

Kenya Digital Economy Assessment

Summary Report



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Digital Economy for Africa

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About DE4A

Rapid digital transformation is re-shaping our global economy, permeating virtually every sector and aspect of daily life, changing the way we learn, work, trade, socialize, and access public and private services and information. In 2016, the global digital economy was worth some USD 11.5 trillion, equivalent to 15.5 percent of the world's overall GDP. It is expected to reach 25 percent in less than a decade, quickly outpacing the growth of the overall economy. However, countries like Kenya are currently capturing only a fraction of this growth potential and need to strategically invest in the foundational elements of their digital economy to keep pace.

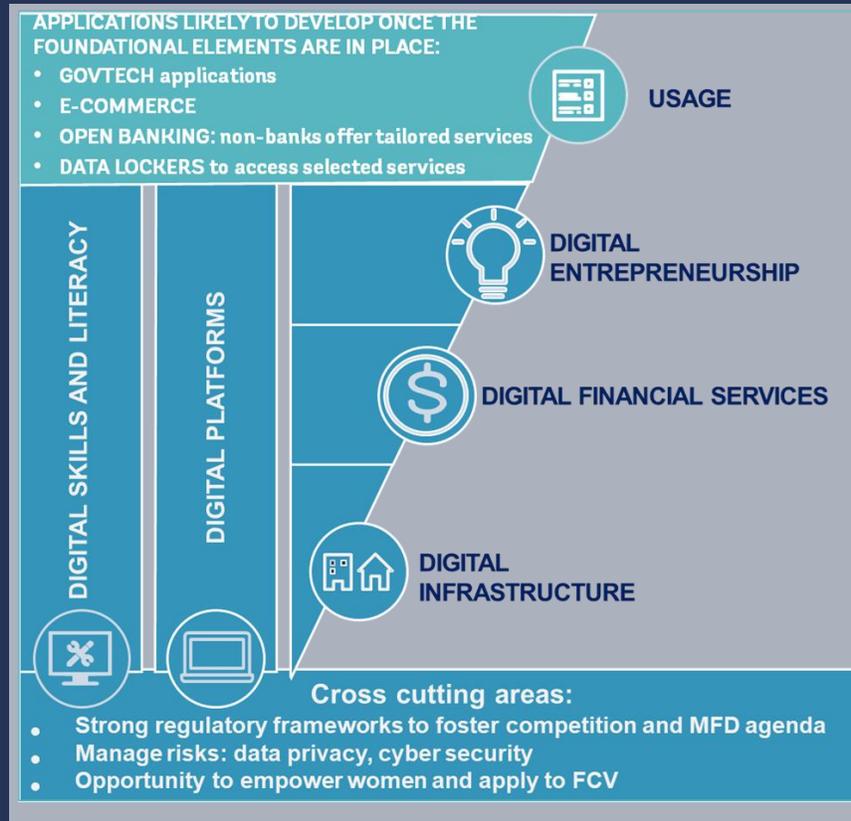
The Digital Economy for Africa (DE4A) Initiative forms part of the World Bank Group's support for the African Union's Digital Moonshot for Africa, which aspires to see every African individual, business and government be digitally enabled by 2030. The DE4A Initiative is underpinned by five principles:

1. **Comprehensive:** Taking an ecosystem approach that looks at supply and demand and defies a narrow, siloed approach in defining the digital economy elements and foundations.
2. **Transformative:** Aiming at a very different scale of ambition beyond incremental 'islands' of success.
3. **Inclusive:** Recognizing that the digital economy is for 'everyone, in every place, and at all times' as well as creating equal access to opportunities and dealing with risks of exclusion.
4. **Homegrown:** Supporting solutions anchored in the local context and unleashing the African spirit of enterprise to support more homegrown digital content and solutions.
5. **Collaborative:** Dealing with the digital economy requires a different, more flexible mindset, including collaboration among countries, across sectors as well as between public and private players.

For a successful and inclusive digital economy, African countries need to support the development of the key foundational building-blocks of the digital economy (see Figure 0-1). Five foundational elements, which are synergistic, have been identified:

1. **Digital Infrastructure:** Digital infrastructure provides the means for people, businesses, and governments to get online, and link with local and global digital services, thus connecting them to the global digital economy. High-quality and affordable Internet connectivity is a critical foundational component of the digital economy.
2. **Digital Platforms:** Digital platforms offer products and services, accessible through digital channels, such as mobile devices, computers, and the internet. They facilitate digital exchange and transactions, enabling producers and users to create value by interacting with each other. Governments, for example, operate digital platforms to offer citizen-facing government services and share information. Commercial firms and non-profit foundations also operate digital platforms to offer a growing array of products, services and information.
3. **Digital Financial Services:** Digital financial services enable individuals and businesses to conduct transactions electronically and open a pathway to a range of digital financial services in addition to digital payments, including credit, savings, and insurance. Access to affordable and appropriate digital financial services is critical for the participation of individuals and businesses in the digital economy.
4. **Digital Entrepreneurship:** Digital entrepreneurship and innovation create an ecosystem that helps bring the digital economy to life, by spurring new, growth-oriented ventures, products, and services that leverage technology. By enabling the transformation of existing businesses, digital entrepreneurship contributes to net employment growth and helps to enhance competitiveness and productivity.
5. **Digital Skills:** Economies require a digitally savvy workforce to build robust digital economies, competitive markets and to enable individuals to access digital services and information. Digital skills constitute technology skills, together with business skills for building or running a start-up or enterprise. Greater digital literacy enhances the adoption and use of digital products and services amongst the larger population.

