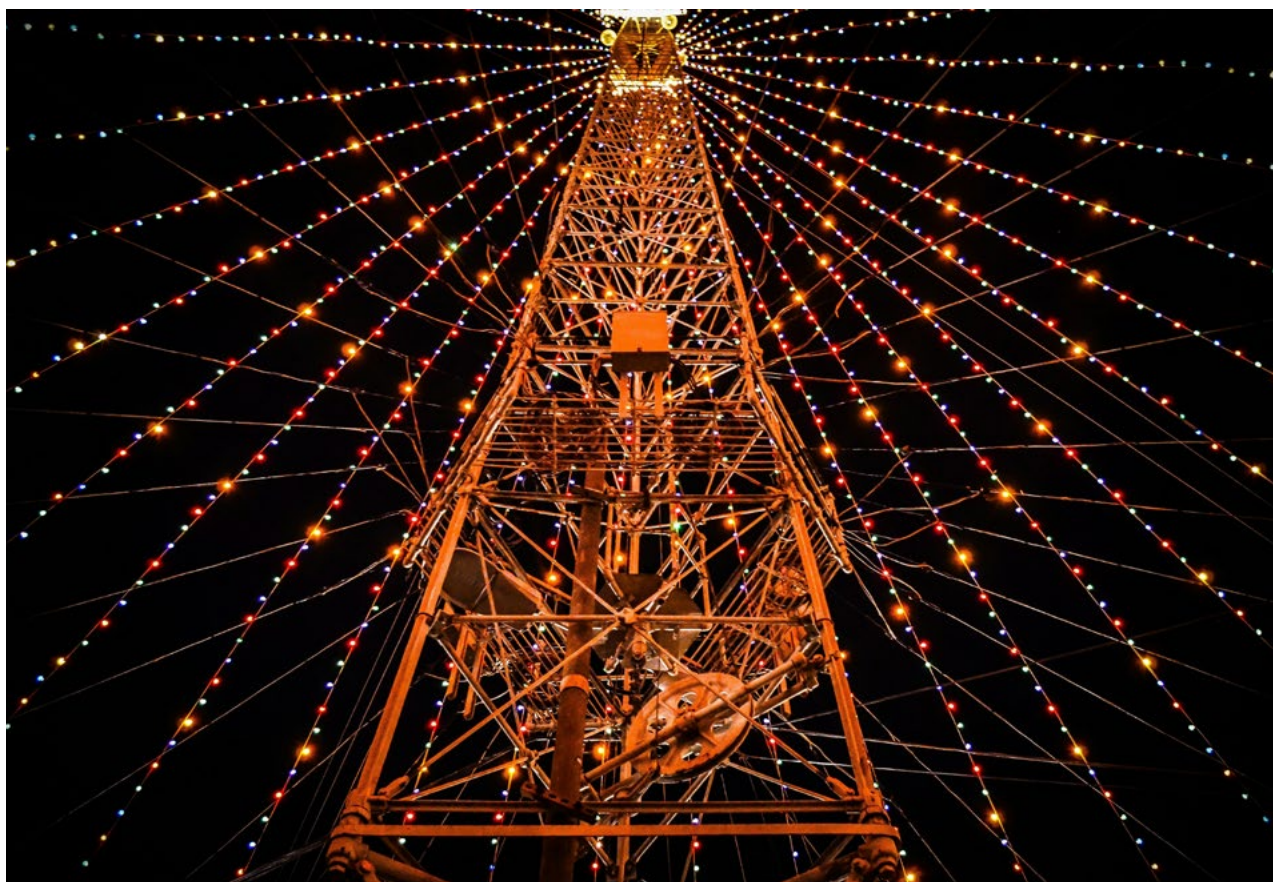
India's progressive trajectory toward harnessing digital services within its governance systems has reaped numerous benefits for both the state apparatus and individuals seeking various public amenities. With an increasing number of Indians gaining access to smartphones and broadband internet connectivity, e-government initiatives have empowered citizens by allowing them instant online access to vital information and essential services via user-friendly portals. By leveraging digitization, government agencies have successfully streamlined processes like tax filing, passport applications, utility bill payments, as well as personal identification documentation such as Aadhaar cards—all contributing significantly to reducing bureaucratic red tape.

1.4 CONSUMPTION PATTERNS ACROSS AFRICA

Consumption patterns of technology and internet services in Africa have witnessed a remarkable transformation over the past decade. As access to affordable smartphones and data plans continues to expand, African consumers are increasingly embracing digital advancements as an integral part of their lives. These consumption patterns reflect both the challenges and opportunities unique to the continent. Despite limited infrastructure, tech-savvy Africans have found innovative ways to adapt, often relying on mobile connectivity rather than fixed-line broadband. This has resulted in a surge of mobile-first solutions,

such as mobile banking platforms that cater specifically to unbanked populations. Additionally, social media usage has skyrocketed across the continent, with African consumers using these platforms not only for entertainment but also as tools for education and entrepreneurship and even for political protests. The growth of e-commerce is another testament to changing consumption patterns; more Africans are shopping online due to convenience and wider product availability. Despite the COVID-19 pandemic, 70 percent of Nigerian e-commerce users planned to do less supermarket shopping.¹⁷

¹⁷ Saifaddin Galal, "Share of E-commerce Users Who Plan to Do Less Supermarket Shopping after the Coronavirus (COVID-19) in Selected African Countries as of 2020," Statista, April 28, 2023, <https://www.statista.com/statistics/1251061/e-commerce-users-plan-to-do-less-supermarket-shopping-after-covid-19-in-africa-by-country/>



A tower with string lights January 9, 2014. Source: Unsplash/Steve Richey

2. The future of digital government: trends and insights

The critical role of technology in promoting innovation in Africa also supports efforts to improve governance and transparency. The digital revolution is opening doors to vast business and social opportunities including the potential to bridge the gap between citizens and their governments. Digital government, with its emphasis on harnessing advanced technologies to enhance public services, is set to shape the future of governance in Africa dramatically. Through a comprehensive array of cutting-edge tools and platforms, digital technologies can empower African nations to achieve their Sustainable Development Goals (SDGs) efficiently and effectively.

In recent years, we have witnessed an inspiring trend toward adopting digital government strategies across the continent. A prime example is Kenya's e-citizen platform—a

centralized portal that offers more than 200 online services ranging from business registration to passport applications—making it easier for citizens and businesses alike to interact with various governmental entities.¹⁸ Similarly, Rwanda's commitment toward becoming a cashless society exemplifies how embracing digital payment solutions can simplify transactions while reducing corruption risks.¹⁹ Furthermore, insights gleaned from big data analytics enable policymakers to design evidence-based policies that cater specifically to societal needs. By leveraging data-driven decision-making, governments can now devise targeted interventions aimed at resolving pressing issues such as healthcare access or unemployment rates within specific regions or communities. Underpinning these advancements are transformative technologies like artificial intelligence (AI) and blockchain—an immutable decentralized ledger system—which bring

¹⁸ “eCitizen,” Department of Immigration Services, Kenyan Visa Application, accessed December 2023, <https://immigration.ecitizen.go.ke/index.php?id=5>

¹⁹ “The Digital Future,” *Finance & Development* (IMF quarterly) 58, no. 1 (March 2021), <https://www.imf.org/external/pubs/ft/fandd/2021/03/pdf/fd0321.pdf>

transparency and trust into public recordkeeping processes essential for fostering efficient governance systems, where accountability prevails, and AI-powered chatbots stand ready as virtual assistants for customer support.

2.1. SHOWCASING THE DIGITAL LANDSCAPE IN AFRICA

Africa's digital landscape is a reflection of its diverse regions and the stark contrast between digital powerhouses and areas of low connectivity. The continent presents a dynamic mix of bustling urban areas along the coasts, where internet connectivity is robust, and remote regions such as the Sahel, characterized by sparse populations and limited access to technology. Digitization efforts must consider this diversity in order to support economic growth and trade across Africa. In the highly digitized regions, there exists a vibrant digital landscape with thriving tech ecosystems fueled by innovation and entrepreneurial spirit. These digital powerhouses are home to cutting-edge start-ups, tech incubators, and multinational corporations that leverage advanced technologies for transformative solutions. In countries with low connectivity, such as those found in remote and landlocked areas like Malawi or underserved communities within larger cities like Kinshasa, bridging the digital divide becomes vital. Such regions face challenges related to limited infrastructure investment coupled with high costs associated with expanding internet coverage to rural or marginalized populations. Thus, dynamism is crucial as it recognizes that one solution may not fit all circumstances—be it developing tailored infrastructures suited for particular regional needs or exploring innovative approaches based on mobile technology penetration, which can both overcome physical barriers and be a cost-efficient solution. Acknowledging this dynamism unique to Africa's vast landscapes and embracing its diversity through targeted strategic digitization initiatives (based on the various contexts across the continent) can unlock new opportunities for economic growth while fostering inclusivity throughout Africa's emerging technology ecosystem.

2.2 THE IMPACT OF THE COVID-19 PANDEMIC ON DIGITAL GOVERNMENT

The convergence of the COVID-19 pandemic and a global shift toward digital government has undeniably transformed the

landscape of public administration. As nations grappled with unprecedented challenges posed by the highly contagious virus, technology adoption emerged as a crucial driver in maintaining effective governance and ensuring uninterrupted public services. During the pandemic, Microsoft CEO Satya Nadella said that the world was experiencing "several years' worth of digital transformation in a few months."²⁰ In response to the urgent need for remote operations, governments accelerated their pace of digitization, reimagining traditional bureaucratic systems into agile and robust online platforms. Digital government initiatives gained newfound momentum as virtual communication tools such as video-conferencing software became indispensable for institutions worldwide. The deployment of advanced data analytics enabled real-time monitoring and forecasting, empowering decision-makers to respond swiftly to changing circumstances amid uncertainty. Moreover, there was an exponential surge in demand for secure digital identity solutions as citizens sought seamless access to essential services while adhering to social-distancing guidelines. Governments also leveraged AI algorithms for contact-tracing efforts, which proved instrumental in reducing transmission rates.²¹ Consequently, this unprecedented reliance on technology during the COVID-19 crisis not only reinforced its pivotal role in reshaping administrative practices but also highlighted its immense potential for revolutionizing future governance models.

Furthermore, digital channels became crucial for citizen engagement during the pandemic—offering avenues for interactive information dissemination about health guidelines, contact-tracing apps, vaccine-registration portals, along with real-time updates on virus spread and containment measures enacted by authorities.²² The surge in technology adoption within the realm of digital governance was evident from the accelerated implementation of e-governance initiatives that streamlined administrative processes like tax filing or permit applications through user-friendly portals or mobile applications accessible round-the-clock. Ultimately, this rapid integration of technology not only ensured continuity in governance but also set a precedent for future digitization efforts aimed at ensuring more resilient responses during crisis situations like the ongoing global pandemic.

