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Powering Africa's Digital Transformation:
The Policy Landscape

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Contents

Introduction

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Recent technological advancements have presented greater opportunities for more people worldwide to participate in the digital economy. As digital capabilities continue to evolve, they are expected to enhance connectivity further, with a profound impact across industries and the broader economy. Across sectors, digital platforms are reshaping the dynamics between customers, employees, and employers. Further, the COVID-19 pandemic accelerated technological transformation by several years, as technology became the essential foundation for continuity in numerous sectors.

Amid these developments, Africa's digital transformation is becoming a key focus of international analysis as experts examine how the continent is navigating the rapidly advancing digital revolution. Although Africa's digital technology growth is not directly comparable to any advanced country or region, the continent is making significant progress. As a developing region, Africa still faces challenges in constructing the necessary infrastructure to become globally competitive in the digital age. However, the gap is closing, and Africa is no longer far behind.

Multiple drivers are fuelling this transformation, shaping opportunities across sectors. The number of people with internet access in Africa is steadily increasing. Meanwhile, mobile phones have become ubiquitous, acting as gateways to the digital world. This widespread mobile connectivity is empowering individuals to access vital services, perform financial transactions, and engage in the digital economy. Further, concrete efforts are being made across the continent to provide high-quality digital services and address misinformation and disinformation about the region. This includes offering open-source, data-driven analysis to highlight the positive strides being made. Efforts to mitigate the risks associated with digital revolution abuses are also a priority—concerns that have historically driven many developing nations' hesitation to fully embrace Africa as a partner in advancing the digital era.

However, the digital transformation is not uniform across the continent. Countries like South Africa, Kenya, Nigeria, and Egypt have shown higher adoption rates due to the improved presence of mobile devices and the internet, and various supportive government policies.

For Africa, digital transformation can be disruptive and transformative, offering a unique opportunity to accelerate industrialisation, drive economic growth, reduce poverty, and improve the quality of life for millions. Digital technologies and services are poised to contribute significantly to the African Union's 'Agenda 2063,' helping to strengthen regional integration and enhance connectivity between African markets and the global economy. This shift could stimulate innovation, create jobs, and open up new economic opportunities across key sectors.

In particular, digital technology can improve market and financial access for underserved populations, including those in remote areas often overlooked by traditional financial institutions. Bridging the digital divide and addressing inequality will rely heavily on ensuring widespread access to secure and reliable internet services. This connectivity can potentially enhance human capital development, providing young people with new opportunities and skills. However, the digital gap may disproportionately affect women and girls, especially those in rural or economically disadvantaged areas, deepening existing gender inequalities.

While digital technologies hold an immense potential to transform Africa, realising this promise will require creating a supportive business environment and an effective regulatory framework. Many least-developed countries across the continent have not fully capitalised on the rapid growth of the digital economy due to various challenges, including insufficient infrastructure and limited skills development.

To fully harness the benefits of digital transformation, a robust legislative framework is needed to strengthen digital infrastructure and ensure affordable, reliable access for all. This framework should support the registration of digital identities and intellectual property, promote the development of new financial and technological innovations, and establish a well-resourced, permanent regulatory body to oversee and guide the future of the digital economy in Africa.

About the Volume

Africa must leverage technology to empower its citizens, particularly those who are underserved and marginalised. While progress has been made, with many African countries taking significant steps—such as expanding digital access to remote communities, promoting digital literacy, and advancing e-governance—there is still much work to be done.

To further accelerate digital transformation across the continent, it is essential to assess the progress made, identify challenges, and address key issues. Africa's digital revolution holds great potential to drive sustainable development and economic growth, but it will require effective policies and strategic investments to unlock its benefits entirely.

This compendium, *Powering Africa's Digital Transformation: The Policy Landscape*, explores various facets of policymaking that can accelerate Africa's digital evolution. Notably, it presents the African perspective, as all contributing authors are based in Africa and actively involved in shaping the continent's digital policies as researchers, academics, or practitioners.

In the first essay, Israel Nyadera explores the potential and challenges of utilising big data to transform governance in Africa. He examines current efforts in digital governance, identifies opportunities for improving public service delivery, and underscores the importance of local capacity building and data security to maximise the impact of big data on governance.

Next, Mikatekiso Kubayi delves into the role of the digital economy in Africa's industrial transformation under 'Agenda 2063'. His essay examines how digital tools and technologies are shaping major development projects, such as the African Continental Free Trade Area and the high-speed train network, and stresses the need for substantial investment to harness the continent's youthful, tech-savvy population to drive economic growth.

Ken Ndalamba and Nelma Manuel analyse the impact of digital transformation on the business environment in Angola over the past 11 years. Their study highlights how Angola has capitalised on digital opportunities to position itself as a leading business destination in Africa.

In his essay, Raymond Onuoha examines digital upskilling in Nigeria, focusing on the gender disparities in access to digital education. He reviews current initiatives, delivery models, and their impacts, and offers recommendations for improving public-private partnerships, scaling training programmes, and establishing robust monitoring frameworks to ensure inclusive digital skills development for women and girls.

Similarly, Caroline Kathure Gatobu investigates the gender digital divide in Sub-Saharan Africa. Her essay highlights the barriers women face in accessing digital technologies and explores opportunities for bridging this gap. It emphasises the critical need for digital inclusion and women's empowerment to drive economic growth and development across the region.

Next, Zedekia Opondo Sidha analyses the impact of information and communication technologies (ICTs), particularly the DHIS 2 system, on stakeholder collaboration in Kenya's health sector. He explores how the system has facilitated data sharing, improved decision-making, and

enhanced policy implementation while addressing challenges such as infrastructure limitations and sustainability concerns. The essay stresses the need for strong infrastructure, capacity-building, and sustainable financing.

In his essay, Siyaduma Biniza evaluates the effectiveness of the user-pay principle and electronic toll collection systems in financing road infrastructure across Africa. Drawing on case studies from Kenya, Morocco, Uganda, and South Africa, he offers insights into the challenges, successes, and opportunities associated with these financing models.

Adekola Thompson explores the potential of blockchain technology in Africa, analysing its applications across various sectors. He examines the role of private equity investments, the challenges faced, and the opportunities for policy adoption while stressing the importance of strategic planning for successfully integrating blockchain technology.

Next, Charles Kabaya examines digital activism in Kenya, focusing on youth-led protests against the 2024 Finance Bill. Through the use of social media and innovative digital tools, young Kenyans mobilised a powerful movement to demand fairer fiscal policies. His study highlights the transformative role of digital platforms in contemporary civic engagement and political activism.

Finally, Avit A. Chami discusses the role of digital transformation in Tanzania's rural economy. He emphasises the need for Swahili-language applications on digital devices to ensure wider access. The essay acknowledges challenges such as inadequate infrastructure, low smartphone penetration, and language barriers, proposing solutions like expanding digital infrastructure, developing user-friendly Swahili apps, and implementing rural-tech empowerment programmes to support ICT-driven initiatives in rural Tanzania.

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Leveraging Big Data for Governance Transformation in Africa: Opportunities and Challenges

Israel Nyaburi Nyadera

The advent and evolution of technology have significantly impacted governance and public administration globally. Countries such as Finland, Denmark, and South Korea exemplify smart governance, attributable to their implementation of advanced technology in public service delivery (1). In Africa, the public sector and the overall public administration practices have historically struggled to meet the expectations of their citizens due to a complex combination of colonialism, military coups, negative impacts of rapid rural-urban migration, nepotism, and corruption (2). However, given the value and possible benefits of technology, some of these challenges can be overcome if the continent can embrace digital transformation in governance. This essay aims to critically examine the prospects and constraints of big data on governance in Africa.

Current State of Digital Transformation and Public Administration in Africa

By the turn of the new millennium, prospects of digital governance were increasing as the costs of installing new internet-enabled devices reduced significantly, connectivity and access increased, and people became more interconnected. African countries have attempted to keep up with this global trend despite the many challenges experienced (3). Today, some of the successful cases of big data in Africa Africa include:

- Benin, which launched the Government Data Interoperability system with support from the government of Estonia. So far, the country is offering over 200 services on its e-government platform, cutting across education, transport and electoral services.

- Ghana has implemented the Digital Financial Inclusion platform, a modernised revenue collection and payment system. It also has the GhanaPay system, which allows users to pay for services such as visa applications.