Figure 0-1: Key component of the digital economy ecosystem



As part of the DE4A Moonshot Initiative, ambitious, high-level targets have been established for all five foundational pillars of the digital economy, articulated under DE4A framework, as a way to define and measure success against the goal of ensuring that every individual, business and government is digitally enabled by 2030 (see Figure 0-2).

Figure 0-2 Digital Moonshot targets across pillars

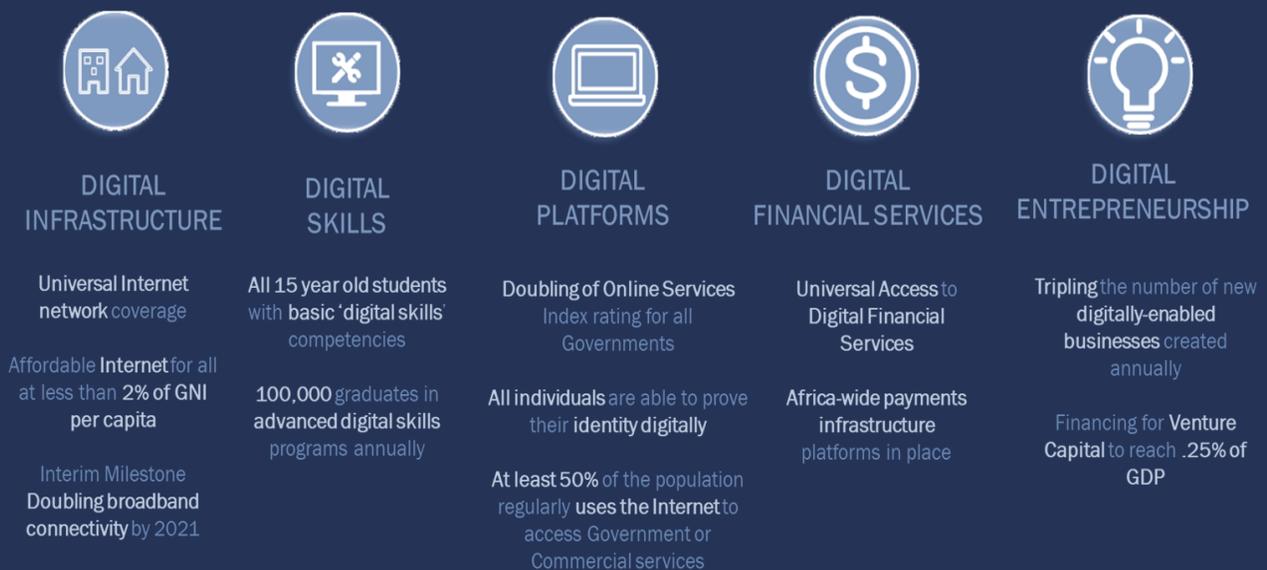


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- **Digital Infrastructure** – Researched and drafted by Casey Torgusson (Senior Digital Development Specialist, GDD11), Margaret Nyambura Ndung'u (Digital Development Consultant, GDD11), and Mavis Ampah (Digital Development Consultant, GDD11).
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Diagnostic Methodology

An **in-country kick-off and fact-finding mission** was undertaken in February 2019, in preparation of this diagnostic. Preliminary findings, based on technical background papers, were presented and validated at an additional **stakeholder workshop** held at the Ministry of Information, Communication and Technology in March 2019. A summary of the final assessment was shared again in August 2019, following which the overall diagnostic was finalized.

In addition to **desk research** conducted, these engagements allowed for broad stakeholder consultation with both the public and private sector, as well as civil society.

The following **stakeholders were consulted** as part of this country assessment:

- **Public sector:** Ministry of Information, Communication and Technology, National Communication Secretariat, ICT Authority, Communication Authority, Central Bank, Ministry of Industry, Trade and Cooperatives, Ministry of Education, Kenya Institute of Curriculum Development.
- **Private sector:** Kenya Private Sector Alliance, ASPEN Network of Development Entrepreneurs, Google, Fuzu, Intel, Lori Systems, female-run enterprises, and start-ups.
- **Incubators and accelerators:** Nailab, iHub, ILab and Metta.
- **Telecommunications sector:** GSMA, Telkom, Airtel, Safaricom, Jamii, Technology Service Providers of Kenya, GSMA, BRCK, Surf and SES.
- **Financial sector:** Kenya Bankers Association, Financial Sector Deepening Kenya, Kenya Commercial Bank, Finserve Africa, Commercial Bank of Africa, Branch, Kopo Kopo, Nairobi Securities Exchange, Musoni, and PesaLink.
- **Education sector:** Kenya Institute of Curriculum Development, Commission of University Education, Moringa School, Ajira, Kenya Education Network, the United States International University-Africa, Kenyatta University, Strathmore University, Kabete National Polytechnic, as well as sample primary schools in Nairobi.

Analysis presented also draws on **regional and global benchmarking**, based on standardized indicators that form part of the DE4A diagnostic methodology. The analysis also draws on government statistics and data shared by the private sector.

