Digital Drivers Template

A Reflection on Kenya's 20-Year Digital Transformation Journey

dial Digital Impact Alliance

Dalberg

UKaid from the British people

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Executive Summary

This template is part of DIAL's five-year "Digital Beacons" strategy and supports the recently co-designed project with UK DAP

In late 2021, Digital Impact Alliance (DIAL) and the UK Government Digital Access Programme (UK DAP) contracted Dalberg Advisors to develop a national Digital Drivers Template. DIAL and UK DAP are seeking to capture and evaluate the common enabling characteristics that contribute to the digital transformation of exemplar countries, such as Kenya, and develop a template for global use. This template is part of DIAL's five-year "Digital Beacons" strategy and supports the recently co-designed project with UK DAP. Built between November 2021 and March 2022, the template reflects pre-existing frameworks in the sector—such as those employed by the United Nations Development Programme, the World Bank, Kenya's Digital Economy Blueprint, and Smart Africa—and incorporates the insights of stakeholders from these organizations. The template further draws on findings from our literature review and indicator analysis to identify key change factors that drive digital transformation.

DIAL and DAP's aim is for decision makers to use the Digital Drivers Template to tell the story of their own national digital transformation journeys, assess progress, and use related insights to prioritize areas for investment or policy action in their own countries.

The drivers themselves are not exhaustive but rather key change factors that emerged from both stakeholder insights and the literature review as being catalytic in driving digital transformation. The six focus areas (people, infrastructure, enabling platforms and services, business and innovation, policy and regulation, and governance) that form the template are thematic groupings of these key drivers and were developed based on DIAL's own focus areas.

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The template draws on three analytical components as well as a literature review

While the Digital Drivers Template is a mental model for decision makers (including but not limited to policy practitioners, consultants, and researchers), it also has analytical components that can be operationalized to assess a country's progress. The template draws on the three analytical components outlined below, as well as a literature review, which has informed and added context to these three analytical components.[1]

- An **indicator analysis** provided a quantitative baseline for a country's digital transformation by analyzing a set of indicators under each focus area. We chose both composite and standalone indicators, which are informed by specific drivers (the process of indicator selection is discussed later in this section). However, in the case where data was not available for a specific country, secondary research was required to analyze similar drivers.
- **Primary research** supplemented the quantitative analysis by providing nuanced narrative support for the quantitative data. We drew on original survey data, stakeholder interviews, and other types of primary research, such as focus groups. This component responded to the reality that new datasets might be required to understand the true scope of digital transformation and subnational dynamics, particularly in countries with limited national-level data.
- A **country reference group** is a country-specific group of ~20 individuals—drawn from the private sector, civil society, universities, donors, and government—who were able to provide further nuance and insights into the quantitative analysis and to fact-check where appropriate. These stakeholders are also potential early adopters of recommendations emerging from the country assessment.
- In addition to these analyses, we conducted a **literature review** to validate findings and provide nuance.

This report applied these analyses to Kenya as the first exemplar of national digital transformation to document its digital transformation journey, highlight the key drivers, and illustrate strengths and opportunity areas for policymakers and other stakeholders. We chose Kenya as an exemplar due to its comprehensive digital transformation relative to other countries across Africa and its promising outlook. The analysis of Kenya aimed to answer four questions: (i) Which drivers showed the most improvement and were thus critical in driving Kenya's national digital transformation journey? (ii) Did some drivers in Kenya's journey matter more than others? (iii) Were some of the drivers dependent on others? and (iv) How can such factors and lessons help inform other countries in their digital transformation journey?

For Kenya, the template will not only support identifying drivers that have been key in the country's digital transformation but also areas of momentum that can be built on and areas where more can be done to accelerate its digital transformation further.

Using the methods outlined above, this assessment of Kenya found that certain drivers (e.g., education and non-digital infrastructure, such as electricity) have played a key role in the country's digital transformation.

1 These three components can and may be adapted according to a country's resources and existing national data.

In 2018, the literacy rate stood at 81.5% for people aged 15 and over, compared to 72.16% in 2007

Investments in basic education have been key to accelerating Kenya's digital transformation, forming the bedrock of the human capital needed to drive the use and creation of digital products. Particularly, the introduction of Free Primary Education in 2003 and Free Day Secondary Education in 2008 helped equip Kenya's population with the requisite levels of education to develop the minimum digital skills necessary to use and habituate themselves to new digital products, such as social media. For example, in 2018, the literacy rate stood at 81.5% for people aged 15 and over, compared to 72.16% in 2007.[2] Furthermore, the Digital Literacy Program initiated by the Kenyan government in 2013—which aims to transform learning in Kenya—has created awareness of the importance of digital literacy. In addition to education, non-digital infrastructure programs, such as electrification, have been critical to Kenya's journey. For example, the Rural Electrification Program, which aims to ensure that all Kenyans have access to electricity by 2030, has connected 8.6 million households (many of them rural) to the grid, along with trading centers, police administrative posts, health centers, and all primary schools.[3,4] Access to electricity is obviously a critical precondition for the uptake and usage of digital devices, and by extension, digital applications and services, by Kenyans.

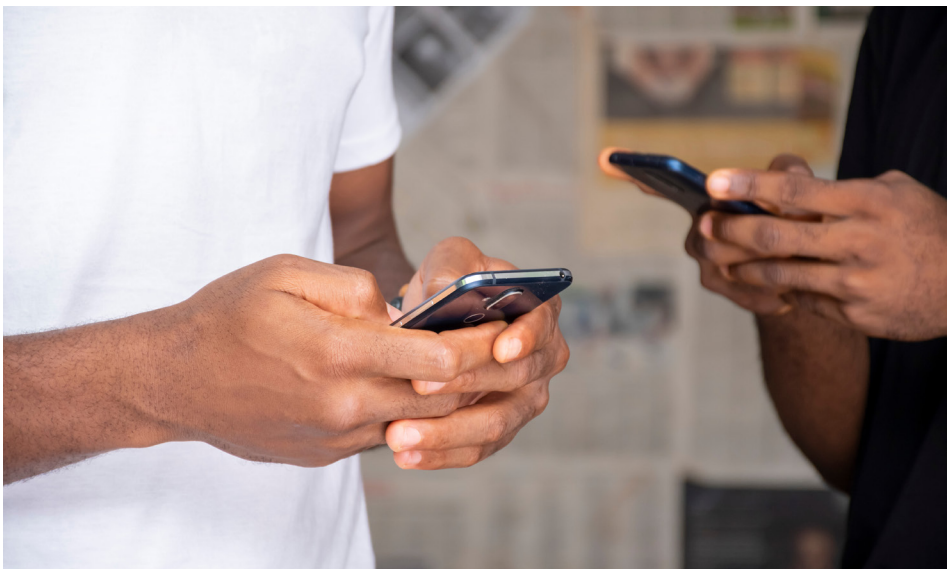
We also found that investments in the digital connectivity infrastructure facilitated by visionary leadership have been crucial in Kenya's digital transformation. Infrastructure investments—such as the installation of The East African Marine Systems (TEAMS) cable in 2009—greatly boosted connectivity while increasing competition among existing internet service providers, leading to decreased costs of connectivity for users. Furthermore, the government's 2012 investment in the National Optic Fiber Backbone Infrastructure has ensured that all 47 counties are connected to the national fiber network, further boosting equitable access, particularly in the last mile.[5] Private sector players have also made significant investments in their connectivity infrastructure, such as cell towers, further increasing connectivity while concurrently lowering the price of data. By 2018, 95.3% of the country was covered by a 2G network, 85% by a 3G network, and 25% by a 4G network, with efforts to connect the remaining unconnected areas underway.[6]

2 The World Bank, Literacy Rate, Adult Total (% of people ages 15 and above) - Kenya, accessed 2022.
3 REREC, Electrification of Public Facilities, accessed 2022.
4 The East African, Kenya Connects 8.6 Million Households to Electricity, 2022.
5 Ministry of ICT and Youth Affairs, NOFBI Phase 2, accessed 2022.
6 Research ICT Solutions, Kenya, accessed 2022.

Photo: Wavebreak Media | stock.adobe.com

Furthermore, tactical regulations have played a key role in creating an enabling environment for fair competition and signaled the government's commitment to supporting the information and communication technology (ICT) sector. The 2006 National ICT Policy deregulated the ICT sector, leading to several watershed developments in Kenya's digital transformation journey, including the end of Telkom Kenya's monopoly over both international and last-mile connectivity in 2007 and the installation of the TEAMS cable two years later.

Mobile money and government e-services have had a transformative impact in Kenya



Additionally, Kenya has made significant strides both in the growth of enabling platforms and in the business and innovation driver, with the former playing a critical role in facilitating the ubiquitous adoption of the applications and services created by the latter. For instance, mobile money and government e-services have had a transformative impact in Kenya as enabling platforms and services. The phenomenal success of the mobile money service M-Pesa is a case in point. At M-Pesa's launch in 2011, only ~42% of Kenyans aged 15 and over had a bank account or an account with a mobile money service provider. By 2017, that figure had reached ~82%, of which ~56% were bank accounts with a financial institution.[7,8] Mobile money provided a convenient option for payment services while decreasing the inconvenience of transacting in person at a bank branch. M-Pesa was able to grow its network of skilled agents at the same pace as its customer base,[9] thus ensuring the geographical proximity of agents to consumers. The ubiquity of M-Pesa has shifted Kenya toward a digital economy by catalyzing digitally enabled interactions between people, government, and business. More broadly, M-Pesa's success has proved the potential of innovative digital products and provided inspiration to Kenya's entrepreneurship and business ecosystem. Similarly, the launch of the e-citizen portal—an official digital payments platform that enables Kenyan citizens, residents, and visitors to access and pay for government services online—has greatly increased convenience for citizens while reducing the costs and corruption often associated with government transactions and services.[10]

7 The World Bank, Global Financial Inclusion, accessed 2022.
8 The World Bank, Account ownership at a financial institution or with a mobile-money-service provider (% of population ages 15+) – Kenya, accessed 2022.
9 HBS Digital initiative, M-Pesa: A mobile money success story from Kenya, 2015.
10 The World Bank, *ID4D Country Diagnostic: Kenya*, 2016.

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Despite reductions over the past two decades, internet and mobile data costs remain high

It is worth noting that Kenya's digital transformation journey has been neither linear nor immune to the effects of broader societal events. The ripple effects of changes implemented years ago by key figures, such as Dr. Bitange Ndemo, the former permanent secretary in the Ministry of ICT, are still felt today. Kenya's digital transformation journey began with the deregulation of the ICT sector during former President Mwai Kibaki's regime in 2002, which paved the way for fair competition among new players. The National ICT Policy (2006) set in motion much of the success Kenya is currently experiencing. The momentum that grew from this type of political influence and leadership cannot be understated as a key driver of change. There has also been a measure of nonlinearity to Kenya's journey. The post-election violence of 2007–08 could never have been predicted as a catalyst for the mass adoption of mobile payments that followed. With bank branches closed temporarily due to insecurity, most Kenyans increasingly turned to mobile money to send funds to relatives and pay for goods and services. This shift persisted, and mobile money has become the dominant transaction layer, facilitating transactions in what is now verging on a cashless economy.

Several persistent challenges must be addressed as Kenya continues its digital transformation journey. Despite reductions over the past two decades, internet and mobile data costs remain high relative to Kenya's digital connectivity infrastructure coverage. This has impeded further uptake and usage of digital applications and services. High internet and data costs also contribute to another ongoing challenge: the digital divide in internet usage. Inclusion across gender, demographics, and geographies still lags. For example, just 35% of women are advanced digital services users, compared to 54% of men, and just 50% of women use mobile internet in Kenya, compared to 71% of men.[11] The divide is even more pronounced at the intersections of gender and geography, age, and occupation, with female rural youth, adult female farmers or homemakers, and self-employed women the most affected.[12] Unreliable electricity, particularly in rural areas, remains a widespread challenge. Additionally, digital trust remains low in Kenya and is bound to decrease with cases of cyber fraud, disinformation, and misinformation on the rise. The lack of a national addressing system is another persistent obstacle, particularly for the growth of e-commerce. Furthermore, challenges with the rollout of Kenya's digital identification (ID), Huduma Namba, have not been resolved, and Kenya's High Court has declared the rollout illegal due to the lack of a data impact assessment.[13] The High Court's decision highlights the importance of having a strong legal framework as a guardrail for deploying digital IDs, which can be riddled with privacy concerns.

11 The Standard, Why Kenya needs a gender inclusive digital transformation, 2021.
12 Ibid.
13 Business Daily, High Court declares Huduma Namba illegal, 2021.
14 Chakravorti, Bhaskar and Chaturvedi, Ravi Shankar, Digital planet 2017: How competitiveness and trust in digital economies vary across the world, IBCG, The Fletcher School, Tufts University, July 2017.
15 Ministry of Health, Kenya National e-Health Strategy, 2010.
16 Business Daily, Inside Kenya's new digital strategy to lift agriculture, 2020.

The Digital Drivers Template enabled us to tease out what drivers have been catalytic to the country's digital transformation

While some sectors remain heavily analog, Kenya has made significant progress and is widely recognized as a country with strong digital momentum. The Kenyan economy has excellent growth potential; it was ranked the fourth-fastest growing digital economy in the world in 2017.[14] Kenya does particularly well in digital infrastructure, basic education, digital payments, up-to-date regulations, e-government, and a burgeoning digital innovation ecosystem. Certain sectors, such as healthcare, have also adopted digital strategies. Kenya's National e-Health Strategy envisions an ICT-enabled transformation of the sector to provide efficient, accessible, equitable, secure, and consumer-friendly healthcare services.[15] The government also launched a digital-for-agriculture strategy with a target of registering 1.4 million farming households in an online portal and 2,300 agro-dealers to supply farm inputs to growers by 2023.[16] Adopting sector-specific digital strategies is crucial to improving transparency and efficiency in sectors, driving inclusive economic growth. However, not all sectors in Kenya are digital or have developed a digital strategy.

Thus, Kenya's story is one of being an exemplar in national digital transformation with plenty of room for improvement. Kenya's areas of strengths—such as investment in education and digital connectivity infrastructure, world-class policies and regulations, and visionary leadership—can inform other countries' strategies and investments. Moreover, its persistent challenges can signal to other countries what complications must be addressed as they move forward with their digital transformation journeys.

This Digital Drivers Template offers a framework through which any country can evaluate itself to identify areas for investment that will accelerate digital transformation. In developing this report, we found that every country's digital transformation journey will be nonlinear, with specific drivers often coalescing to accelerate and steer a particular country down its own path. In the case of Kenya, the three methodological components of the Digital Drivers Template enabled us to tease out what drivers have been catalytic to the country's digital transformation and offer clear lessons to other countries on their digital transformation journeys. Furthermore, the template will be continually refined and improved to ensure that countries have the best possible template to evaluate and inform their decision-making processes.

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The Digital Drivers Template As A Mental Model

The Digital Drivers Template will be a living document ... refined and improved over the coming months and years

Objectives and Background

The Digital Impact Alliance (DIAL) is a "think,do, replicate" tank housed at the United Nations Foundation. DIAL's vision is a world where services can safely reach everyone using digital technology and data. As part of its Digital Beacons strategy, DIAL supports countries in undertaking digital transformation and investigates the factors that have driven long-standing digital transformation efforts in countries such as Kenya. With support from the UK Government Digital Access Programme, DIAL undertook this study to document national digital transformation and responsible data use journeys.

DIAL partnered with Dalberg Advisors to accomplish three tasks: (i) develop a common analytical process to inform subsequent national digital transformation studies, (ii) produce and publish a report on Kenya's national digital transformation, and (iii) generate a national Digital Drivers Template that highlights the common drivers of a country's digital transformation.

The Digital Drivers Template will be a living document; in other words, it will be refined and improved over the coming months and years to ensure that countries have the best possible template to assess their progress on key enablers and document their own national digital transformation journeys.

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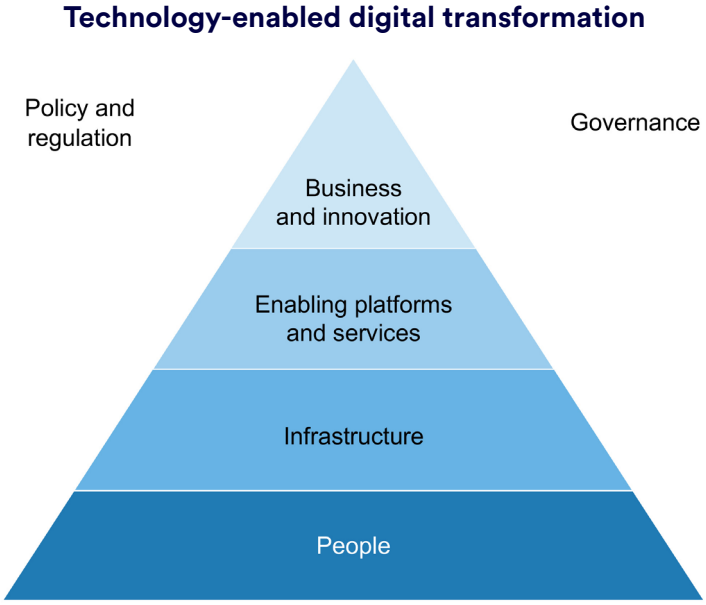
A country that invests in its people and infrastructure and creates a baseline of enabling platforms and services will have the foundation to develop the business and innovations required to enable a broad shift from analog to digital

The Digital Drivers Template

DIAL's Digital Drivers Template is a mental model that can guide countries in understanding the broad domains in which national digital transformation occurs while acknowledging the diversity of the drivers of national digital transformation and its many outcomes. Essentially, the Digital Drivers Template seeks to identify the key drivers of digital transformation, which have been grouped into six focus areas: (i) policy and regulation, (ii) governance, (iii) people, (iv) infrastructure, (v) enabling platforms and services, and (vi) business and innovation (see Figure 1). Each driver was measured using a set of indicators to provide countries with a framework they can use to monitor their success.

FIGURE 1: THE DIGITAL DRIVERS TEMPLATE



A country that invests in its ***people*** and ***infrastructure*** and creates a baseline of enabling ***platforms and services*** will have the foundation to develop the ***business and innovations*** required to enable a broad shift from analog to digital. Strong private sector activity is necessary for these business innovations (i.e., applications and services), which can be propelled by robust ***governance, policies, and regulations***. These cross-cutting factors must evolve to respond to and steer innovation. The desired end-state of this journey is the ubiquitous use of digital technology, followed by digital technology-enabled growth.

P

Both the productivity and creativity of a country's ***People*** are central to inclusive growth in the digital age. The skills needed to create and provide digital products are key to driving digital transformation,[17] as are literacy and basic education, which enable the acquisition of the basic digital skills needed for the widespread and equitable adoption of digital products. An educated populace also drives the evolution of the localized use of, habituation to, and trust in digital products. Therefore, investment in basic education and developing digital skills are a precondition of any other focus areas gaining momentum.

17 Digital Planet, The African leapfrog index: Getting lions to leapfrog, IBCG, The Fletcher School, Tufts University, December 2020.

In parallel, investing in ***Infrastructure*** directly impacts affordability, quality, and inclusive access, which are necessary for digital transformation. Investing in digital connectivity infrastructure directly impacts internet quality and thus access to and the use of advanced applications and services. The adoption of connectivity standards and network security measures also drives national digital transformation by ensuring the security of the networks—and thereby the content—building user trust, and ultimately driving the adoption of digital applications and services. However, investing in infrastructure alone is insufficient and should be accompanied by investment in developing digital capabilities to maintain the related infrastructure. There is also a direct relationship between connectivity and digital capabilities.

Once these two pieces—human capital and infrastructure—are in place, a country should invest in building ***Enabling Platforms and Services***. These facilitate ubiquity in digital functions, interactions, and transactions. Digital payment systems, for instance, form the transaction layer that facilitates financial interactions between various actors in the digital ecosystem, thereby driving digital transformation. Similarly, identification and authentication are key to transactions by fulfilling know-your-customer (KYC) obligations for both businesses and governments. Implementing authentication on digital platforms increases trust, enabling a transition from analog to digital applications and services, such as those that support e-commerce. There is often an inherent trust built into these enabling layers, as they are the railways of everyday functions, and having this railway in place can facilitate the innovation potential in the digital economy.

Subsequently, ***Business and Innovation*** developments are often only possible once foundational focus areas, such as infrastructure and enabling platforms and services, are in place; for example, e-commerce requires an enabling service (i.e., digital payments as a transaction layer) to function. Innovative developments have the potential to grow economies and improve social welfare. For example, emerging technologies, such as artificial intelligence (AI), have the potential to enable leapfrogging by introducing efficiencies and new technological solutions to education, healthcare, and finance, thereby accelerating inclusive economic development.