That said, challenges cropped up in implementing technology for crucial tasks such as contact tracing and in raising awareness to facilitate technology adoption. First, privacy concerns

20 Lauri Haav, "The Digital Transformation of Government During Covid-19," Forbes Council post, April 12, 2022, <https://www.forbes.com/sites/forbesbusinesscouncil/2022/04/12/the-digital-transformation-of-government-during-covid-19/?sh=7e957db2dbec>

21 "Using Artificial Intelligence to Help Combat COVID-19," Organisation for Economic Co-operation and Development (OECD), updated April 23, 2020, <https://www.oecd.org/coronavirus/policy-responses/using-artificial-intelligence-to-help-combat-covid-19-ae4c5c21/>

22 "Johns Hopkins Releases Report on Digital Contact Tracing to Aid COVID-19 Response," staff report, Hub news center, Johns Hopkins University, May 26, 2020, <https://hub.jhu.edu/2020/05/26/digital-contact-tracing-technologies-report/>

emerged as a significant hurdle in the adoption of digital contact tracing solutions.²³ Balancing the need for public health surveillance with individuals' rights to data security became an intricate task that required careful navigation. Second, ensuring widespread access to technological resources proved difficult, particularly among marginalized communities facing socioeconomic disparities.²⁴ The reliance on smartphones and internet connectivity created barriers for some individuals in receiving important information or participating fully in contact-tracing initiatives. Additionally, varying levels of digital literacy presented another obstacle during these efforts. Many people struggled to understand how to effectively use new technologies or were hesitant about embracing them due to limited knowledge or fear of their efficacy. Furthermore, misinformation and conspiracy theories circulating online hindered targeted communication campaigns aimed at spreading accurate information about the virus and preventive measures.²⁵ Overall, despite immense strides made during this time through digitization efforts, addressing these challenges was essential for optimizing technology's potential impact on combating COVID-19 effectively.

2.3 THE IMPORTANCE OF PRIVATE-SECTOR ENGAGEMENT

The private sector plays a crucial role in driving the progress and delivery of technology and digital services, such as cloud computing and cybersecurity. These companies allocate resources for research and development (R&D) and innovation, constantly creating new digital technologies to improve efficiency and productivity in our ever-changing world. By embracing these advanced developments, the private sector not only sets impressive benchmarks for customer experience but also cultivates an atmosphere that encourages the public sector to strive for similar levels of digital transformation. However, despite notable progress in certain areas, government institutions often find themselves trailing behind due to cumbersome bureaucratic red tape and limited resources at their disposal. To bridge this gap, active involvement and collaboration with the private sector are essential as it provides access to invaluable expertise and expansive resources needed for successful implementation of digitized systems across various sectors.

Adopting a more corporative approach to digital technologies would enable the public sector to harness their full potential in delivering improved services efficiently and meeting heightened user expectations. By doing so, governments can harness the expertise of private companies while overcoming bureaucratic constraints, thereby benefiting from accelerated innovation adoption, and ultimately improving citizen-centric service delivery across various domains.

2.4 ARTIFICIAL INTELLIGENCE: A TRANSFORMATIVE FORCE

AI has emerged as a transformative force in the realm of e-government and digital services, enhancing and improving the way governments interact with their citizens.²⁶ With its ability to analyze colossal amounts of data quickly and accurately, AI provides invaluable insights that enhance decision-making processes within government agencies. Using AI-enabled systems, governments can improve public services and address societal challenges more efficiently. One area where artificial intelligence excels is streamlining e-government services. Through intelligent chatbots and virtual assistants powered by Natural Language Processing (NLP) algorithms, citizens can receive personalized support around-the-clock without human intervention.²⁷ These AI-based interfaces offer real-time responses to queries related to tax filing, welfare benefits eligibility, or permit applications—cutting down waiting times significantly while increasing user satisfaction levels.

Moreover, AI-driven predictive analytics enable better resource allocation within government departments by identifying patterns from vast datasets. This helps optimize service-delivery strategies across multiple sectors such as transportation planning or healthcare provision. For instance, machine learning algorithms can spot traffic congestion trends based on real-time monitoring systems and suggest adjustments to routes or infrastructure projects accordingly.²⁸ The utilization of big data further strengthens evidence-based policymaking for governments worldwide. Governments are equipped with an abundance of information collected from various sources—social media platforms, sensors embedded in

23 Brianna Navarre, "COVID-19 Data-Driven Spark Privacy and Abuse Fears," *U.S. News*, January 19, 2022, <https://www.usnews.com/news/best-countries/articles/2022-01-19/contact-tracing-biometrics-raise-privacy-concerns-amid-pandemic>.

24 Melise W Dejene Lemma et al., "Information Communications Technology in Higher Education in Africa: Challenges from the COVID-19 Pandemic," *United Nations Africa Knowledge Series* 1, no. 3 (July 2022), <https://www.un.org/osaa/what-we-do/africa-knowledge-network/knowledge-products/information-communications-technology>.

25 Jacob Kushner and Kang-Chun Cheng, "The Long Shadow of Covid-19 Myths," *BBC*, March 28, 2023, <https://www.bbc.com/future/article/20230328-the-long-shadow-of-covid-19-myths>.

26 "The Impact of Digital Technologies," United Nations, n.d., <https://www.un.org/en/un75/impact-digital-technologies>.

27 Anett Numa, "AI Chatbot to Replace and Improve Governmental e-Services," *Speaker's Corner*, e-Estonia, October 21, 2020, <https://e-estonia.com/ai-chatbot-to-replace-and-improve-governmental-e-services/>.

28 Mahmuda Akhtar and Sara Moridpour, "A Review of Traffic Congestion Prediction Using Artificial Intelligence," ed. Michael Bazant, Special Issue: Machine Learning Applications in Transportation Engineering, *Journal of Advanced Transportation* 2021, via Hindawi, <https://doi.org/10.1155/2021/8878011>.



Robot standing near luggage bags in shopping mall in Kyoto, Japan, May 3, 2018.
Source: Unsplash/ OLYMPUS IMAGING CORP.

urban infrastructure, public records databases—enabling them to gain unique insights into citizen behavior and needs.

AI is being utilized in various industries across the continent, including health, agriculture, fintech, and educational technology. As an example, the Nvidia Inception program supports early-stage ventures by providing access to the Nvidia developers platform for scalability.²⁹ In Nigeria, Wuraola Oyewusi, a pharmacist turned data scientist, is using AI and data science to save lives in the healthcare field.³⁰ In Uganda, doctors are equipping new mothers with AI-enabled devices to monitor their newborns' health.³¹ Finally, Responsible AI Network-Africa, a Ghanaian-German partnership, is building a network of scholars in Africa to foster responsible development and use of AI in governance.³²

2.4.1 Predictive analytics for public services

Predictive analytics are a powerful tool in the realm of e-government, enhancing digital services by leveraging data-driven insights. By analyzing vast amounts of structured and unstructured data, governments can be proactive by predicting which services are needed with unprecedented accuracy. This has

immense implications for citizens' experiences when accessing government services online. With predictive analytics at their disposal, governments can anticipate user needs and proactively offer personalized suggestions or recommendations even before they are requested. As a result, citizens are able to access information and complete transactions more quickly and easily by streamlining processes. Moreover, predictive analytics enable governments to gain deep “customer” understanding through granular segmentation of citizens based on various factors such as demographics, behavior patterns, sentiment analysis from social media feeds, etc. Armed with this knowledge, e-governments can tailor their service offerings accordingly while ensuring inclusivity and accessibility for all citizens. For instance, predictive models may help identify potential issues that certain segments of the population might face while utilizing specific digital services due to language barriers or disabilities.³³ Predictive analytics offer strategic foresight that helps build efficient plans by forecasting demands accurately. Governments leverage these forecasts to optimize resource allocations efficiently to meet citizen expectations during peak periods effectively, facilitating a smooth functioning of core public services without overwhelming infra-

29 “NVIDIA On-Demand,” Nvidia, n.d., <https://www.nvidia.com/en-us/on-demand/session/gtcspring22-s41924/>.

30 “Data Science Nigeria,” <https://www.datasciencenigeria.org/wuraola-oyewusi/>.

31 Nita Bhalla, “Ugandan Medics Deploy AI to Stop Women Dying after Childbirth,” Reuters, January 31, 2020, <https://www.reuters.com/article/us-uganda-women-health-tech/ugandan-medics-deploy-ai-to-stop-women-dying-after-childbirth-idUSKBN1ZU2EH/>.

32 “RAIN Africa,” Responsible AI Network–Africa, n.d., <https://rainafrica.org/>.

33 Arnaud Bertrand and Julie McQueen, “How Can Digital Government Connect Citizens without Leaving the Disconnected Behind?,” Ernst & Young, June 19, 2023, https://www.ey.com/en_gl/government-public-sector/how-can-digital-government-connect-citizens-without-leaving-the-disconnected-behind

structures. Further, advanced algorithms within predictive analytics systems enable enhanced risk mitigation capabilities for government agencies managing sensitive information across various touchpoints in cyberspace. Identifying cyber threats early on allows proactive measures like fraud detection. For instance, a fraud detection system called Manila is used by First National Bank (FNB) South Africa to detect unusual behavior among customers. This type of fraudulent activity affects banks as well as their customers. African banks alone suffered a loss of \$1 billion in 2021 due to account takeover fraud.³⁴ The impact of this pervasive problem is further exacerbated by the substantial financial losses and severe damage to customers' credit ratings that result from account takeovers.

2.4.2 Machine learning for efficiency

Machine learning is enhancing the landscape of e-government and digital services, providing innovative solutions to automate and enhance customer service for government services. With its ability to analyze massive amounts of data effectively, machine learning algorithms can uncover patterns and insights that empower governments to deliver more efficient services to their citizens.³⁵ By leveraging this technology, e-government platforms can streamline processes such as citizen registration, permit applications, or tax filings by automating repetitive tasks and reducing human intervention. This not only saves time but also improves accuracy, while minimizing potential errors inherent in manual processing.

Furthermore, machine learning has proven to be an invaluable tool in Africa, with numerous use cases that have the potential to revolutionize various industries and sectors.³⁶ In the healthcare industry, for instance, machine learning algorithms can analyze vast quantities of medical data to identify patterns and make accurate predictions for disease detection and prevention. This technology is especially beneficial in remote areas where access to healthcare professionals may be limited.³⁷ In agriculture, machine learning models can assess soil quality, weather conditions, and crop health to optimize farming practices and improve overall yield.³⁸ By leveraging this technology, farmers are able to make informed decisions

regarding irrigation schedules or pest control measures. However, it's worth mentioning that a key challenge lies in training these algorithms effectively due to the scarcity of labeled datasets specific to African contexts. Such datasets play a crucial role in ensuring accurate performance for local languages or unique challenges faced by the continent like wildlife conservation or drought prediction models. Implementing machine learning solutions may require initial investments in infrastructure setup and computing resources; however, scaling these technologies over time could potentially lead to cost-effective operations as hardware costs decrease and expertise is localized within the continent.