Every African individual, business and government is Digitally Enabled by 2030



DIGITAL
INFRASTRUCTURE



DIGITAL SKILLS



DIGITAL PLATFORMS



DIGITAL FINANCIAL
SERVICES



DIGITAL
ENTREPRENEURSHIP

Acronym List

A4AI	Alliance for Affordable Internet
AI	Artificial Intelligence
AML	Anti-Money Laundering
AML/CFT	Anti-Money Laundering and Combating the Financing of Terrorism
API	Application Program Interfaces
APO	Access to Government Procurement Opportunities
ARPU	Average Revenue Per User
ATM	Automated Teller Machine
AU	African Union
BAN	Business Angel Networks
BPO	Business Process Outsourcing
ccTLD	Country Code Top-level Domain
CA	Communication Authority
CBA	Commercial Bank of Africa
CBK	Central Bank of Kenya
CNC	Computer Numerically Controlled
CMP	Common Market Protocol
CRB	Credit Reference Bureau
DE4A	Digital Economy for Africa Initiative
DFS	Digital Financial Services
e-ProMIS	Electronic Project Management Information System
EAC	East African Community
EDGI	E-Government Development Index (United Nations)
EPI	E-Participation Index (part of EDGI)
FMC	Financial Markets Conduct
FMCA	Financial Markets Conduct Authority
FTTP	Fiber-To-The-Premises
G2B	Government-to-Business
G2C	Government-to-Citizen
G2G	Government-to-Government
GCCN	Government's Common Core Network
GDC	Government Data Centre
GDP	Gross Domestic Product
GDPR	General Data Protection Regulations (European Union)
GEA	Government Enterprise Architecture
GII	Gender Inequality Index
HE	Higher Education
ICT	Information and Communication Technology
ICTA	ICT Authority
ID	Identification
ID4D	Identification for Development
IFMIS	Integrated Financial Management Information System
ILO	International Labor Organization
IoT	Internet of Things
IP	Intellectual Property
ISP	Internet Service Provider
IT	Information Technology
ITES	IT-Enabled Services
ITMS	Integrated Tax Management System
ITU	International Telecommunication Union

IXP	Internet Exchange Point
KE-CIRT/CC	Kenya Computer Incident Response Team – Coordination Centre
KEBS	Kenya Bureau of Standards
KENET	Kenya Education Network
KENIA	Kenya Innovation Agency
KEPSA	Kenya Private Sector Alliance
KETRACO	Kenya Electricity Transmission Company Ltd.
KITOS	Kenya IT and Outsourcing Society
KITP	Kenya Industrial Transformation Program
KODI	Kenya Open Data Initiative
KPLC	Kenya Power and Lighting Company
KRA	Kenya Revenue Authority
KYC	Know Your Customer
LAN	Local Area Network
M&E	Monitoring and Evaluation
MDA	Ministry, Department or Agency
MIS	Management Information System
ML	Machine Learning
MNO	Mobile Network Operators
MoE	Ministry of Education
MoICT	Ministry of Information and Communication Technology
MoITC	Ministry of Industry, Trade, and Cooperatives
MSME	Micro, Small and Medium-sized Enterprises
MTP	Medium Term Plan
MVNO	Mobile Virtual Network Operator
NAS	National Addressing System
NCST	National Commission for Science and Technology
NESP	National Education Sector Plan
NIIMS	National Integrated Identity Management System
NIMES	National Integrated Monitoring and Evaluation System
NOFBI	National Optic Fiber Backbone Infrastructure
NRB	National Registration Bureau
NRI	Networked Readiness Index
OECD	Organization for Economic Co-operation and Development
ONA	One Network Area
PAYE	Pay-as-you-earn
PDTP	Presidential Digital Talent Program
PIN	Personal Identification Number
PMIS	Public Investment Management Information System
PPP	Public-private Partnership
SACCO	Savings and Credit Co-Operative Societies
SME	Small and Medium-sized Enterprise
STEM	Science Technical Engineering and Mathematics
STI	Science, Technology and Innovation
TIMS	Transport Integrated Management System
TSC	Teacher Service Commission
TVET	Technical and Vocational Education and Training
USF	Universal Service Fund
OTC	Over the Counter
USSD	Unstructured Supplementary Service Data
VAT	Value Added Tax
WBG	World Bank Group
WEF	World Economic Forum

Executive Summary

Kenya has acquired the status of a regional leader within East Africa with its position as the ‘Silicon Savannah’. This elevated status owes to a number of advantages in the form of a thriving tech ecosystem, digitally skilled talent, geographical positioning endowment, and ICT centric policies. The country boasts of dedicated government ministries, authorities and programs along with existence of widespread digital infrastructure. These fundamentals have elevated Kenya in the region, and attracted both regional and international attention, capital, networks and resources.

Kenya aspires to become a middle-income country by 2030 and has identified four priority growth areas as part of its ‘Big Four Agenda’ - manufacturing, food security, affordable housing and universal health coverage. Each of the digital economy foundations outlined in this report – digital infrastructure, digital platforms, digital financial services (DFS), digital entrepreneurship and digital skills are crucial to achieving this aspiration. They are the building blocks Kenya needs to drive innovation, economic growth, job creation and improved service delivery across the economy.

A dynamic and inclusive digital economy requires universal access to broadband, as well as other key ICT infrastructure. At present, Kenya has one of the most advanced digital infrastructure networks (public and private) in the region - a result of early liberalization of the telecom sector, improvements to its national backbone, as well as strategic regulatory interventions to support an enabling environment. This has in turn yielded solid private sector investment in communications infrastructure and services. In 2017, the ICT market was estimated to be worth US\$ 5.48bn, contributing 7 percent to the country’s gross domestic product (GDP). Amid this generally improving picture, key gaps persist in access to infrastructure and services in rural areas and among marginalized populations, and the regulatory regime is beginning to fall behind the demands of a rapidly evolving technology landscape and changing market dynamics.