These business innovations can be propelled by forward-leaning ***Policies and Regulations***, which are cross-cutting elements. A supportive policy environment creates the right incentives for digital transformation. For example, the liberalization of subsectors through fair and transparent competition regulations can unlock private sector investment by signaling to this sector that governments are committed to ensuring a level playing field, thereby encouraging investment. Moreover, cybercrime and cybersecurity regulations ensure the safety of online transactions and interactions and build user trust, thereby increasing the adoption and usage of digital applications and services. Data and privacy regulations fulfill the same purpose by providing guidelines and assurances on the secure use and storage of user data by data holders.

Furthermore, open government and data regulations provide guidelines for citizens and governments regarding how to access government data, increasing transparency and trust in governments. Additionally, capital investment regulations provide guidelines for administering privately pooled funds while defining the penalties for managers, essentially providing constitutional protection to investors, which helps build confidence within the private sector.

Active ***Governance*** is another critical cross-cutting component to building an enabling ecosystem for digital transformation. Political will is necessary for the passing of regulations that enable digital transformation, and dynamic leadership has the potential to accelerate digital transformation by unlocking the necessary goodwill across government silos. For instance, national information and communication technology (ICT) strategies are critical to signaling to the private sector that governments are committed to digital transformation, thus unlocking investment. Governance is also critical in directing finance to infrastructure projects that can accelerate digital transformation. Moreover, empowered regulatory bodies are critical in ensuring that regulations are fully implemented, and strong competition regulatory bodies are crucial in ensuring a transparent and level playing field.

Case Study: Assessing Kenya's National Digital Transformation Journey Using the Template

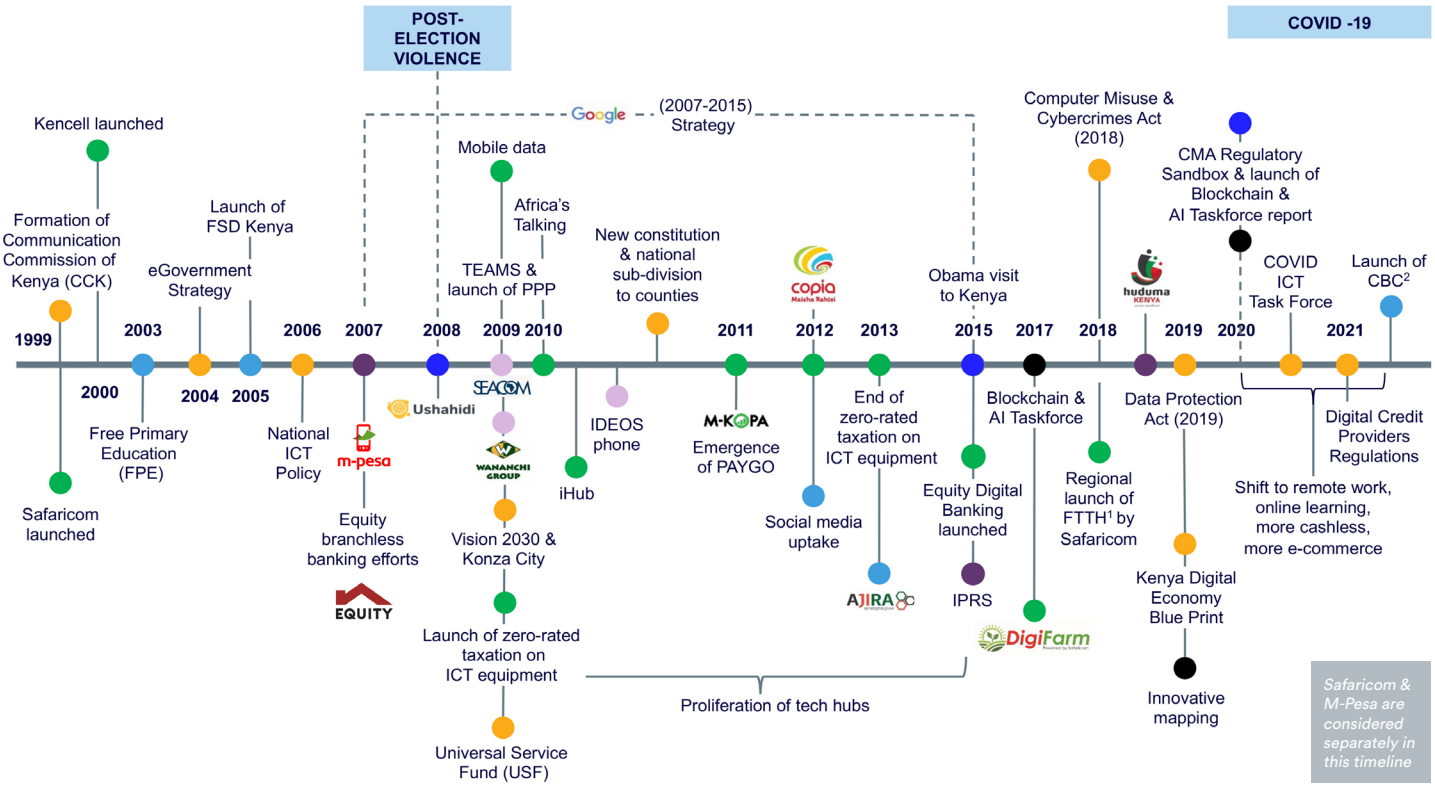
Kenya's digital transformation journey spans three dynamic and exciting decades. During this period, the country has undergone widespread development across the focus areas in the Digital Drivers Template (see Figure 2). However, this journey has by no means been linear, with certain policy and regulatory elements playing key roles in accelerating developments in other focus areas, such as business and innovation.

Summary of Kenya's Digital Transformation Journey

This section examines Kenya's digital transformation across three decades, starting in the 1990s. These three decades represent a period of unprecedented digital transformation for Kenya, driven by concerted advocacy efforts, deregulation, and the rapid introduction and adoption of new technologies.

Photo: IndustryAndTravel | Shutterstock.com

FIGURE 2: TIMELINE OF THE EVENTS THAT HAVE SHAPED KENYA'S DIGITAL TRANSFORMATION



Notes: 1. FTTH – fiber-to-the-home, 2. Competency Based Curriculum

Pre-2000: *Laying the groundwork*

1997

During this period, the ICT sector in Kenya underwent deregulation and liberalization, which saw the legalization of the internet and the shift to a focus on the role of civil society organizations (CSOs), which moved from being activism-focused on the supply of the internet to understanding the needs of both potential and new users.

1999

Concerted advocacy from CSOs and outside actors forced the government to pass the Telecommunication and Postal Sector Policy in 1997.[18] By 1999, the government had passed the Kenya Information and Communications Act, which culminated in the breakup of the then Kenya Posts and Telecommunications Corporation (KP&TC) into three separate entities: Telkom Kenya, Kenya Postal Corporation, and the Communication Commission of Kenya (CCK). The liberalization of the telecommunications sector eventually gave rise to the mobile operator Safaricom.

2000–2010: *The era of momentum*

2000

From 2000 onwards, the CCK became Kenya's telecommunications regulator, ushering in a new era of further deregulation and government collaboration with the ICT sector.[19] In light of the earlier legalization of the internet, the government began recognizing its potential as a critical driver of development. As a result, both barriers to entry in licensing and fees decreased, thereby increasing competition. However, new challenges—such as the affordability of services and the high equipment cost—emerged, while others persisted, such as geographical inclusion and Telkom Kenya's monopoly.[20] The year 2000 also saw a consortium of Kenyan internet service providers (ISPs) launch the Kenya Internet Exchange, which replaced expensive international links facilitated by satellite.[21] In 2000, Kencell (later known as Zain and then Airtel) also launched.

2002

In 2002, a new regime came to power, bringing an increase in foreign investment and the privatization of state corporations. Safaricom, a spinoff of Telkom Kenya, took the Kenyan telephony market by storm.[22] Safaricom would go on to revolutionize connectivity in Kenya; by 2002, Kenya had roughly half a million mobile phone users, a number that would continue to grow rapidly.[23]

2006

In 2006, the government gazetted the National ICT policy, signaling its continued belief in the potential of ICT to spur economic development. In 2007, Telkom Kenya's monopoly ended, taking with it many barriers to internet access.[24] Where the private sector was unwilling to venture—for example, rural infrastructure and international connectivity—the government intervened with major investments.[25]

18 Ibid.
19 Ndemo, Bitange and Weiss, Tim, editors., Digital Kenya: An entrepreneurial revolution in the making, 2017.
20 Ibid.
21 Ibid.
22 Ibid.
23 Ibid.
24 Ibid.
25 The Kenya Communications (Amendment) Act, 2009: Universal Service Fund.

2007

In 2007, Vodafone, through Safaricom, launched M-Pesa, which quickly became a global trailblazer in mobile money transfer services. M-Pesa ushered in further innovations and the widespread uptake of additional services and applications in digital finance and e-commerce,[26,27] made possible by the Central Bank of Kenya's (CBK) minimal regulations.[28] The government's arm's-length approach—dubbed the "test-and-learn" approach by the current CBK Governor, Dr. Patrick Njoroge—enabled the majority of Kenyans who did not have formal bank accounts to digitally transact through M-Pesa.[29] Broad access spurred the mass adoption and usage of digital financial services.

Additionally, through a public–private partnership, the Kenyan government built a terrestrial fiber infrastructure, the National Optic Fiber Backbone Infrastructure (NOFBI), which increased competition among the private sector, driving down the cost of broadband and increasing connectivity speeds.[30]

2008

In 2008, post-election violence in Kenya catalyzed the founding of the crisis crowdsourcing platform Ushahidi to monitor Kenyan elections. This platform has since been recognized and adopted globally for monitoring crises.[31] The post-election violence also led to a shift from manual to electronic voting and result transmission to address vote rigging concerns which helped spark the violence in the first place. Furthermore, the subsequent media ban in the country after the announcement of the election results created a media blackout, forcing many Kenyans to turn to other means of finding and relaying information.[32] As a result, Kenyans increasingly used social media platforms and tools—such as wikis, blogs, Facebook, Flickr, YouTube, Twitter, and mashups—to organize and share information about the crisis, violence, and fundraising efforts.[33] While some Kenyans used social media channels to call for peace, others used them to disseminate biased information, tribal prejudices, and hate speech. In the end, the post-election violence undoubtedly drove the uptake of social media as an alternative public sphere, one whose salient features—a new kind of citizen participation and a horizontal form of information sharing[34]—further driving the digital transformation of Kenya.

In 2008, Kenya launched Vision 2030, aiming to transform the country into a rapidly industrialized, middle-income country by 2030.[35] The government also began implementing a unified licensing framework (ULF) based on the principle of technology neutrality. This framework allows any form of communications infrastructure to be used to provide any type of communication service. The ULF has driven innovation and the development of applications in the market.[36] Moreover, the Ministry of ICT, led by Dr. Ndemo, set up The East African Marine System (TEAMS) consortium, whose cable went live in 2009, alongside the privately funded SEACOM cable.

26 Ndemo, Bitange and Weiss, Tim, editors., Digital Kenya: An entrepreneurial revolution in the making, 2017.
27 Din, Gina, Daughter of Africa, 2022.
28 Njoroge, Patrick, Kenya's digital transformation journey, 2020.
29 Ibid.
30 Ndemo, Bitange and Weiss, Tim, editors, Digital Kenya: An entrepreneurial revolution in the making, 2017.
31 Ibid.
32 Makinen, Maarit and Kuira, Mary Wangu, Social media and post-election crisis in Kenya, 2008.
33 Ibid.
34 Ibid.
35 Thomas-Aguilar, Blakely, How Huduma Kenya Embraced Digital Transformation for Social Good, Radius/VMware, 2019.
36 Ndung'u et al., *The State of Digital Transformation in Kenya*, Research ICT Africa, 2019.

2010–2020: *The great digital migration*

2010 In 2010, the innovation hub, **iHub**—a pioneer among African co-working and incubation spaces—opened in Nairobi.[37] That same year, Huawei partnered with Safaricom to introduce the **IDEOS**, the first under-$100 smartphone, in Kenya. The rapid adoption of this phone increased connectivity by decoupling internet access from static cybercafés.[38]

Kenya also introduced **The Competition Act in 2010**, further amended in 2012 and 2014.[39] This regulation established a Competition Authority and a Competition Tribunal with wide-ranging mandates, including overseeing mergers and acquisitions and introducing regulations on a range of anti-competitive practices.[40]

2012 Beginning in 2012, social media (in particular, Facebook) became Kenyans' preferred means of connecting and interacting online. This uptake of social media also spurred engagement with online entertainment, games, and music. By 2016, Kenya was among only five African countries with a list of locally trending topics on Twitter.[41] In recent years, the popularity of WhatsApp has also grown in the country; its intuitive design has further driven smartphone ownership and data usage, which in turn has increased the adoption of other applications and services.[42]

2013 In 2013, the Kenyan government further cemented the ICT sector's critical role in digitally transforming the economy. In adopting a national broadband strategy as a key infrastructure intervention, the government recognized the rollout of broadband as "critical to the achievement of **Vision 2030** [which] aimed to transform Kenya to a knowledge-based society driven by a high capacity nationwide broadband network."[43] In the same year, it launched an ambitious e-government program dubbed **Huduma Kenya** to address Kenyans' challenges in accessing public services.[44] These services are now available online through eCitizen, a one-stop-shop electronic service portal. This system has greatly increased convenience for citizens and has reduced the cost and corruption often associated with access to public services.[45] The government also inaugurated physical, multi-service centers across the country, known as **Huduma Centers**, to widen access to services and bring e-government to the people.[46]

2014 In 2014, the CCK was rebranded as the **Communications Authority of Kenya (CA)**. The regulator now has greater independence and a broader degree of authority,[47] which has driven further transparency and deregulation in the ICT sector.

2015 In 2015, the government launched the **Integrated Population Registration System (IPRS)**, a one-stop shop for personal information and biometrics for locals and foreigners.[48] By 2016, the IPRS had identity information on roughly 42 million Kenyans. It has subsequently become integral to authentication and identification, with private and public institutions using it to fulfill authentication tasks.[49]

37 Ibid.
38 Ibid.
39 Republic of Kenya: Competition Act 2010.
40 Ndung'u et al., *The State of Digital Transformation in Kenya*, Research ICT Africa, 2019.
41 Ndemo, Bitange and Weiss, Tim, editors, Digital Kenya: An Entrepreneurial Revolution in the Making, 2017.
42 Ndung'u et al., *The State of Digital Transformation in Kenya*, Research ICT Africa, 2019.
43 Ibid.
44 Thomas-Aguilar, Blakely, How Huduma Kenya Embraced Digital Transformation for Social Good, Radius/VMware, 2019.
45 The World Bank, *ID4D Country Diagnostic*: *Kenya*, 2016.
46 Ibid.
47 Ndung'u et al., *The State of Digital Transformation in Kenya*, Research ICT Africa, 2019.
48 Kenya Vision 2030, Integrated Population Registration System, accessed 2022.
49 The World Bank, *ID4D Country Diagnostic: Kenya*, 2016.

2017 In 2017, the government established the **Blockchain and AI Taskforce** under the Ministry of ICT to champion the exploration of opportunities presented by emerging technologies. The taskforce released its report in 2019. Although its recommendations have not yet been adopted as law, there is an opportunity that they will be in the future.

2018 The **Computer Misuse and Cybercrimes Act** came into effect in 2018. This law addresses a range of cybercrimes and computer-related offenses, including those related to critical infrastructure, mobile money, cybersquatting, blockchain, and cryptocurrency.[50] The government also launched the National Broadband Strategy 2018–2023 in 2018, which built on the 2013–2017 strategy in considering technological and industry trends and market realities.

2019 In 2019, the government launched the **National ICT Infrastructure Masterplan 2019–2029** to streamline the country's ICT infrastructure management. In the same year, it passed the Data Protection Act, closely modeled on the European Union's (EU) General and Data Protection Regulation (GDPR).[51] The Data Protection Act gives constitutional protection to the right of privacy to Kenyans, prescribes the criminal penalties for the misuse of personal data, and provides entities—such as mobile network operators (MNOs)—with access to personal data, along with guidelines on how to process, store, and use this data.

2020 The Kenyan government adopted an updated National ICT Policy in 2020, which is meant to align the former ICT sector policy with the 2010 constitution and Vision 2030. It also includes new provisions for foreign direct investment, which increase the local ownership requirement of companies providing ICT services in Kenya.[52] By and large, this policy aims to align Kenya with global technological and market trends and help build trust and confidence in the digital ecosystem.

Analysis of Kenya through the Digital Drivers Template

The Kenya case study provides an example of what a country's analysis can look like

Keeping the story of Kenya's digital transformation in mind, this section looks at the six focus areas and analyzes the interplay between these areas and the drivers in the template to test and validate the mental model. As an application of the template, the Kenya case study provides an example of what a country's analysis can look like. This case study is built from inputs—such as an analysis of indicators from existing indices and databases—insights from a survey of micro, small, and medium-sized enterprises (MSMEs) in Kenya (developed for this work),[53] and stakeholder insights from interviews with experts and literature on Kenya. It synthesizes the findings and helps users think in terms of: (i) Where is my country performing strongly in the digital transformation process? (ii) Where is there an opportunity to catalyze momentum in progress? and (iii) Where is an investment required to unlock further growth in digital transformation?

50 National Council for Law Reporting Library, Computer Misuse and Cybercrime Act, 2018, 2018.
51 Usercentrics, Data Protection Act Kenya | Compliance with Cookiebot CMP, 2021.
52 Global Trade Alert, Kenya: National Information Communications and Technology (ICT) Policy Guidelines 2020, accessed 2022.
53 The survey was conducted from December 2021 to February 2022. A sample of 383 respondents were interviewed for the business survey. The majority of the interviewed respondents were business owners (68%), followed by overall managers (18%), and IT heads/managers (6%). The interviews were conducted with businesses across eight regions that constitute Kenya's former provinces: Nairobi (93 businesses), Eastern (89 businesses), Central (54 businesses), Nyanza (42 businesses), Western (37 businesses), Coast (30 businesses), Rift Valley (21 businesses), and North Eastern (17 businesses).

Policy and Regulation

PR

Forward-leaning policies and regulations have the potential to facilitate leapfrogging in digital transformation

An enabling ecosystem that creates the right incentives and environment through regulation is critical for digital transformation. The policies and regulations that precipitate the liberalization of sectors—such as telecommunications—can drive competition, for example, while unlocking private sector investment. This was the case following the 2002 change in government from President Daniel Arap Moi's regime to that of President Mwai Kibaki. The advent of pro-business policies and regulations ushered in a new era of competition that saw the entry of new ISPs and MNOs into the telecommunications space. This led to increased investment in digital connectivity infrastructure, driving down internet costs while concurrently increasing affordability.[54] This has resulted in the increased adoption and usage of digital applications and services and has undoubtedly contributed to increasing user habituation and trust in the country.

Moreover, the CBK's initial "watch and wait" approach, coupled with tactical policies and regulations, enabled the growth of mobile money and, by extension, has largely fostered the growth of an innovative culture in Kenya, facilitating the proliferation of other enabling platforms and services. Additionally, the adoption of both data privacy and world-class cybersecurity regulations has increased user trust in digital applications and services, further driving adoption and usage.

Forward-leaning policies and regulations also have the potential to facilitate leapfrogging in digital transformation. Should Kenya adopt the recommendations made by the Blockchain and AI Taskforce, the country has the potential to secure a first-mover advantage in the adoption and usage of emerging technologies, further accelerating its digital transformation.