- In Rwanda, the government is partnering with a private company to implement the IremboGov Online Portal. Launched in 2015, this digital platform offers over 100 services from 20 government agencies. So far over 2.7 million transactions have been completed using this portal.

Beyond E-Government: New Opportunities for Digital Transformation and Governance

While e-government platforms continue to benefit millions of Africans, advancements in technology require a look beyond e-government platforms to see how these can accelerate the quantity and quality of public service delivery. Alongside e-government, a comprehensive digital governance approach can be achieved by adopting artificial intelligence, big data, the Internet of Things, quantum computing, and smart-city technologies. These tools are not only helpful in

enhancing the speed and accuracy of service delivery, but they can serve more people equally and fairly.

For example, big data can significantly assist African governments in addressing challenges by enabling effective performance monitoring and facilitating data-driven policymaking, which is crucial for countries currently grappling with the effects of ad-hoc policy declarations. Additionally, big data analytics can enhance the understanding of public opinion by analysing various data sources, including social media. In the era of evidence-based decision-making, big data will not only lead to an analysis of current and historical data, but it also allows for predicting issues and trends (4). This can reduce the impact of problems such as flooding, drought, and famine. The early warning capability of big data can also improve response to rural-urban migration, conflicts, public health emergencies, and the population bulge. Furthermore, big data can help reduce corruption and foster accountability and transparency by enabling the government to share information with the public, and citizens using that information easily through big data analytics. Also, the recurring problem of wasteful spending can be addressed using big data, allowing for the optimum allocation of resources to areas that matter the most using insights from data. Startups and entrepreneurs can also enhance their productivity and business environment by leveraging information and data from big data. This can also lead to innovation and the invention of new products.

Adopting big data in governance will not require African countries to reinvent the wheel. There already exist many countries from which to adopt best practices. One of these countries is India, which has already begun using big data to improve the living conditions of and service delivery to the people. For example, the Indian government has integrated big data into its smart cities agenda. This is seen in its urban infrastructure management, energy consumption, and traffic. The health and agricultural sectors are also benefiting from the input of big data. India is already using big data for telemedicine to monitor patients better, health surveillance to track the spread of diseases, and for personalised treatment and accurate diagnosis (5).

Indian farmers benefit from an optimised supply chain and precision farming (6). India has also adopted big data in the financial sector to deal with fraud, assess credit scores, and evaluate risks. These are areas African countries can benefit from immensely.

Challenges Adopting Big Data in Africa

Despite the opportunities, adopting big data has several limitations. The most significant challenge is an over-dependence on external sources for both technology and ideas (7). This prevalent issue could prove detrimental to the continent, as technology-producing countries will focus on technologies tailored to their own needs. It is imperative that African countries cultivate local capacity for the production and implementation of digital technologies within their public sectors. Such an approach will ultimately reduce costs and preserve sovereignty. In addition, there must be deliberate and intentional efforts by African governments to shift towards smart governance. African nations must critically reflect on their specific needs, challenges, and the potential benefits of digital transformation and governance. If the advantages of digitalisation and smart governance surpass the drawbacks, then these initiatives should be prioritised in planning and resource allocation. Developing a critical mass of local experts who can lead the big data process is also crucial. By addressing these challenges, African countries can better harness the potential of big data in public administration.

Conclusion

This essay examined the opportunities and challenges of big data and governance in Africa, identifying that public administration is globally transitioning towards smart governance for the more efficient and sustainable delivery of public services. However, to fully gain from big data, there is a need for cooperation in building local capacity and reducing dependence, which is important for cost-cutting and encouraging the creation of a pool of enthusiastic digital champions within Africa. Also, there must be realistic planning by avoiding

grandiose plans that may be unachievable. In addition, cautious progression into emerging fields such as big data is important, and African countries should avoid taking huge leaps into uncharted territories. Prioritising data and platform security is crucial, given that the new frontier of conflicts is in the digital space (information, data, and codes).

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The Role of Digital Mode in Africa's Industrial Transformation

Mikatekiso Kubayi

The objective of the African Union's 'Agenda 2063', a "blueprint and master plan for transforming Africa into the global powerhouse of the future" (1), is to detail Africa's contribution to the global human experience through innovation and production, new ways of producing, and solutions to global (2) challenges in the ongoing industrial revolution. This is one way of understanding the African Renaissance, which Cheikh Anta Diop (3) and Thabo Mbeki (4), among other African thinkers, have measured to be achievable. Africa, too, shares in a period during the Fourth Industrial Revolution, which involves artificial intelligence and the digital economy.

The digital economy presents an opportunity to accelerate development and improve the human experience in Africa. Yet, according to a 2023 World Bank statistic, only 36 percent of Africa's population has access to broadband internet (5). In a global economy driven by digital technologies and innovation, infrastructure for cloud computing, among other technologies, is vital, but Africa continues to trail other regions. Technologies such as 5G are shaping the world economy, from the agricultural value chain (in India, China, Russia, Brazil, and the US) to automotive manufacturing (in Germany, the US, South Korea, China, and Sweden) and general e-commerce.

Of course, not all African economies are identical in their tech capabilities. Small Island Developing States such as the Seychelles, Mauritius, and Cape Verde are among the leading technologically advanced African states that include South Africa, Egypt, Morrocco, Nigeria, Botswana, Kenya, and Namibia. In South Africa, for instance, apart from the push for smart cities at a macro level, innovators such as app developers have begun offering solutions ranging from emergency assistance (for instance, Namola) to housekeeping services (such as Sweep South) at the touch of a smartphone screen.

Investing in Africa's Productive Economy

Africa contends with the lowest foreign direct investment despite the proven reliability of return on investment. This is reflected in the 2023 Disrupt Africa report that traces the decline to 2016, which continues to 2023 with a 35.9 drop from 2022 (6). This is despite the significant growth potential backed by a rising young middle-class population, skilled, able, and ready to work and innovate, according to the 2023 United Nations Africa Dialogue Series policy brief (7).

The African population is the youngest in the world, accounting for 70 percent of the continent's total population (8). It is also expected to grow to 2.5 billion by 2050 (9). This is a large current and potential future workforce. It is also a significant current and future market for all goods and services. The Africa Continental Free Trade Area requires a highly developed logistics capability, and this requires the most advanced tech for port and rail operations, air travel, road networks, pipelines for liquids (water, oil, and gas), and other needs that could be met by domestic production.

This demographic is ideal for investment in infrastructure for the digital economy. It is also ideal for industrialisation and national economic pursuits, as well as social pursuits. Pedagogy, with the use of teaching tools such as tablets and software, the use of drones for policing, and the delivery of medicines and entertainment, have all been revolutionised by digital technologies. However, access to technology for consumption is not the only ideal in Africa. Producing technology locally for local markets and greater participation in global value chains is a greater ideal.

Some Critical Areas for Industrial Growth

The digital economy requires investment in research and development (R&D) and digital infrastructure. This is crucial for applications across all sectors, such as energy. Investment is also required for generation, grid development, and expansion, as well as R&D. A stable, consistent, and reliable energy supply is crucial for industry, production, and social needs such as health. The agenda to localise production is also reliant on it. A strong argument has been repeatedly made for technology transfers (10). This is one way to expedite the development of capabilities, to fabricate goods by exploiting the abundant mineral endowments, and to produce at scale and competitive cost.

Some of the new areas of research and exploration include the green hydrogen economy. Some countries, such as South Africa and Namibia, have made significant policy and implementation efforts. Green hydrogen carries a lot of potential for cleaner energy and new industries throughout its potential value chains. The tech sector is important for the development of these new industries. There are a lot of potential downstream benefits from the development process of the green hydrogen economy and its eventual operations. These include advancing the transition to cleaner energy and developing local manufacturing value chains that can create jobs and improve living standards.

Other important areas include digital systems for rail infrastructure, transport navigation systems, and logistics. There is also a contradiction that needs to be resolved. Africa has significant untapped gas deposits from the west to the south of the continent. New industries in Africa also include the oil and gas sector under development in coastal South Africa and costal Namibia. This is a new fossil fuel-based industry in the Southern African Development Community region, notwithstanding the contradiction against climate action commitments and goals, which can potentially generate significant income for the region and aid its development.

Climate action itself holds significant potential for industrialisation and growth. Mining firm Anglo-American is investing in producing

electric vehicles for its mining activities (11). In 2022, it announced the development of a prototype for the world's largest hydrogen-powered mine-haul truck. For this, the production value chain of solar panels and other more earth-friendly technologies require the application of digital technologies and must be supported by financing for enabling infrastructure and production.