Access to digital financial services has been key to Kenya’s digital economy success story to date – enabling individuals and businesses to transact online in unprecedented numbers. The country has one of the highest mobile money penetration rates in the world. This is primarily driven by the digital financial platform, M-Pesa, which has successfully increased financial inclusion and helped spur related innovation and expansion of public and private digital service provision. It has also provided the rails for other digitally enabled sectors, such as e-commerce, FinTech and agri-insurance. The rise of credit opportunities presents both risks and potential gains for consumers - as with many areas of digital transformation, regulation needs to constantly keep up with the pace of innovation. Looking ahead, issues of market dominance in telecoms and mobile money markets may need to be addressed to ensure adequate competition and to maintain the pace of investment, innovation and consumer cost-reduction that have driven Kenya’s digital economy growth.

Kenya’s entrepreneurship ecosystem is renowned for its dynamism and high-risk appetite – turning increased access to digital technologies into new businesses, transforming traditional industries and increasingly driving jobs growth. The local players have experimented with different business models and ideas and have a deep understanding of local market and consumer dynamics. However, there are factors hindering this growth; the accessibility to capital, limited domestic market size, availability of data in user-friendly formats, locational bias favoring major tech hubs within Kenya and agglomeration of talent and capital in global hubs, as well as insufficient government support around tax incentives and procurement policies. Addressing these factors should be a key focus area for Kenya going forward. Kenya’s tech firms still struggle to scale into large enterprises that can drive overall employment growth, and many traditional industries, such as manufacturing have been slow to digitize, preventing much needed productivity gains.

As more and more products and services are digitized, digital platforms will play a pivotal role in transforming the way Kenya's people, and the wider region, government, businesses, and civil society interact. Kenya has made great strides in digitizing public services and there is a growing array of private sector innovators creating new platforms from health to agriculture and e-commerce. Businesses and individuals are increasingly using platforms to connect to new customers, information, services and jobs. However, this is only scratching the surface of the potential. Rollout of a robust digital identification (ID) platform is crucial to expand access to digitized services and transactions for which identification is often a prerequisite (e.g., financial, social, education) and take advantage of economic opportunities (e.g., formal employment and property rights). While a digital ID system is being developed, the current framework needs to be enhanced. A stronger trust environment, including robust data protection, privacy legislation and regulations, increased cybersecurity awareness, and response capabilities are needed to build the confidence to transact online and protect critical information, networks and infrastructure. Challenges in the logistics and postal network will likewise need to be tackled to bring down the high costs of e-commerce deliveries. Early successes in digitizing public services will need to accelerate with an eye toward user-centric design, leveraging shared IT infrastructure and data across government and creating more opportunities for public-private collaboration to generate innovative digital services offerings.

Increased regional integration is critical to the long-term success of Kenya's digital economy. Kenya, together with Uganda, Rwanda and South Sudan are working to create a more interconnected digital market in East Africa, removing cross-border barriers to telecommunications, infrastructure deployment, digital financial transactions, data sharing, and e-commerce. Maintaining and accelerating momentum around this regional agenda will boost investment, reduce costs, improve the utility of the consumer experience, and help build a much larger market where Kenya's digitally enabled firms can thrive. The trends toward opening of digital markets in Ethiopia may likewise provide a strategic opportunity for deeper integration.

Despite this generally positive outlook, there are still several cross-cutting constraints significantly limiting further development of the digital economy. These include low usage of digital technologies and representation in the digital workforce by women, and heavy financial and regulatory burdens for startups attempting to participate in the digital economy ecosystem. Furthermore, skills - both in terms of digital literacy and awareness to drive demand, and advanced skills to drive innovation are not at the required level to propel the digital economy forward at the desired speed and to maintain Kenya's status as a regional leader. It is crucial that there is an enabling environment for digital entrepreneurship, the effect of which has a cross-cutting impact on all other foundation pillars of the digital economy.

Kenya's rural reality also needs to be better served and included in the digital economy. Although three quarters of the population live in rural areas, broadband access is limited outside of urban centers, which affects both access and use of digital services; only 17 percent of Kenya's rural population reports using the internet on a weekly basis. Affordability of broadband and digital devices continue to lock out many of the poorest Kenyans, stripping them of the benefits of the digital economy. Moreover, the overwhelming majority of digital infrastructure, entrepreneurship resources, as well as training and skills opportunities are only available in urban centers, namely Nairobi.

The potential dividends from a strong and inclusive digital ecosystem are enormous, with well-documented links to economic growth, service delivery and job creation. The internet has encouraged inclusion, efficiency and innovation by lowering the cost of transactions, expanding markets and services to excluded communities and making supply chains more efficient. To take full advantage of this enormous opportunity, Kenya needs to address critical gaps in the digital ecosystem if it is to achieve its objective of a globally competitive, industrialized, middle-income country. This report outlines these gaps and suggests remedies to address them.