54 Ndemo, Bitange and Weiss, Tim, editors, Digital Kenya: An Entrepreneurial Revolution in the Making, 2017.

Photo: pigprox | stock.adobe.com

FIGURE 3: POLICY AND REGULATION FOCUS AREA INDICATORS MEASURED

Drivers	Indicators	Does data/ policy exist?	Since when?
Cybercrime and cybersecurity regulations	• ITU Global Cybersecurity Index • Law or directive on increasing censorship or punishment	✓ ✓	2018
Data protection and privacy	• Data protection and privacy law(s) • Quality and scope of data protection law(s)	✓ ✓	2019
Open government and data regulations	• Open access to government information law(s) • Member of Open Government Partnership	✓ ✓	2010 Kenya since 2011
Digital health regulations	• Laws or regulations for privacy, confidentiality, and access to health information (privacy) • Protocol for regulating or certifying devices and/or digital health services	✓ ✓	2019[55] 2017[56]
Digital payments and trade regulations	• Regulatory guidance on electronic payment schemes • Regulatory framework for cross-border mobile money transfers	✓ ✓	2014 2014
Digital intellectual property (IP) regulations	• IP protections, 1–7 (best)	✓	2007-2017
Competition regulations	• Infrastructure sharing mandated • Number portability required from mobile operators • Regulator and/or competition commission enforcing the country's ICT licensing requirements and regulations • Existence of a competition authority	✓ ✓ ✓ ✓	2009 2018 1998 2010
Business innovation regulations	• Regulatory template supports digital innovation/ entrepreneurship • Tax clinics and favorable policies for small and medium-sized enterprises (SMEs) and start-ups	✓	2019 No data available
Capital investment regulations	• Availability of capital investment regulations	✓	2012
Local/foreign ownership requirement regulations	• Availability of local/foreign ownership regulations	✓	2015
Infrastructure and "right-of-way" regulations	• Availability of infrastructure and right-of-way regulations	✓	2009
Emerging technologies regulations	• Policies that address the spectrum issues regarding emerging technologies in general—including the development of a 5G and AI strategy—and Internet of Things devices in particular • Government encouraging funding of AI research	 ✓	No data available 2020
Enforcement of digital regulations	• Coordinating institution • Efficiency of digital regulations	✓ ✓	2000 2008
Open internet regulations	• Freedom House's Key Internet Controls score	✓	2009
Online content regulation (incl. social media)	• Law(s) regulating online content in place • Law(s) regulating social networks in place	✓ ✓	2019 2019
Universal access policies/ regulations	• Specific policies to promote free or low-cost internet access • Accessibility and inclusion of digital or e-services for marginalized groups	✓ ✓	2010 2010

55 These regulations are covered under the data protection and privacy
56 Kenya does not have comprehensive laws on regulating or certifying devices and/or digital health services; however, in 2017, the Ministry of Health published standards and guidelines for mobile health (mHealth) systems, which fall under digital health services.

PR

Successes

Successes

The indicator analysis suggested that Kenya's score in the policy and regulation focus area has progressively increased, particularly between 2010 and 2020. Progress has been more pronounced across some drivers, including (i) competition regulations, (ii) cybercrime and cybersecurity regulations, (iii) capital investment regulations, (iv) digital payments and trade regulations, (v) local/foreign ownership requirement regulations, (vi) data protection and privacy regulations, (vii) enforcement of digital regulations, (viii) digital social protection regulations, (ix) online content regulations, and (x) open government and data regulations.

I. The **Competition** Act of 2010—which sought to promote and safeguard competition in the national economy and protect consumers from unfair and misleading market conduct—established the development of institutions to regulate the ICT sector.[57] For example, the Competition Act led to the creation of the Competition Authority, a regulatory body responsible for policing monopolistic tendencies and enforcing transparency in licensing. Stakeholders cited the Competition Act as the most important factor in driving digital transformation in Kenya as it accelerated investment, leading to lower connectivity prices. However, the first wave of the liberalization of the ICT sector came in 1999, driven by events such as the concerted advocacy from CSOs and the International Monetary Fund (IMF) nudging the government to issue the Telecommunication and Postal Sector Policy in 1997.[58] By 1999, the government had passed the Kenya Information and Communications Act, establishing a competitive environment. This culminated in the break-up of the then KP&TC, which liberalized the telecommunications sector and gave rise to Safaricom and Kencell. Further deregulation led to the collapse of Telkom Kenya's monopoly on both international and last-mile landline connectivity in 2007, opening the sector up to additional ISPs.[59] On both occasions, consumer demand and innovation spurred the liberalization process. The entry of new players into telecommunications and internet provision drove down device and connectivity prices, accelerating digital transformation.[60] In the interviews, the stakeholders agreed that shifting from government-led initiatives (*push* incentives) to consumer-led demand (*pull* incentives) was the key accelerant of Kenya's digital transformation.[61]

II. The Computer Misuse and Cybercrimes Act (2018) has put Kenya's **cybercrime and cybersecurity regulations** on par with global standards. Prior to this act, cybersecurity in Kenya was regulated by the Kenya Information and Communications Act (1998), amended in 2009, which prescribed criminal penalties for actions that threaten cybersecurity. However, this law did not account for emerging and evolving cyberthreats, such as disinformation and identity theft, which the more comprehensive 2018 law addresses.[62] In addition to providing an overarching framework for cybersecurity, the Computer Misuse and Cybercrimes Act contains provisions for online content regulation and digital social protection.

III. **Capital investment regulations** also registered improvement, largely due to the Capital Markets Act (2012), which established the Capital Markets Authority (CMA) and tasked it with promoting, regulating, and facilitating the development of an orderly, fair, and efficient capital market in Kenya.

57 National Council for Law Reporting, Competition Act, 2010, 2010.
58 Ndemo, Bitange and Weiss, Tim, editors, Digital Kenya: An Entrepreneurial Revolution in the Making, 2017.
59 Ibid.
60 Ibid.
61 Stakeholder interviews.
62 National Council for Law Reporting Library, Computer Misuse and Cybercrimes Act, 2018, 2018.

PR

Successes

IV. **Digital payments and trade regulations** have improved as the government has taken a more prominent role over time in regulating the payment space, ultimately facilitating the proliferation of this enabling transaction layer. In 2014, the government issued the National Payments Systems Regulations 2014 to strengthen the regulation of digital transactions.[63] Specifically, the regulations provided for the authorization and oversight of payment service providers, designation of payment systems and instruments, and implementation of anti-money laundering measures. It is widely accepted that a safer digital transactions layer will further accelerate Kenya's transition to a fully digital economy.

V. **Local/foreign ownership regulations** have also trended in a positive direction, largely driven by the Investment Promotion Act (2019), which guides foreign investment and regulates foreign ownership of companies in the country. The bill also offered incentives—such as investment deductions and rebates to foreign investors who invest more than $100,000 (though this figure could be revised upward to $300,000)—if local ownership was integrated into company structures.[64] This regulation was further amended in 2021 to ensure the participation of county governments in promoting trade in the country, further devolving this function.[65]

VI. **Data protection and privacy regulations** have also improved, largely due to the passing and adoption of the Data Protection Act (2019), which established data privacy as a fundamental constitutional right. Closely modeled on the EU's GDPR, the Data Protection Act is intended to safeguard consumers' personal information and provide companies with clear guidelines on how to handle their users' data.[66] The stakeholders mentioned the importance of data protection and privacy regulations in building user trust and, therefore, habituation and cited the public and private sectors' increased awareness of cyberthreats—such as phishing—as a factor driving investments in network security, particularly in the financial sector.

Case Study 1:
Communication Commission of Kenya (CCK)

The CCK was founded in 1999 after the break-up of the Kenya Posts and Telecommunications Corporation, which had hitherto been a de facto government monopoly in both the provision and regulation of telecommunications and postal services in Kenya. This was the result of international bodies'—such as the International Monetary Fund and the World Bank—demands for structural reform policies, and concerted advocacy efforts by civil society organizations. The CCK became Kenya's sole regulator of the telecommunications and postal sectors and drove many of the developments that contributed to the liberalization of the telecommunications sector.

63 Central Bank of Kenya, National Payments Systems Act, 2014, 2014.
64 Business Daily, Kenya to increase cash threshold for foreign investors, 2021.
65 Government Printer, Investment Promotion (Amendment) Act, 2021.
66 Usercentrics, Data Protection Act Kenya | Compliance with Cookiebot CMP, 2021.

PR

Successes

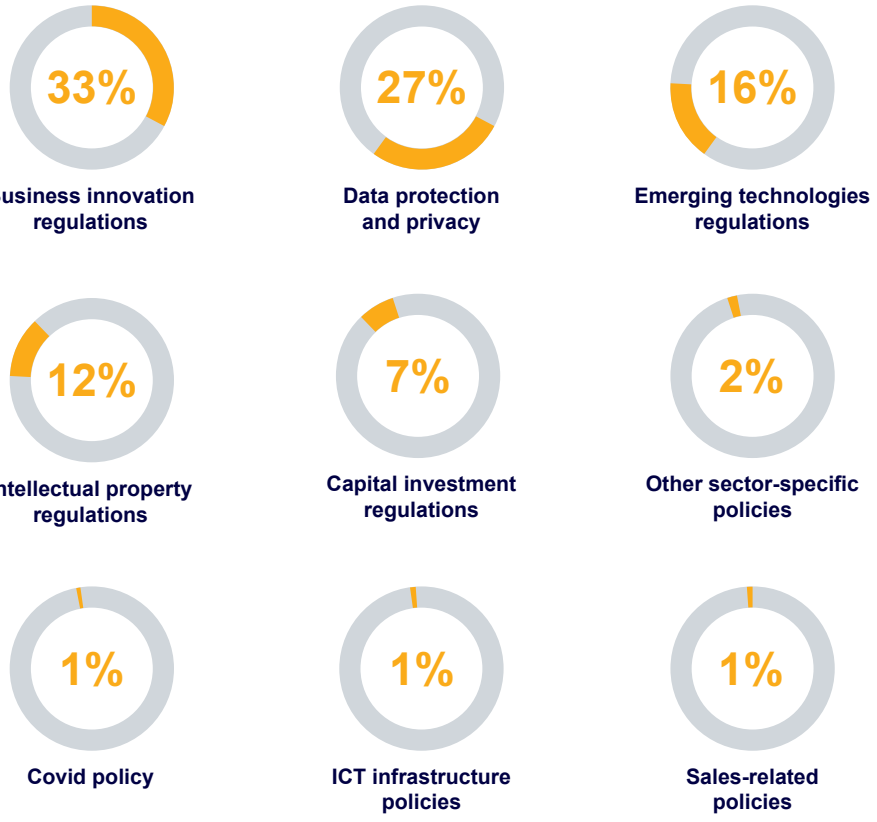
VII. **Enforcement of digital, digital social protection, and online content regulations** have also improved, bolstered by the empowerment of the CA as the coordinating institution to ensure enforcement of digital regulations. The CA seeks to improve the efficiency of digital regulation, outlining its approach in the Strategic Plan 2018–2023, which guides the execution of its mandate as a regulator and signals the direction of its plans to the public.

The MSME business survey indicated that Kenya performs strongly in (i) ease of doing business, (ii) use of digital technologies, and (iii) cross-cutting policies and regulations. The businesses indicated that the ease of doing business in Kenya has improved; the majority of the MSMEs noted that it is "relatively easy" to do business in Kenya, compared to 21% who noted that it is "relatively difficult. This was consistent across sectors and business maturity levels. It points to the strength in ease of doing business in Kenya, driven by regulations that have streamlined a range of processes, from business registration to daily operations.

I. Just over half (55%) of the businesses acknowledged that some policies and regulations encourage their use of digital technologies in their daily operations, implying awareness and adoption of digital-driven policies, particularly among service-related businesses.

II. The businesses also indicated that they are aware of cross-cutting policies addressing business innovation and data protection and privacy. This points to awareness among businesses of regulations that affect regular operations and those that can potentially increase their revenue or affect their data security.

FIGURE 4: POLICIES AND REGULATIONS THAT BUSINESSES ARE AWARE OF, 2022

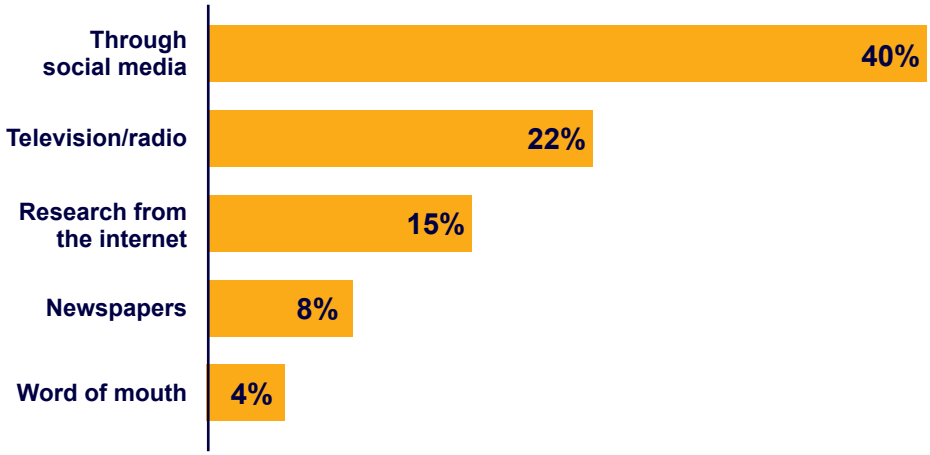


PR

Successes

Opoportunities

FIGURE 5: SOURCES OF AWARENESS OF POLICIES AND REGULATIONS FOR BUSINESSES, 2022



Additionally, the businesses indicated that social media (40%), television and radio (22%), and the internet (15%) are their major sources of information on policies and regulations. This could have been driven by the ubiquity of these sources and their proximity to businesses, pointing to businesses' mass uptake of digital devices that enable access to social media, news sources, and the internet.

Opportunities

According to the indicator analysis, while progress has been made on most of the drivers listed in this section, there are still opportunities to further strengthen others. These include, among others, (i) digital health regulations, (ii) universal access policies regulations, and (iii) right-of-way regulations for building emerging technology infrastructure.

I. While Kenya has several **health-related laws**—including the Public Health Act (2012), which is aimed at securing and maintaining public health—and regulations to guide the training, registration, and licensing of health practitioners, the country still lacks an explicit law aimed at governing the rapid transition of healthcare to the digital sphere. Protocols for regulating or certifying medical devices and/or digital health services, except for mHealth, have yet to be adopted. Thus, this presents an opportunity to further strengthen digital regulations in the healthcare space.

II. **Universal access regulations** can be strengthened to promote free or low-cost internet, particularly in rural areas where the high cost of mobile data remains prohibitive, and last-mile fiber access is largely unavailable. In 2009, Kenya passed the Kenya Communications (Amendment) Act, which established the Universal Service Fund (USF) under the CA[67] to both support widespread access to ICT services and promote capacity building and innovation in such services. In 2016, the CA undertook the "ICT Access Gap Study" to determine access to and use of ICT by public institutions and enterprises.[68] Since then, the CA has undertaken two major projects in line with the USF's mandate: the Voice Infrastructure Project, which connected 2G services to sublocations that remained under- or unserved[69] and, in collaboration with the then

67 Communications Authority of Kenya, Universal Access Overview, accessed 2022.
68 Ibid.
69 Ibid.

PR

Opportunities

Challenges

Ministry of Education, Science and Technology, the Education Broadband Connectivity Project, which enhanced ICT connectivity in public learning institutions.[70] While these efforts are commendable, they have fallen short of ensuring that rural areas can access reliable internet connections. They have also failed to include a gender lens in their implementation, which is especially important given that women are less likely to have internet access than men. Therefore, there are opportunities to expand existing initiatives to target rural households while building a gender lens into implementing these projects to ensure inclusivity.

III. While Kenya has made progress in its **infrastructure and right-of-way regulations**, there are opportunities to further strengthen existing regulations to facilitate right-of-way for emerging technologies. Kenya does have right-of-way regulations for access roads and other infrastructure—including electricity lines and sewer systems—built along these roads.[71] However, there are plans to amend these regulations to expedite the issuance of way leaves[72] to facilitate the fast deployment of infrastructure and embed broadband in future government housing projects.[73] The status of the planned amendment is currently unclear.

The MSME survey suggested that there are opportunities to (i) increase the adoption and usage of digital technologies across product-based sectors and (ii) improve businesses' awareness of sector-specific policies and regulations.

I. Across sectors, the businesses operating in primary and secondary industries (i.e., manufacturing [55%], agriculture [67%]) noted that there are few policies or regulations that encourage their regular use of digital technologies. This calls for further investment in understanding specific challenges faced by these key sectors and crafting interventions that both respond to the identified challenges and stimulate digital adoption.

II. Moreover, Kenyan businesses are largely unaware of sector-specific policies and newer policies and regulations, such as those related to COVID-19. This indicates that MSMEs seldom invest in learning about and understanding policies and regulations that affect their own sectors. This implies that such businesses may not receive policy updates in ways that target them. For instance, businesses may fail to read government gazettes, as these are often disseminated through government websites, which businesses may not read. Other forms of media—such as social media or radio—could prove more successful in disseminating policy updates that affect businesses.

Challenges

The indicator analysis pointed to challenges in (i) digital IP regulations, (ii) business innovation regulations, (iii) emerging technology regulations, and (iv) open government and data regulations.

I. Kenya's digital **IP regulations** can be further strengthened. Currently, its IP laws do not comply with international standards, including the Agreement on Trade-Related Aspects of IP.[74] Furthermore, existing laws are not comprehensive. However, the Kenyan parliament is in the process

70 Ibid.
71 National Council for Law Reporting, Public roads and roads of access act, 2010.
72 A right of way granted by a landowner, generally in exchange for payment and typically for purposes such as the erection of telegraph wires or laying of pipes.
73 Communications Authority of Kenya, National broadband strategy, 2018-2023, accessed 2022.
74 World Intellectual Property Organization, Strengthening Kenya's IP landscape, 2016.

PR

Challenges

of preparing *sui generis* laws for the protection of traditional knowledge, genetic resources, and traditional cultural expressions. The status of the new law is currently unclear. A central implementing body also needs to be established, as existing bodies—such as the Kenya Industrial Property Institute—focus on specific sectors.

II. **Business innovation regulations** also present persisting challenges. The Startup Bill 2020,[75] which aims to create incubation programs for startups, currently regulates innovation in the country. While the law has provisions for a National Research Fund for the development and growth of start-ups, the funds are only available for start-ups that go through government incubation programs, thus excluding start-ups that pass through private programs. The bill also requires double registration; in other words, it requires that entities first register as a company, partnership, limited liability partnership, or non-governmental organization before being eligible to register as a start-up.[76] The bill further stipulates that a start-up must have a patent or trademark registered in Kenya to qualify, which excludes entities that may not have sufficient funding to fulfill this requirement.[77] Furthermore, there is no explicit provision for seed funding, which is critical for fledgling businesses. Additionally, the bill does not provide start-ups with incentives such as tax clinics.

III. **Emerging technology regulations** have also been met with numerous challenges. In 2017, the government, under the Ministry of ICT, established the Blockchain and AI Taskforce to explore opportunities presented by emerging technologies.[78] The taskforce released a report in 2019, noting the considerable impact the Fourth Industrial Revolution would have on all aspects of life. While few of its recommendations have been implemented thus far, and no regulations guiding the country on how to embrace and capitalize on emerging technologies have been drafted, the recommendations represent a promising start. Meanwhile, the implementation of Kenya's digital ID, Huduma Namba, has also been fraught with challenges, including inadequate public participation, lack of a data protection impact assessment, potential exclusion from access to socioeconomic rights, and potential discrimination of minority groups.[79]

IV. **The open government and data regulations** have not yet achieved what they were designed to do. The Access to Information Act (2016) regulates access to government information and aims to promote transparency. The regulation requires that government agencies make official information more freely available, provide for proper access by each person to official information relating to said person, and protect official information to the extent consistent with the public interest.[80] However, in practice, not all government datasets are available.

The MSME survey suggested that awareness of IP rights among ICT and manufacturing businesses remains low, as does awareness of policies and regulations among mature businesses.

75 Government Printer, Startup Bill, 2020, 2020.
76 ICLG, New Startup Bill will foster entrepreneurship, but there are still some stumbling blocks | Kenya, 2021.
77 Ibid.
78 Arunda, Benjamin, The impacts of emerging technologies in the future of law and legal practice: A case of Kenya, Journal of Conflict Management and Sustainable Development, 2020.
79 Privacy International, Data Protection Impact Assessments and ID systems: The 2021 Kenyan ruling on Huduma Namba, accessed 2022.
80 Communications Authority of Kenya, Guidelines on access to information requests, accessed 2022.

PR

Challenges

Complexities and unintended consequences

I. Awareness of IP rights was surprisingly low among ICT (15%) and manufacturing (19%) sector businesses, which could imply minimal innovation in these sectors that require the protection of IP rights.

II. Furthermore, no variation was found in awareness of policies and regulations across the spectrum of business maturity—a surprising result, given the expectation that mature businesses would be more aware relative to other businesses. This could imply that businesses do not invest in keeping up with regulations.

Complexities and unintended consequences

One caveat mentioned by the stakeholders was the need to approach regulations with a balance between proactivity and patience. With fledgling sectors or regulators with limited experience regulating a sector, there may be a need for a "watch and wait" stance, as was the case with the CBK and the early days of mobile money. The CBK's arm's-length approach to regulating M-Pesa during its infancy allowed the service to innovate and evolve by encouraging experimentation alongside the development of enabling regulations, with input from M-Pesa, instead of a more conventional "policy-first" strategy, which often stifles innovation.[81] This more patient and interactive approach allows regulators to gather practical evidence from live testing innovations before adjusting regulations where necessary. However, it is more costly and requires greater regulatory capacity.[82] An enabling environment shaped by regulations that supported digital innovation and entrepreneurship undoubtedly enabled M-Pesa to thrive and has spurred a digital transformation in Kenya. Other countries can benefit from similar market-enabling policies incorporating regulatory flexibility to allow experimentation.