Conclusion

The digital economy is a product of evolving industrial revolutions that require Africa to keep pace with and, where possible, aim to get ahead of it. The tech value chains it generates provide crucial pathways for Africa's industrialisation efforts, development, and the renaissance it seeks to reignite. Africa holds several advantages it can leverage to achieve these ends. It has one of the youngest populations globally and is projected to grow to 2.5 billion over the next two decades. It has a strong, growing, educated, and tech-savvy middle class, workforce, and consumer market. It carries significance for both production and consumption. However, significant investment is required to use the digital economy to achieve development goals. This is an agenda that the entire Global South has been mobilising for decades. Investing in the tech sector and tech transfers in Africa means investing in Africa's young people and, by implication, investing in Africa's future.

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Achieving Digital Transformation in Angola: Challenges and Opportunities

Ken Ndalamba and Nelma Manuel

The fourth industrial revolution has compelled economies worldwide, both developed and developing, to revisit the value chain of products and services, from production to delivery to final consumers, across all sectors (1).

In the public sector, Africa, a bastion of most developing countries, has been making efforts to improve its infrastructure to accommodate the technological advancements and demands brought forth by the fourth industrial revolution. Many countries in Africa's regional economic communities (2)—the Arab Maghreb Union (AMU), Community of Sahel-Saharan States (CEN-SAD), East African Community (EAC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), and the Southern African Development Community (SADC)—have been striving to leverage digital transformation.

Digital transformation encompasses using technology to improve the efficiency and effectiveness of public service delivery. E-government and e-participation are the outcomes of the process. Services such as e-passports, e-visas, e-bookings and check-in, e-registration and licensing of businesses, online payments of services and products, and distant education are among the most notable outcomes of digital transformation in Africa.

Fulfilling three fundamental pillars is necessary to have efficiently functioning e-government services. These are online services, human capital, and telecommunication infrastructure (3). On these factors, South Africa ranks at the top of the African continent and the SADC region, Tunisia takes the top spot in the AMU and the CEN-SAD regions, Ghana in the ECOWAS region, Kenya in EAC region, and Gabon in the ECCAS region (4). While these countries have been leading their respective regions in terms of e-government efficiency and effectiveness, changes in the overall rankings between the 2022 and 2024 versions of the E-Government Development Index (EGDI) suggest that individual countries are making efforts to leverage technology to help position themselves to attract potential investors (5). This shows that Africa is on track to achieving digital transformation despite the various challenges facing the continent. Still, some emerging countries, after long periods of unrest, have been striving to catch up with the rest of the world, allowing digital transformation to lead the way in their economic recovery. Angola is a case in point.

The Angola Example

Angola has been leveraging digital transformation benefits to position itself as a preferred destination for business in Africa. Since the end of its civil war in 2002, which lasted over three decades, Angola has been aiming to catch up with the rest of the world. However, challenges at all levels have slowed its progress in taking advantage of the opportunities to diversify its economy through technology (e-government services).

The 2024 EGDI suggests that Angola has not made any significant progress between 2003 and 2024 in terms of developing e-government services; the country was ranked 148 in 2003, and lower still at 156 in 2024 (6). Human capital and telecommunication infrastructures are proving to be challenging for the country. In fact, between 2003 and 2024, Angola experienced a rollercoaster of economic growth and development, which might have contributed to a lack of investments (7). This was despite efforts in recent years to place the country's satellite (AngoSat-2) in orbit to embrace and promote digital

transformation to prompt and improve e-participation. Likewise, Angola's position on the E-Participation Index has worsened, from 84 in 2003 to 152 in 2024 (8).

Challenges and Opportunities

The slow progress in promoting and leveraging digital transformation during the 2003-2022 period underlines challenges that can be turned into opportunities for the country.

The provision of public services is increasingly simplified through digital platforms such as Portal dos Serviços Públicos Electrónicos do Governo de Angola (Government of Angola's Electronic Public Services Portal) (9), Guiché Único da Empresa (Company Single Window) (10), and Sistema Integrado de Licenciamento da Actividade Comercial (Integrated Commercial Activity Licensing System) (11). However, there is a limited capacity to secure the delivery of continuous and uninterrupted services, provision of content and technology.

Such challenges raise questions about the country's telecommunication infrastructure, including the availability of reliable systems and facilities that support the functioning of the transmissions that provide the foundation for communication services. Even though Angola has placed its AngoSat-2 satellite in orbit (12), hoping to achieve greater performance in terms of the quality of technological products and services, the result is yet to be seen in terms of the support it can provide (in enabling online services) to the various business activities across sectors.

Challenges regarding human capital are evident when online services and telecommunication infrastructure do not perform as they should, despite the National Science, Technology, and Innovation Policy aiming to build a knowledge society by incorporating science, technology, and innovation into the country's development strategy to combat poverty and improve people's lives.

These challenges provide an opportunity for the country to revisit and examine its legislations and practices to effectively address its

shortcomings to take advantage of the global economic situation that favours it by diversifying its economy through digital transformation.

Conclusion

Angola has all the potential to establish itself as the best and preferred destination for business in Africa. However, unless it effectively implements the three pillars of digital transformation—online services, human capital, and telecommunication infrastructure—it would prove difficult to experience digital transformation and leverage any benefits.

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Digital Upskilling for Powering Africa's Transformation: A Gendered Case Study of the Nigerian Ecosystem

Raymond Onuoha

Digitalisation and its complementary technologies are undoubtedly disrupting the socioeconomic context of societies through the innovative production and delivery of goods and services, and the livelihoods derivable from them. While this transition presents developing countries with great opportunities to boost their economic positions within the globalised market, adopting and adapting to the transition with respect to the foundational requirements to access the emergent opportunities for sustainable digital transformation optimally remains a significant challenge (1). A key cog in this wheel of transformation is the comparatively digitally unskilled workforce. In Africa, the main underpinning factor for this gap is a skills mismatch within the educational sector, leading to negative livelihood outcomes, such as underemployment and a wider labour market participation in informal sectors for its mostly youthful population (2). The hesitation of Africa's educational sector to fully embrace and integrate technology into its curricula and teaching methods has had profound consequences for the workforce. In an era where digital literacy and technical skills are critical for success, particularly in sectors such as information technology, digital marketing, and financial services, the lack of tech-driven education has left many workers ill-prepared. The slow pace of technology adoption in schools and universities across the continent creates a significant skills gap. While the global economy shifts towards automation, artificial intelligence, and other digital

innovations, many African workers are underqualified for new job opportunities. Consequently, they face limited career advancement and economic participation, exacerbating unemployment rates and hindering national development. Moreover, this technological lag affects women disproportionately. Cultural and socioeconomic barriers already limit their access to education and employment opportunities, and the lack of digital upskilling within educational institutions further marginalises them. Without targeted interventions to bridge this divide, more women will likely be left behind in transitioning to a digital economy. This is especially concerning in Nigeria, a country with a rapidly growing population and increasing demand for tech-savvy professionals.

The Nigerian Experience: A Case Study

Nigeria has over 500 operational digital platforms across several sectors, including financial services, transport, logistics, e-commerce, health, agriculture, and education (3). These digital platforms have facilitated increased livelihood opportunities for the youthful population, especially women. Nevertheless, their impact is limited. A fundamental barrier in this domain is the persistent focus of government policies on the formal sector, even as women continue to dominate key economic sectors such as agriculture, small-scale commerce, and the informal sector—a grey labour area within which platform livelihoods broadly fall (4). A key constraint for women to participate more actively in the evolving digital ecosystem in Nigeria is inadequate access to digital skills. In developing countries like Nigeria, mobile phones are the most ubiquitous platform to connect to the digital economy (5). While there is ubiquitous ownership of mobile phones in the country, complementary mobile internet access is still inadequate (see Figure 1).