2 Introduction

Population	52.5 million
GDP	\$95.5 billion
GDP growth	5.8%
Urban population	27.5%
Adult literacy rate ¹	81.5%
Employment to pop. ratio (% ages 15 and older) ²	72.7%
Rural population with access to electricity (%) ³	71.6%
Life expectancy	66.3 years
Gender Inequality Index (GII)	0.545
Mobile cellular penetration ⁴	103.4 per 100 population
Internet subscription (%)	42%
Mobile money account penetration	>70%
ICT contribution to GDP ⁵	9.2%



Table 1 Kenya at a glance, 2019: key top-level figures and map (Source: World Bank Indicators, 2019, Kenya Economic Survey, Kenya Economic Update, 2019t, Findex database)

2.1 Kenya and the Digital Economy

2.1.1 Progress to-date and cross-cutting challenges that remain

On many counts Kenya emerges a digital economy leader on the African continent – a country that realizes the potential of the digital economy to accelerate and “future-proof” economic growth, as well as expand opportunities and access to new jobs and services for Kenyans. Proactive public investments in infrastructure, as well as progressive policies and regulations are paying off and have helped boost access to broadband. Kenya’s geographic position also means that it benefits from direct access to international connectivity links. A forward-looking regulatory environment has also encouraged the innovation that has helped make Kenya a hub for digital financial services, with mobile money platforms revolutionizing financial access and helping Kenya achieve one of the highest levels of financial inclusion on the continent. This has, in turn, had a marked impact on poverty reduction, demonstrating the ability of digital tools and services to benefit the most vulnerable. Kenya is also home to one of the most vibrant digital entrepreneurship communities in Africa, which have spawned an expansion of digital application and services, making Kenya a regional-leader in terms of both e-government and e-commerce. Finally, the Government of Kenya has made strides in expanding the number of public digital platforms and services available and is making a concerted effort to introduce digital skills in the national education systems and nurture digital talent through a host of public initiatives.

Retaining competitive advantage as an innovation leader requires breaking the shackles that bind the ecosystem and prevent further advancement. As an early mover and leader of the digital revolution across the African continent, it would be all too easy for Kenya to rest on its laurels. But as the pace

¹ Adult literacy rate, percentage of people age 15 and above, UNESCO

² ILO estimate

³ World Bank Sustainable Energy for All, 2018

⁴ Economic Survey 2019, Kenya

⁵ Ministry of Information, Communication and Technology

of technology innovation and growth of the global digital economy continue to accelerate, Kenya's citizens, businesses and the government will need to run even faster just to keep pace. For example, despite Kenya's vibrant digital entrepreneurship community, digitization still fails to permeate many traditional industries and too many individuals still do not have affordable access to broadband and digital devices or the knowledge to use them productively and safely.

Macro-level challenges related to poverty and equality still characterize Kenya's digital economy, which contribute to a lingering digital divide. Income remains a key determinant of access and usage of digital devices, broadband and e-services (both public and private) in Kenya – with the affordability of handsets and credit reported as the main barrier to access and usage, followed by basic and digital literacy.⁶ An urban-rural divide also dominates Kenya's digital economy landscape, where rural communities remain underserved by existing digital infrastructure, digital skills initiatives and digital entrepreneurship support networks. Equally, women remain underrepresented in tech and persistent gender gaps remain in relation to mobile internet penetration (4%), awareness of mobile internet (16%), as well as spending on mobile services (29%).⁷

As the Fourth Industrial Revolution unfolds, Kenya will need to prepare for upcoming disruptions. Countries will see changes in labor markets, growth in new occupations, new ways of organizing work, new skills requirements in jobs and new tools to augment workers' capabilities. For an optimistic vision of the future to become a reality, it is essential for Kenya to address the existing challenges and not just to develop the skills and resources needed today, but also to start building the skills and resources needed to successfully leverage the technological advances of tomorrow.

⁶ GSMA, 2019, the Mobile Gender Gap Report.

⁷ Ibid.

Focus Box: Cross cutting challenges constraining development of Kenya's digital economy

- **Ensuring that the digital economy is more inclusive.** The benefits, or so-called digital dividends, that arise from increase digital access are well-documented – including greater access to services and information that help reduce transaction costs, vulnerability and increase productivity, etc. Making handset and digital services more affordable and enabling network and digital services rollout in rural areas remains a top priority – ensuring that all Kenyans regardless of age, gender and geography have access to digital tools and services will be key to an inclusive Kenyan digital economy.
- **Addressing growing market concentration.** While competition in the telecoms market has helped drive down prices, key market segments could benefit from greater competition, which would inter alia help boost access to connectivity and new digital financial services. The dominance of vertically integrated players in one market segment such as mobile money, mobile connectivity, content or e-commerce can have spillover effects in other market segments as consumers become locked into a single network and smaller players have difficulty competing. This is presenting a challenge to long term dynamism of Kenya's digital economy and a drag on investment, innovation and consumer welfare.
- **Supporting more agile and enabling regulation and policy.** While a permissive and enabling regulatory environment has helped foster early growth in digital financial and connectivity services, Kenya's regulatory environment has in many cases struggled to keep pace with evolving market dynamics and emerging technology. Today, regulatory inertia and overlapping mandates means that Kenya increasingly struggles to address critical regulatory issues related to, for example, ensuring competition in the era of platformed-based economies, responding to new cyber security threats and supporting safe data sharing across borders. Regulation will be key to creating a level playing field that can foster innovation – for example, by introducing policies that are conducive to start-ups and do not discriminate based on business or institution type. With growing market maturity, there is also a need to enforce greater market discipline, for example, pertaining to digital financial services and e-commerce, improving aspects such as consumer protection.
- **Creating a trust environment.** Enhancing regulation and capacity for enforcement in areas such as data protection and cybersecurity will also be instrumental in helping to create a more robust trust environment, which is a pre-requisite for new digital services to thrive and their uptake to increase – this notably includes the introduction of the new digital ID system (Huduma Namba), the expansion of public and commercial e-services, and use of e-payments. Increasing consumer awareness is another critical piece.
- **Enhancing digital human capital.** While Kenya still ranks as a top performer in terms of digital skills in Africa, gaps in basic digital skills still limit the usage and application of digital tools and services. Similarly, a weak supply of digital talent emerges as a key constraint for the development of new, innovative and home-growth digital services and business-models. As most jobs are expected to become more ICT-intensive¹, broadening the digital skills base will be key to protecting jobs and facilitating access to new ones. Building a tech-savvy workforce is key to harnessing emerging opportunities in high growth sectors, supporting relevant and productive employment, and job growth.