Nevertheless, in some contexts, a proactive approach is essential. Challenges with the rollout of Huduma Namba have highlighted the complexities of regulating a national digital ID program and pointed to the need for regulation that addresses concerns regarding data protection, exclusion from access to socioeconomic rights, and potential discrimination of minority groups before a rollout begins.

A further priority that emerged from the business survey was the need to convince policymakers to create an enabling environment for fledgling innovations and businesses in the ICT sector, such as tax breaks that enable these businesses to deploy capital toward growth. For instance, in Kenya, stakeholders lobbied policymakers not to tax broadband to enable them to offer consumers lower data rates and drive growth. While policymakers initially committed to not taxing broadband, these regulations were overhauled in 2021, raising the cost of airtime and internet data services.[83] These cost increases have been passed on to consumers, harming the ICT sector and working counter to national digital transformation goals.

Increasingly, regulation sandboxes are being used to facilitate testing and provide evidence for various types of policy. For instance, Kenya's CMA adopted a regulatory sandbox approach in 2017 to live test innovative capital market-related products, solutions, and services with the potential to deepen and develop the capital market prior to launching in the mass market.[84]

81 CGAP, Regulatory sandboxes: A tool for fostering financial innovation, accessed 2021.
82 Ibid.
83 Daily Nation, Kenya: Airtime, internet cost to rise as MPs propose higher taxes, 2021.
84 Capital Markets Authority, Regulatory Sandbox, accessed 2022.

PR

Complexities and unintended consequences

Regardless of the regulatory approach, the implementation of regulations is often challenging. For example, regulations of social networks and online content can veer into surveillance, highlighting the need to balance the implementation and maintenance of online freedoms. Digital activism may be censored by authorities uncomfortable with controversial online discussions, and some governments can abuse regulations to silence critics and dissidents online. Furthermore, excessive regulations may have the unintended consequence of stifling the rights those regulations aim to safeguard. Uganda offers a compelling example in this regard. As internet usage has grown, so has the state's crackdown on citizens' digital rights through arrests, intimidation, and internet blockages via excessive regulations.[85] Since 2015, the Ugandan government has continually enacted new policies limiting internet access and free speech while promoting surveillance and the censorship of dissent. During the 2021 general election, the government went as far as to shut down the internet and social media.[86]

Deregulation has helped—openness and fairness and limited government involvement has driven innovation in the country.

Reference Group Member – Private Sector

85 The Independent, Digital rights in Uganda, 2021.
86 Ibid.

Governance

G

Dynamic leadership has the potential to accelerate digital transformation by fostering necessary goodwill across government silos

Active government participation is a critical first step in driving digital transformation.[87] The highest levels of government need to support national digital transformation through a whole-of-government approach. Across countries, Ministries of ICT should be adept at navigating changes in political regimes to ensure the continuity of investments and gains made in previous regimes.

Political will is also necessary to pass legislation, issue regulations, allocate funding, and cut red tape.[88] For instance, Kenya's e-Government strategy (2004) and National ICT Policy (2006)—updated in 2014—signaled the government's recognition of the ICT sector's critical role in transitioning Kenya into a digital economy, which unlocked private sector investment. Furthermore, dynamic leadership has the potential to accelerate digital transformation by fostering necessary goodwill across government silos. The dynamic leadership of Dr. Bitange Ndemo, for instance, helped unlock political goodwill, driving increased investment in infrastructure, such as fiber optic cables, which increased connectivity and drove down internet costs.

Dr. Bitange Ndemo pushed changes in the [National ICT Sector] bill adopted in 2006, which deregulated the ICT market. This happened in Kenya [at that time] but not elsewhere in Africa.

Reference Group Member – Private Sector

87 Dalberg analysis.
88 Ibid.

Photo: Sopotnicki | Shutterstock.com

FIGURE 6: GOVERNANCE FOCUS AREA INDICATORS MEASURED

Drivers	Indicators
National digital strategies	• Availability of a digital government strategy • Presence of key performance indicators (KPIs) for measuring the implementation of the National Digital Government Strategy (NDGS) • Coordinating institution for digital government • Government officials that understand and support the vision for digital government • Strategy/policy and training sessions to develop skills among public service workforces • ICT capabilities • KPIs linked to the NDGS to monitor implementation • Permanent government entity that owns, maintains, facilitates, and coordinates the development and implementation of the digital government strategy
Cross-cutting strategies	• Cybersecurity strategy and policy documents • Cyber unit or center within a core entity • Government e-inclusion strategy; qualitative rating 0–2 (2=best) • National digital skills strategies
Sector-specific strategies	• National e-health/digital health strategy or framework • Availability of sector-specific frameworks governing digital activities • Implementation of sector-specific frameworks • Presence of digital strategies controlling the national interior and coordination of government • Presence of a national e-commerce policy • Presence of a national e-trade policy • Presence of a national financial inclusion strategy • Presence of a national housing strategy • Availability of national agencies that regulate industrialization, trade, and enterprise development • Availability of national agencies that govern education, science, and technology • Presence of a national agriculture development strategy • Gender diversity, public services and youth
ICT strategy financing	• Dedicated budget line for digital transformation activities • Overall budget for the Ministry of ICT • Seed funding to kick-start small-scale ICT projects, such as digital health, digital education, and digital agriculture

G

Governance

Successes

Kenya has progressed in the focus area of governance, particularly between 2010 and 2020, driven by improvements in (i) national digital strategies and (ii) financing.

I. Improvements in **national digital strategies** have been driven by the implementation of the e-Government Strategy (2004) and the National ICT Policy (2006), which was updated in 2014 to align with the new constitution (2010) and Vision 2030. The updated National ICT Policy signaled the government's recognition of the ICT sector's potential in transitioning Kenya to a digital economy and unlocking private sector

G

Successes

Opportunities

investment. Additionally, active governance has resulted in strategies for cybersecurity and skills development. The stakeholders noted the dynamic leadership of Dr. Bitange Ndemo during his tenure as the permanent secretary at the Ministry of ICT as another important driver of Kenya's digital transformation, highlighting the important role of leadership and champions within the government. Dr. Ndemo's active leadership helped generate political goodwill and expand infrastructure investment, which increased connectivity and drove down costs. Additionally, he spearheaded the development of the National ICT strategy in 2006, which ably guided subsequent developments in the ICT sector. A hallmark of Dr. Ndemo's approach was close consultation with various stakeholders, from students to start-ups, to arrive at an inclusive strategy.

II. **Kenya's ICT strategy financing** also improved, particularly between 2010 and 2020, largely because of the government allocation of capital for last-mile connectivity projects that the private sector had historically avoided, such as the NOFBI. All 47 counties are now connected to the NOFBI, promoting digital inclusion in underserved communities.

Opportunities

Given the need to increase coordination across government actors, cross-cutting strategies present the greatest opportunity for impact. On a cross-cutting issue such as cybersecurity, strong coordination is needed between agencies in charge of policy making, strategy implementation, and cybersecurity incident investigation and response. The development of a cybersecurity strategy and its implementation is currently the responsibility of the Ministry of ICT, the national center/responsible agency for coordination is the Kenya National Computer Security Incident Response Team – Coordination Center under the CA, and the cybercrime investigation unit is part of the National Police Service, which is under the Ministry of Interior.[89] Despite the comprehensiveness of the country's cybersecurity policy, assigning different tasks to different ministries or agencies could lead to siloed operations, creating inefficiencies and slowing down both implementation and response to incidents.

Additionally, there is an opportunity for Kenya to integrate open-source technology and building blocks—enterprise-ready, reusable software components that provide key functionalities in facilitating generic workflows across multiple sectors—into government ICT architecture.[90] Given the enduring need for collaboration across government ministries, departments, and agencies (MDAs), such building blocks have the potential to facilitate information and repository sharing and greater collaboration. This will increase interoperability and efficiency across government. Currently, the Kenyan government only minimally uses digital building blocks, for example, for identification and authentication purposes.

89 United Nations Institute for Disarmament Research, Cyber Policy Portal, Kenya, 2014.
90 GovStack, Building Blocks, accessed 2022.

G

Challenges

Complexities and unintended consequences

Challenges

The indicator analysis pointed to challenges in sector-specific strategies that guide the transition of certain sectors, such as manufacturing, into the digital age. While there has been progress on this front—such as the digitization of government functions across ministries—most of the work across government MDAs remains analog, particularly at the local level. Additional work remains to complement existing efforts and implementation.

Complexities and unintended consequences

Government bureaucracy often acts as a deterrent to the speedy implementation of digital infrastructure projects. In Kenya, for instance, government bureaucracy could have slowed the completion of the TEAMS cable. However, strong leadership at the Ministry of ICT turned what was expected to be a six-to-ten-year project into a two-year endeavor. Such a dramatic outcome may not be possible in all contexts; however, it demonstrates that both strong leadership and vision are needed to accelerate digital transformation.

Elections, meanwhile, have represented a significant wildcard for Kenya's digital transformation. The violence following the elections of 2007–2008 resulted in the creation of Ushahidi, an open-source platform to collate and map data that has gone on to revolutionize disaster response. With new regimes come new priorities, often upending trends in regulations and investments in digital transformation. However, as it happened, President Uhuru Kenyatta's regime picked up where the previous regime left off, continuing pro-business regulations and investment in infrastructure and further accelerating Kenya's digital transformation.

People

Inclusion should be central to any digital transformation effort

This focus area is arguably the most cross-cutting driver of digital transformation. The widespread and equitable adoption of digital applications and services depends on basic education levels and digital skills. For instance, investment in basic education in Kenya through Free Primary Education (FPE) in 2003 and later Free Day Secondary Education (FDSE) helped to promote the acquisition of the digital skills necessary to support the evolution of the localization of technology, habituation to digital devices and services, and user trust in digital transactions and data security. The government-sponsored Digital Literacy Program (DLP) has also led to increased digital awareness among Kenyans and, thereby, the adoption and usage of digital applications and services. It is worth noting that the advent of easy-to-use social media applications, such as WhatsApp, has also played an important role in habituating Kenyans to digital technology and accelerating the uptake of other applications, such as e-government. Investing in *people* and human capacity appeared to be a precondition for gaining momentum in this report's other focus areas.

The stakeholders involved in the country reference group for this study stressed that inclusion should be central to any digital transformation effort. Technology is an amplifier; the world is transitioning to the digital age at different rates, and large swathes of the population—notably women, the poor, and rural residents—are likely to face a growing disadvantage. This is evident in Kenya, where 86% of women own a phone, compared to 91% of men, and only 32% of women are mobile internet users, compared to 49% of men. Initiatives that address this divide are necessary to ensure an inclusive digital transformation.

Photo: wazkkii | stock.adobe.com

FIGURE 7: PEOPLE FOCUS AREA INDICATORS MEASURED

Drivers	Indicators
Culture, habituation, and user experience	• E-government services tailored to the needs of local populations • Availability of basic information in the local language (qualitative rating 0–3, 3=best) • Process or mechanism to accommodate user feedback for online services • Individuals using the internet to access social networks • People who used the internet to buy something online in the past year (%) • E-Government Development Index e-participation index • Gender Development Index
Basic education	• Mean numeracy score in the Survey of Adult Skills (PIAAC) • Appropriate financial literacy curricula at primary, secondary, and tertiary levels • Level of literacy (% of the population) • Number of teachers by teaching level of education • Mean years of schooling
Digital capabilities and skills	• Enterprises that employ ICT specialists and had hard-to-fill vacancies for ICT specialists • High-level skills: workforce with tertiary education • Digital skills among the active population • Proportion of youths and adults with basic digital skills • Proportion of youths and adults with advanced digital skills
Digital trust	• Digital trust • Trust in online privacy (%) • Trust in government websites and applications (%) • Trust in information on social media (%)

People

Successes

Data from the indicator analysis suggested Kenya has made significant progress across the people focus area, particularly regarding basic education.

I. Basic education registered a strong improvement, driven by government investment in both FPE, introduced in 2003,[91] and FDSE[92] in 2008. Kenya's literacy levels slightly improved from 79% in 2010 to 82% in 2020. Furthermore, the mean years of schooling increased from 5.3 years in 2000 to 6.6 years in 2020. Higher levels of education are positively correlated with higher levels of digital skills.[93,94] The stakeholders also concurred that basic education, alongside digital trust, is the most important driver of digital transformation. Investment in basic education, while requiring long-term patience to produce results, has an outsized impact on digital transformation and general wealth and well-being.[95]

91 Journal of Education and Practice, Free primary education policy: coping strategies in public primary schools in Kakamega South District, Kakamega County, Kenya, 2015.
92 KBC, Govt releases Kshs. 7.5B towards Free Day Secondary Education programme, 2021.
93 UNESCO Institute for Statistics (2020).
94 Braun et al., Rethinking Education in the Digital Age, 2020.
95 Stakeholder interviews.

Successes

The MSME survey suggested that Kenya has made significant progress in (i) higher education, (ii) digital skills, (iii) on-the-job training, and (iv) adequacy of digital skills among staff.

I. Most of the businesses surveyed indicated that their staff had a minimum of secondary school education: 30% had some secondary education, 31% had a secondary school diploma, and 25% had a university education. This indicates high levels of literacy in the country, in line with the findings from the literature.

FIGURE 8: AVERAGE LEVEL OF EDUCATION WITHIN BUSINESSES SURVEYED, 2022

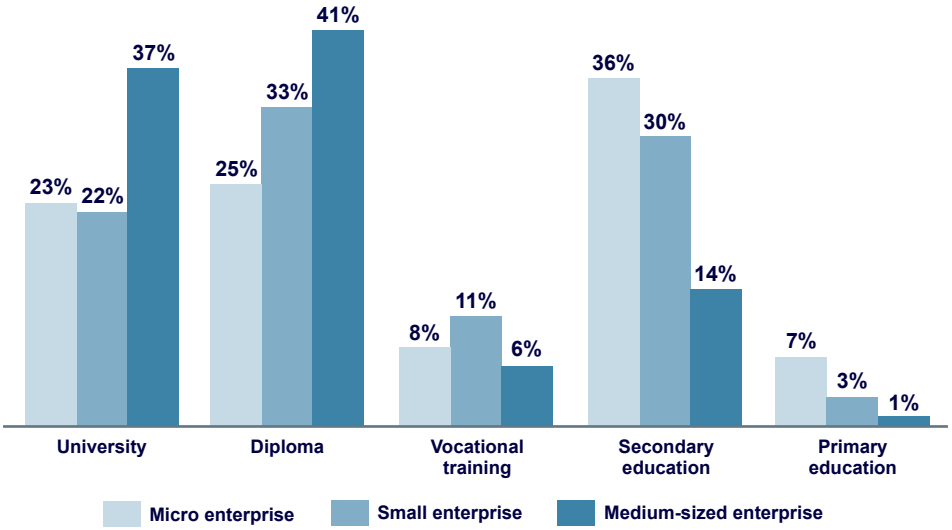
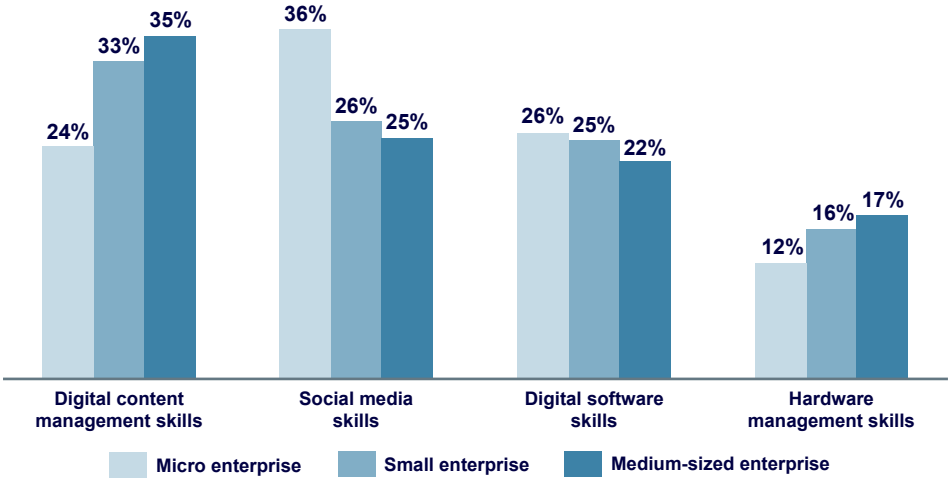


FIGURE 9: ICT PERSONNEL SKILLS BY BUSINESS TYPE, 2022



II. The MSME survey signaled a growing utilization of digital skills across businesses. However, 35% of ICT personnel across the MSMEs were categorized as low-to-medium skilled, with the leading skills being social media and digital content management. Service-oriented MSME staff had the lowest-to-medium digital skills, such as marketing, while manufacturing and ICT sector businesses had the highest number of professionals with advanced ICT skills.

III. Sixty-eight percent of employees indicated that they learned their digital skills on the job, highlighting the growing importance of on-the-job training in aligning available skills with evolving MSME digital needs. This figure could also indicate the degree of misalignment between the digital skills demanded by industry and those taught in formal educational institutions.

Opportunities

IV. Sixty percent of MSMEs characterized the levels of ICT skills among their staff as adequate. Moreover, 38% stated that they do not need any additional talent to take advantage of digital technologies to advance their businesses. This implies that most of the staff in Kenyan MSMEs possess adequate and often transferable digital skills necessary to conduct their tasks.

One way to think of this is "local content" services—i.e., payment platforms and video content. These need to be localized to see adoption uptick. For example, when we were democratizing content via YouTube, we were cognizant of what content and advertisement should be visible when launching in Africa to drive adoption.

Reference Group Member – Private Sector

Opportunities

While the cultural appropriateness of technology and people's habituation to digital technology increased throughout the analysis, there are opportunities to further invest in inclusivity to accelerate Kenya's digital transformation.

The cultural appropriateness of technology and habituation indicator has shown signs of progress, particularly the Gender Development Index (GDI) and the E-Government Development Index (E-GDI) e-participation index. Kenya's GDI improved from 0.897 in 2000 to 0.924 in 2010 and 0.937 in 2020, against a global benchmark of 1.[96] The slight improvement between 2010 and 2020 suggests a loss of momentum in achieving gender development parity during this period and represents an opportunity for further progress. Meanwhile, the EGDI e-participation index recorded an improvement from 0.2992 in 2003 to 0.3338 in 2010 and 0.53 in 2020 against a global benchmark of 1.[97] Despite this improvement, Kenya's middling score in 2020 suggests that there is still much work to be done to encourage and facilitate women's participation in and use of e-government technologies. E-government services can also be further tailored to suit the needs of local populations and bring services closer to Kenyans in rural areas where the ruralurban digital divide—driven by lower access to digital infrastructure and lower levels of digital literacy—impacts access.[98]

Furthermore, the stakeholders noted the salient role localizing content has had in driving digital transformation. Localization helps increase the relevance and appropriateness of the content. For instance, the democratization of YouTube content in Kenya allows users to see local content and relevant advertisements,

96 UNDP, Gender Development Index, accessed 2021. The GDI measures gender gaps in human development achievements by accounting for disparities between women and men in three basic dimensions of human development—health, knowledge and living standards—using the same component indicators as in the Human Development Index (HDI). The GDI is the ratio of the HDI, calculated separately for females and males using the same methodology as in the HDI. It is a direct measure of the gender gap, showing the female HDI as a percentage of the male HDI and is measured between 0–1.
97 United Nations, E-Participation Index, accessed 2022. The e-participation index (EPI) is derived as a supplementary index to the UN E-Government Survey. It extends the dimension of the Survey by focusing on the use of online services to facilitate the provision of information by governments to citizens ("e-information sharing"), interaction with stakeholders ("e-consultation"), and engagement in decision-making processes ("e-decision making"). This is scored between 0–1.
98 Engineering for Change, Challenges in implementing digital technologies in rural Kenya, 2020.

Opportunities

leading to increased content creation and YouTube usage. The relevance and cultural appropriateness of content available from global products and services also play a key role in generating user trust and adoption—people are more interested in seeing and have more confidence in content they can relate to.