Figure 1: Comparative mobile phone ownership and Internet access across select African countries

	MOBILE OWNERSHIP (%)	GENDER GAP	MOBILE INTERNET (%)	GENDER GAP
Egypt	83% / 81%	2%	65% / 57%	12%
Ethiopia	75% / 55%	27%	22% / 10%	57%
Ghana	92% / 86%	7%	61% / 45%	26%
Kenya	93% / 88%	6%	59% / 39%	34%
Nigeria	91% / 86%	5%	56% / 34%	38%
Senegal	89% / 77%	13%	72% / 57%	20%
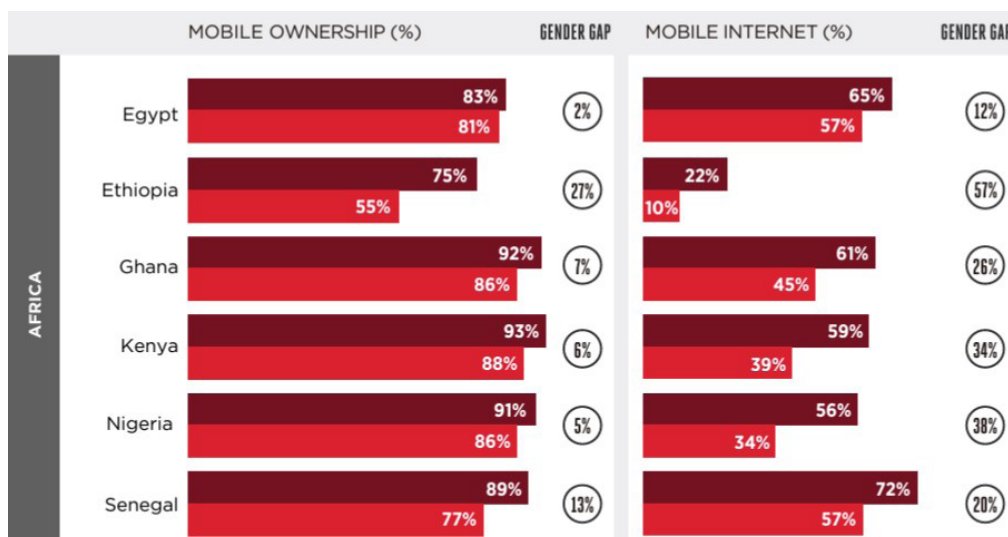
Source: GSMA (6)

Instructively, mere access to mobile technology is not enough for this effective participation; it also requires that users are provided with complementary skills and knowledge resources to facilitate their meaningful engagement within the digital ecosystem.

Delivery Models and Digital Skills Focus

The delivery model adopted by gendered digital skill suppliers in Nigeria is via summer camp programmes, usually lasting two to three weeks. The training programmes typically consist of two phases: the recorded online component, which focuses on conceptual and theoretical elements, and the more practical-oriented physical delivery sessions. The breadth of digital skills being provided comprises basic to intermediate skill levels, including social media selling (digital projects portfolio building, content creation, WhatsApp for business), mobile videography, and web design (via WordPress, Wix, Canva, and personal domains).

Training Scaling Strategies

The suppliers are implementing some specific strategies to drive a scaled adoption of these gendered digital skills training programmes.

One of these is via women mentorship—leveraging successful women within the technology ecosystem to influence the participants based on their own 'real' career stories. Some suppliers also use 'accountability coaches' who guide and provide technical support to the learners within smaller groups regarding training elements. A few other skills suppliers are also adapting some of their training resources into local languages to facilitate more inclusive learning, especially for those who do not have access to formal education and are thus limited in their understanding of English. The suppliers also use female trainers to encourage female participation, as this approach appears safer and more relaxing for the learners.

Impact

Although the digital skills programmes have trained thousands of women and girls across the country, the lack of detailed measurement and evaluation impact assessment frameworks with respect to the training initiatives is a critical gap. Nevertheless, a few providers have begun some initial steps of feedback collation via pre- and post-evaluation of participants, parents, and other stakeholders that can influence training outcomes. These preliminary assessments indicate that most trainees have been getting jobs, some directly through the skill providers and some through indirect means, such as on freelancing platforms, including Fiverr and Upwork.

Long-Term Sustainability

In scaling the preliminary impacts of the digital skills initiatives with respect to their longer-term sustainability, there are some key leverage points. One of these is the criticality of re-enforced public-private partnerships, especially concerning regenerating the country's technical and vocational education and training (TVET) sub-sector—a key institution for driving the scaling of gendered digital skills education, given the significant gaps in access to formal education in Nigeria (7). According to a 2022 UNESCO report (8), "In Nigeria, 87 percent of TVETs have not yet digitalized any part of their training programme and 82 percent of TVETs do not have an adequate digital teaching infrastructure. While the National TVET Policy (9) provides for the alignment of the curriculum with ICT, the practice is different." Within this constraint, the

private sector and other non-state actors can provide complementary support to the public funding of TVET institutions with respect to teacher training, the construction of digital hubs, the development of ed-tech platforms, and so on (10).

Conclusion and Recommendations

This essay sheds light on contextual developments within the digital skills supply system for women and girls in Nigeria. It highlights the levels of their engagement and reach, delivery models, scaling strategies, impact, and the scope of the critical challenges for ensuring the long-term sustainability of training initiatives within the Nigerian platform economy. Within the purview of the issues discussed, the essay presents the following key recommendations:

- Partnerships across ecosystem players should be accelerated in the appropriate design, development, and implementation of the gendered digital skills programmes within the local context, especially with respect to evolving a regenerated TVET system incorporating substantial online platforms and mobile learning components.

- To incentivise adoption at scale, gendered digital skills training needs to be complemented with more labour opportunities, especially at the basic to intermediate skill levels. This proposition will require a comprehensive and coherent institutional and policy framework that supports equitable livelihoods for women in emerging forms of work, such as online work, crowd work, and other types of virtual work.

- Optimal monitoring and evaluation frameworks to facilitate a more holistic understanding of the impacts of gendered digital skilling policies and training initiatives over the short and long term should be prioritised by the relevant ecosystem players. This mechanism will provide an evidence-based approach to defining, identifying, recruiting, and enrolling programme participants to ensure that the trainings reach them with the right opportunities.

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Empowering Women in Africa: Harnessing Digital Technologies for Economic Inclusion

Caroline Kathure Gatobu

Across the world, investments in digital technologies are at the forefront of the global agenda to achieve sustainable development. However, digital transformation is still a new concept that many African countries are grappling with alongside other challenges. The African Union's 'Digital Transformation Strategy for Africa' has established a goal of digital inclusion for every African by 2030 (1). The bigger goal is to achieve the 'Agenda 2063' (2), where African countries are expected to embrace a science-, technology-, and innovation-driven skills revolution, and focus on women and girls' empowerment, among other goals. To accomplish these goals, concerted efforts must be made to eliminate the barriers for African women to contribute to the digital economy and to create an enabling environment for technology-oriented entrepreneurship.

The Gender Digital Divide in Sub-Saharan Africa

The gender digital divide in Sub-Saharan Africa is a multifaceted issue. Women in Sub-Saharan Africa often encounter significant obstacles to accessing and utilising digital technologies, such as limited educational opportunities, insufficient financial resources, and cultural practices that restrict their involvement in the digital economy (3).

These challenges are more pronounced in rural areas, where women often lack access to education and financial support. Despite these barriers, there are promising opportunities to bridge the gender digital divide in Sub-Saharan Africa by implementing specialised digital literacy programmes that can empower women with essential skills to effectively engage with technology, and access to finance by creating microfinance initiatives specifically for women to help them invest in technology and businesses, thus fostering their economic independence. By capitalising on these opportunities, various stakeholders can work together to close the gender digital divide and empower women across Sub-Saharan Africa participate comprehensively in the digital economy.

Opportunities for Digital Inclusion

Research indicates that digital technologies can significantly transform economies worldwide and create more job opportunities. Digital technologies enable women to work more efficiently, enhance their learning experiences, and boost productivity in their roles. A World Bank study conducted in Tanzania examined the effects of mobile internet availability (3G or 4G coverage) on employment, particularly among vulnerable populations (4). It found that mobile broadband coverage positively influenced consumption and reduced poverty, a result consistent with findings in other African nations such as Nigeria and Senegal. The World Bank study reinforces that digital technology can yield beneficial effects. A crucial way mobile broadband improves welfare is through its favourable impact on labour outcomes. However, these positive labour results tend to benefit men more, particularly younger and educated men. While educated women who gained access to 3G coverage transitioned from agricultural work to other employment opportunities, they did not experience the same level of benefits as men. This underscores the fact that, although mobile technology can enhance livelihoods, certain socioeconomic and demographic groups still encounter significant barriers to realising the potential advantages of connectivity. It emphasises the need to equip these underserved groups, especially women, with the necessary skills and resources to capitalise on the economic opportunities that digital technologies can provide.