- **Taking a user-centric approach to public e-services.** Offering more efficient digital public services can help drive digital adoption. Achieving greater interoperability and integration of systems and infrastructure, as well as better process re-engineering can help improve the user experience. Fragmentation still characterizes many aspects of government's e-government program.
- **Supporting regional digital integration.** Ultimately, many of the benefits that stem from greater digitization are generated by increased productivity and lower transactions costs, generated by network effects and economies of scale. By working with its neighbors to support the creation of a larger digital market, Kenya can help maximize the impact of its investments and reforms to enhance its competitiveness and achieve digital transformation far greater than the sum of its parts. Increased regional integration is thus critical to the long-term success of Kenya's digital economy.

2.1.2 Kenya's National Development Strategy & the Digital Economy

Kenya Vision 2030⁸ is the national development blueprint that highlights the development of the Information, Communications and Technology space as a priority. Vision 2030 aims to transform the country into a globally competitive, middle income country offering a high quality of life for all citizens by year 2030. IT-Enabled Services (ITES) is a core economic pillar in Vision 2030, being implemented by the Ministry of Information, Communications and Technology. Ministry of ICT's ⁹ vision is to 'be the leader in transforming Kenya into a regional ICT hub and a globally competitive digital economy'.

National ICT master plans and innovation centric policies provide the requisite foundation and structure to the ICT landscape. The National ICT Master Plan (2014-2018)¹⁰ initiated flagship projects such as a Science & Technology Parks and an ITES centre in Konza Technopolis. A new policy framework for Science, Technology and Innovation (STI) was developed in 2012,¹¹ strengthening the governance framework, through new agencies, including the National Commission for Science and Technology (NCST)¹², Kenya Innovation Agency (KENIA)¹³, and the National Research Fund (NRF)¹⁴. In addition, Kenya is also actively working with other East African Community (EAC) member countries to formulate an East African Regional Science, Technology and Innovation (STI) Policy, with support from The United Nations Educational, Scientific and Cultural Organization (UNESCO).¹⁵

Government ministries and programs play an enabling role in the innovation and technology space. The Ministry of ICT, and the ICT Authority have been set up with the objective of advancing the ICT agenda. The government has also launched specific programs focused on developing the entrepreneurship ecosystem, including the Constituency Digital Innovation Hubs¹⁶ and Pasha Centres¹⁷ - which are digital centres being set up across the country to bridge the rural-urban digital divide. Direct support programs have also been launched. These include; the Presidential Digital Literacy Program,¹⁸ and the Huduma Whitebox Program¹⁹; these are helping to impart digital skills and to provide entrepreneurs a platform for pitching their innovations to the government respectively.

⁸ Kenya's Vision 2030, online at <https://vision2030.go.ke/>, accessed at 05/03/2019

⁹ Ministry of ICT, online at <http://www.ict.go.ke/>, accessed at 05/03/2019

¹⁰ National ICT Master Plan (2014-2018), ICT Authority, 2014

¹¹ Science, Technology and Innovation, sector plan, Ministry of Education, Science & Technology, 2012

¹² National Commission for Science, Technology and Innovation

¹³ Kenya National Innovation Agency, online at <http://www.innovationagency.go.ke/>, accessed at 05/03/2019

¹⁴ National Research Fund, online at <http://www.researchfund.go.ke/>, accessed at 05/03/2019

¹⁵ Towards an east African regional STI policy, online at http://www.unesco.org/new/en/member-states/single-view/news/towards_an_east_african_regional_science_technology_and_inn/, accessed at 05/02/2019

¹⁶ Constituency Digital Innovation, according to the Ministry of Information, Communications and Technology, "The objectives of the project are to support entrepreneurs and access to free Wi-Fi in all the 290 constituencies countrywide. It will also enhance awareness and uptake of on-line platforms for employment and business opportunities"

¹⁷ Pasha Centers, Launched in 2011 by the Information, Communications and Technology Authority

¹⁸ President's Digital Literacy Program, Ministry of Information, Communications and Technology

¹⁹ Huduma Whitebox initiative, joint project of the Ministry of Information, Communications and Technology and ICT Authority

The Big 4 Agenda, along with Medium Term Plans (MTPs) and support of intergovernmental agencies is targeted towards building the digital landscape. The overarching Vision 2030 has catalysed the economic transformation of the country towards a digital society. This course is now reinforced through the Big Four agenda,²⁰ a five-year action plan that puts strategic importance on ICT as a key enabler to realize immediate priorities (food security, universal healthcare, housing, manufacturing). The Vision 2030 and Big 4 Agenda are being implemented through a succession of five-year Medium-Term Plans (MTPs). One of the themes of the Third MTP (2018-2022)²¹ is to develop the innovation space further by establishing Konza Technopolis as a smart and sustainable ecosystem, establishing greater national STI parks and implementing Science, Technology, Engineering and Mathematics (STEM) education programs.