Social media has also been a key driver of habituation in Kenya. In 2012, social media overtook email as Kenyans' de facto means of online interaction.[99] This spurred an uptick in engagement with entertainment, games, and music. The trend grew; by 2016, Kenya was one of only five African countries with a list of locally trending topics on Twitter.[100] WhatsApp's popularity and intuitive design have also driven smartphone ownership and data usage, which has led to the further adoption of other applications and services.[101] Thus, it is evident that social media has been key in driving awareness and use of a broad spectrum of digital applications.

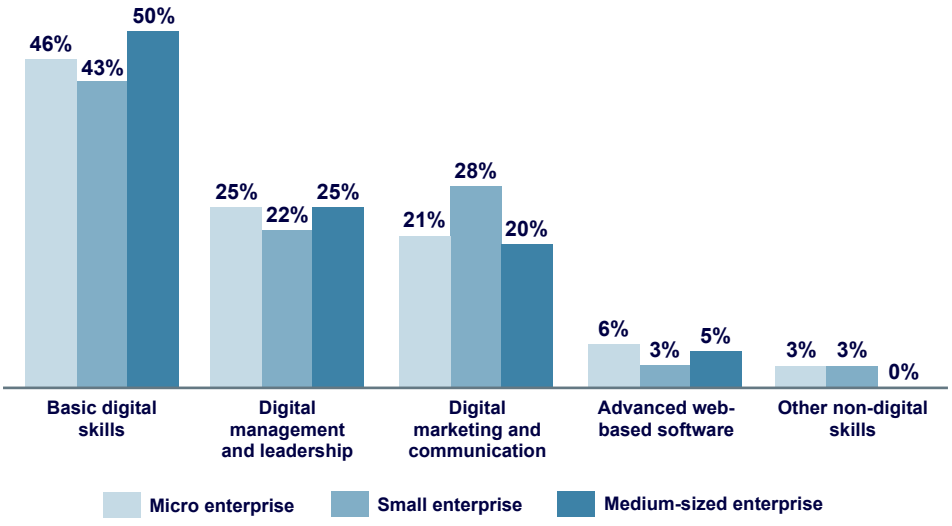
The results of the MSME survey suggested the following opportunities: (i) investment in digital transformation, (ii) investment in ICT skills in the education sector, and (iii) training in modern digital applications.

I. The MSMEs were relatively evenly split between having a department that drives digital transformation (53%) and not having one (47%). However, 73% of the ICT-related businesses have a department driving digital transformation, indicating they are the most likely to adopt new and emerging digital technologies.

II. Half of the businesses in the education sector indicated that their employees had slightly inadequate digital skills. This points to an urgent need to redirect resources to equip employees in this sector with the requisite digital skills. This is important as Kenya intends to transform its education system through the DLP.

III. Moreover, across all sectors, the businesses recognized the impact of the Fourth Industrial Revolution and the growing applications of emerging technologies, such as blockchain. Investments need to be geared toward providing employees with training in modern digital applications to meet the growing demand for these skills among businesses.

FIGURE 10: TOP FIVE TALENT NEEDS BY BUSINESS TYPE, 2022



99 Ndemo, Bitange and Weiss, Tim, editors, Digital Kenya: An Entrepreneurial Revolution in the Making, 2017.
100 Ibid.
101 Ndung'u et al., *The State of Digital Transformation in Kenya*, Research ICT Africa, 2019.

Challenges

Complexities and unintended consequences

Challenges

While Kenyans' trust in digital services and applications improved during the analysis period, there are still opportunities to further build on the gains made. Kenyans' trust in online privacy is high, at 0.896/1.[102] This may have been driven by the enactment of stringent data protection laws, which has boosted user confidence in the safety of their online data. However, only 34% of Kenyans trust information from social media,[103] while only 44% trust government websites and applications.[104] While Kenya ranks first in Africa for trust in news from social media, this low score of 34% perhaps points to a deeper challenge regarding misinformation, which users recognize.

The government can further sensitize Kenyans to build trust in government websites. Digital trust is critical in driving adoption and usage by ensuring users feel secure interacting and transacting digitally. The stakeholders noted how M-Pesa's association with Safaricom, a trusted brand, helped build consumer confidence in the new product. M-Pesa itself would go on to build a "trust infrastructure" for digital transactions in Kenya, driving the innovation of additional financial products that were afforded a much easier entry into the market.

Despite progress in reforming basic education, there are persistent challenges with including digital skills in school curricula. In 2016, the government launched the DLP, which aimed to introduce primary school children to digital technology and communications, beginning with those in lower primary.[105] However, the program's implementation has been fraught with difficulties, including inadequate digital learning devices in schools, inadequate digital skills among teachers, teacher absenteeism, and an unreliable electricity supply in parts of the country. In higher learning institutions, such as universities, inadequate ICT infrastructure, financial constraints, lack of affordable and adequate bandwidth, lack of operational e-learning policies, and low digital skills of teaching staff have also hindered e-learning and the acquisition of digital skills.[106] There is a need to invest further in developing e-learning policies, ICT infrastructure in schools, and the training of teaching staff to boost digital knowledge among students and, subsequently, the general population in Kenya.

Complexities and unintended consequences

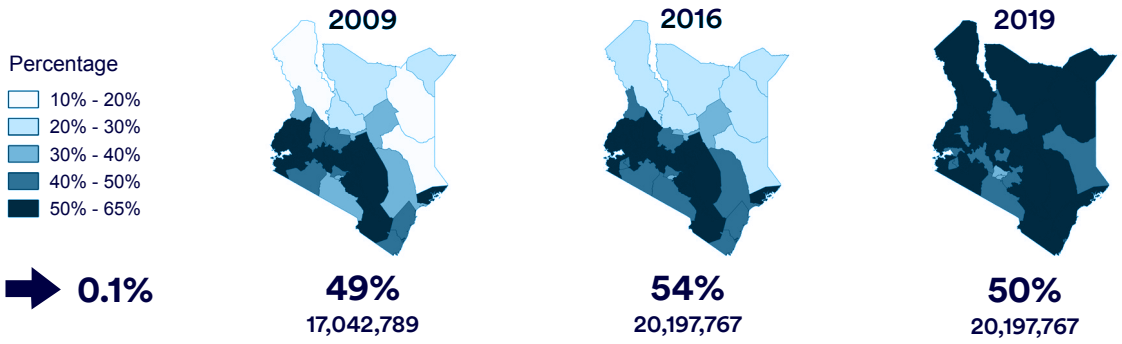
While concurrent public investment in both technology and skills is essential, it can often be challenging, as ministerial departments responsible for deploying ICT and technology developments often do not coordinate with departments leading education advancement.

102 Dalberg Research, "State of Digitization in Kenya," 2020.
103 Business Daily, Digital access: 17pc of Kenyans now use social media, 2020.
104 The Economist Intelligence Unit, Inclusive Internet Index 2021 database, accessed 2021.
105 Ibid.
106 Tarus et al., Challenges of implementing e-learning in Kenya: a case of Kenyan public universities, 2015.

Subnational perspectives: People

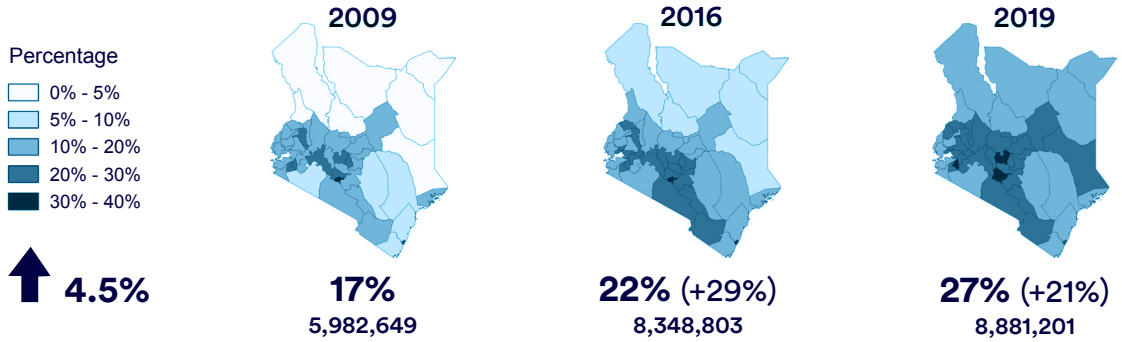
Population with primary education

- The share of the population with primary school education increased slightly in 2009–2016, with 2016 recording the highest increase.
- Counties in Northern Kenya recorded the highest increase, driven by increased awareness and availability of FPE.
- Moreover, 88% of the population is aware of the importance of basic literacy.



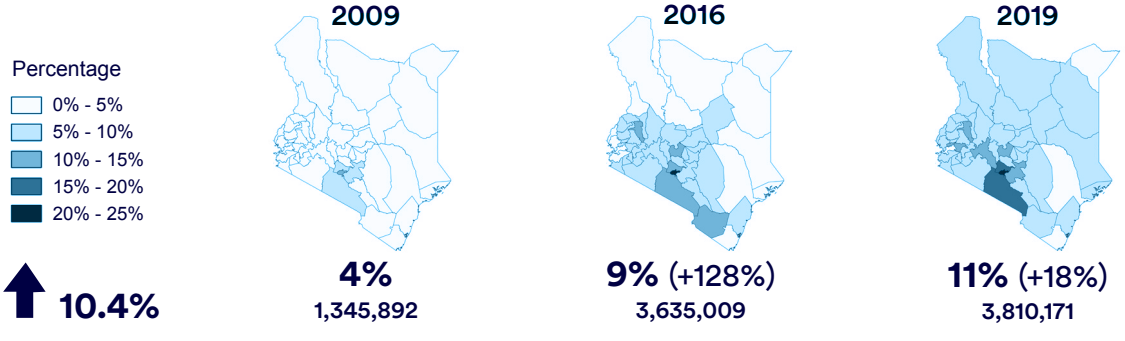
Population with secondary education

- The population with high school education increased from six million in 2009 to nine million in 2019 (4.5% CAGR). The Central, Western and Southern parts of the country recorded the highest increases.
- 2009–2016 recorded the highest growth (29% CAGR), likely due to the introduction of FDSE in 2013, as well as the first cohort of students who received FPE entering secondary school.
- However, the transition rate from primary to secondary school is moderate at 48%, highlighting persistent capacity and affordability challenges.



Population with tertiary education

- In 2009, tertiary education enrolment was low and was largely concentrated in Nairobi and its neighbouring counties, where most universities/colleges are located.
- However, higher education enrolment has increased. This could be attributed to greater awareness of the importance of higher education, improved absorptive capacity due to increased investment in higher education, and increased affordability.
- Nairobi and counties in Central Kenya—which have the highest concentration of tertiary education institutions—have recorded the greatest gains in higher education enrolment.



Infrastructure

I

Investing in infrastructure has a direct impact on affordability, quality, and inclusive access

Infrastructure is the bedrock of digital transformation; thus, investing in infrastructure has a direct impact on affordability, quality, and inclusive access.[107] For example, Kenya's investment in the TEAMS cable has driven increased connectivity and provided an alternative to mobile-based connectivity, thereby increasing affordability and access.[108] Furthermore, introducing the IDEOS smartphone in late 2010 marked another watershed moment in Kenya's digital transformation. The phone's affordability drove its rapid adoption, increasing connectivity and the usage of digital applications and services.[109] The government-led NOFBI cable further connected Kenya's 47 counties to the national fiber-optic network, revolutionizing the delivery of government services across the country and directly impacting the usage of e-services. Investment in infrastructure has also led to an overall increase in internet quality, decreasing user friction. In the long term, reduced friction increases habituation and affinity to adopting emerging technologies, with implications for both business and innovation. Additionally, increased internet quality enables the use of advanced digital applications, which positively impacts digital transformation. However, investing in infrastructure alone is insufficient and should be accompanied by investments in the digital capabilities required to use and maintain the infrastructure.[110]

107 Stakeholder interviews; Dalberg analysis.
108 Pathways for Prosperity, "*Digital Economy Kit*," 2020.
109 Ibid.
110 The World Bank, Mashreq 2.0: Digital Transformation for Inclusive Growth and Jobs, 2018; Stakeholder interviews.

Photo: SKT Studio | Shutterstock.com

FIGURE 11: INFRASTRUCTURE FOCUS AREA INDICATORS MEASURED

Drivers	Indicators
Internet access and use	• Percentage of the population who own or have access to a range of devices • Gender gap ratio for mobile phone ownership (female/male ratio) • Percentage of the population who use the internet via an unlimited broadband connection at home or at a place of work or study • Percentage of the population using the internet • Gender gap in internet use
Internet quality	• Average mobile broadband download speed (Mbps) • Fixed broadband download speed (Mbps) • Mobile latencies
Internet affordability	• Mobile broadband basket (prepaid, 1 GB) • Fixed broadband internet monthly subscription (US$) • Mobile prices relative to income • Affordability as % of gross national income • Market concentration or Herfindahl-Hirschman Index (HHI)
Connectivity standards adoption and network security	• Adoption of IPv6 (% of the population) • HTTPS (% of pages load on HTTPS) • DNSSEC validation (% of users validating DNSSEC) • MANRS readiness (Score 0–100)
Digital connectivity infrastructure	• Telecommunication infrastructure index • Total base stations • Internet Exchange Points (IXPs) per population • Domain count per 1 million people • Secure internet servers per 1 million people • Number of transnational fiber optic cables (overland and undersea)
Non-digital infrastructure*	• Access to electricity (% of the population) • Rural electricity access (% of the population) • Quality of electricity supply (1–7) • Quality of roads (1–7) • Proportion of the rural population who live within 2km of an all-season road • Percentage of the population without postal services

I

Infrastructure

Successes

The indicator analysis revealed that Kenya had recorded overall growth in the infrastructure focus area. Progress has been most pronounced in (i) digital connectivity infrastructure, (ii) internet quality, and (iii) connectivity standards adoption and network security.

I. Improvements in digital connectivity infrastructure have been driven by investment in both overland and undersea cables. For instance, the NOFBI cable has connected the 47 counties to the national fiber-optic network.[111] Additionally, increased competition among ISPs has contributed to improvements in affordability. The TEAMS cable has also driven increased

111 ICT Authority, NOFBI, accessed 2021.

connectivity and provided an alternative to mobile data and satellite-based connectivity. This, in turn, has driven down connectivity prices and increased the range of applications that can be accessed, accelerating Kenya's digital transformation. However, the stakeholders noted that investment in non-digital infrastructure is also critical. For instance, installing mobile towers in rural areas with poor roads increases the cost of maintenance and thus the cost of operations for MNOs. These costs are then passed on to users in the form of higher data costs, negatively impacting affordability and equitable access.

II. Internet quality has also improved, driven by increased investment in digital connectivity infrastructure and technologies. For instance, Kenya's mobile broadband download speed rose from 9.75 megabits per second (Mbps) in 2010 to 22.75 Mbps in 2020.[112] Similarly, upload speeds rose from 0 Mbps in 2010 to 19.35 Mbps in 2020.[113] This has largely been driven by the adoption of third- and fourth-generation broadband cellular network technology. Fiber is also increasingly being rolled out in urban areas, contributing to further improvements in internet quality. In 2018, 95% of Kenya's population had access to a 2G network, 85% to 3G, and 25% to 4G.[114] Furthermore, Kenya became the second African country (after South Africa) to launch a 5G network in 2021.[115]

FIGURE 12: NETWORK COVERAGE BY TYPE IN KENYA, 2018

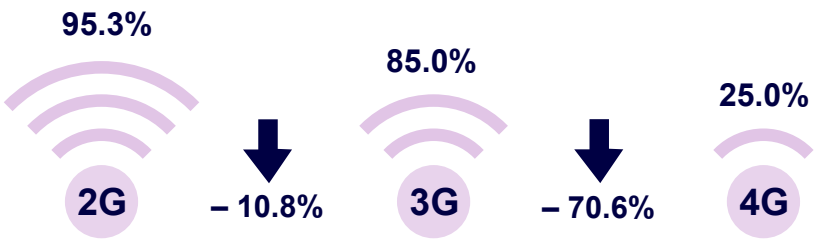
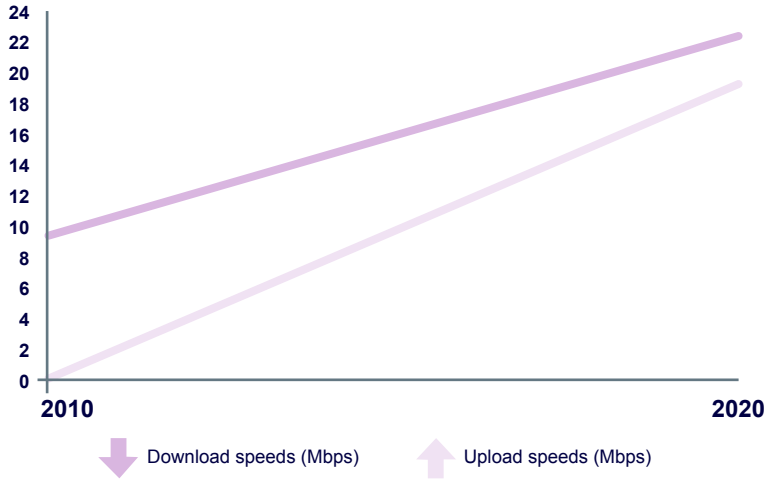


FIGURE 13: KENYAN MOBILE BROADBAND DOWNLOAD AND UPLOAD SPEEDS, 2010–2020



112 ITU Database.
113 Ibid.
114 Research ICT solutions, Kenya, accessed 2021.
115 Quartz, Kenya becomes second African country to launch 5G, 2021.

I

Successes

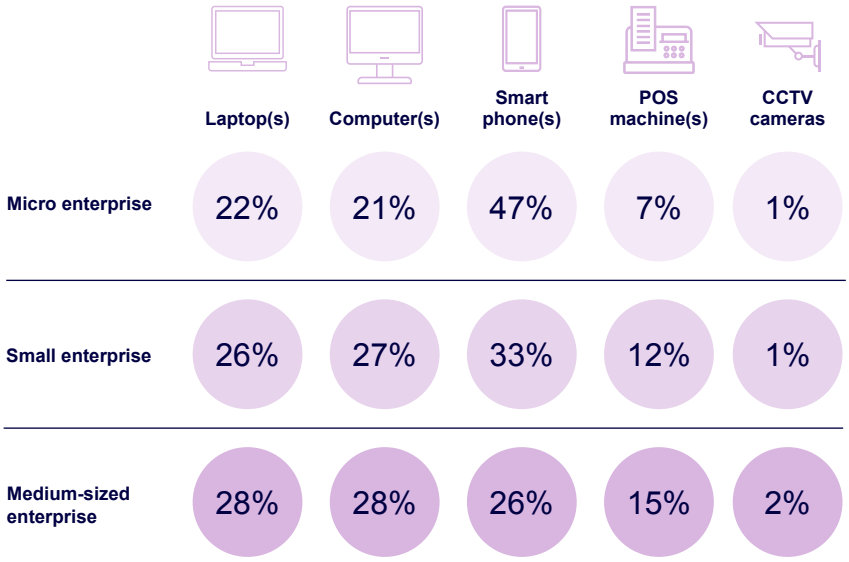
III. Connectivity standards adoption and network security have also improved, driven by a growing recognition of the importance of both cybersecurity and reducing user friction. These improvements were initially driven by the Kenya Information and Communications Act (1998), which prescribed criminal penalties for actions that threaten cybersecurity. The government passed the comprehensive Computer Misuse and Cybercrimes Act in 2018,[116] which prescribes the penalties for a wider range of actions, further strengthening cybersecurity in the country and improving user trust.

The business survey suggested that Kenya has made significant progress in (i) the uptake of digital devices and (ii) internet usage.

I. Seventy-six percent of MSMEs use ICT equipment for their daily operations, with smartphones (47%), laptops (22%), and computers (21%) the most commonly used. These numbers indicate a mass uptake of digital devices, particularly smartphones, which are comparatively affordable. They also indicate an increasing recognition on the part of MSMEs of the role played by digital technologies in improving revenues and efficiency.

   However, 21% of businesses use digital sales equipment, such as PDQ machines,[117] to monitor sales and inventory, underlining the persistence of traditional point-of-sale (PoS) digital products.

FIGURE 14: TOP FIVE DIGITAL DEVICES USED BY BUSINESS TYPE, 2022



II. Ninety-two percent of the businesses surveyed use the internet—39% of MSMEs use mobile broadband while 43% use a wireless connection to access the internet—indicating the increased adoption of digital connectivity devices. Eleven percent of MSMEs, most of them in urban centers, indicated that they use fiber optic internet. The businesses also indicated that they had experienced increased revenues (19%), improved customer satisfaction (18%), and increased market shares (17%) due to using the internet, pointing to the clear benefits of adopting and using the internet for businesses.