Digital Technologies and Job Creation: Impact on Lower-Income and Lower-Skilled Populations

Evidence suggests that both internet access and the adoption of new digital technologies contribute to creating more and better job opportunities for lower-income and lower-skilled individuals, ultimately aiding in poverty reduction. In regions with internet access, labour force participation and wage engagement have significantly increased over time compared to areas without coverage. For instance, digital tools like local language videos and smartphone decision support apps can offer tailored advice, resulting in higher crop yields for women farmers. Although mobile internet access has grown substantially, Africa's overall internet coverage still falls short compared to other continents (5).

Women's economic empowerment over the years has been identified as a critical driver for sustainable economic growth and development (6). However, women in Africa face numerous barriers, including limited access to education, limited employment opportunities, limited access to credit, responsibilities that limit the time spent on economic activities, discriminatory cultural practices that hinder their access to capital, and limited access to markets. There is also a widening digital gender gap that magnifies socioeconomic disparities, highlighting the need to bridge the digital divide to provide unmatched development opportunities.

Case Study: Digital Access for Women in Kenya

The Kenyan government has achieved significant milestones aimed at mitigating inequality and promoting gender equality by providing funds to support the economic empowerment of vulnerable groups such as women, youth, and persons with disabilities. One such initiative is the Women Enterprise Fund (WEF), which provides financial support through mobile money transfers. Funds are allocated to women's groups that come together, register with the Department of Social Services, and apply for loans. The WEF also focuses on building the capacity of women entrepreneurs through a volunteer programme, where volunteers are stationed at the constituency level. Their responsibilities include recruiting women, training, and monitoring project progress and

loan repayments. This training encompasses various topics, including business skills, market access, and basic information and communication technology skills.

A 2022 study found that the communication channels and media (used to disseminate information about the WEF) played a crucial role in helping women access financial resources (7). These channels ranged from traditional media to modern information technologies. Furthermore, effective sensitisation and information dissemination by fund managers and government officials enabled beneficiaries to access, utilise, and benefit from the funds and the programme.

The Kenyan government has made strides in women's empowerment through digital technologies by including digital aspects in specific programmes such as the National Government Affirmative Action Fund and WEF. Digital technologies have eased working within the groups by disbursing funds among its members through MPESA, a mobile money transfer platform, and by planning meetings through WhatsApp. Through these initiatives, digital access has significantly impacted and changed women's lives in Kenya by cutting expenses in commuting to markets through mobile banking.

Kenya's Ministry of Information, Communication and the Digital Economy has introduced several digital infrastructure programmes across the country to bring all government services online. This is supported by the Kenya Digital Master Plan, which aims to put up hotspots in public installation in rural areas and other public spaces (8). Currently, there are 61 hotspot installations in various parts of Kenya, primarily in public open markets. This initiative has impacted the lives of the traders in the markets, most of whom are women who can now sell their items online and conduct some of their businesses through digital platforms.

Conclusion

The digital divide is a substantial challenge in Sub-Saharan Africa, where women are disproportionately affected by limited access to digital technologies (9). Formulating strategies to include women in the digital economy in Africa will present vast opportunities to reduce

inequality, achieve development and economic growth, and accelerate business and market integration in the region. African countries will be able to enhance women's economic empowerment by bridging the gender digital divide to achieve digital inclusion, and by promoting gender equality in the region. Governments and the private sector should include initiatives to close the gender digital divide, focusing on securing land and resource rights, finding alternative livelihoods, and fostering gender equality. The private sector can also promote digital literacy.

For Africa to empower its women economically through digital technologies, there should be initiatives to subsidise mobile phone costs, free internet hotspots, and reasonably priced data plans to ensure women can contribute meaningfully to the digital world. There should be programmes that provide women with basic digital skills and training on using relevant applications to unlock opportunities to improve their livelihoods. Girls in schools should also be given access to quality education, particularly in the science, technology, engineering, and mathematics fields, which is essential for building the next generation of women entrepreneurs who can positively contribute to Africa's economy.

African governments should also provide an enabling policy and legal environment for digital technology to be embraced for economic empowerment. This can be through the inclusion of women in digital platforms to network and by providing technical support on utilising the digital platforms, with the overall aim of changing practices at the community level. Finally, African governments should strive to build capacity for the relevant institutions and individuals engaged in digital literacy initiatives to enhance women's empowerment. This should be through grassroots-level technical skills training for financial and non-financial services.

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Towards Collaborative Governance in the Public Sector: Analysis of Health Information Systems in Kenya

Zedekia Opondo Sidha

The pioneers of policy implementation studies, such as Jeffrey Leonard Pressman and Aaron Wildavsky, have continually advised policymakers to legislate proposals that are not dependent on multiple agencies for implementation. These sentiments were further entrenched during the new public management revolution that emphasised specialisation and goal attainment over cooperation. In practice, however, many policy problems are boundary-spanning. Violent extremism, climate change, and COVID-19, for instance, are complex and interconnected, demanding stakeholders' collaboration, breaking silos, and forming cross-sectoral teams. The 'joined-up government' and 'whole-of-government' approaches are some of the concepts that have been used to encourage horizontal and vertical collaboration across departments (1).

Collaboration can improve efficiency, decrease duplication, and leverage diverse resources, but it requires conflict and priority management. This essay discusses how information and communication technologies (ICTs) help stakeholders coordinate complex policy issues. Many scholars have documented how digitalisation increases service delivery, accountability, and public ethics (2). However, its role in improving collaborative governance remains uncharted. This essay examines Kenya's health information systems to demonstrate how ICTs might enable a whole-of-society approach to boundary-spanning policy issues..

Challenges of Intergovernmental Collaboration

Collaboration is theoretically beneficial but challenging to implement. Pressman and Wildavsky identified six barriers to government cooperation (3). First, goal imparity happens when agencies only do mission-aligned work, causing conflicts when priorities change. Second, economic development agencies may prioritise rural over urban employment creation despite similar goals. Third, multitasking can reduce focus and urgency. Fourth, leadership and organisational conflicts can inhibit collaboration. Fifth, legal and procedural incompatibilities are difficult. Finally, standard operating procedures may limit agency flexibility and cooperation (4). With these assertions, they advise governments to make policies that are not dependent on more than one agency for implementation.

ICTs as an Enabler for Stakeholder Coordination and Policy Implementation

ICTs can improve stakeholder collaboration and policy execution. Digitising governmental administration boosts efficiency, openness, and accountability. ICTs allow stakeholders to communicate and share information in real time, facilitating coordinated action and informed decision-making. Kenya's District Health Information Software (DHIS 2) shows how ICTs affect stakeholder coordination. The 2011 web-based DHIS 2 increases data collection, analysis, and reporting of health system data (5). DHIS 2 intends to centralise health reporting, standardise report outputs at all levels, connect service delivery data with other health databases, increase ICT infrastructure, train people to manage the system, and ensure stakeholder support (6) (see Figure 1 for DHIS 2 stakeholders).

Figure 1: Stakeholders in Kenya's District Health Information Software
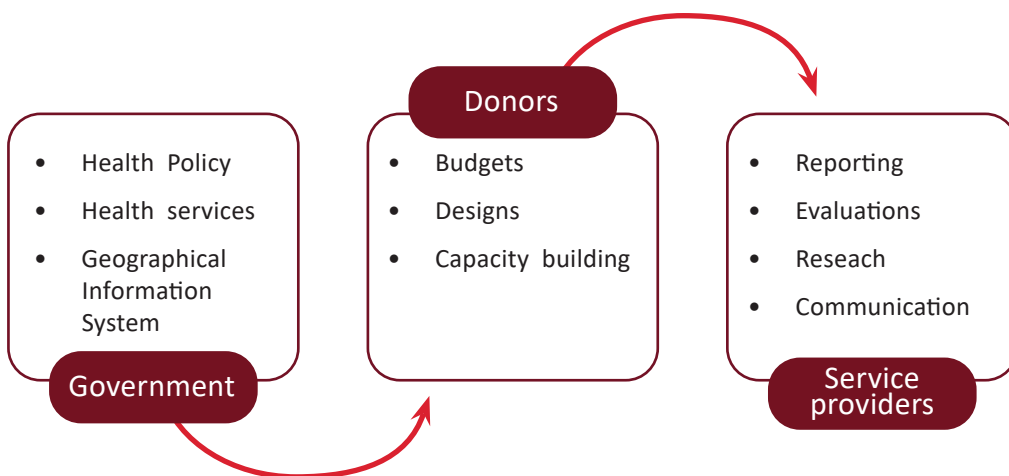
Source: Author's own

Using DHIS 2, health facility communication has improved substantially. By linking nursing stations, laboratories, and consulting rooms, health data is easily accessed and exchanged among stakeholders (7). This link reduces the duplication of efforts and improves healthcare coordination, improving service delivery. Consistent and complete health data aids repeated analyses and research validity and dependability. DHIS 2 digital records chronicle all medical operations and treatments, increasing accountability and identifying medical negligence.