2.2 Structure of this Report

The chapters that follow present a summary of key diagnostic findings and the current state of the five foundational pillars of Kenya’s digital economy. The first chapter discusses the current access, quality and resilience of digital infrastructure, as well as the availability and affordability of connectivity. The second chapter analyzes the current application, as well as capacity to expand the use of digital platforms - both in the public and private sector. The third and fourth chapters turn to examining the current state of digital financial services and the digital entrepreneurship ecosystem, respectively. The fifth chapter looks at the current state of digital skills attainment and coverage, in relation to the basic, advanced and e-business skills needed to support further uptake of digital services, and application of digitally enabled solutions. The report concludes with a summary of next steps.

2.3 Limitations and data gaps

The analysis presented in this report is subject to the constraints posed by the current availability of data pertaining to the digital economy in Kenya. In undertaking this diagnostic several data gaps and discrepancies were identified - notably, in relation to connectivity and skills. Supply-side data also proved to be more readily available than demand-side data, particularly in relation to digital platforms and services. These gaps highlight the need to improve related data collection, as a means to both improve policymaking and track progress pertaining to digital economy development. Equally, further analytical efforts are needed to estimate the true contribution of ‘digital’ to overall economy growth and job creation, which were beyond the scope of this analytical exercise.

²⁰ The Big 4 Agenda, online at <https://big4.president.go.ke/>, accessed at 06/03/2019

²¹ Third MTP (2018-2022) for Vision 2030, online at <http://www.mtp3.go.ke/>, accessed at 06/03/2019

3 Digital Infrastructure

Key messages:

- Progressive policies, regulations and strategic public investments have boosted investments and access to broadband in Kenya. The reach of broadband networks is growing, prices have been falling, and network speeds are increasing.
- However, a significant digital divide remains along lines of income, geography (rural -urban) and gender. Services and devices are still unaffordable to many Kenyans relative to average incomes. Equally, low digital literacy, lack of relevant digital content and services, as well as weak access to electricity prevents wider uptake.
- Kenya’s “first mile” infrastructure, supported by four submarine cables, is relatively robust and competitive, benefitting from high network speeds and rapidly falling prices – and more new cables are on the way.
- Kenya’s “middle mile” infrastructure, supported by its backbone and metro networks, is also relatively robust along primary routes and around major cities and towns, yet remains limited in rural areas. Moreover, pricing, quality and reliability remain key challenges.
- Market concentration is a growing concern in relation to “last mile” infrastructure – notably in the mobile networks market through which most users access the internet.
- Regulations (referred to as the “invisible mile”) are no longer keeping pace with rapid sector evolution. Regulatory inertia and overlapping mandates between institutions is hindering the country from preparing for the digital economy of the future.

3.1 Importance of Digital Infrastructure

Often hailed as the “Silicon Savannah”, Kenya’s strong digital infrastructure has fueled innovation, entrepreneurship and investment in the broader ICT sector, helping the country become a global leader for innovation in mobile and internet technology. Indeed, Kenya is ranked among the 10 highest performing countries in Africa by the WEF’s NRI, which assesses how well economies are using ICTs to boost competitiveness and well-being.

3.1.1 Socioeconomic Rationale for Digital Infrastructure Development

Robust connectivity through broadband is a critical foundation to fast-track its socio-economic development agenda. Kenya’s ICT sector already contributes approximately 7 percent of the country’s GDP, and this is expected to increase. McKinsey estimates that increased access to the Internet could contribute up to US\$300bn to Africa’s GDP by 2025, with the largest impact felt on the following six sectors of the economy: education, health, agriculture, financial services, retail, and government

Improving backbone connectivity infrastructure can allow the private sector to develop solutions for the last mile and marginalized groups. Almost 75 percent of Kenya’s population lives in rural areas²², where health services are of poor quality, communities are less connected, and agriculture accounts for more than 70 percent of employment. Some initiatives are already demonstrating the power of digital technologies to bridge the gap between urban and rural citizens. Innovative internet service providers and startups such as BRCK, Surf and UjuziKilimo, are connecting off grid schools and communities to the internet through solar-powered devices and hotspots and helping farmers to measure soil characteristics to understand soil quality and improve farming productivity.

²² KNBS, 2018

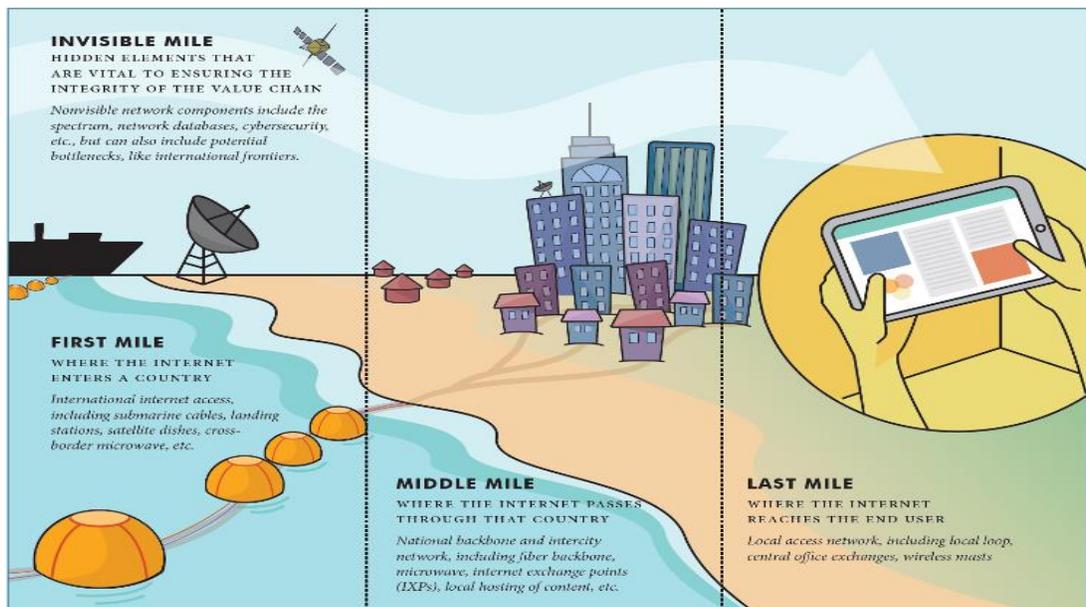
3.1.2 Alignment with Country Development Strategy & Goals