116 National Council for Law Reporting Library, Computer Misuse and Cybercrimes Act, 2018, 2018.
117 A "process data quickly" or PDQ machine is a device that merchants use to take card payments.

I

Opportunities

Opportunities

Data from the indicator analysis suggested that there are opportunities for improvements across (i) internet access and usage and (ii) internet affordability.

I. Closing the gender gap in mobile phone—particularly smartphone—ownership and usage can further drive Kenya's digital transformation. While the gender gap in mobile ownership remains relatively low, at 5% in 2019, the gender gap in internet usage remains relatively high, at 34%,[118] suggesting opportunities for improvement. Affordability can play a role in addressing uneven access and usage across genders. For example, in late 2010, introducing the affordable IDEOS smartphone marked a watershed moment in Kenya's digital transformation, along with device financing plans for low-income earners.

II. While internet affordability has improved, the price of internet access remains high relative to income, suggesting opportunities to further drive down costs. Kenya's broadband internet tariffs have registered a slight drop of US$6 (from ~US$80 in 2012 to ~US$74 in 2020).[119] In 2020, 1 GB of mobile data cost 2.62% of gross national income (GNI) per capita.[120] However, this is still high relative to the best-performing countries in Africa, such as Mauritius (0.54% of GNI per capita), and globally, such as India (0.45% of GNI per capita).[121] This finding is in line with the stakeholder statements that internet costs remain high despite consistently dropping due to competition among MNOs.[122] However, efforts are underway to further drive down costs. For instance, fiber-to-home packages are decreasing the cost of connectivity by enabling more people to share a single network access point.

The business survey confirmed the results of the indicator analysis regarding internet affordability.

I. Thirty-nine percent of businesses pointed to the internet costs as their biggest challenge, highlighting a need for interventions that decrease this cost while increasing inclusive access to and usage of digital services and applications. The businesses also indicated that improvements in internet supply quality, coverage, and affordability would encourage the adoption of digital technologies.

In order to accelerate digital transformation [you need to] get non-digital infrastructure right, too.

Reference Group Member – Private Sector

118 GSMA, The mobile gender gap report in 2020, 2020.
119 The World Bank, Fixed broadband internet tariffs, PPP $/month, $/month, accessed 2022.
120 Alliance for Affordable Internet, Mobile broadband pricing, data for 2020.
121 Ibid.
122 Country Reference Group.

I

Challenges

Complexities and unintended consequences

Challenges

The indicator analysis showed that non-digital connectivity infrastructure presents the biggest challenge. There are three specific dimensions to the challenges in this driver that are worth highlighting:

I. While the Kenyan government has made significant investments and progress in driving universal access to electricity, 30% of all Kenyans—and 40% of rural Kenyans—still did not have access in 2019.[123] Furthermore, most Kenyans face persistent reliability challenges, with frequent power outages, particularly in rural areas.[124] Kenya's electricity supply quality registered modest improvements from 3.86/7 to 4.09/7 between 2010 and 2020.[125]

II. Most rural areas do not have access to all-season roads, complicating last-mile delivery efforts. This challenge is especially pronounced during rainy seasons when most roads in rural areas become impassable.[126] The proportion of Kenyans in rural areas living within two kilometers of an all-season road registered a slight increase from 57% to 60% between 2010 and 2020, signifying slow progress in the tarmacking of roads in the country.[127] However, the current government's increased investment in infrastructure has led to the tarmacking of more roads in rural areas.[128]

III. Kenya does not have a national addressing system (NAS) that governs and regulates the assigning of addresses and numbering streets and properties nationally. The Kenya Information and Communications (Numbering) Regulations (2010) mandated the CA to establish a NAS.[129] However, progress on its implementation has been slow, and stakeholder buy-in workshops were not held until 2016.[130] The CA developed draft NAS standards and guiding implementation frameworks in 2017, but no further progress has been recorded.[131] The lack of a NAS makes last-mile delivery more complicated and costly by forcing e-commerce businesses to rely on systems such as Google Maps or creating last-mile pick-up and delivery points to facilitate deliveries.

Complexities and unintended consequences

The stakeholders noted that convincing donors to channel funding to infrastructure was difficult, as most felt that the funds could be better utilized in poverty alleviation efforts. Furthermore, the low utilization of the internet throughout the continent prior to 2010 made convincing donors even harder. While the donors eventually relented, they requested that 22 countries develop the TEAMS cable and share it. However, 19 countries were unaware of how the cable would benefit them. Wary of how difficult it would be to convince both donors and partner countries to see things its

123 The World Bank Data, Access to electricity (% of population) – Kenya, accessed 2021.
124 The Standard, Hard questions about the on and off power outage, 2022.
125 The World Bank Data, Quality of Electricity Supply, 1–7 (best), accessed 2021. The quality of electricity supply rating answers the following question: In your country, how would you assess the reliability of the electricity supply (lack of interruptions and lack of voltage fluctuations)? [1 = not reliable at all; 7 = extremely reliable].
126 The East African, Rains continue to leave a trail of destruction in Kenya, 2019.
127 The World Bank Data, Quality of roads supply, 1–7 (best), accessed 2021.
128 The World Bank, How reforms transformed Kenya's roads, 2018.
129 Communications Authority of Kenya, National Addressing System, accessed 2021.
130 Ibid.
131 Ibid.

I

Complexities and unintended consequences

way, Kenya formed a consortium that invested in landing the cable on its coast. It also subsidized institutions' internet use, deliberately creating a market that expanded as private businesses saw the benefits of connectivity. Fast forward to today, and Kenya now supplies its excess internet capacity to neighboring countries.

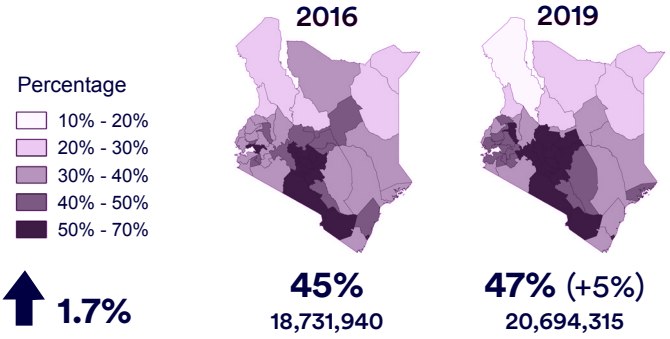
Despite such successes, there is a looming concern in Kenya that the high price of internet serves as a barrier to widening access. Kenya has the highest internet prices in East Africa, despite having one of the best connectivity infrastructures on the continent.[132] Countries with cheap internet rates have excellent mobile and fixed broadband infrastructure; providers can offer large amounts of data, which brings down the price per gigabyte. Those with less advanced broadband networks rely heavily on mobile data, and the economy dictates that mobile data prices must remain low, as that is what people can afford.[133] With its infrastructure and high mobile penetration, Kenya should have lower internet prices relative to its East African neighbors. Therefore, interventions that will drive down the cost of internet—including increased competition among MNOs—and lowering taxes are both needed in the country.

132 The Standard, Study: Kenya has most expensive Internet in East Africa, 2021.
133 Ibid.

Subnational perspectives: Infrastructure

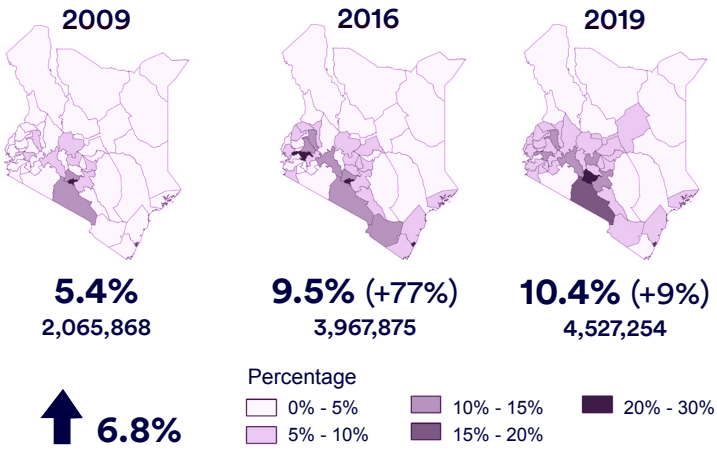
Mobile phone ownership

- Mobile phone ownership increased from 19 to 21 million Kenyans between 2016 and 2019 due to an increase in affordability and the introduction of financing solutions for low-income earners.
- Nairobi and neighboring counties in Central Kenya score the highest in mobile phone ownership, with 80%+ of the population owning a mobile phone. Mobile ownership also increased in Western Kenya between 2009 and 2019, driven by a fast-growing youth population.



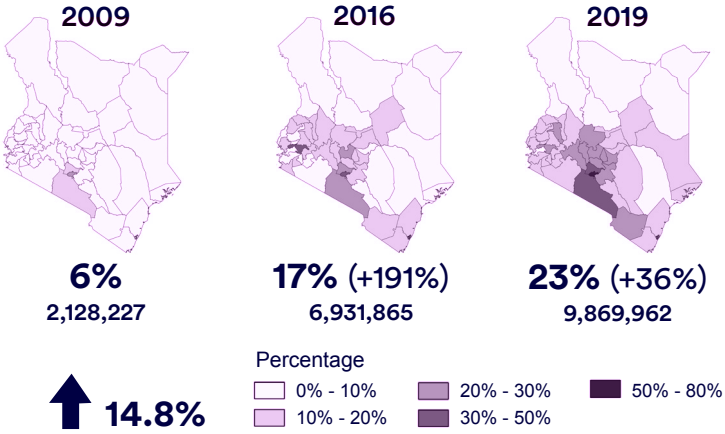
Computer usage

- Computer usage increased from two to five million Kenyans between 2009 and 2019 due to increased affordability and an awareness of the utility of computers for both businesses and households.
- Kenya's major cities and neighboring counties recorded the highest growth in computer usage.
- To increase usage, sensitization on computer usage outside Central Kenya is needed. This will also drive digital transformation in the long term through increased usage habituation nationwide.



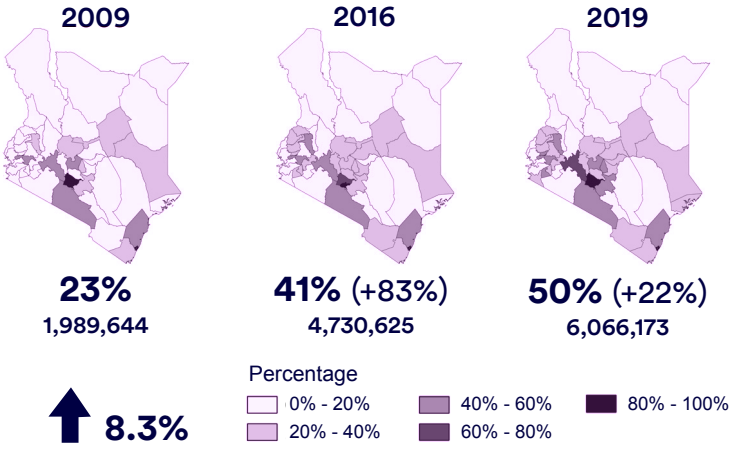
Internet access

- Internet access grew from two to ten million Kenyans between 2009–2019, potentially due to increased affordability driving smartphone and computer usage.
- The period of 2009–2016 also saw a 191% increase in internet access. This period coincided with the introduction of affordable smartphones, e.g., IDEOS. Kenya experienced a further 36% increase between 2016 and 2019.
- Counties in Central Kenya recorded the highest increase in internet access, at 20%. This increase has radiated outward to other counties.



Access to electricity

- Households with access to electricity increased from two to six million between 2009 and 2019 (8% CAGR), driven by the rural electrification program.
- The Southern and Central regions recorded the highest increase, due to their proximity to Nairobi.
- The period of 2009–2016 saw the greatest growth, at 83%, coinciding with the bulk of electrification efforts.
- However, 50% of households still do not have access to electricity, impeding inclusive digital transformation by limiting the uptake and usage of digital devices.



Enabling Platforms and Services

EPS

Investments in the transaction layers that facilitate digital interactions ensure the proliferation of digital products

Enabling platforms and services facilitate other digital functions and accelerate national digital transformation. Thus, investments in the transaction layers that facilitate digital interactions—such as digital payments—ensure the proliferation of digital products. In Kenya, the ubiquity of mobile money has not only driven the country toward a cashless economy but has also fostered a range of innovations in the financial technology (fintech) space with the emergence of companies such as Cellulant.[134] Furthermore, government investment in the IPRS—a one-stop shop for personal and biometric information on both locals and foreigners launched in 2015—has led to further improvements in authentication and identification. This has had direct implications for businesses, particularly the financial sector, by enabling easier fulfillment of KYC requirements. Moreover, the introduction of the Public Procurement Information Portal (PPIP) can increase transparency not only in tendering but also in building user trust in the government. Furthermore, e-service delivery increases convenience for citizens while further building trust and habituation as the country rapidly shifts toward a digital economy.

134 Cellulant is a leading pan-African payments company that provides locally relevant and alternative payment methods for global, regional, and local merchants. Cellulant provides a single digital payments platform—named Tingg—that addresses the complex payments needs of businesses.

Photo: Kehinde Olufemi Akinbo | Shutterstock.com

FIGURE 15: ENABLING PLATFORMS AND SERVICES FOCUS AREA INDICATORS MEASURED

Drivers	Indicators
Identification and authentication	• Percentage of citizens and businesses with a digital ID • Percentage of the population with ID (all) • Percentage of the population with ID (females)
E-procurement	• E-procurement functionalities supported
Digital registries and shared data repositories	• Availability of digital land registries • Availability of authentic sources for data registries • Availability of data repositories **(secondary research required)**
E-services portal	• EGDI • Proportion of government agencies with online services available to citizens • Presence of a single digital gateway
Digital payment systems	• Percentage of adults who made a digital retail payment in the past year • Percentage of firms accepting digital payments • Percentage of adults with access to a mobile money account
Data, standards, and interoperability	• Number of official data sets available • Data management strategy implemented • Data sharing agreements or exchange protocols with third parties

EPS

Enabling Platforms and Services

Successes

The indicator analysis suggested that Kenya has registered improvements in (i) digital payments, (ii) identification and authentication, and (iii) e-procurement.

I. Improvements in digital payments are largely the result of the utility and ubiquity of M-Pesa. The number of registered mobile money accounts in Kenya rose to 67.15 million in 2021, from 0.02 million in 2007.[135] Furthermore, in 2015, the Kenyan government invested in consolidating authentication data through the IPRS,[136] which consolidated population registration information into a single database for ease of verification by both government and private bodies.[137] The system has improved identification and authentication, increasing efficiency across various activities, particularly financial transactions.[138] The stakeholders noted that rapid growth in the digital payment ecosystem is driving Kenya's transition to a fully digital economy. Safaricom has largely fostered this by enabling the innovation of other financial services, such as M-Tiba, allowing individuals to save for medical care.[139] The release of M-Pesa's application programming interface (API) in 2015 further encouraged the creation of innovative use cases for the popular platform.[140] Increasing competition from other mobile money service platforms drove the release of the API, signaling the maturing of Kenya's digital payments ecosystem as digital payments steadily replace cash.

135 Central Bank of Kenya, Mobile payments, accessed 2021.
136 Ndung'u et al., *The State of Digital Transformation in Kenya*, Research ICT Africa, 2019.
137 The Presidency, Integrated Data System to Make E-government A Reality, 2015.
138 Ndung'u et al., *The State of Digital Transformation in Kenya*, Research ICT Africa, 2019.
139 Kenya News, 1 million households to benefit from UHC plan, 2022.
140 Stakeholder interviews.

EPS

Successes

Two extrinsic events have also contributed to the rapid adoption of mobile money in Kenya. First, in 2008, the Kenyan post-election violence catalyzed the rise of mobile money. With most Kenyans unable to access banks for several days, mobile money became the de facto means of sending money to relatives, particularly in rural areas. Second, the COVID-19 pandemic is driving another shift in Kenya's digital transformation journey. The pandemic has reshaped many facets of Kenyan life, including work, education, and social interactions. Many Kenyan companies with the resources to do so are adopting a flexible work model, allowing employees to work from home for a number of days. Many students took online classes—although most schools have since re-opened for in-person learning. Furthermore, DJs held virtual parties either over Zoom or YouTube Live, introducing a new format for social interactions. The government also adapted to virtual applications to conduct business, such as legislative meetings.

The biggest impact of the pandemic has been the shift toward a cashless economy. With paper money believed to be a potential source of virus transmission, the government directed payments to be made either by mobile money or card. Additionally, the CBK worked with mobile money operators to eliminate transaction charges for amounts below Kenyan shillings (KES) 1,000, increase transaction limits to KES 150,000, increase the daily limit to KES 300,000, eliminate the daily transaction limit, and eliminate charges for transfers between mobile money wallets and bank accounts until the end of the calendar year 2021.[141] This encouraged using mobile money for payments, resulting in a jump in the total value of transfers by 97% between the advent of COVID-19 and the end of 2021. As in other countries, COVID-19 will undoubtedly continue to change the landscape of Kenya's digital financial services. The inclusive growth potential is significant if governments seize the opportunity presented by the pandemic-induced shift to digital.

Case Study 2:
The Integrated Population Registration System (IPRS)

In 2015, the government launched the IPRS, a portal that draws and integrates data from various identification databases. The IPRS currently has data on 42 million Kenyans and plays a central role in authentication. In 2016, it responded to roughly 1.5 million electronically generated identity-related queries daily. The majority of the authentication queries come from the financial sector, but increasingly from other agencies as they are integrated into the system. As Kenya's economy digitally matures, the IPRS will play a central role in providing the authentication layer necessary for digital transactions.

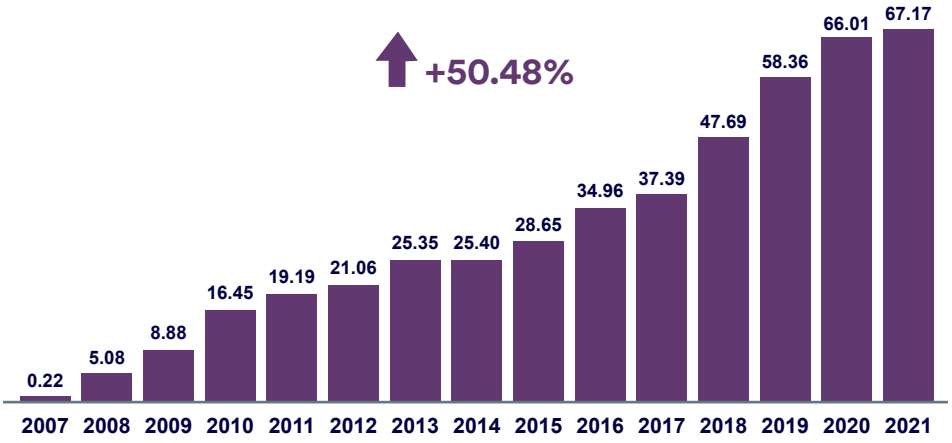
141 FSD Kenya, Mobile Money 1 year into a pandemic – a shift away from cash towards a cash-lite economy, 2021.

EPS

Successes

II. The stakeholders indicated that identification and authentication is another important driver of digital transformation. Kenya has made progress on this front; as of 2018, 97% of all Kenyans possessed a conventional, paper-based ID.[142] The centralization of identification data from different sources through the IPRS, which is accessible by both public and private institutions, has been key to creating greater efficiencies in authentication and, consequently, digital transactions. The launch of the IPRS in Kenya has enabled easier KYC authentication, particularly in the financial services industry and, more recently, across other sectors. Streamlined and widespread KYC drives innovation, builds trust, and improves efficiencies across digital transactions.

FIGURE 16: TOTAL REGISTERED MOBILE MONEY ACCOUNTS (MILLIONS), 2007–2021, CAGR



III. Progress in e-procurement has been driven by the government's launch of the PPIP in 2014.[143] Since then, the number of published tenders in the portal grew from 39 in 2015 to 24,722 in 2020. Similarly, the number of contracts grew from 24 in 2015 to 6,688 in 2020, with the number of suppliers registered growing from 0 in 2015 to 11,610 in 2021.[144] This has contributed to streamlining public procurement while increasing the transparency of what had hitherto been an opaque process.

The business survey results indicated that Kenya had made progress in (i) the use of e-government services and (ii) electronic payments.

I. Eighty-five percent of the MSMEs indicated that they use e-government services, particularly tax-related applications. However, the use of e-government services seemed to be concentrated in formal businesses.