By analyzing vast archives of previously resolved cases or typical FAQs, these systems can provide intelligent chatbots or virtual assistants that engage with users seamlessly—24/7—to answer questions promptly and efficiently. Consequently, machine learning has become an indispensable tool for governments worldwide seeking to build smart ecosystems where citizens' needs are met swiftly using cutting-edge technologies. Moreover, machine learning empowers governments to automate repetitive tasks such as form filling or basic information provision by employing chatbots that engage with users in real-time conversations, mimicking human interactions to support customer service and engagement.³⁹ In essence, by utilizing this cutting-edge technology, e-government implementations effectively streamline processes while ensuring personalized attention to citizens' needs.

2.4.3 Data privacy

In an AI world, data privacy and security will be important in our daily lives. As AI continues to revolutionize various industries, it is imperative to ensure that citizens' confidential data remains protected from malicious actors. With the tremendous advancements in AI technology, concerns regarding hacks, ransomware attacks, and phishing attempts have become more prevalent.⁴⁰ Safeguarding citizens' data while utilizing AI necessitates robust security measures and ethical practices. First, organizations must establish stringent protocols for data privacy, adhering to legal frameworks and industry standards;

34 Peace Itimi, "How African Banks Can Spot and Prevent Account Takeover Fraud," Smile ID (blog), November 26, 2023, <https://usesmileid.com/blog/how-african-banks-can-spot-and-prevent-account-takeover-fraud>.

35 Deloitte AI Institute, "The Government and Public Services AI Dossier," Deloitte Development LLC, 2021, <https://www2.deloitte.com/us/en/pages/consulting/articles/ai-dossier-government-public-services.html>

36 "What Is Natural Language Processing (NLP)," IBM, n.d., <https://www.ibm.com/topics/natural-language-processing>

37 Tsegahun Manyazewal et al., "The Potential Use of Digital Health Technologies in the African Context: A Systematic Review of Evidence from Ethiopia," *npj Digital Medicine* (Nature Portfolio) 4 (2021), <https://www.nature.com/articles/s41746-021-00487-4>.

38 Rubby Aworka et al., "Agricultural Decision System Based on Advanced Machine Learning Models for Yield Prediction: Case of East African Countries," *Smart Agricultural Technology* 2 (December 2022), via Science Direct, <https://www.sciencedirect.com/science/article/pii/S277237552000156>.

39 "Driving Impact at Scale from Automation and AI," Digital/McKinsey, February 2019, 69, <https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Driving%20Impact%20at%20scale%20from%20automation%20and%20AI/Driving-impact-at-scale-from-automation-and-AI.ashx>

40 Ian King, "Cisco Sees AI Software Making Phishing Attacks Harder to Resist," Bloomberg, April 24, 2023, <https://www.bloomberg.com/news/articles/2023-04-24/cisco-sees-ai-software-making-phishing-attacks-harder-to-resist#xj4y7vzkg>

this entails obtaining explicit consent from individuals before collecting their personal information. Implementing encryption techniques throughout the data lifecycle is crucial to prevent unauthorized access or decryption by hackers.

Employing sophisticated firewalls and intrusion detection systems can help detect potential threats promptly. Regular vulnerability assessments ought to be conducted by skilled cybersecurity professionals who identify weaknesses in the system architecture proactively, addressing them swiftly before exploitation arises. Technical safeguards also play an essential role in securing citizen's data within the realm of artificial intelligence. Robust encryption algorithms should be employed when transmitting sensitive information across networks or storing it in databases—rendering such valuable resources unreadable by malicious entities even if they are somehow intercepted during transfer or storage processes. Moreover, user awareness campaigns regarding common cyber threats such as phishing play a pivotal role in safeguarding against social engineering attacks.⁴¹ Educating individuals about recognizing suspicious emails or links minimizes the risk of falling victim to fraudulent schemes seeking sensitive information illegally.

2.5 EMERGING TECHNOLOGIES IN PUBLIC DOMAINS

Emerging technologies have permeated various sectors and are increasingly being adopted by governments worldwide to enhance public-service delivery to citizens through digital services or e-government initiatives. Governments are leveraging these cutting-edge tools to streamline bureaucratic processes, increase accessibility, and improve overall efficiency within the public sector. One interesting example is the adoption of blockchain technology in frontier and emerging markets to curb corruption in

public procurement systems. With its decentralized ledger system, blockchain ensures transparency and accountability by recording transactions securely, thereby minimizing fraudulent activities. Countries such as Georgia and Ghana have implemented blockchain-based platforms that enable transparent transactions, minimizing corruption risks while boosting investor confidence.⁴² This innovation not only ensures secure property rights but also simplifies procedures for citizens seeking to buy or sell properties. By leveraging these innovative solutions, governments can streamline administrative processes, increase accessibility to information and resources, and address local challenges effectively.

Similarly, smart city solutions utilizing Internet of Things (IoT) devices are gaining traction across several emerging markets such as Brazil and China.⁴³ These integrated technologies facilitate efficient resource management by monitoring environmental conditions like air pollution levels or waste management systems' capacity in real-time – enabling governments to make data-driven decisions aimed at improved urban planning while simultaneously enhancing citizen welfare. Additionally, biometric identification systems are being utilized to strengthen national security measures, for instance; they offer accurate verification methods critical for managing fraud risks associated with social welfare programs and preventing identity theft cases within the public sector.⁴⁴ These examples exemplify how emerging technologies can facilitate government delivery of digital services that cater to citizens' needs while resolving local challenges efficiently. However, certain countries need to be cautious about integrating biometrics due to citizens' concerns regarding surveillance and personal security. Further, countries and regulators need to take precautions to protect data from hackers and cybercrime by implementing Zero Trust Security (so that no one is trusted by default from inside or outside the network, and verification is required from everyone trying to gain access to resources on the network), and by training staff on data security.

41 "Avoiding Social Engineering and Phishing Attacks," US Cybersecurity & Infrastructure Security Agency (CISA), February 1, 2021, <https://www.cisa.gov/news-events/news/avoiding-social-engineering-and-phishing-attacks>

42 Inge Snip, "Georgia: Authorities Use Blockchain Technology for Developing Land Registry," Eurasianet, April 19, 2017, <https://eurasianet.org/georgia-authorities-use-blockchain-technology-for-developing-land-registry>

43 "Global IoT in Smart Cities Market," KBV Research, January 2024, via ReportLinker, https://www.reportlinker.com/p06249506/Global-IoT-in-Smart-Cities-Market-Size-Share-Industry-Trends-Analysis-Report-By-Component-By-Solution-Type-By-Services-type-By-Application-By-Regional-Outlook-and-Forecast.html?utm_source=GNW

44 Identification for Development (ID4D), *A Primer on Biometrics for ID Systems*, World Bank, 2022, <https://id4d.worldbank.org/id-biometrics-primer>

3. African progress on government transformation

Many African governments are actively supporting the future growth of e-government by implementing policies that foster innovation and enhance citizen engagement. The African Continental Free Trade Area (AfCFTA) aims to create a single market for goods and services across the continent.⁴⁵ As part of this agreement, member countries are committed to improving governance structures and adopting advanced technology infrastructure to facilitate seamless trade through digital platforms. To support this growth, significant investments need to be made in robust technology infrastructure that can handle the increasing volume of transactions and data flow associated with e-governance initiatives. This includes investing in high-speed internet connectivity, expanding broadband coverage, establishing secure data centers, and developing interoperable systems that enable efficient delivery of digital services. These advancements will empower governments to provide streamlined administrative processes through online portals while ensuring secure transmission of confidential information between citizens and public institutions. By embracing such policies and fostering a conducive technological environment, African governments pave the way for inclusive economic development driven by innovative e-services tailored toward meeting diverse citizen needs effectively.

3.1 ENABLING INFRASTRUCTURE

Data centers in Africa have become an integral part of the continent's technological infrastructure, facilitating the storage and management of colossal amounts of data. So that means that indigenous African data centers are available to store data. With rapid advancements in technology, several African countries have established their own state-of-the-art data centers, designed to cater specifically to local needs.⁴⁶ These pioneering facilities not only provide invaluable support for businesses across various sectors but also ensure that sensitive information stays within national borders, promoting data

sovereignty and security. Addressing concerns around baseload electricity and redundancy, African data centers certainly recognize the criticality of uninterrupted power supply.⁴⁷ To address this challenge head-on, many facilities employ robust strategies such as incorporating backup generators into their power infrastructure or forging partnerships with energy providers to ensure stable electricity supply. In addition, advanced monitoring systems help minimize downtime by constantly monitoring power consumption patterns and anticipating potential disruptions. When it comes to managing fiber build-out and bandwidth requirements within African countries, many governments have realized the significance of investing in reliable communication infrastructures. Many understand that seamless interconnectivity between regions is crucial for knowledge transfer, economic growth, and social development on the continent. Consequently, numerous initiatives have been undertaken over recent years aimed at expanding fiber networks across Africa—both within individual nations as well as through transnational collaborations, but challenges remain including costs, permits, and regulations.⁴⁸

3.2 POLICY

As African countries start to realize the transformative power of digital technologies, many are actively developing policies to support the delivery of digital services to their citizens. These nations recognize that a well-crafted policy framework is essential for harnessing the potential benefits while ensuring data privacy and security. To this end, governments are enacting laws and regulations that guide how data should be collected, stored, processed, and shared.⁴⁹ Countries need to prioritize safeguarding citizens' personal information by incorporating stringent measures such as anonymization techniques or adopting explicit consent mechanisms for data usage. Additionally, African countries acknowledge the importance of cross-border data flows in an increasingly interconnected world and strive to strike a balance between facilitating these

45 "Agreement Establishing the African Continental Free Trade Area," African Union (website), accessed January 2024, <https://au.int/en/treaties/agreement-establishing-african-continental-free-trade-area>

46 Alexis Akgwagiyam, "New Data Centers Are Supercharging Cloud Computing in Smaller African Countries," *Semafor* (news platform), June 22, 2023, <https://www.semafor.com/article/06/22/2023/data-centers-fuel-cloud-computing-in-smaller-african-countries>

47 *African Climate & Datacenter PUE 2021*, White Paper, 2021, CAP DC and Africa Data Centres Association, <http://africadca.org/wp-content/uploads/2022/05/PUE-Climate-Hydrogen-in-African-DCs-White-paper.pdf>; PUR stands for power usage effectiveness.