With its comprehensive illness prevalence and health outcomes data, DHIS 2 allows transnational and comparative investigations. Sharing data will enable researchers from different places to get deeper insights and conduct better investigations. The consolidated database improves health programme monitoring and assessments, which is essential for HIV/AIDS reduction. DHIS 2 provides reliable and timely data for evidence-based policymaking and health goal tracking.

Despite its benefits, implementing the DHIS 2 in Kenya is not without difficulties. Rural health institutions often lack internet and gear. DHIS 2 management and use staff are scarce and require constant training and capacity-building. Donor money is unpredictable, putting the system's future in danger. Political and bureaucratic entities that use traditional

techniques may resist a centralised health information system, needing strong leadership and advocacy.

Policy Implications, Conclusion, and Recommendations

Kenya's DHIS 2 implementation shows how ICTs can improve health stakeholder collaboration. DHIS 2 has helped physicians provide efficient, targeted treatment by centralising health data and enhancing data access. The long-term viability of systems like DHIS 2 depends on ICT infrastructure, technical competency, and sustainability in financing. Kenya shows the need for measures that address these difficulties while harnessing ICTs' promise to revolutionise public health.

Realising the benefits of ICTs requires continued investment, strong governance, and stakeholder engagement. Governments and development partners should prioritise technical capability and internet connectivity to implement health information systems effectively. To sustain ICT-enabled systems like DHIS 2, policymakers should examine data governance frameworks, security and privacy, and data use and transparency. Indeed, using ICTs can improve governance, outcomes, and sustainable development goals.

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Lessons from Electronic Toll Collection in Africa

Siyaduma Biniza

Domestic resources are the most sustainable way to fund infrastructure investment (1). However, the high poverty levels, inequality, and illicit financial flows in Africa undermine domestic resource mobilisation across the continent (2). African governments have responded to these challenges by getting willing private users to pay for infrastructure development costs (the user-pay principle) and taking advantage of digital transformation using electronic toll collection (ETC). This essay draws lessons on the user-pay principle and the use of ETC in Africa.

The experiences in Kenya, Morocco, Uganda, and South Africa present valuable lessons on the prospects of using the user-pay principle to finance road infrastructure in Africa. These cases are chosen due to their unique country contexts, the technology deployed, and the different outcomes. Assessing the ETC system in South Africa in detail by highlighting its country-specific challenges and opportunities enables one to draw a broad-based understanding of the continent.

The Kenya, Morocco, and Uganda Cases

Kenya

In July 2022, the Kenya National Highway Authority (KeNHA) established Moja Tollpay with an on-board unit (OBU) to make toll

payments on the Nairobi Expressway (3). The expressway recorded 60,000 daily users by September 2023, twice the volumes needed to repay the financing (4). KeNHA's financing model for the expressway is a success of the user-pay principle, and 75 percent of toll fees were paid using ETC (5).

Morocco

In June 2014, Société Nationale des Autoroutes du Maroc (ADM), the Moroccan National Highway Authority, established Jawaz using an OBU on selected toll stations (6). Jawaz was later expanded throughout the Moroccan national highway network (7). In 2023, ADM collected toll fees worth DAM 3.40 billion (approx. US$340.82 million), 58 percent of which came from over two million Jawaz users, of which three-quarters were heavy goods vehicles (8). ADM's deployment of the user-pay principle generated more than double its investment budget for 2023 (9). The toll fees generated on the road network were significant enough to cover ADM's operating expenses of DAM 2.06 billion (approx. US$211.38 million) or its debt servicing costs of DAM 1.6 billion (approx. US$168.53 million) in 2023 (10). In 2023, ADM used state-guaranteed concessional loans in foreign currencies worth DAM 16.2 billion (approx. US$1.63 million), bond issuances worth DAM 18.8 billion (approx. US$1.89 billion), commercial loans worth DAM 2.2 billion (approx. US$224.24 million), and self-generated income to finance its investment expenditure (11). ADM's deployment of the user-pay principle could finance its road infrastructure investment in the future. The adoption of ETC has achieved significant progress despite additional room for improvement. Jawaz has become widely adopted as the primary form of payment.

Uganda

Uganda's parliament passed the Roads Bill 2018 in May 2019 to enable tolling to recover the costs of constructing, operating, maintaining, and rehabilitating its road network (12). In January 2022, the Uganda National Roads Authority (UNRA) established Upesi using a payment card on the Kampala-Entebbe Expressway (KEE). Upesi users receive discounts of between 10 percent and 70 percent

on toll fees (13). The KEE recorded 20,000 daily users by February 2023, a quarter of the volumes needed to repay the financing (14). UNRA's financing model for the KEE is an early failure of the user-pay principle, and only 6 percent of trips are paid using ETC.

South Africa's Experience

In May 2013, the South African parliament passed the E-toll Bill 2013 to implement the ETC system (15). The South African National Roads Agency Limited (Sanral) established an e-toll using an OBU and open road tolling (ORT) on the highways in the Gauteng Freeway Improvement Project (GFIP) in December 2013 (16). Unlike controlled access through boom-down toll stations, ORT uses gantries over the GFIP highways to track and bill users, with instant payment for e-toll users or post-billing for unregistered users. In November 2014, Sanral expanded the e-toll to selected boom-down toll stations across South Africa (17). Sanral collected ZAR 589.00 million (approx. US$32.88 million) using ORT in 2023/24, implying it would take 152 years to repay the GFIP financing (18). Sanral's financing model for the GFIP is a failure of the user-pay principle and the adoption of ETC is low since e-toll users constitute 15.16 percent of collected toll fees (19).

Challenges and Opportunities

ORT had compliance, technical, and litigation challenges since the outset. Some of the critical challenges include:

- Non-compliance: Sanral initially targeted 93 percent e-toll payment compliance but only achieved 35 percent compliance in the first year of operations (20). The compliance deteriorated to 20 percent between FY2019/20 and FY2021/22 (21).

- Billing errors: Sanral faced many issues with double billing and errors with the electronic national administration traffic information system (e-Natis), leading to thousands of motorists disputing or never receiving their e-toll invoices (22).

- Litigation: Several non-governmental organisations, led by the Organisation Undoing Tax Abuse, have brought various legal challenges over the constitutionality of the e-toll system. These legal challenges were eventually dismissed by the Pretoria High Court, Constitutional Court, and Supreme Court of Appeals, but individual users were permitted to bring a legal challenge against Sanral if they were summoned for the non-payment of e-tolls. As of February 2022, the number of defensive challenges had increased to 2,028 cases, of which 1,929 cases were in magistrates' courts at a total value of ZAR 112.28 million (approx. US$6.23 million), and 99 cases were in the high court valued at ZAR 152.78 million (approx. US$8.48 million) (23).

After a 12-year legal battle that ended in a payment impasse, the South African government abandoned the ORT in April 2024 (24). However, Sanral aims to repurpose the e-toll infrastructure to improve mobility and road safety, and combat crime (25). Sanral is currently undergoing a certification and approval process to use existing e-toll gantries for average speed over distance enforcement (26). Sanral has continued rolling out ETC at boom-down toll stations across South Africa (27).

Lessons from ETC Experiences Across Africa

The African governments that have used ETC and user-pay systems to finance road infrastructure investment equitably and efficiently have seen varying levels of success and seemingly unintended consequences. Further research is required to understand whether the poor adoption of Upesi in Uganda is due to negligible gains from less traffic congestion on the KEE or negligible gains from faster toll payments with ETC. Upesi shows the limited influence of toll fee discounts on growing ETC adoption. From a technological perspective, Upesi also seems unjustified since its services could be replaced by allowing electronic payment via bank card or money transfer.