II. Sixty-one percent of the businesses noted that their customers use electronic payments, indicating the proliferation of PDQ machines in the country. The COVID-19 pandemic has motivated businesses to adopt card payments as a safety measure, further driving the country toward a cashless economy. Additionally, most of the businesses surveyed use mobile money and mobile banking to make and receive payments, indicating that most businesses have integrated digital financial payments into their operations. SMEs use more advanced digital payment platforms—

142 The World Bank, Identification for development (ID4D) global dataset, accessed 2021.
143 The Payers, Kenyan government launches e-procurement system, 2014.
144 Public Procurement Information Portal, Distribution of Tenders and Contracts by Procuring Entities, accessed 2021.

such as credit cards and POS—than micro businesses, suggesting that as businesses grow, they are more likely to adopt more forms of digital payment. Overall, Kenya's robust regulations on digital payments have contributed to this rapid uptake.

FIGURE 17: TYPES OF DIGITAL PAYMENT PLATFORMS USED BY BUSINESS TYPE, 2022

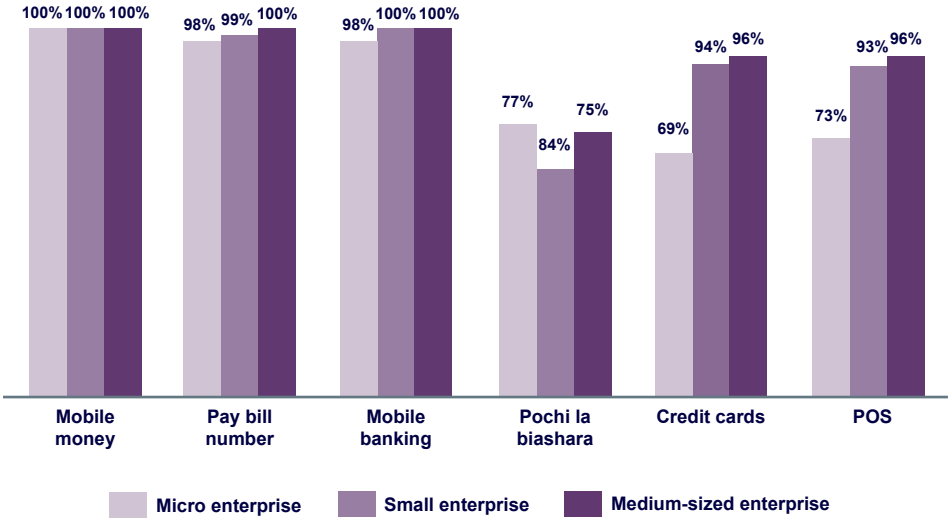
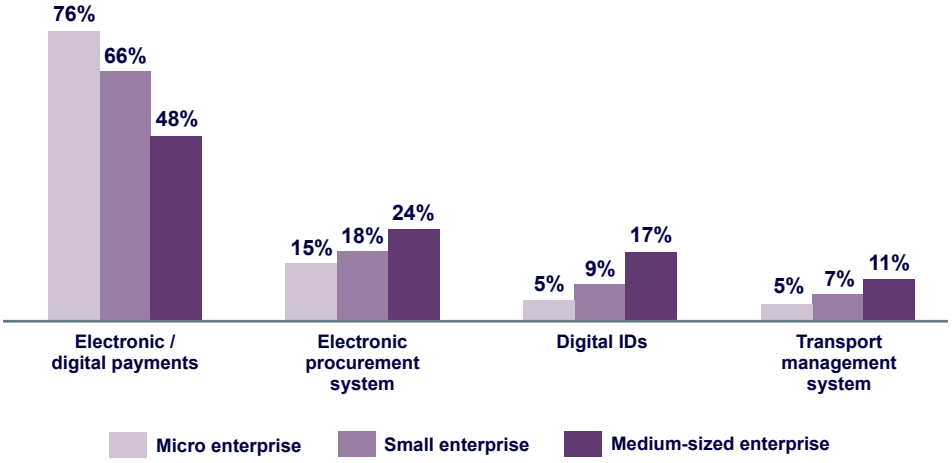


FIGURE 18: TYPES OF DIGITAL PLATFORMS USED BY BUSINESS TYPE, 2022



Opportunities

The indicator analysis suggested that there are opportunities for improvements in (i) digital government and (ii) digital registries and data repositories.

I. Digital government services (i.e., e-services) have improved in Kenya following the launch of the Huduma Kenya Program. The initiative aims to transform public service delivery by providing efficient and accessible government services at the convenience of citizens through various integrated service delivery platforms. The launch of the e-citizen portal—an official digital payments platform that enables Kenyan citizens, residents, and visitors to access and pay for government services online—has also contributed to the growth in e-government services, including tax payments

EPS

Opportunities

and applications for an ID, passport, or driver's license.[145] However, for those lacking internet connectivity or for whom accessing a physical center is still a necessity or preference, there are just 52 Huduma Centers nationwide to serve the entire population. This results in long queues at these centers,[146] which are often only located in major towns, burdening citizens with the expense and time commitment of traveling to and from these locations. Furthermore, citizens who fail to receive services have little alternative but to return to queue another day, without any assurance of a better outcome.

There are opportunities to further streamline e-government services to increase efficiencies and reduce the time and financial burden the current structure imposes on Kenyans. The wide-scale adoption of Huduma, Kenya's e-citizen portal, has the potential to address inefficiency and act as an accelerant for digital transformation in Kenya, much like M-Pesa or social media. However, care should be taken to ensure that a strong data privacy and cybersecurity regime is deployed to prevent any potential loss of personal information through cyber intrusions.

II. Digital registries and data repositories have also improved, driven by the launch of schemes to centralize data and make it available to both public and private entities. The IPRS represents the single largest data registry in the country; however, its sole focus is identity and authentication, and the country is yet to launch a harmonized national data registry for all sectors. For instance, the Kenya National Bureau of Statistics (KNBS) acts as the principal government agency for collecting, analyzing, storing, and disseminating statistical data in Kenya. Further opportunities exist to link data across MDAs into one shared national repository to improve efficiency, as opposed to the current situation in which each MDA largely stores its own data. However, the stakeholders interviewed shared little on the roles of digital registries, shared data repositories, and shared data systems and management in driving digital transformation, which may have been due to the relative nascence of these features in Kenya. Further investments in more efficient data storage and management are likely to be effective accelerants of Kenya's digital transition.

Meanwhile, the MSME survey suggested that (i) encouraging businesses to use the whole suite of government e-services and (ii) encouraging informal businesses to use e-government services are both promising opportunities.

I. The National Transport and Safety Authority of Kenya and e-payments emerged as the least used e-service applications across businesses. While some services are task-specific (such as vehicle registration or driver's license renewal), e-payments are multi-purpose. This could point to low awareness among MSMEs of e-government services that do not affect their daily operations. Thus, there is an opportunity to further sensitize businesses on the existence and benefits of these e-services to encourage their usage.

II. Furthermore, informal businesses hardly use any e-services. Given the outsized role they play in the Kenyan economy, this needs to be addressed. Productive informal firms are more likely to formalize should they perceive a positive tradeoff for using e-government services.

145 eCitizen, Services & Information, accessed 2021.
146 Majira, List of all Huduma Centers in Kenya, 2020.

EPS

Challenges

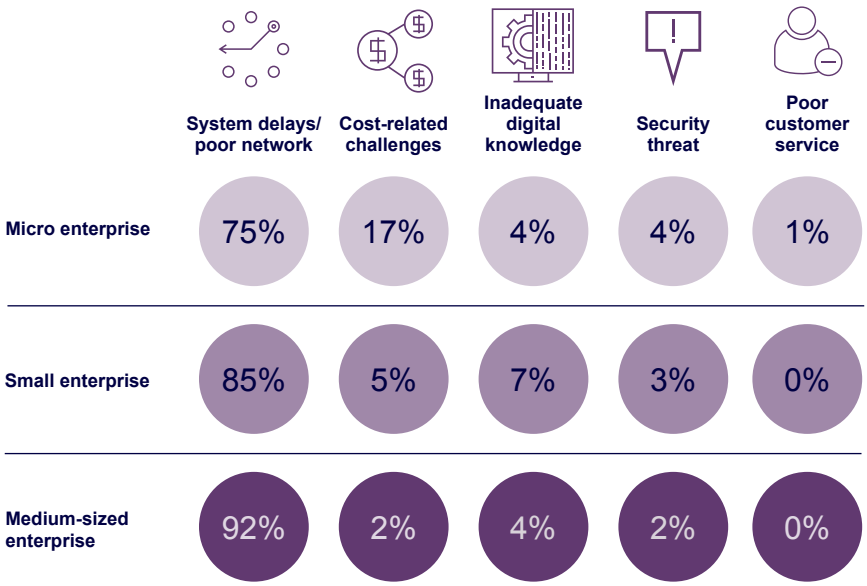
Challenges

While Kenya has made progress in the identification and authentication driver, challenges persist, driven by legal hurdles in the rollout of digital IDs. Efforts to roll out a digital ID, Huduma Namba, have been marred by litigation and citizen mistrust. This is especially concerning as Kenyans generally trust digital applications and services.[147] Concerns regarding data privacy, the use of Huduma card as a medium of payment, and disinformation contributed to Kenyans' lack of trust in Huduma Namba.[148] Nevertheless, efforts to roll out Huduma Namba signal the government's recognition of the important role digital IDs play in a digital economy, and the rollout is expected to continue. Further concerns regarding digital IDs center on the potential discrimination of minority populations. The case of Somali refugees who were taken to Kenyan refugee camps as children in the early 1990s offers a good example. At the refugee camps, the United Nations High Commissioner for Refugees (UNHCR) took fingerprints in administrative procedures to support its work. However, when most of these refugees reached the age of 18 and applied for Kenyan national IDs, they were rejected, as the UNHCR had handed over its database to the government, which matched the fingerprints to its database and marked the applicants as refugees. CSOs' efforts to have this group recognized as citizens culminated in the government's pledge to address their plight in 2019, a process that is still ongoing.

The MSME survey indicated that system delays and poor networks present challenges in using e-government services as they pertain to businesses.

I. The MSMEs cited system delays as their biggest challenge while using government e-services, highlighting the need to upgrade these enabling platforms to increase efficiency and usage.

FIGURE 19: CHALLENGES USING E-GOVERNMENT SERVICES BY BUSINESS TYPE, 2022



147 Business Daily, Digital access: 17pc of Kenyans now use social media, 2020.
148 Medium, Huduma Namba: Public perception of the Kenyan government's national integrated identity management system, 2019.

EPS

Complexities and unintended consequences

Complexities and unintended consequences

Kenyan's skepticism of Huduma Namba conflicts with the existing evidence that Kenyans are receptive to and early adopters of digital applications and services.[149,150] Despite the Huduma Namba's potential to enhance efficiency, improve service delivery, and curb corruption, a modest number of Kenyans initially turned up for government-led mass registration. As religious factions in Kenya criticized the program, a rumor circulated that Huduma Namba was the "mark of the beast," driving many Kenyans to abstain from participation.[151] This was further reinforced by the government's threat to cut off services from those who would not register. The distrust of Huduma Namba partly stemmed from the government's failure to conduct mass civic education exercises to help Kenyans understand its value.

149 Dalberg, Kenya's Digital Economy: A People's Perspective, 2021.
150 Stakeholder interviews.
151 .coda, Kenya's Controversial Biometric Project Is Shrouded in Secrecy, 2019.

Business and Innovation

BI

Tech-enabled business and innovation is a sign of a maturing digital ecosystem

Business and innovation developments are predicted to impact developments in foundational focus areas, such as infrastructure and enabling platforms and services. Tech-enabled business and innovation is a sign of a maturing digital ecosystem. Kenya's reputation for innovation has led to it being dubbed the Silicon Savannah. The growth of Kenya's research and development (R&D) ecosystem is poised to continue due to investments in other drivers—such as strong IP regulations—and will undoubtedly continue to attract capital and skilled talent to the country. Moreover, Kenya is recognized as an early adopter of emerging technology. The government underscored this reputation by convening a Blockchain and AI Taskforce to assess how the emerging technological revolution could be leveraged to enhance Kenya's ICT adoption and development track record. This second wave of enabling policies and governance can further help the country's transition into the next stage of digital transformation.

Photo: Vic Josh | stock.adobe.com

FIGURE 20: BUSINESS AND INNOVATION FOCUS AREA INDICATORS MEASURED

Drivers	Indicators
Digital jobs	• ICT task-intensive jobs as a percentage of total employment • Digital-intensive sectors' contribution to value-added growth
R&D	• Number of innovation hubs, incubators, and accelerators • Venture capital deals
Entrepreneurship ecosystem and SMEs	• Availability of support services for SMEs • SMEs selling online (at least 1% turnover) • SMEs total turnover from e-commerce
Emerging technologies	• Policies that address the spectrum issues around emerging technologies • Government encourages funding AI research
Macroeconomic environment	• Total annual investment • Manufacturing employment as a proportion of total employment (%) • Manufacturing value added (current US$) as a proportion of GDP (%)
Digital trade*	• Share of ICT goods as a percentage of total annual trade • Rules for Know Your Customer (KYC), Anti-Money Laundering (AML)/Combating the Financing of Terrorism (CFT) • Bilateral trade flows of ICT goods
E-commerce	• Internet shoppers as a share of the population • Share of businesses making e-commerce sales that sell across borders
Digital financial services	• Number of loans distributed (volume and default rate) • Number of cashless transactions per capita • Number of non-branch access points per 100,000 adults (e.g., agent, POS, ATM) • Number of bank branches per 100,000 adults

BI

Business and innovation

Successes

The indicator analysis suggested that Kenya has made significant progress in (i) R&D, (ii) emerging technologies, and (iii) digital financial services.

I. While Kenya's IP rights regulations are not comprehensive—for example, the country still lacks sui generis laws for the protection of traditional knowledge, genetic resources, and traditional cultural expressions—their enactment has nevertheless signaled a strengthening of the protection of IP, resulting in improvements in both R&D and emerging technologies. By offering protection against copyright infringement, Kenya allows innovations to enjoy competitive advantages in the market, which encourages further investment in innovation within the country. The stakeholders stated that the proliferation of innovation hubs had driven the growth of R&D and, with it, an increase in venture capital (VC) deal flow and the emergence of Nairobi as a tech talent destination.[152] They also noted that there had been a marked shift in VC funding in Kenya, starting in the 1990s,

152 Business Insider, Kenya ranked top tech hub in sub-Saharan Africa, 2019.

BI

Successes

when Development Finance Institutions (DFIs) changed their funding approach on the continent to focus on private companies. This derisked capital flowing to firms in Kenya and signaled to VCs that deal flow was available.[153] However, the stakeholders also noted that while Kenya has long shaped its innovations and investments to donor agendas, this is now changing. There have been significant investments in fintech, although the focus has remained largely on lending and payment services, which have so far experienced the most success. The pandemic has also seen increased deal flow to education technology start-ups.

II. The proliferation of innovation hubs and incubators, along with the growth in VC deal flow, has created an innovation environment in Kenya that attracts top talent to work on emerging technologies. Currently, Kenya is home to trailblazing start-ups, most of which have been founded through collaborations between local and foreign talent. Nairobi is also emerging as one of the biggest technology hubs in Africa.[154] The government plans to launch Konza Technopolis, envisioned as a world-class smart city powered by a thriving ICT sector, reliable infrastructure, and business-friendly governance systems.[155] The city seeks to attract businesses in ICT and bioscience, commercial and residential developers, and research universities, ultimately turning it into a technology hub modeled after Silicon Valley. Furthermore, the stakeholders indicated that emerging technologies have the potential to leapfrog today's ICT systems, as was the case when cellular technology leapfrogged traditional fixed-line connectivity across Africa.[156]

III. Additionally, the release of M-Pesa's API catalyzes the creation of innovative new use cases in digital financial services.[157]

The results of the MSME survey suggested that Kenya has made progress in (i) e-commerce, (ii) digital procurement, and (iii) the use of digital applications by businesses.

I. Ninety-three percent of the ICT-related businesses and 63% of non-ICT-related businesses deliver their products and/or services digitally.

II. Eighty-one percent of the medium-sized and 70% of the small businesses procure their products and/or services digitally, compared to 55% of the micro businesses. This could point to the increased awareness of the benefits of digital technology in increasing business efficiency among small and medium-sized businesses and the increased adoption and usage of digital applications and services. While micro businesses may be aware of the benefits of digital technologies, they often lack the resources to invest in them.

III. Furthermore, 50% of the businesses indicated that their use of digital applications had increased revenue and improved productivity, underlining the importance of adopting digital technologies for businesses. In addition, using digital applications and services increased efficiency, productivity, and customer engagement for all businesses. Specifically, the MSMEs in product-oriented sectors—such as wholesale and retail—indicated improvements in resource management due to the use of digital applications and services in their business operations. The businesses were split on mobile money or social media as their most-

153 Stakeholder interviews.
154 Business Insider, Kenya ranked top tech hub in sub-Saharan Africa, 2019.
155 Konza Technopolis website.
156 Stakeholder interviews.
157 Stakeholder interviews.

used digital application/service, providing further evidence of the large-scale adoption of digital devices, particularly smartphones, and digital payments across businesses.

FIGURE 21: IMPROVEMENTS FROM USING APPLICATIONS/DIGITAL SERVICES BY BUSINESS TYPE, 2022

Opportunities

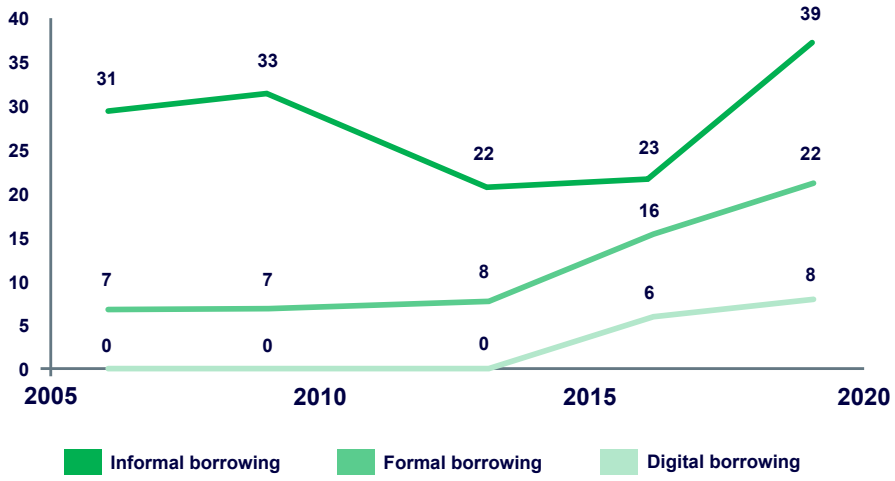
Data from the indicator analysis showed that there are opportunities for improvement across (i) digital financial services, (ii) e-commerce, and (iii) digital trade.

I. Following the success of mobile money, Kenya has made significant progress in digital financial services. This can be attributed to the competitive environment enjoyed by innovators and providers of mobile financial services, including closer collaboration between the ICT sector and financial regulators.[158] However, for all the focus on mobile money, other digital financial services have not been given due consideration.

   Similarly, digital loans disbursed in Kenya remain low; just 13.6% of adults digitally borrowed in 2019.[159] The relative difficulty of accessing formal loans in Kenya has led to the emergence of digital lenders that often charge extortionate interest rates, with some as high as 150%.[160] There are opportunities to build on the innovation and penetration of mobile money by innovating across other financial services, including credit and insurance. This would make the digital transaction layer ubiquitous, which is a necessary development for digital transformation.

158 ITU, Keynote address by the director general communications authority of Kenya during the workshop on digital financial services and financial inclusion at the ITU headquarters in Geneva, Switzerland.
159 FSD Kenya, Digital credit in Kenya: facts and figures from FinAccess, 2019.
160 TechCrunch, Kenya cracks down on digital lenders over data privacy issues, 2021.

FIGURE 22: PERCENTAGE OF ADULTS (18+) BORROWING FROM FORMAL, INFORMAL, AND DIGITAL SOURCES, 2005–2020



II. E-commerce has also trended positively, particularly over the past decade with the emergence of players such as Jumia and Copia. E-commerce still lags in person-to-person product sales; however, there are many potential avenues for investments to make improvements. In the 2019 KNBS household survey, only 4.3% of Kenyans indicated that they had shopped online. E-commerce remains more prevalent in urban areas than rural areas, where logistical challenges and the costs of last-mile delivery remain formidable obstacles.

III. Kenya has made progress across digital trade, but there are opportunities for greater investment in producing ICT goods and services. Notable progress has been made on the rules for KYC and AML/CFT[161] compliance due to the CBK's work with the financial sector to enact regulations around money laundering.[162] However, the share of ICT goods as a percentage of total annual trade has remained low over the past two decades, growing from 0.04% in 2000 to 1.14% in 2010 before falling back down to 0.4% in 2020.