48 Landry Signé, "Fixing the Global Digital Divide and Digital Access Gap," Commentary, Brookings Institution, July 5, 2023, <https://www.brookings.edu/articles/fixing-the-global-digital-divide-and-digital-access-gap/>.

49 *Fostering Economic Resilience in a World of Open and Integrated Markets*, Report Prepared for the 2021 UK Presidency of the G7, OECD, 14, <https://www.oecd.org/newsroom/OECD-G7-Report-Fostering-Economic-Resilience-in-a-World-of-Open-and-Integrated-Markets.pdf>.



African heads of state pose for a group photo with African Union Commission (AUC) Chairperson Moussa Faki Mahamat at the African Union Headquarters, in Addis Ababa, Ethiopia February 17, 2024. Source: REUTERS/Stringer.

flows for economic growth while upholding individuals' rights through agreements with other nations or regional governance bodies.⁵⁰ By proactively addressing issues related to policy formulation and data privacy, African countries aspire to create an environment conducive to delivering efficient digital services while safeguarding their citizens' interests securely.

3.2.1 African Union

In response to the evolving global economy and potential for economic growth, the African Union (AU) has recognized the imperative role that ICT plays in supporting trade across the continent. As a result, the body has implemented strategic policies, frameworks, and guidelines focused on government transformation and leveraging digital services to facilitate efficient trade processes within Africa.⁵¹ One such significant initiative is the establishment of an e-government framework designed to streamline administrative procedures by embracing technological advancements. This framework promotes transparency, accountability, and accessibility of government services through digitization while also fostering public trust in governance systems. As a result of AfCFTA—which seeks to create a single market for goods and services among member states of the African Union, and eliminate

tariffs and nontariff barriers to trade within Africa's borders—technology infrastructure has become even more vital for trade and regional integration.⁵²

By focusing on improving telecommunication networks, expanding broadband access, developing reliable data centers, and enhancing regional power grids necessary for sustaining these technologies, the AU aims to create an enabling environment conducive for cross-border trading activities. Moreover, recognizing that innovative digital services present opportunities not only for governments but also private enterprises involved in trade facilitation, comprehensive guidelines have been put forth for this by the AU. These encompass adoption of electronic payment systems such as mobile money platforms or fintech solutions encouraging secure financial transactions between parties involved in cross-border trades.

Additionally, various challenges still need to be addressed for these initiatives to reach their full potential. While significant progress has been made in developing regional technology infrastructure throughout Africa over recent years, persistent disparities remain between countries regarding network coverage and internet penetration rates—particularly in

50 *AU Data Policy Framework*, African Union, February 2022, <https://au.int/sites/default/files/documents/42078-doc-AU-DATA-POLICY-FRAMEWORK-ENG1.pdf>.

51 *The Digital Transformation Strategy for Africa (2020-2030)*, African Union, n.d., <https://au.int/sites/default/files/documents/38507-doc-dts-english.pdf>.

52 “The African Continental Free Trade Area,” African Union (website), n.d., <https://au.int/en/african-continental-free-trade-area>.

rural or remote areas—hindering seamless implementation of e-government solutions. Additionally, issues relating to cybersecurity pose ongoing threats as governments work toward digitizing critical processes; ensuring robust safeguards are essential when managing sensitive citizen data online.

3.2.2 Regional Bodies

The AU recognizes eight regional economic communities⁵³ (RECs):

1. Arab Maghreb Union (UMA)
2. Common Market for Eastern and Southern Africa (COMESA)
3. Community of Sahel–Saharan States (CEN–SAD)
4. East African Community (EAC)
5. Economic Community of Central African States (ECCAS)
6. Economic Community of West African States (ECOWAS)
7. Intergovernmental Authority on Development (IGAD)
8. Southern African Development Community (SADC)

These RECs recognize that a well-established digital infrastructure is essential for effective regional integration and fostering economic collaboration. Consequently, they have implemented various policies and frameworks aimed at facilitating e-government services and trade across the continent while supporting African growth.⁵⁴ To harness the potential of technology-led development, these RECs focus on establishing robust technology infrastructure. They encourage investment in broadband connectivity expansion projects to ensure internet access is widespread throughout their territories. By improving data transmission capabilities and reducing connectivity costs within remote areas, they aim to bridge existing digital divides that hinder progress. Additionally, these bodies advocate for active participation from governments in promoting digital education across all sectors as a means of fostering innovative solutions and ensuring an inclusive society.

Moreover, dedicated efforts have been made toward creating comprehensive guidelines for e-government implementation within each REC's jurisdiction. Ranging from streamlining administrative processes to enhancing service delivery through

online channels or mobile applications, these guidelines provide a clear roadmap for adapting traditional governance structures into more efficient digital systems. Collaboration among member states further facilitates knowledge-sharing experiences crucial for successfully implementing transformative e-governance practices.

However, several challenges still demand attention before reaping the full benefits of a digitally advanced trading ecosystem across Africa. First, disparities persist regarding access to technology infrastructure among different member states due to factors such as limited resources or inadequate investment priorities. Addressing such discrepancies requires collective efforts focused on equitable distribution of resources and targeted capacity-building initiatives tailored toward bridging digital divides between nations or regions within each economic community.⁵⁵ Second, there remains an urgent requirement for improved cybersecurity measures given the sophistication of cyber threats targeting both governments' digitization endeavors as well as private-sector businesses.

3.3 RESPONSIVE INSTITUTIONS

Government transformation in Africa requires responsive institutions that develop technology policies to support trade. With the implementation of AfCFTA, these government institutions are actively promoting and implementing policies, frameworks, and guidelines aimed at supporting the African growth story. A central focus lies in technology infrastructure development, which includes enhancing digital services and e-government initiatives. To facilitate trade across the continent, governments need to invest in robust digital networks, information systems, and secure platforms for easy access to market information and streamlined customs processes. These measures aim to eliminate barriers such as bureaucracy and corruption while ensuring transparency and efficiency in cross-border transactions.

Governments need to understand that a strong technology policy is crucial for fostering an enabling environment where businesses can thrive. As part of this effort, they have set up reliable electronic payment systems, simplified registration procedures for businesses, established online portals for licensing requirements, and implemented efficient customs clearance processes using digital documentation. These efforts not only attract foreign direct investment but also support local entre-

53 "Regional Economic Communities (RECs)," African Union, <https://au.int/en/organs/recs>.

54 Asmaa ElGanainy et al., *Trade Integration in Africa Unleashing the Continent's Potential in a Changing World*, Departmental Paper, IMF, May 2023, 3, <https://www.imf.org/-/media/Files/Publications/DP/2023/English/TIIAIEA.ashx>.

55 OECD, *The Future of Production: The Case for Regional Integration*, 2020 Policy Note on Africa, OECD Development Centre and OECD Emerging Markets Network, 2020, <https://www.oecd.org/dev/EMnet-Africa-Policy-Note-2020.pdf>.

preneurs by providing them with equal opportunities within regional markets.

However, despite some progress made so far on e-government initiatives and facilitating trade through technological advancements, various challenges still need attention. One prominent challenge is bridging the digital divide between rural areas lacking adequate connectivity infrastructure compared to urban centers.⁵⁶ Expanding internet penetration across diverse geographical regions remains a priority to ensure inclusive economic growth throughout Africa.

3.4 PUBLIC CLOUD

Especially in the area of digital services, the transformation of government in Africa is closely linked to the adoption of advanced technology infrastructure. The implementation of public cloud storage has emerged as a crucial catalyst for this transformative process. With AfCFTA, it is imperative for governments across the continent to embrace digitization and streamline their service delivery mechanisms. Public cloud storage offers a multitude of benefits for e-government initiatives in Africa, including improved data management, enhanced accessibility, and cost-effectiveness. By leveraging cloud-based solutions, government agencies can securely store vast amounts of data while simultaneously ensuring its accessibility from any location or device, facilitating efficient governance processes and decision-making.⁵⁷

By utilizing cloud technologies, government entities can collaborate seamlessly and share data across borders in accordance with AfCFTA regulations.⁵⁸ This not only allows for more efficient communication among agencies, but also promotes streamlined service delivery throughout Africa. By breaking down geographical barriers and transforming bureaucratic processes into agile systems, cloud storage enables governments to effectively meet the needs of their citizens. Moreover, it offers reliable redundancy measures to prevent downtime or outages caused by system failures or natural disasters—a crucial factor in regions with unstable power

networks. The impact of accessing the cloud reaches far beyond technical advantages; it brings significant value to service delivery across Africa's diverse landscape, encompassing both geographic and socioeconomic differences.⁵⁹ Furthermore, this technology can greatly benefit remote areas facing limited connectivity challenges if solutions catered to low-bandwidth environments are implemented.

3.4.1 Big Data

Africa has seen a dramatic increase in the use of big data by government agencies and the public sector in recent years, signaling a shift toward harnessing technology to improve governance.⁶⁰ This transformation is intrinsically intertwined with the exponential growth of big data and its seamless storage and security for digital service delivery. With Africa's population projected to surge from 1.5 billion inhabitants to an astonishing 2.5 billion, governments must embrace this data-driven approach to better support their citizens and deliver services in a cost-effective and timely manner that adheres to global norms. As governments increasingly recognize the immense potential of big data, they are leveraging it through various means such as e-government initiatives which facilitate the digitization of governmental processes.⁶¹ By harnessing technologies like cloud storage, vast amounts of data can be securely stored and accessed on-demand, ensuring streamlined operations across diverse sectors ranging from healthcare to education to transportation. Embracing these technological advancements not only enhances administrative efficiency but also empowers citizens by providing them with convenient access to critical public services.

In addition, governments can utilize big data analytics tools to obtain valuable insights from extensive datasets in real-time or through retrospective analysis of long-term trends. By leveraging this information, decision-makers gain crucial intelligence for informed policymaking and addressing societal challenges proactively. Cloud storage solutions are essential in facilitating the integration of diverse datasets and improving accessibility and scalability for public agencies. Through this advanced approach, African governments can effectively utilize big data to formulate precise policies on pressing issues such as health-

56 "From Connectivity to Services: Digital Transformation in Africa," World Bank (website), June 26, 2023, <https://www.worldbank.org/en/results/2023/06/26/from-connectivity-to-services-digital-transformation-in-africa>.

57 "Cloud Services Advance Digital Transformation for Governments," World Bank, June 10, 2022, <https://www.worldbank.org/en/news/feature/2022/06/07/cloud-services-advance-digital-transformation-for-governments>.