The user-pay principle requires access control to avoid non-payment and challenges collecting from debtors. As such, KeNHA can avoid

some of the collection challenges facing Sanral. In addition, the visible gains from less traffic congestion on the Nairobi Expressway justify the cost for users. However, the gains from faster transaction times do not seem to motivate the further adoption of the MOJA Tollpay. Lastly, KeNHA must rely on commercial traffic to scale the user-pay principle for future road investment. Despite the significant time savings with ORT, its deployment may only be feasible within access-controlled highways combining boom-down toll stations.

Conclusion

The user-pay principle and ETC have been implemented across Africa with varying levels of success. The experiences of Kenya, Morocco, Uganda, and South Africa present many lessons for the rest of the continent. Most critically, the user-pay principle is only a partial solution, as illustrated in Uganda; the level of discounts aimed at attracting users has no bearing on the adoption rates, as illustrated in Morocco and Uganda; and commercial traffic seems to be a crucial foundation for scalability of ETC, as illustrated in Morocco. Lastly, public perception plays a crucial role in the ultimate success of ETC, as illustrated in South Africa. Through these experiences, it is evident that the user-pay principle and ETC are part of the solution instead of a silver bullet to raise sustainable funding for road infrastructure investment.

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Developing Blockchain and Cryptocurrencies in Africa

Adekola Thompson

T he word 'blockchain' is often synonymous with cryptocurrency. While this conception is not entirely unfounded, it is a partial representation of the technology and its potential. A recurrent misconception by African governments was predicated on the infamy attached to the technology's earliest widespread use cases (1).

The blockchain, or distributed ledger technology (DLT), is the core technology upon which cryptocurrencies are built and developed. DLT can be defined as a shared immutable ledger that facilitates the process of recording transactions and tracking assets in a business network (2). The technology can be applied to the non-exhaustive areas of finance and insurance, climate and environment, identity and ownership, agriculture and food, energy, health, education, employment, and logistics and traceability. Use cases require investments to facilitate research and development in the space. To this end, investments imported into Africa through private equity play a crucial role in the research and development of the technology.

Blockchain Development in Africa

Across the African continent, several countries have announced plans to incorporate blockchain technology, either through private equity investments under the private sector or national policy adoption strategies. The recipient countries of these private equity investments include Kenya, Seychelles, Ghana, Egypt, Nigeria, Cameroon, the Democratic Republic of Congo, and South Africa. The disproportionate distribution of these investments is such that 63 percent of foreign investment into the continent went to the financial services sector, including insurance, payment services, and market infrastructure. The other areas of application—including climate and environment, identity and ownership, agriculture and food, energy, health, education, employment, and logistics and traceability—shared 37 percent (3).

While Nigeria and South Africa are significant contributors to the cumulative GDP of Africa—with total estimates of US$395 billion and US$404 billion, respectively (4)—only South Africa is a leader in blockchain research output, alongside countries like Mauritius, Seychelles, and Botswana. Alongside leading research in DLT applications, Kenya and Nigeria also have exclusive national blockchain adoption strategies. Furthermore, countries such as Cote d'Ivoire, Mauritius, Rwanda, and South Africa have included blockchain adoption as part of their national digital economy strategies (5).

Some countries have adopted a risk-based approach, such that the technology can be regulated to the extent of risk exposure to its consumers/citizens; the European Union adopted a similar approach in drafting its artificial intelligence policies. Such policies provide for parallel growth between the innovators and the regulators (6). Policy guidance could be drawn from adhering to Moore's Law in the smart chip manufacturing industry (7). It theoretically provides an approximate two-year window within which new technologies through computing power and electronics are expected to require amended regulations, in anticipation of the redundancy of existing frameworks due to DLTs increased scalability.

Functional intracontinental interoperability of blockchain technology products for African prosperity could be realised under the African Union's 'Agenda 2063' (8), facilitated by the African Union Development Agency-NEPAD (9) and guided by the International Organization for Standardization. As a result, the areas of agricultural supply chains, healthcare data management, financial system efficiency, financial inclusion, qualification, mobility, and voting integrity will have a positive impact on the 2063 agenda. Additionally, the African Continental Free Trade Area's Digital Protocol on e-commerce (10), to be adopted in 2024, provides the soft infrastructure necessary for Africa to increasingly adopt this new technology.

African countries have varied relational experiences with DLT. For instance, Nigeria once declared an outright ban on cryptocurrencies as digital assets were not considered legal tender (11), and it unsuccessfully launched Africa's first central bank digital currency (CBDC) in 2021, with plans to revamp the CBDC's application (12). In 2018, Tanzania designed the 'AID: Tech' and 'Pharm Access' applications using blockchain technology to collect and validate digital health data to make antenatal care more effective by providing digital identities to every pregnant woman (13).

Also in 2018, the South African Reserve Bank commenced a proof-of-concept with DLT called 'Project Khokha' to explore a blockchain-based interbank system with operational capacity commensurate with transaction volume of daily transactions, with the certainty of confidentiality and finality. The project involved seven commercial banks, and it leveraged 'Quorum' (14). The insights from this proof-of-concept proved valuable toward understanding the technological capabilities and legal policy areas that will require further determination, much to the appreciation of the South African public. Notably, in 2022, South Africa ranked 18 out of 26 countries on a list of 7,834 people surveyed from 26 countries for cryptocurrency adoption (15).

Conclusion

For Africa to leverage DLT applications effectively as its countries formulate strategies and learn from experience, such policies will need to be complementary to the distinct policies governing the hard infrastructure areas of energy (16) and data centres as they will lead to improved latency speeds and scalability of DLT on the continent.

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Digital Activism and the 2024 Popular Youth Protests in Kenya

Charles Kebaya

Since its introduction in Kenya in the late 1990s, the internet has served as a platform for free discussions and fostering public opinion. Various social media platforms have been used to create dynamic and networked public spaces where numerous issues affecting the nation are canvassed. Increased internet access and expansion in Kenya have led to the rise of digital activism—using digital technologies in the campaign to bring about social and political change (1). It encompasses social campaigning practices that utilise digital network infrastructure and tools, including social media, mobile phones, emails, digital sit-ins, and other internet applications for communication and mobilisation (2). Digital technologies have provided new mobilisation strategies, extended the scale of social movements, and eased the coordination of civil movements across regions without sustained, hierarchical, and formal organisations, as witnessed during the 2010/2011 Arab Spring in Algeria, Egypt, and Tunisia, and #RhodesMustFall and #FeesMustFall movements in South Africa.

Youth Protests Against Increased Taxation in Kenya

Civil society organisations and opposition political parties rely on traditional strategies of mobilisation against the government in Kenya. These strategies include using mainstream media such as television, newspapers, and radio. Additionally, opposition parties mobilise along party and ethnic lines, which often are not very effective. On their part, the youth opted to use digital activism as a strategy for the anti-government protests related to increased taxation.

On 18 June 2024, Kenya witnessed the biggest occurrence of digital activism. The youthful population, primarily 'Gen Z', organised and fully utilised digital tools to bring to life the #OccupyParliament protests witnessed in the country in the past (3). The protests, a stark contrast to past demonstrations, embraced technology. On the day, thousands of young Kenyans thronged Nairobi's Central Business District and major towns nationwide to protest against the draft Finance Bill 2024. They had moved onto the streets based on concerted mobilisations on social media platforms such as TikTok, Instagram, and X, where a movement fronted by two hashtags, #RejectFinanceBill2024 and #ZakayoShuka, had been conceptualised and circulated. The draft Finance Bill 2024, much like its predecessor in 2023, has spawned controversy nationwide due to its punitive proposals. Published by the National Assembly on 9 May 2024, the draft Finance Bill 2024 is a legislative proposal outlining the government's planned tax measures for the 2024-2025 financial year. Among the numerous changes proposed were significant amendments to income tax, value-added tax (VAT), and excise duty, as well as modifications to the administration of taxes in Kenya. One of the most contentious proposals contained in the draft bill was the imposition of a 16 percent VAT on financial transactions and basic commodities, which would have seen an increase in the prices of goods such as bread, diapers, goods supplied to public entities, monetised digital content, money transfer fees charged by banks and other financial services, and interest earned from infrastructure bonds and family trusts.