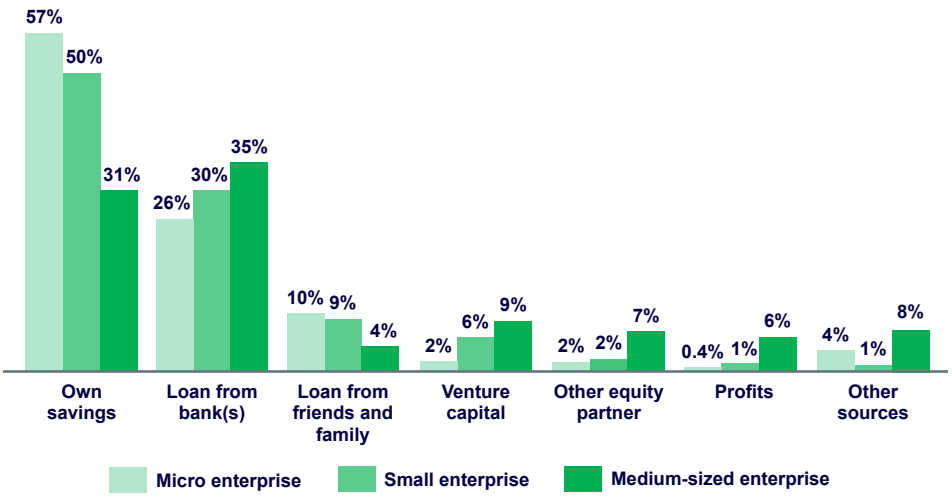
Challenges

The business survey indicated that access to formal financing remains a challenge for micro and small businesses. Businesses also face various technical challenges, such as delays in their use of digital applications.

I. Micro and small businesses face persistent challenges in accessing formal financing. Half of the small business owners and 57% of the micro business owners indicated that they had used their own savings to finance their business activities, compared to 31% for medium-sized businesses. Thus, innovative digital interventions are needed to enable these businesses to access formal financing, such as alternative credit scoring, to determine their credit worthiness.

161 Anti-money laundering/combatting the financing of terrorism.
162 Central Bank of Kenya, Anti-money laundering guidelines for the provision of mobile payment services, 2013.

FIGURE 23: SOURCES OF FINANCING BY BUSINESS TYPE, 2022



II. Digital system delays, security risks to data, and fraud were the major challenges cited by the businesses using digital applications and services, implying a need to invest more in data security to address the related issues. Complexities and unintended consequences

Complexities and unintended consequences

The stakeholders noted that while Safaricom and its M-Pesa service have played an outsized role in driving Kenya's digital transformation, the sheer dominance of both could have the unintended consequence of stifling competition. Start-ups in Kenya are wary of entering into competition with Safaricom, given its resources, influence, and capability to replicate the position of start-ups. Care should therefore be taken to ensure that the competitive post-regulation environment—one that gave rise to the innovative products that drove the early stages of Kenya's digital transformation—is either able to persist or be restored.

Furthermore, M-Pesa's dominance of the mobile money market has allowed transaction costs to remain high—particularly for the poor, who often transact smaller amounts—through high percentage cuts for both transfers and withdrawals. The Treasury is working on a proposal to slash M-Pesa transaction costs, which should offer some relief to low-income Kenyans.[163]

Another challenge facing Kenya is how to regulate the rapidly proliferating digital lending platforms, which often charge extortionate interest rates. While digital lending has given most Kenyans easy access to otherwise difficult-to-secure loans without any collateral or lengthy application processes, this easy access has also driven many Kenyans into debt. To address the challenges caused by defaulting on loans, the CBK has created a Credit Reference Bureau (CRB) to collect data on loans issued by financial institutions. Currently, approximately 14 million Kenyans are blacklisted by the CRB.[164] Loan recipients listed in the CRB portal face several challenges, including denial of subsequent loans, the risk of auction, and the loss of employment opportunities. The CBK gazetted the Digital Credit Provider regulations in 2021 to regulate the sector. However, while these regulations cover data privacy, they fail to address concerns regarding the exploitative interest rates charged by lenders. Therefore, the laws need to be strengthened to include a cap on digital lending interest rates.

163 Business Daily, Treasury prepares to slash M-Pesa charges, 2022.
164 Business Daily, Borrowers blacklisted on CRBs hit 14 million, 2021.

Discussion

Without investing in foundational building blocks, such as enabling policies and regulations, infrastructure, and human capacity, digital dividends remain limited

Kenya's digital transformation journey highlights the importance of investing in fundamental building blocks, such as enabling policies and regulations, infrastructure, and human capacity. Without these foundational elements, digital dividends remain limited. Digital skills are needed for citizens to engage with digital products and services meaningfully. Education drives adoption, habituation, and sustained use, and Kenya has made great headway in this regard with its universal education policy. This same educated population has produced the app developers and infrastructure maintainers necessary to sustain a digital economy. Our business survey reflected this finding, as staff across most firms reported having a minimum of secondary school education and basic-to-medium digital skills.

Kenya's early investment in infrastructure (i.e., the undersea cable and NOFBI cable) was a key building block that helped position it as one of the most connected countries in Africa. The combination of high-level government buy-ins, visionary leadership, and advantageous political decisions (i.e., Kenya taking the lead in TEAMS) created early opportunities for Kenya to build and invest in critical digital infrastructures when many countries were looking the other way. With TEAMS, for instance, under the visionary leadership of Dr. Bitange Ndemo, Kenya acknowledged donor concerns regarding the utility of investing in an infrastructure project without apparent benefits given the low utilization of internet capacity in Africa while also recognizing the potential of connectivity to drive economic change, taking the lead in investing in landing the fiber optic cable on Kenya's coast. The TEAMS project illustrates the value of leaders in other countries taking the bold step of championing digital infrastructure, even when the benefits of connectivity are not apparent to all actors.

Photo: Authentic travel | Shutterstock.com

Finding comfort with a degree of uncertainty may pay greater dividends in the long run

Although Kenya has committed significant resources to infrastructure and education, the way it did so reveals how opportunism and synchronicity can have a deep impact. Regulators in Kenya initially took a "watch and wait" approach to mobile money, which later became the critical enabling layer that facilitates most interactions and transactions in Kenya. Other countries use this as a lesson in the value of working with momentum, not against it. In other words, the digital economy can evolve so quickly that a preemptive regulatory approach, which may be appealing in the short term, can risk backfiring. Finding comfort with a degree of uncertainty—and taking a "regulatory sandbox approach"—may pay greater dividends in the long run. Moreover, investing in early education was not envisioned solely as a support for digital transformation; the education agenda aligned with Kenya's broader developmental goals at the time. However, the upside of digital transformation cannot be understated, and digital adoption has risen alongside education levels, suggesting a correlation. Previous research has confirmed that this is a causal relationship, and studies have shown that lower levels of education have a negative impact on technology adoption and usage, suggesting the converse is true. While not tailor-made to promote digital transformation, investing in education has helped drive digital adoption in Kenya, generating the strong tech talent and capabilities for which Kenya is known.

Furthermore, the enactment of open data regulations that culminated in the launch of the Kenya Open Data Initiative improved public oversight of government and helped build trust through increased transparency. In the private sector, open data has also helped support innovation and growth by removing barriers to data access, use, and shareability. However, while the enactment of open data regulations represents a starting point for greater transparency, implementation presents challenges. Not all data is published in the portal, and governments sometimes use loopholes in open data regulations to rebuff disclosure requests from citizens, as was the case in the Kenyan government's rejection of pleas to disclose the Standard Gauge Railway (SGR) contract, citing foreign relations and national security concerns.[165]

Mobile money has undoubtedly been central to Kenya's success story; however, Safaricom's ongoing dominance poses a challenge to market competition. One would be remiss not to highlight the role of M-Pesa in Kenya's story. Much has been written about this, and the case has been studied to a great extent by scholars in this space. M-Pesa has been critical to Kenya's story, and as a transaction layer, it is the enabling platform and service that provides the railway for so much of Kenya's digital economy. The question is whether Kenya would exemplify digital transformation without M-Pesa. This is unlikely, and few would argue otherwise. However, it is also true that few would disagree that the outsized presence of Safaricom (M-Pesa's parent company) today poses a challenge to market competition. Now that a strong enabling layer exists, to continue its upward trajectory, Kenya needs *more* players that can develop more railways and even *more* players that can develop the apps and services that can capitalize on M-Pesa's API. While many might focus on the dark side of having such a dominant player in the market, few developing countries, besides India, are in the fortunate position of having a core railway in place. Our mental model in this work has been this: if the drivers that make up the foundational *infrastructure* and *people* focus areas are in place, an enabling layer can be developed to facilitate the ubiquity required for digital transformation. The Kenya experience affirms this, and mobile money has been central to its digital transformation.

165 Business Daily, State rejects once again plea to make SGR contract public, 2021.

Businesses need to be connected more than ever in a post-pandemic and virtual world

With the foundational focus areas in place, further business and innovation developments will undoubtedly continue to emerge. However, as this happens, the need to address digital inequality will become even more critical. The businesses we surveyed in this report cited the ease of doing business in Kenya as a key driver of their success. This is a welcome nudge to any country looking to digitally transform. In a nutshell, firms prefer to operate where the conditions are favorable to their core business. Today, favorable conditions do not just pertain to the ease of registering a business or friendly tax rates for firms. In the current context of a rapidly digitizing world, firms want to connect to their suppliers and customers digitally. In Kenya, 76% of the firms we surveyed use digital devices, while 92% of these use the internet. Businesses need to be connected more than ever in a post-pandemic and virtual world. With the foundational focus areas firmly in place, more business and innovation developments in Kenya are both expected and welcome. However, there is no escaping the fact that Kenya's Central region is more developed and digitally sophisticated than its neighboring counties. Thus, there is a clear call to action to address this glaring inequality and distribute the benefits of digital transformation more evenly across Kenya. Future innovations need to speak to the needs of the rural and marginalized populations and ensure that no citizen is left behind to avoid a thriving capital and declining hinterland scenario.

Much of Kenya's growth story has been set in the context of a strong policy, regulatory, and governance ecosystem, which is critical to any country's digital transformation journey. While multiple highlights came to the surface regarding policy, regulation, and governance, we will discuss two here that have shaped the course of Kenya's digital transformation and demonstrate its government's sharpness. First, in the wake of the post-election violence of 2008 and the mass adoption of mobile money, the government initiated a ULF based on the principle of technology neutrality, which allowed any form of communications infrastructure to be used to provide any type of communication service. This has driven innovation and the development of applications in the market.[166] Furthermore, in 2020, the Kenyan government adopted an updated national policy for the ICT sector, called the National ICT Policy. This new policy was meant to align the former ICT sector policy with both the 2010 constitution and Vision 2030. However, the vision (a prosperous ICT-driven Kenyan society) and mission (to improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable, and affordable ICT services) remained unchanged, further cementing the government's recognition of the ICT sector as a critical developmental tool with the potential to transform the economy.[167] These two examples illustrate two features that other governments can emulate: (1) removing barriers to innovation for the private sector and (2) keeping digital transformation at the forefront despite political changes. In the first example, the government leverages policy to unlock growth, and in the second, the government remains consistently dedicated to the vision of digital transformation, even as policies evolve and power changes hands. We know that the private sector, a critical actor in the digital transformation agenda, needs to see this type of commitment and consistency from the government to invest.

The work of digital transformation is, in some respects, never done; the Kenyan government's consistently forward-looking approach to digital policies and regulations has been a critical ingredient of its successes to date. In 2017, the government established the Blockchain and AI Taskforce

166 Ndung'u et al., *The State of Digital Transformation in Kenya*, Research ICT Africa, 2019.
167 Ibid.

Other countries can borrow from Kenya's future-leaning education investments to accelerate their digital transformation

under the Ministry of ICT to champion the exploration of opportunities presented by emerging technologies. The taskforce released its report in 2019, noting the oversized impact that the Fourth Industrial Revolution would have on all aspects of life, including labor and the economy. However, so far, no regulations guiding the country on how to embrace and capitalize on these emerging technologies have been drafted. While this can be interpreted as a lack of action, regulators may deliberately adopt a "watch and wait" tactic akin to their approach with mobile money. To reiterate, a preemptive and premature regulatory approach may seem attractive in the short term but could backfire in the long term. As with much of the world, Kenya is grappling with blockchain as an innovation. The mere fact that a team is keenly keeping an eye on this development is commendable in and of itself. Other developing countries looking to advance in digital transformation should take note.

Furthermore, the government has made conscious investments in digital literacy through the DLP, which aims to transform learning in Kenya. The government believes that technology has the power to bring about systemic change in basic and higher education. By transforming teaching and learning through integrating technology in the learning environment, the government believes it is building the digital talent to develop—and use—the next wave of digital technologies and applications. Kenya should continue to invest in developing highly skilled digital talent while concurrently investing in innovation to create opportunities to utilize this talent. Other countries can borrow from Kenya's future-leaning education investments to accelerate their digital transformation.

With all these commendable successes and some notable areas for further progress, what can we take away from Kenya's journey? While this report does not purport to offer a neat answer to that question, we consistently landed on one overarching insight regarding digital transformation: *it is not linear, and governments must position themselves favorably at every juncture*. What this may mean in one country will likely look different in another. That said, this report has provided insights into how the actions of Kenya's public, private, and civil society sectors—as well as the outcomes of both planned and unpredictable events—have made Kenya an exemplar of digital transformation and will, we hope, be helpful to practitioners looking to translate such lessons into their own contexts. We also hope that both the findings of this report and the analysis of Kenya's journey can inspire other countries as they embark on their own journeys of digital transformation.

Annex 1: Inequality Analysis

The value of this analysis lies in highlighting the gaps and trends within regional populations

The inequality analysis evaluated variations across four of the six focus areas between 2009 and 2020. This analysis sought to determine whether there is uniformity or disparity within the population across the focus areas. The value of this analysis lies in highlighting the gaps and trends within regional populations, which in turn affect the digital transformation of these communities. For instance, there is a small gap in how the population in Nairobi scores in each of the four focus areas, suggesting that Nairobi's inequality level is low compared to other regions.

We used proxies where data was missing. By focus area, these proxies include:

i. ***Infrastructure*** – (i) the type of device respondents own (e.g., basic phone, smartphone, tablet, and/or computer), (ii) the number of internet access channels respondents have access to and use (at home/school, cybercafé, Wi-Fi, public community hubs, Ajira youth empowerment centers, restaurants and coffee shops, mobile data), (iii) the network quality to which have respondents have access (2G, 3G, or 4G), and (iv) whether respondents can access electricity in their homes.

ii. ***People*** – (i) digital literacy as a measure of respondents' ability to use digital financial services on a mobile phone or computer; communicate with others using digital devices; view pictures, videos, and other forms of entertainment; use social media; search for and receive information on a mobile phone; receive health, education, or government services through a digital device; use digital services for livelihood support; use e-commerce platforms to buy and sell products; and use digital platforms to create and share original content; (ii) digital trust as a measure of respondents' confidence in their data being safe with digital applications; and (iii) the highest level of education attained by respondents as a measure of literacy.

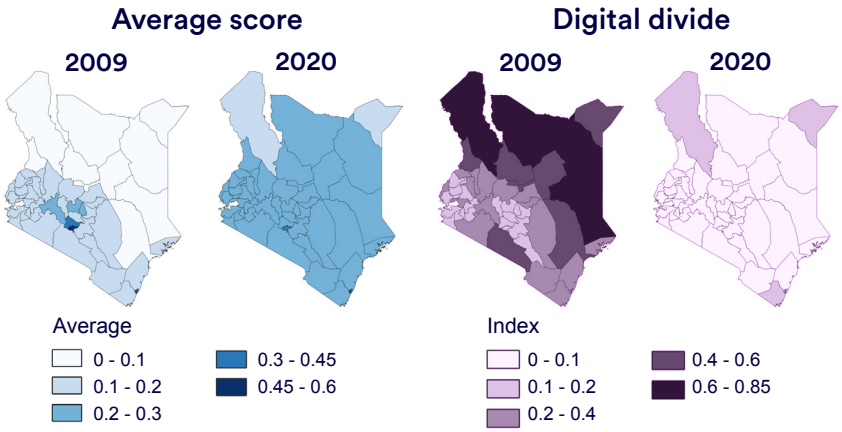
iii. ***Enabling platforms and services*** – respondents' awareness and use of e-government services or platforms, including iTax, e-citizen, the National Health Insurance Fund, the National Social Security Fund, the National Transport and Safety Authority, and digital county government platforms.

iv. ***Regulations*** – (i) whether respondents read privacy policies for services and applications, (ii) to what extent respondents trust the policies put in place to protect them while using digital services, and (iii) the actions taken after respondents experienced fraud or heard of someone else who experienced fraud through a mobile phone, computer, or the internet.

The inequality analysis, represented by the digital divide score, was measured on a scale that ranged from 0 to 1, where 0 represents equality (lowest inequality level), and 1 represents total inequality (highest inequality level). We scored each focus area separately; there was no single score for inequality across the four focus areas. A score closer to 0 in a particular focus area for particular geography indicates low inequality.

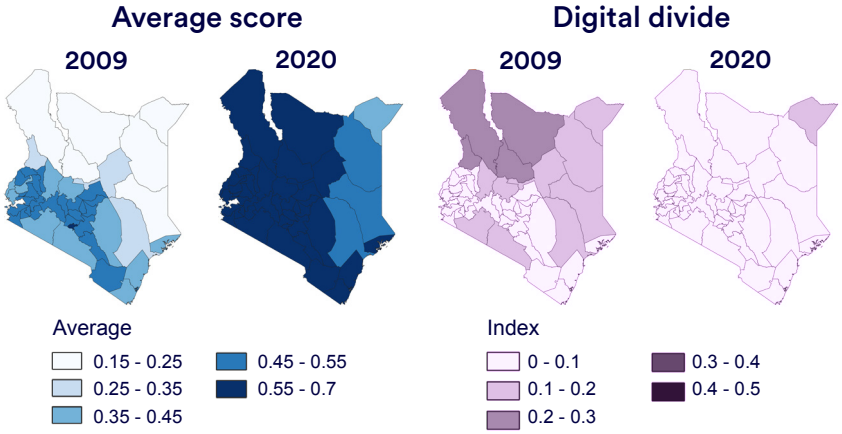
Infrastructure: ***equality improved between 2009 and 2019; however, average scores remain low***

- In 2009, **inequality was high**, except across counties in the Central and Western regions.
- However, in 2020 **inequality was medium**.
- There is a need to further improve the connectivity infrastructure to decrease inequality at the overall national level, so it is deemed low.



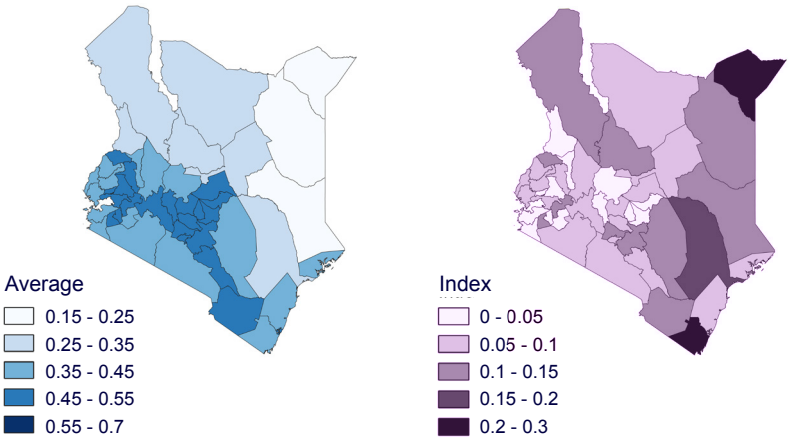
People: ***equality in the people focus area has improved over the years***

- In 2009, there was medium inequality in most parts of the country, except in Northwestern Kenya, which had high inequality.
- In 2020, Kenya achieved low inequality across the entire country.
- Digital education and literacy should be promoted in Mandera to decrease the medium inequality in that region.



Enabling platforms and services: ***equality in enabling platforms remains low in remote Kenya***

- There is medium inequality in most counties. However, Mandera and Kwale show the highest inequality, while more developed parts of Kenya have low inequality, e.g., Nairobi.
- There is a need to sensitize the more remote parts of the country to the availability of e-government services. This will improve the awareness and usage of e-government services and reduce inequality from medium to low.



Regulation and policy: ***the entire country records low inequality***

- There is low inequality across the entire country.
- However, the East lags slightly regarding regulations that protect digital interactions and the usage of digital services.