58 "U.S.-Africa Business Center White Paper: Recommendations for Implementing the New Digital Transformation with Africa Initiative," US Chamber of Commerce, December 19, 2022, <https://www.uschamber.com/assets/documents/U.S.-Chamber-Digital-Transformation-with-Africa-White-Paper-12.2022.pdf>.

59 Alison Gillwald et al., *The Cloud Over Africa*, ed. Alison Gillwald, Research ICT Africa, n.d., https://www.researchictafrica.net/publications/Evidence_for_ICT_Policy_Action/Policy_Paper_20_-_The_cloud_over_Africa.pdf.

60 "Big Data for Sustainable Development," United Nations (website), n.d., <https://www.un.org/en/global-issues/big-data-for-sustainable-development>.

61 William D. Eggers et al., *Seven Pivots for Government's Digital Transformation: How COVID-19 Proved the Importance of "Being" Digital*, Deloitte Center for Government Insights, May 3, 2021, <https://www2.deloitte.com/us/en/insights/industry/public-sector/government-digital-transformation-strategy.html>.

care and education with evidence-based insights.⁶² By harnessing the power of comprehensive analytics frameworks and big data infrastructure, governments can optimize resource allocation strategies to deliver cost-effective services tailored to regional needs without compromising ethical standards or lagging behind international norms when handling sensitive information within vast databases—a task that these nations must diligently tackle in an increasingly interconnected world driven by technological advancements.

3.4.2 INDIGENOUS DATA STORAGE

In the ever-evolving landscape of technology infrastructure, data storage plays a pivotal role in empowering e-government and digital services across Africa. The importance of having indigenous African data storage cannot be underestimated as it ensures that sensitive information generated within the continent is securely stored and easily accessible.⁶³ With a rapid increase in digital services, such as online banking, telemedicine, and e-commerce, it becomes imperative for Africa to have robust local cloud and data storage systems tailored to its unique needs. By building local infrastructure specifically designed for African requirements, entrepreneurs can foster economic growth while addressing issues like latency, compliance with

regional regulations, and privacy concerns that often arise when utilizing foreign cloud storage providers.⁶⁴ Additionally, relying on local entrepreneurs to develop cloud storage solutions can spur innovation within the continent's tech industry.

MainOne, a West African connectivity and data-center solutions provider, expanded into several West African countries and provides services to banks, financial services, consumers, industrial, and government clients.⁶⁵ Building these essential foundations locally not only fosters technological self-reliance but also job opportunities for skilled professionals who understand the specific challenges faced by African businesses and governments. By encouraging entrepreneurship focused on data storage solutions aligned with African values and cultural nuances, institutions can enhance trust among citizens who seek transparency in their interactions with the government or other service providers. Promoting localized data storage promotes sustainability by reducing reliance on external entities that may not prioritize supporting Africa's unique requirements fully. Homegrown cloud storage allows governments and organizations to exercise greater control over their own data sovereignty while minimizing vulnerabilities associated with depending solely on international providers whose data centers might be located far away from the continent.⁶⁶

62 Alyson Marks, "The Potential for Data-Driven Policymaking in Africa: Success Stories Across the Continent," Sustainable Development Solutions Network (a UN initiative), November 18, 2022, <https://www.unsdnsn.org/the-potential-for-data-driven-policymaking-in-africa-success-stories-across-the-continent>.

63 Alexis Akwagyiram, "New Data Centers Are Supercharging Cloud Computing in Smaller African Countries," *Semafor*, June 22, 2023, <https://www.semafor.com/article/06/22/2023/data-centers-fuel-cloud-computing-in-smaller-african-countries>.

64 "Meeting the Rising Data Centre Demand in Africa," *Techcabal*, September 26, 2023, <https://techcabal.com/2023/09/26/meeting-the-rising-data-centre-demand-in-africa/>.

65 Joan Aimuengheuwa, "MainOne Expands Data Center Footprints in Cote d'Ivoire," *Techeconomy*, November 6, 2023, <https://techeconomy.ng/mainone-expands-data-center-footprints-in-cote-divoire/>.

66 Peter Judge, "Understanding Africa's Data Center Challenge," White Paper, Data Center Dynamics, September 6, 2022, <https://www.datacenterdynamics.com/en/analysis/understanding-africas-data-center-challenge/>.

4. E-government solutions

In today's rapidly evolving digital landscape, e-government solutions have emerged as a transformative force in driving progress and efficiency within emerging and frontier markets. These innovative platforms are revolutionizing the way governments provide services to their citizens, harnessing the power of technology to bridge gaps between administrations and publics. By leveraging the potential of cutting-edge digital services, e-government is bringing forth a new era of transparency, accessibility, and convenience for individuals residing in these markets. Through secure online portals, citizens can now effortlessly access an array of government services such as tax filing, license applications, business registrations, healthcare appointments, and many more from the comfort of their homes or mobile devices. This shift not only saves time but also reduces bureaucratic red tape traditionally associated with physical paperwork processes. Moreover, e-government solutions facilitate greater citizen engagement through features like online feedback mechanisms or interactive discussion forums where individuals can express their concerns or suggestions directly to policymakers. The advent of such digital connectivity is driving remarkable socioeconomic development by enhancing administrative efficiency while ensuring equal access to essential government services across various regions within these emerging and frontier markets.

4.1 DIGITALIZATION SERVICE DELIVERY

The rapid advancement of technology and increasing internet penetration in Africa has paved the way for a tremendous growth potential in e-government service delivery, ultimately contributing to the billion-dollar global market. The global digital transformation market is expected to grow at a compound annual growth rate (CAGR) of 26.7% from 2023 to 2030, reaching US\$731.13 billion in 2022.⁶⁷ As governments across the African continent recognize the benefits of digitization, they are increasingly investing in building robust e-services infrastructure to cater to their citizens' needs. This exponential growth is expected not only due to improved connectivity but also because of rising demand from tech-savvy populations who seek convenient access to government services online. However, this expansion comes with its fair share of challenges such as

ensuring data security, addressing infrastructural gaps in remote areas, and overcoming resistance toward technological adoption at various levels within governments.⁶⁸ Through innovations aimed at streamlining service-delivery processes while maintaining high standards of security and user experience, private enterprises as well as governments themselves can tap into this burgeoning market despite these hurdles. The potential benefits include reduced bureaucracy and faster response times from government agencies, which lead to increased citizen satisfaction levels overall. With an optimistic outlook on e-government's role in transforming governance systems across Africa over the next three decades or so, stakeholders must collaborate proactively while harnessing new technologies that can effectively address existing challenges encountered along the path toward establishing a thriving e-services ecosystem throughout the continent.

4.2 DIGITAL IDENTITY

African e-government and digital services rely heavily on digital identity for their development and transformation. As governments across Africa embrace ICT, ensuring secure digital identities becomes increasingly crucial.⁶⁹ Digital identity serves as the virtual representation of an individual or organization involved in online transactions or interactions with public services. In the context of e-government, it enables citizens to access government portals, submit applications or documents electronically, make payments, request official certificates or licenses—all without physically visiting administrative offices. African governments need to prioritize securing digital identities for several reasons.⁷⁰ First, ensuring secure digital identities helps mitigate fraud and impersonation risks that can undermine trust between citizens and their government's online platforms. With robust authentication measures such as biometrics or multifactor verification systems integrated into these digital identities, individuals' personal information remains protected from unauthorized access or misuse during various online transactions involving sensitive data such as social security numbers or financial records. Second, secured digital identities enhance operational efficiency by streamlining bureaucratic processes that consume considerable time for both citizens

67 *Digital Transformation Market Size, Share & Trends Analysis Report by Solution*, Grand View Research, August 2023, <https://www.grandviewresearch.com/industry-analysis/digital-transformation-market>.

68 Andreea Stoiciu, "The Role of e-Governance in Bridging the Digital Divide," *UN Chronicle* XLVIII, no. 3 (2011), <https://www.un.org/en/chronicle/article/role-e-governance-bridging-digital-divide>.

69 *Smart Africa Alliance: Digital Identity*, Smart Africa, 2020, <https://smartafrica.org/wp-content/uploads/2020/12/blueprint-smart-africa-alliance-%e2%80%93-digital-identity-layouty.pdf>.

70 "The State of KYC in Africa Mid-year Report 2023," Smile ID, 2023, 2-23, <https://usesmileid.com/reports-and-guides/the-state-of-kyc-in-africa-mid-year-report-2023>.

and governmental institutions alike while reducing administrative costs incurred through paper-based procedures commonly found in traditional service delivery models.⁷¹ Third, protecting individuals' privacy rights through stringent data-protection regulations safeguards citizen trust in the government's commitment to ensure confidentiality when interacting with its e-services ecosystem. With enhanced cybersecurity protocols implemented at each touchpoint within this framework—from user registration during enrollment procedures with ongoing monitoring for suspicious activities—governments are better positioned to confidently expand their range of available services while fostering greater engagement.

4.3 EFFICIENCY

In today's rapidly advancing digital era, the concept of e-government has emerged as a transformative force in enhancing efficiency and expediting administrative processes. By leveraging electronic platforms, citizens are now empowered to effortlessly obtain permits, licenses, and various other official documents with unprecedented swiftness and effectiveness. Countries such as Estonia and India have pioneered successful e-services initiatives that exemplify how technology can streamline bureaucratic procedures while ensuring seamless service delivery to their populations.⁷² As the African continent prepares for an exponential population growth projected to reach 2.5 billion people by 2050, it becomes increasingly imperative to mitigate against the potential pitfalls of traditional bureaucracy through proactive digitization efforts. Embracing e-government on a comprehensive scale will be indispensable in optimizing efficiency within public administration systems, enabling governments to meet the burgeoning demands of their citizens efficiently and effectively.

4.4 CYBERSECURITY

Most small businesses with electronic footprints in Africa currently face a significant challenge when it comes to cybersecurity, as they lack the necessary safeguards and protocols to deter potential adversaries. This vulnerability is primarily due to a lack of serious attention given to cybersecurity measures

within these organizations. Although there have been improvements in cybersecurity practices within the government sector, much more work needs to be done, particularly as e-services continue to gain prevalence across the continent. As AFCFTA gains momentum and facilitates increased digital transactions, harmonization of cybersecurity should become an imperative standard practice.⁷³ Small businesses can protect themselves against cyber threats and ensure the confidentiality, integrity, and availability of their valuable data assets by implementing robust security measures in their operations.