The draft bill's publication sparked social media backlash. Kenyans started organising and joining social media groups in large numbers to express their disapproval of the repressive draft bill. The #RejectFinanceBill2024 campaign began after Kenyans were discontented with the implications of certain provisions in the bill. Realising the potential impact of the bill on their lives, the youth created memes and explainer videos that went viral across social platforms like Tiktok, WhatsApp, Facebook, and Instagram. These videos dominated social media for days and formed the original inspiration behind the people-led demonstrations. From major cities such as Nairobi, Kisumu, and Mombasa to regional hubs of Nakuru, Kisii, Nyeri, and Eldoret, protestors transformed the streets into vibrant displays of dissent as they chanted "Zakayo must fall", "Reject Finance Bill" and "Reject, not Amend," reflecting their deep dissatisfaction with the proposed legislation.

A characteristic feature of these protests was the carnivalesque atmosphere created through performances as protestors moved from one street to another. As they marched, protestors sang, clapped, and stamped their feet rhythmically to popular songs playing on loudspeakers. Relying on the antiphonal structure, renowned popular music rappers Octopizzo and Nyashinski rendered their songs as protesters sang along. Juliani's famous hit song, 'Utawala' not only emboldened the protesters but morphed into a signature tune for the protests. Overall, the sheer size and sound of the performances evoked an atmosphere of carnival and festival.

Realising the dangers posed by the internet, particularly the experiences of the 2010/2011 Arab Spring, the government enacted the Computer Misuse and Cyber Crimes Act 2018, which gave government agencies sweeping powers meant to curtail the right to access information and media as enshrined in the constitution. During the protests, the government arbitrarily arrested and detained several youth leaders and accused them of violating the Cyber Crimes Act. These arrests sparked nationwide outrage and prompted the youth to intensify their demands and protests.

An unstructured supplementary service data, or USSD, platform (*665*971#) was also developed by the protest organisers, with multiple functions such as facts about the bill, asking finance GPT, meetup points, and submitting anonymous tips. Its ability to inform is based on localised content. The digital platform was also crucial in organising medical and legal backing for demonstrators. Because traditional communication channels could be hijacked and/or compromised, real-time information-sharing on digital platforms became important. Calls for immediate legal representation were aired on X, along with information on police stations where protesters were detained. This enabled lawyers to find people in need quickly, help them, and ensure their rights were upheld. For those injured, online platforms were used to inform paramedics of their exact location so that they could offer first aid before they were ferried to various hospitals. This online mobilisation was more effective than traditional ways, proving the value of social media in organising legal defence activities.

Factors Contributing to the Widespread Dissent

It is imperative to note that the widespread dissent towards the draft bill can be attributed to several other factors, primarily the significant presence of youth on social media. Digital platforms were central in driving discussions concerning the bill, raising awareness about the bill's negative impacts, and for mobilisations against it. The youth used Chat GPT to convert the bill into audio and enhance its access through translation into local languages. This rapid circulation of content promoted civic consciousness and was instrumental in spreading the protest call widely and swiftly. The stringent and unpopular proposals contained in the draft bill were seen to inflict pain on a population already reeling from high rates of inflation and unemployment. In addition, the draft bill proposed an increase in tax for digital businesses, digital content creation, internet, and data. This could have adversely affected the burgeoning Kenyan tech startup scene, a driver of economic growth. All these infuriated the youth, a key demographic heavily reliant on the internet and data (4).

Conclusion

Digital technologies have notably raised citizens' engagement on issues germane to governance in Kenya. This was evident during the countrywide protests in mid-2024. Unlike past protests that were primarily mobilised by opposition leaders against the government, these demonstrations relied on digital tools that successfully translated digital activism into tangible, on-the-ground action by Kenyan youth. Digital activism gave young people a voice to speak up against government excesses, runway corruption, unemployment, the skyrocketing cost of living, and increased taxation. As such, social media platforms have become indispensable popular sites for civic engagement and for "taking up cultural and political agency" (5). All these show that in today's digital age, civic activism has shifted from utilising traditional forms of protest to digital media platforms to spur political discourses and voice concerns against various socioeconomic inequalities in contemporary society.

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Digital Transformation in Tanzania: The Case for Swahili-Language Apps

Avit A. Chami

Tanzania, located in East Africa, has a population of about 61 million (as of 2022), with about 40 million living in rural areas (1). The country has the largest population and the lowest population density in the East African region. At the same time, Tanzania's population is Africa's most youthful, with over 60 percent being under 25 years (2).

More people in many rural areas of Tanzania use digital services today than ever before. Indeed, Tanzania's digital ecosystem has evolved considerably over the last decade across its expanse (3), and digital technology has become an integral part of the daily lives of urban and rural communities (4). With their inclusion in industries, workplaces, markets, and at the household level, rapidly evolving information and communication technologies (ICTs) are a major driving force behind the ongoing social, economic, and institutional transformations in Tanzania. For instance, integrating digital technologies with government services through e-government systems and applications has positively impacted the actual functions, operational processes, service provisions, and information flow among private and public institutions (5). Advancements in ICTs, increased internet penetration, a greater number of mobile users, and the growing demand for digital services across all spheres of life have meant that digital transformation now plays a crucial role in Tanzania's economic landscape (6).

Mobile technology is at the centre of Tanzania's digital transformation. Mobile phone services connect more people in the country than any other ICT, with 21.82 million internet users, 5.65 million social media users, and 67.72 million active cellular mobile connections at the start of 2024 (7). Most urban areas have have a significant number of mobile users and high mobile internet penetration (8). However, ICT-driven digitalisation initiatives in rural areas still face numerous challenges despite significant investments in such technologies, including building and operating digital infrastructure for public service delivery through an e-government system (9).

Challenges for Rural Digital Transformation

There are three key issues among the many that plague the rural digital transformation initiatives:

Inadequate power supply and digital technology-supporting infrastructures: These are critical issues in rural areas, where most of the population resides. Although Tanzania has a major power supplier, the Tanzania Electric Supply Company, and has diverse sources of power (including solar energy), only 70 percent of the rural population was able to access power supply from the national grid by June 2024 (10). Still, there is the promise of improvement in production and distribution through the Julius Nyerere Hydroelectric Power Project and other ongoing initiatives by the Rural Energy Agency. At the same time, digital infrastructure is weak in rural areas.

Low penetration of smartphones and high penetration of feature mobile phones: This poses a major bottleneck in achieving functional digital transformation initiatives in most rural areas in the country. Smartphones typically cost significantly more than feature phones, with the latter a more affordable option for the rural population. Feature phones do not have internet access. As a result, the higher usage of feature phones in rural areas presents difficulties in accessing digital and other forms of innovation initiatives.

Low levels of education and foreign language skills: These are the key issues impacting how individuals and communities access and utilise digital transformation initiatives in rural areas. The education and awareness-related barriers pose greater challenges to socially diversified groups (including farmers, traders, and livestock-keepers) in rural areas who are more likely to be illiterate and do not understand the English language, which is widely used in almost all forms of technological devices and their applications (11). This limits the exposure to digital technologies and the spread of digital initiatives.

Promoting Swahili-Language Applications

Introducing mobile applications in Swahili will be a significant step in enhancing digital transformation initiatives in rural Tanzania. Notably, there are about 500 million Swahili speakers worldwide (12), meaning any application in the language will likely have a significant uptake. The availability of applications and other e-services in the local language will expand and strengthen the scope and pace of digital transformation in rural Tanzania and beyond.

Several rural areas in Tanzania where smallholder agriculture and livestock-keeping are the major economic activities, such as Kilosa and Sengerema, have seen the increased integration of ICTs through public and donor-supported initiatives, and the strong efforts of national and international institutions (13). These include applying local vernacular languages in the supplied ICT kits, and the use and delivery of ICT services in rural areas for more enhanced farming and livestock-keeping activities. The initiatives focused on enhancing the quality, accessibility, and affordability of ICT services in rural areas (14).

Indeed, the Tanzanian government has also undertaken several deliberate measures—including awareness creation, behaviour change communication and capacity-building programmes for service providers and rural communities (15)—to encourage the adoption of various ICT-driven digital initiatives, mainly through mobile phones.

However, most mobile phones available in Tanzania operate in foreign languages, limiting their impact. This presents the need for developing more user-friendly Swahili applications to cater to the Swahili-speaking populations in Tanzania and many other countries such as Kenya, Rwanda, Burundi, Uganda, the Democratic Republic of Congo, South Sudan, and Somalia.

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