4.4.1 Threats and deterrence for public data

In today's interconnected digital age, cybersecurity has become the backbone for ensuring citizen trust and safeguarding mission critical systems in African governments. The importance of robust cybersecurity deterrence cannot be overstated, particularly when it comes to securing public data from unknown threats. Mission-critical systems, encompassing vital infrastructure and government networks, store an unprecedented amount of sensitive information crucial for effective governance.⁷⁴ To fortify these systems against ever-evolving threats, African governments must adopt a multifaceted approach. They need to invest in state-of-the-art technologies that can identify and mitigate potential vulnerabilities promptly. From deploying advanced firewalls and intrusion detection systems to implementing encryption techniques for data protection during transmission or storage—comprehensive safeguards should be developed across all layers of their IT infrastructure architecture. Concurrently, fostering a culture of cyber awareness is paramount; frequent trainings should be provided to personnel handling mission-critical data, so they remain vigilant against social-engineering tactics employed by threat actors seeking unauthorized access.⁷⁵ Furthermore, proactive initiatives such as establishing dedicated cybersecurity agencies or departments can coordinate efforts across governmental bodies while streamlining decision-making processes related to threat mitigation strategies. These agencies could work closely with international partners and industry experts in exchanging intelligence on emerging cyber threats specific to the region—thereby enhancing collective defense capabilities through collaboration. Importantly, developing strong legislative frameworks tailored specifically toward combating cybercrime

71 R. Jesse McWaters et al., *A Blueprint for Digital Identity*, Industry Project of the Financial Services Community, Prepared in collaboration with Deloitte, Future of Financial Services Series, World Economic Forum, August 2016, https://www3.weforum.org/docs/WEF_A_Blueprint_for_Digital_Identity.pdf.

72 Peeter Vihma, "Four Lessons from 20 Years of Championing Digital Societies," e-Estonia, June 15, 2023, <https://e-estonia.com/four-lessons-from-20-years-of-championing-digital-societies/>.

73 Alberto Lemma, Max Mendez-Parra, and Laura Naliaka, *The AfCFTA: Unlocking the Potential of the Digital Economy in Africa*, ODI, 2022, <https://repository.uneca.org/bitstream/handle/10855/48749/b12019173.pdf?sequence=1&isAllowed=y>.

74 *Building Resilience, New Strategies for Strengthening Infrastructure Resilience and Maintenance*, OECD, 2021, <https://www.oecd.org/g20/topics/infrastructure/Building-Infrastructure-Resilience-OECD-Report.pdf>.

75 *Identifying Emerging Cyber Security Threats and Challenges for 2030*, European Union Agency for Cybersecurity, March 2023, <https://www.enisa.europa.eu/publications/enisa-foresight-cybersecurity-threats-for-2030/@download/fullReport>.



100 US dollar banknote. January 5, 2018. Source: Unsplash/Vladimir Solomiany

is pivotal for creating deterrents within this space. This involves enacting laws that sternly penalize malicious cyber activities ranging from hacking attempts to identity theft or unauthorized disclosure of information.

4.4.2 Securing mission-critical systems

In the evolving landscape of African governments' digital transformation, securing mission-critical systems has become paramount.⁷⁶ These systems encompass a vast array of vital operations such as national defense, healthcare services, financial transactions, and infrastructure management—all of which lie at the very heart of a country's functioning. With Africa increasingly leveraging big data to drive economic growth and development initiatives, safeguarding these mission-critical systems from unknown threats is crucial for overall stability and progress. Governments need to adopt comprehensive

strategies that encapsulate multiple layers of security measures tailored specifically to their context. This includes investing in robust hardware and software solutions fortified with encryption protocols, firewalls, intrusion detection systems, and more advanced technologies like machine learning algorithms capable of identifying potential vulnerabilities preemptively. Additionally, increasing awareness about cybersecurity risks among government personnel through training programs is essential for enforcing best practices consistently across departments. Moreover, fostering collaboration between public-private partnerships can facilitate sharing expertise on threat intelligence and implementing effective cybersecurity frameworks adapted to regional dynamics while considering unique socioeconomic challenges faced by emerging economies in Africa's diverse landscape.⁷⁷ Ultimately, prioritizing the protection of mission-critical systems will not

⁷⁶ Blessing Ife Oyetunde, "Africa's Digital Transformation Hinges on Strategic Partnerships, Say Panellists at the e-Governance Conference," GovInsider, June 29, 2023, <https://govinsider.asia/intl-en/article/africas-digital-transformation-hinges-on-strategic-partnerships-say-panellists-at-the-e-governance-conference>.

⁷⁷ "Partnerships between the Public and Private Sectors That Foster Information Sharing Are Essential to Protecting Critical Infrastructure and to Furthering Cybersecurity," CISA, n.d., <https://www.cisa.gov/topics/partnerships-and-collaboration>.

only ensure uninterrupted service delivery but also instilling confidence among citizens and international stakeholders alike in Africa's journey toward becoming an interconnected hub driven by innovation in this era dominated by technology's pervasive influence.

4.4.3 Policy

To safeguard trade, commerce, and public-sector service delivery in African countries, robust cybersecurity policies should be implemented. These policies need to encompass a comprehensive framework that addresses various aspects of cybersecurity such as data protection, network security, incident-response plans, risk-assessment methodologies, and employee training programs.⁷⁸ Additionally, these frameworks must align with international standards and best practices. Governments should establish stringent guardrails to ensure compliance through strict enforcement mechanisms and penalties for noncompliance. The policies should encourage collaboration between the government entities responsible for cybersecurity and private-sector stakeholders including businesses and technology providers.

AU member states can play a crucial role in implementing effective cybersecurity policies.⁷⁹ It can facilitate knowledge sharing by establishing platforms for information exchange among member countries on emerging cyber threats, vulnerabilities, and mitigation strategies. The AU also could lead efforts in capacity building by providing technical assistance and training programs tailored specifically to address the unique challenges faced by African nations. Furthermore, one significant initiative that can reinforce cybersecurity measures is AfCFTA, which can leverage its influence to mandate stringent security requirements for digital transactions within its purview. Incorporating strong encryption protocols, secure e-payment systems, and secure supply chain management solutions into its policy framework will help foster a safe ecosystem where businesses from different regions feel confident engaging

digitally with few or no concerns about data breaches or other cyber risks.

4.5 REVENUE COLLECTION

Governments across the globe have recognized that embracing e-government services can lead to significant improvements in revenue collection.⁸⁰ By integrating technology and digital platforms into their operations, these governments can streamline processes and enhance efficiency in various sectors. With traditional methods often plagued by delays, errors, and inefficiencies, implementing electronic systems has revolutionized this critical aspect of governance. Through user-friendly online portals, citizens can conveniently access and submit their tax returns or other financial obligations electronically at any time from anywhere. This not only reduces paperwork but also minimizes human errors during data entry or calculation processes, thus ensuring accurate and timely payments. Additionally, automated reminders and notifications help keep taxpayers informed about upcoming deadlines or outstanding dues, further enhancing compliance rates while reducing unnecessary penalties or legal disputes.

This shift to digital services not only increases transparency but also minimizes opportunities for fraud or corruption in revenue transaction processes by reducing human interaction.⁸¹ Moreover, automated systems enable real-time monitoring of transactions while providing accurate data analytics that assist authorities in identifying potential areas for revenue growth and implementing targeted strategies accordingly. In conjunction with effective cybersecurity measures to safeguard citizen information, e-government initiatives present immense opportunities for governments to optimize their revenue-collection mechanisms efficiently while enhancing overall service-delivery standards through seamless integration of technology into administrative processes.

78 *Emergency Services Sector: Cybersecurity Framework Implementation Guidance*, CISA, May 2020, <https://www.cisa.gov/sites/default/files/publications/emergency-services-sector-cybersecurity-framework-implementation-guidance-052020-508.pdf>.

79 Mercy King'ori, Ulric Quee, and Hunter Dorwart, "The African Union's Data Policy Framework: Context, Key Takeaways, and Implications for Data Protection on the Continent," *Future of Privacy Forum* (blog), March 29, 2023, <https://fpf.org/blog/the-african-unions-data-policy-framework-context-key-takeaways-and-implications-for-data-protection-on-the-continent/>.

80 David Amaglobeli, Ruud de Mooij, and Mariano Moszoro, "Harnessing GovTech to Tax Smarter and Spend Smarter," IMF (blog), September 7, 2023, <https://www.imf.org/en/Blogs/Articles/2023/09/07/harnessing-govtech-to-tax-smarter-and-spend-smarter>.

81 OECD, *Supporting the Digitalisation of Developing Country Tax Administrations*, Forum on Tax Administration, 2021, <https://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/supporting-the-digitalisation-of-developing-country-tax-administrations.pdf>.

5. Case studies

5.1 ESTONIA

Estonia, a small Baltic nation with a rich history and vibrant culture, has become a remarkable example of digitalization's transformative power. Through its relentless efforts in embracing technology, Estonia has efficiently utilized digitization to propel itself to the top tier of countries in this realm. Numerous case studies have delved into the country's pioneering journey toward becoming an e-society, highlighting how it strategically harnessed digital tools and services to revolutionize governance and citizen experiences alike. At the forefront of this transformation is Estonia's groundbreaking e-government infrastructure that enables seamless online interactions between citizens, businesses, and government institutions. This innovative system ensures convenient access to essential public services through secure digital identities called "e-Residency," allowing individuals from anywhere in the world to establish a trusted presence within Estonia's digital ecosystem. Furthermore, comprehensive e-services such as digitally signing contracts or accessing medical records have been seamlessly integrated into everyday life for Estonians, fostering efficiency and transparency across various sectors. The success of Estonia's digitization endeavors can be attributed not only to its robust technological infrastructure but also its commitment toward nurturing tech-savvy citizens who possess strong digital skills from an early age through extensive educational initiatives. As other nations strive to replicate Estonia's achievements in leveraging technology for societal advancement, these case studies serve as invaluable resources offering insights into harnessing the full potential of digitalization for national growth and development.

5.2 CANADA

Canada has made significant strides in its plan for e-government and digital services, albeit falling short when compared to Estonia. While both countries have recognized the importance of leveraging technology to enhance government services, Canada's progress has been hindered by various challenges and obstacles. One major challenge is the sheer size and diversity of Canada, which spans vast geographical areas with a diverse population spread across urban centers as well as remote regions. This poses difficulties in ensuring equitable access to e-government services for all citizens, especially

those residing in rural and underserved areas with limited internet connectivity.⁸² In addition, Canada's federal system of governance adds complexity to the implementation process as it involves collaboration among multiple levels of government—federal, provincial, and municipal—making coordination and harmonization a daunting task. Moreover, concerns related to privacy and security have also emerged as barriers since Canadians prioritize protecting personal information from potential data breaches or misuse.⁸³ These factors coupled with budget constraints have further impeded the seamless integration of e-government practices throughout the country. Nonetheless, despite these challenges along the path toward comprehensive digitization of public services, Canada strives to bridge this gap between their current state and Estonia's exemplary model.

5.3 INDIA

India's National e-Governance Plan (NeGP) stands as a testament to the nation's commitment toward digitalization and leveraging technology to enhance citizen services. With an ambitious vision, this plan aims to make all government services available electronically, seamlessly bridging the gap between citizens and their government. Through the implementation of NeGP, India is witnessing a paradigm shift in its approach toward governance, with e-services emerging as the cornerstone. By developing dedicated online portals and platforms, citizens can now access vital information and avail themselves of various governmental facilities right from the comfort of their homes or offices. This transformation creates unprecedented convenience for individuals while reducing bureaucratic hurdles traditionally associated with mundane tasks such as document processing or fee payments. As electronic counterparts replace physical paperwork in sectors like healthcare, education, transport, agriculture, taxation, and more, India is embracing an era where e-government becomes synonymous with efficiency and accessibility. The newfound ability for citizens to interact electronically with public agencies fosters transparency while empowering individuals by providing them greater control over their interactions with various arms of governance. The National e-Governance Plan thus proves instrumental in propelling India into a future where governmental services are promptly delivered through secure online channels—transforming society one electronically enabled transaction at a time.

82 *Digital Equity: Focusing on Every Canadian's Digital Future*, Future of Canada Center, Deloitte, n.d., <https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/fcc/digital-equity-2/ca-catalyst-digital-equity2-aoda-en.pdf?icid=de2-report-en>.

83 *National Cyber Threat Assessment 2023-2024*, Communications Security Establishment, Government of Canada, <https://www.cyber.gc.ca/en/guidance/national-cyber-threat-assessment-2023-2024>.

6. E-Government solutions in Africa

6.1 FUTURE PROJECTIONS

Several market projections predict substantial growth in the global e-government market in the coming years.⁸⁴ The increasing adoption of digitalization initiatives by governments across the world has paved the way for significant opportunities in this market. There are several reasons for this, including increased internet penetration, advancements in ICT, and a growing tech-savvy population. Market projections indicate that the e-government sector will experience rapid expansion due to its ability to enhance transparency, accountability, accessibility, and efficiency within public administration systems. Additionally, as more countries strive toward becoming smart cities or digital nations, they are likely to invest heavily in e-governance solutions that can streamline administrative processes while improving service delivery standards.⁸⁵ Market projections also reveal that cloud-based solutions and mobile applications will play a pivotal role in shaping the future landscape of e-government services globally. By enabling personalized experiences and data-driven decision-making capabilities at scale, emerging technologies such as AI, blockchain, big data analytics, and IoT will further transform government-citizen interactions. In conclusion, with increased governmental emphasis on leveraging technology for citizen-centric governance, coupled with technological advancements driving innovation in this field, we can confidently anticipate an upward trajectory for the global e-government market based on comprehensive market projections.⁸⁶

6.2 HOMEGROWN SOLUTIONS

Homegrown solutions in the domain of e-government are proving to be crucial for the development of Africa's developer, system integrator, and ICT ecosystem. As countries across the continent endeavor to bridge the digital divide and harness technology for efficient governance, it is becoming increasingly evident that relying solely on foreign expertise and off-

the-shelf solutions does not adequately address local needs and challenges.⁸⁷ Homegrown solutions enable African countries to tailor their e-government initiatives according to their unique societal contexts, institutional frameworks, and developmental aspirations. By fostering a vibrant culture of innovation within Africa's own technological landscape, these locally created solutions empower governments with greater control over their digital transformation processes while also nurturing local talent. Homegrown solutions help overcome issues such as language barriers and cultural nuances that often hamper effective implementation when relying on external providers. As African developers and system integrators devise e-government applications specifically catering to regional requirements, they enhance their skills while simultaneously creating an inclusive digital society that speaks directly to its citizens' concerns—from improving service delivery mechanisms to ensuring transparency in government operations.⁸⁸ In this way, homegrown e-government solutions become more than just tools; they embody a comprehensive approach toward sustainable social development by empowering both the public sector and local ICT ecosystem.

6.3 ENGAGING THE DIASPORA

Engaging the diaspora in e-government solutions has the potential to revolutionize Africa's digital landscape, paving the way for accelerated development and improved public services. To achieve this, African countries must tap into the immense expertise and resources of these African diaspora communities. By actively involving these communities in supporting e-government initiatives, African nations can leverage their knowledge and technical assistance to build robust digital infrastructures. The first step is establishing strategic partnerships with diaspora organizations and professionals who specialize in areas such as IT management, cybersecurity, data analytics, and software development. Collaborating with these individuals enables African governments to benefit

84 "2023 Technology Industry Outlook," Deloitte, <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/technology-media-telecommunications/2023-tmt-outlook-technology.pdf>.

85 "5G Smart Cities Whitepaper," Deloitte China, June 2020, <https://www2.deloitte.com/content/dam/Deloitte/cn/Documents/technology-media-telecommunications/deloitte-cn-tmt-empowering-smart-cities-with-5g-white-paper-en-200702.pdf>.

86 "E-Governance Market Expected to Reach USD 45.76 Billion by 2026 at 12% CAGR-Report by Market Research Future (MRFR)," GlobeNewswire, September 29, 2021, <https://www.globenewswire.com/news-release/2021/09/29/2305684/0/en/E-Governance-Market-Expected-to-Reach-USD-45-76-Billion-by-2026-at-12-CAGR-Report-by-Market-Research-Future-MRFR.html>.

87 Hafez Ghanem, "Shooting for the Moon: An Agenda to Bridge Africa's Digital Divide," Commentary, Brookings Institution, February 7, 2020, <https://www.brookings.edu/articles/shooting-for-the-moon-an-agenda-to-bridge-africas-digital-divide/>.

88 "Improving Africa's Service Delivery through E-Governance," African Union Development Agency blog posted by the Secretariat on behalf of AU High-Level Panel on Emerging Technologies and Calestous Juma Executive Dialogues, February 21, 2022, <https://www.nepad.org/blog/improving-africas-service-delivery-through-e-governance>.

from cutting-edge technologies while also enhancing local capacity through technology transfers. Additionally, engaging these communities requires innovative approaches that foster collaboration between Africans abroad and local stakeholders. This entails creating platforms for knowledge sharing where members of the diaspora can contribute ideas on e-government strategies based on successful models they have witnessed elsewhere. These collaborative efforts are crucial in developing tailored solutions that address unique challenges faced by each country within Africa. Moreover,

offering incentives to attract skilled professionals back home is an effective approach toward boosting e-government capabilities. Creating policies that incentivize or facilitate temporary return programs would enable diaspora experts to transfer their skills directly through specialized training sessions or mentorship programs conducted locally. To bolster support further, targeted campaigns should be launched both locally and internationally aimed at raising awareness about opportunities for engagement in e-governance projects across Africa.



People sitting inside a meeting room having a discussion November 7, 2019. Source: Unsplash/Women of Color in Tech

7. Recommendations

As the population of Africa grows to 2.5 billion, there is a growing need for digitalization and e-government services to support both current and future demographics. In light of projections that by 2050, one-quarter of the world's population will live in Africa, countries like Egypt, Ethiopia, Nigeria, Kenya, and the Democratic Republic of Congo will need to prepare their governments, infrastructure, and societies for a near doubling in population; to deal with the bureaucratic administration of this population boom, e-government and digital services will be essential.⁸⁹

As countries begin to implement digital services through e-government portals, it is crucial to have strong policies and frameworks in place to secure and retain data. Cybersecurity risks will always exist, but by establishing effective policies and procedures, these risks can be mitigated. AfCFTA can help in that work by, for example, coordinating standards for citizens' data to both protect that data and help in realizing the vast potential of a single market for goods and services across the continent. Regional bodies also have a responsibility to ensure their member countries adhere to global best practices in supporting trade, e-government services, and most importantly, citizen service delivery.

7.1 AFRICAN GOVERNMENTS

In the era of rapid technological advancements, it is imperative for African governments not only embrace digitization of their public services but also data privacy and security. To ensure that sensitive information remains sacrosanct, a range of recommendations should be considered:

- Implement robust security measures like the Zero Trust approach, which requires continuous verification at every stage to prevent unauthorized access and guarantee data integrity.

- Invest in comprehensive security training programs for government employees to help cultivate a culture of cyber resilience and awareness within organizations.
- Integrate redundancy measures such as regular data backups or mirrored systems, which contribute to quick recovery from any potential breaches or system failures while preserving the confidentiality and availability of public service-related data.

However, challenges must also be addressed effectively along this journey toward enhanced digital infrastructure. Data sovereignty emerges as one such challenge where governments need to establish policies regulating foreign jurisdiction over citizens' personal data stored by international corporations operating within their territories. Establishing a strong legal framework is another crucial aspect; developing clear guidelines pertaining to cybersecurity standards, incident reporting procedures, and consequences for noncompliance will promote accountability across all sectors handling public service data.

Moreover, safeguarding consumer rights for effective data protection goes hand-in-hand with these efforts toward securing digital platforms. By enacting legislation that specifically addresses gathering consent before collecting personal information from users and providing them control over how their information is utilized ensures an individual's right to privacy isn't compromised throughout various online interactions.

7.2 AFRICAN UNION

The African Union, as a guiding force for the continent's development and unity, has a pivotal role in supporting African countries to amplify their digital or e-government services. First, the African Union can facilitate knowledge exchange and

89 Declan Walsh, "How the Youth Boom in Africa Will Change the World," *New York Times*, October 28, 2023, <https://www.nytimes.com/interactive/2023/10/28/world/africa/africa-youth-population.html>.



Student enrolled in a special STEM programme attend a computer class alongside other students in Abuja, Nigeria February 18, 2022. Source: REUTERS/Afolabi Sotunde

communication between nations by organizing regular conferences and seminars specifically focused on e-government best practices.⁹⁰ These events would enable policymakers and experts from different countries to share insights, experiences, successes, and challenges faced in implementing digital services effectively. Additionally, the African Union can establish partnerships with international organizations that specialize in providing technical assistance for e-governance initiatives. By leveraging these resources, member countries can receive comprehensive support ranging from capacity-building programs to funding opportunities tailored towards scaling up their respective digital infrastructure.

To ensure successful adoption of e-government across Africa, it is imperative for all nations to adhere to specific regulations and rules set by both individual governments and collective bodies like the African Union. Primarily, it is crucial for countries to prioritize data protection laws that safeguard citizens' personal information within their electronic systems without compromising privacy rights. Furthermore, adopting standardized protocols related to cybersecurity measures would be instrumental in building trust among users while promoting secure access to online government platforms.

Moreover, fostering interoperability between various e-government systems implemented by different nations is vital for facilitating seamless collaboration among them. This entails enacting regulations that embrace open data principles alongside common standards governing software interfaces used in electronic service delivery across borders.

7.3 AFCFTA SECRETARIAT

The African Continental Free Trade Area presents a tremendous opportunity for African countries to enhance their digital and e-government services, enabling them to scale up their operations and efficiency. To support this transition, it is crucial for African countries to adhere to certain regulations and rules that facilitate the adoption of e-government platforms and ensure seamless integration. Recommendations include:

- Governments should prioritize investments in digital infrastructure such as high-speed internet connectivity across urban and rural areas alike, which would lay a strong foundation for the delivery of e-services on a wider scale.

90 "The 5th Ordinary Session of the Specialized Technical Committee on Communication and Information Communications Technology," African Union, November 17–23, 2023, <https://au.int/en/5thstccict>.

- Standardization efforts must be made at regional levels through collaborative initiatives among member states, as establishing common technical guidelines or frameworks can help streamline processes across borders and foster interoperability among different national systems.
- Strict data protection laws are imperative to instill trust in citizens regarding personal information security when utilizing these digital platforms. Adequate privacy measures must be put in place while ensuring compliance with international standards like the General Data Protection Regulation (GDPR).⁹¹
- Training programs should be implemented to empower civil servants with the necessary skills and knowledge required for efficient management of e-government services, encompassing aspects such as cybersecurity protocols or user interface design tailored toward citizen-centricity.

Through adherence to these regulations and rules under AfCFTA's guidance, African countries can effectively harness the potential of digital technologies in bolstering their e-governance capabilities across various sectors for sustainable growth and economic development for future growth.

7.4 US PRIVATE SECTOR

Multinational companies are expanding and increasing their market share in new international markets as developed markets become saturated, resulting in a healthy return for shareholders. In addition, multinational corporations should invest in Africa to diversify their revenue streams and reduce overdependence on traditional markets or regions saturated with competitors. While some US multinationals have already begun tapping into the African market, there is still much potential for growth and expansion for others. By 2050, Africa will not only be the largest continent, but its growing disposable income will also create opportunities for US companies to cater to a rising middle-class consumer base seeking high-quality products and services. Technology firms that offer services should take note that many African countries are increasing their budget for ICT and technology services, making them open for business. Despite certain challenges such as reliable electricity, governance challenges, and human capital in some countries, these obstacles should not dissuade companies from exploring the vast potential of this market.

The African market offers unique advantages like relatively low competition compared to other emerging economies such as China or India. Establishing a strong foothold in Africa now would enable US firms to gain substantial first-mover advantages while building brand loyalty among consumers who are currently underserved by international companies. By entering this vibrant marketplace, US multinationals can gain a competitive edge over rivals who have yet to seize this advantage. Investing in Africa would allow these corporations to tap into a vast pool of consumers hungry for goods and services while benefiting from favorable demographic trends such as increasing urbanization and an expanding middle class.

A number of major corporations, including Microsoft, Alphabet, and Nvidia, have extended their start-up and developer programs to Africa. It would be beneficial for additional US companies to follow suit in order to foster local talent in coding, development, and engineering for the upkeep of networks and data centers. With the rising trend of diaspora professionals returning or traveling between countries, it is essential for companies to consider tapping into their knowledge and understanding of the region as they seek to expand into new markets.

7.5 AFRICAN PRIVATE SECTOR

To drive the digitization efforts across Africa, it is crucial for private-sector multinationals, and particularly mobile network operators such as MTN, Safaricom, and Orange, to take a proactive role. These industry leaders should spearhead initiatives aimed at training the youth in cybersecurity and data privacy. With the growing digital ecosystem in Africa comes an increased risk of cyber threats and breaches that can undermine progress. Thus, by equipping young individuals with essential knowledge and skills on protecting information systems and maintaining robust security measures, these companies can play a pivotal role in safeguarding against potential vulnerabilities. Furthermore, it is equally important for other African private-sector organizations to contribute actively by establishing more internship or cooperative programs specifically designed to nurture future technology professionals. Such initiatives will enable aspiring individuals to gain hands-on experience while working alongside experts on the complex technological systems found within various industries. By fostering talent development within the region itself, Africa will be better positioned to build a self-sufficient workforce capable of supporting ongoing digitization endeavors effectively.

91 "What Is GDPR, the EU's New Data Protection Law?," European Union's GDPR website, n.d., <https://gdpr.eu/what-is-gdpr/>.

7.6 DEVELOPMENT FINANCE INSTITUTIONS

To propel Africa's digitization efforts forward, it is imperative for development finance institutions (DFIs) such as the African Development Bank and the World Bank to actively support these initiatives. One crucial aspect that requires immediate attention is data security and cybersecurity. As the region transitions into a digital era, there must be a concerted effort to incentivize countries in taking this matter seriously. DFIs can play an integral role by assisting nations in prioritizing robust cybersecurity measures and implementing stringent policies. This could involve creating frameworks for risk assessment or providing funding for training programs aimed at equipping local talent with essential digital skills and knowledge necessary to safeguard critical information systems from cyber threats. By nurturing a culture of information security consciousness throughout Africa, DFIs can make significant strides in fostering sustainable digitization practices on the continent.

7.7 US GOVERNMENT

The US government has implemented initiatives to support digitalization in Africa through partnerships with Australia, Japan, and other allies. While these efforts, such as Blue Dot Network and Access Africa, mark a beginning, further steps can be taken to aid these developing markets.⁹² One crucial measure would be for the US government to actively incentivize its multinational technology companies to expand their presence and R&D facilities in regions like Africa. This could be achieved through various means, such as tax breaks or other incentives. Additionally, promoting collaborations between American tech giants and local entities would facilitate the transfer of knowledge and skills, while driving economic growth in these areas. With a projected population of 2.5 billion inhabitants in the near future, Africa presents a significant consumer market for

Western multinationals, making it imperative for them to establish a footprint on the continent.

Leveraging institutions like the US Development Finance Corporation (DFC) is crucial in supporting the development of public digital services in Africa. DFC's commitment to Africa is reflected in the fact that \$11 billion of its portfolio is from Africa, with \$1 billion already approved in 2023.⁹³ By promoting investment opportunities, the United States can foster strong digital infrastructure and augment local innovation ecosystems. The DFC's suite of financial tools such as loans, equity, and blended finance mechanisms can yield desired results in enhancing ICT connectivity and technological capabilities in African nations. In addition, its guarantee coverage for political, currency, and expropriation risks can further derisk digital and technology investments.⁹⁴ While the Export-Import Bank of the United States has provided financing for US products and services to support digital development, more could be done to build digital capacity and development in Africa.

In addition, given China's Digital Silk Road (DSR) initiative, it is paramount for the US government to actively support its own companies in developing the African market, just as China has supported Huawei for communications infrastructure and ICT backbone support. These efforts can greatly contribute to narrowing the digital divide on the African continent and stimulate economic development in a burgeoning consumer market. While several initiatives and programs were introduced at the US-Africa Leaders Summit 2022,⁹⁵ there is still room for improvement. One potential area for growth is in tripling funding for essential infrastructure such as data centers and fiber networks, which would set the United States apart from China and its DSR initiative. Attracting major American companies like Nvidia and Cisco to expand into the African market would also benefit local ecosystems by promoting collaboration and implementing effective strategies. This would result in job opportunities, skill development, and overall economic advancement.

⁹² "Blue Dot Network," US Department of State (website), accessed November 2024, <https://www.state.gov/blue-dot-network/>.

⁹³ "Readout from DFC CEO and Head of Delegation Nathan's Engagement at the U.S.-Africa Business Summit," US International Development Finance Corp., July 13, 2023, <https://www.dfc.gov/media/press-releases/readout-dfc-ceo-and-head-delegation-nathans-engagement-us-africa-business>.

⁹⁴ "Our Products," DFC, accessed December 2024, <https://www.dfc.gov/what-we-offer/our-products>.

⁹⁵ "2022 U.S.-Africa Leaders Summit Overview," Fact Sheet, US State Department, last updated December 18, 2023, <https://www.state.gov/2022-u-s-africa-leaders-summit-overview/#:~:text=The%20U.S.%2DAfrica%20Leaders%20Summit,over%20the%20next%20three%20years>.

8. Conclusion

The changing demographics of the African continent, coupled with the lessons learned from the COVID-19 pandemic, underscore the urgent need for widespread adoption of digital services for e-government. As Africa's population continues to grow, traditional methods of service delivery will become increasingly strained, making it imperative to embrace digital technologies to effectively reach and serve the growing population. The pandemic has demonstrated the transformative power of digitalization in maintaining

essential services and fostering resilience in the face of disruption. African countries must now capitalize on this momentum and make the necessary investments in infrastructure, training, and digital literacy to fully harness the potential of e-government service delivery. By embracing digital transformation, African nations can both enhance the efficiency and effectiveness of public services, and empower citizens to engage more actively in the democratic process, paving the way for a brighter and more prosperous future.



Image of Gulf of Mexico, United States from outer space December 26, 2015. Source: Unsplash/NASA

9. About the author



Nii Simmonds is a nonresident senior fellow with the GeoTech Center, a seasoned professional with extensive expertise in emerging and frontier markets. With an astute understanding of the rapid changes occurring within these markets, Nii has honed his knowledge in emerging technologies, innovation, manufacturing, and supply chains.

He has Fortune 500 managerial experience with profit and loss responsibility in Big Pharma and biotech, consumer products, and strategy consulting. These positions have mostly involved strategic and long-term planning for different business divisions and providing C-level executives with competitive, joint-venture, and growth strategy advice.

Having worked extensively in Africa, Nii has successfully implemented private-sector initiatives that promote entrepreneurship and innovation as pivotal drivers of economic development. Through strategic partnerships with local businesses and organizations, he has facilitated the establishment of sustainable ecosystems that foster economic

resilience and job creation. Nii draws on these diverse experiences while incorporating local nuances specific to African markets.

Nii also consults with early-stage ecosystems in a variety of roles including venture adviser, board observer, and entrepreneur-in-residence. Additionally, Nii advises and provides thought leadership on artificial intelligence and emerging technologies, as well as their impact on society in terms of innovation, policy, and accelerating impactful solutions to challenges.

For the World Bank Group, International Finance Corporation, and African Development Bank, Nii has worked and provided consultation in the areas of private-sector development, diaspora engagement, financial inclusion, and agribusiness. He developed a diaspora engagement program at the World Bank Group with the goal of incentivizing professionals in the African diaspora to contribute both human and financial resources to early-stage enterprises for job creation in Africa.

Nii holds a bachelor of science in management from Smeal College of Business at Pennsylvania State University with a minor in information systems and statistical analysis. In addition, he undertook graduate studies in executive education in operations/business process management at The Wharton School at University of Pennsylvania.



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