Kenya's long-term vision to become a middle-income country by 2030 requires state of the art connectivity through a robust telecommunications network. The potential dividends from a strong digital infrastructure foundation are immense, with well-documented links between broadband infrastructure and long-run rates of economic growth. The need for universal access to ICT infrastructure is articulated by draft National ICT policy (2017), which seeks to create "conditions that enable the use of always-on, high speed, wireless, internet across the country" and "frameworks that support the growth of data centers, pervasive instrumentation underpinning the Internet of Things (IoT), machine learning (ML) and local manufacturing while fostering a secure, innovation friendly ecosystem".

3.2 Diagnostic Findings: Current State of High-Speed Internet Development

This section assesses the digital infrastructure value chain in Kenya, from the First Mile (international connectivity), through the Middle Mile (the fiber optic backbones and inter-urban networks), to the Last Mile (access by end users) and the Invisible Mile (supporting policy, regulation, institutions and other intangible parts of the digital infrastructure network such as spectrum, licensing, taxation, competition, and cybersecurity) – see figure 2-1. Digital infrastructure, particularly middle-mile and last-mile, remains under-developed, has limited the spread of broadband. Growing bottlenecks in the invisible mile are likewise denting market competitiveness and modernization.

Figure 3-1 Key components of internet access and development



3.2.1 Availability and access to broadband

Kenya's Internet usage has steadily increased in recent years - over 16 percent²³ of its citizens were connected to the Internet in 2017, which is slightly higher than the East African average²⁴. Moreover, usage is growing quickly. As the cost of ICT services has continually dropped, demand has grown, illustrated by a steady increase in the penetration of voice (86.1 percent) and internet access (16.6 percent)²⁵. Almost 99 percent of Kenyans that access the Internet do so through mobile networks - limiting their user experience and creating challenges with data usage. The fixed-line market is negligible, with about 70,000 subscribers.

²³ ITU, 2017

²⁴ Reliably comparable cross-country data is difficult to find aside from the ITU, which is reported with a significant time lag. Alternative metrics suggest that the internet penetration levels are now much higher than 16% and significantly higher than neighboring countries.

²⁵ ITU, 2017. It should be noted that ITU data is reported with a significant time lag and the penetration rates noted in other indices are significantly higher.

Kenya's rural majority is underserved. Access is especially challenging in rural and remote areas, where about 75 percent of the country's population resides. Outside of Nairobi and Mombasa, broadband access is limited. Only 17 percent of Kenya's rural population reported using Internet on a weekly basis, compared to 44 percent of the urban population²⁶. Margins and average revenue per user (ARPU) remain extremely low in rural areas – a dynamic which limits the business case for further infrastructure investment by the private sector. Tackling this urban-rural digital divide, as well as divides along the lines of gender, age and disability, will be imperative to ensure that all Kenyans benefit from investments in digital infrastructure and services, and the subsequently the wider digital economy. Pricing remains prohibitive for many - the cost of 1GB of data is around 4 percent of national monthly income, double the projected global affordability target of 2 percent.²⁷ This puts access out of reach to the poorest individuals, particularly affecting the rural poor, the elderly, women, and other marginalized groups.

3.2.2 Analysis of Sector and Market Structure

Kenya has one of the most robust digital infrastructure markets in the region. At the national level, a combination of early liberalization of the telecom sector, improvements to the national backbone, as well as strategic regulatory interventions to create an enabling environment have yielded positive results in terms of private sector investment in communications infrastructure and services. The ICT market was estimated to be worth US\$ 5.48bn in 2017, an increase of about 32 percent from the previous year.²⁸

Competition between four mobile operators (Safaricom, Airtel, Telkom and Jamii) has contributed to a mobile penetration rate that is much higher than the East African sub-regional average (86.1 percent compared to 62.8 percent), and reduced prices for both mobile voice and Internet services. However, market concentration is a growing concern, as Safaricom (the largest of the four operators) has consistently maintained a dominant market share over the last 10 years. It currently holds a 65 percent share of the mobile market, which is reinforced by its dominance within the domestic mobile money market. Airtel and Telkom Kenya, the second and third largest operators in the country, have publicly declared their intention to merge and consolidate their customers and infrastructure to help them compete. This merger could potentially create a stronger challenger to Safaricom, as they would then hold a combined 30 percent share of the mobile market. However, the merger also contributes to further reduction in the number of market players, potentially harming competition. The recent award of a 4G license to Jamii Telecom is expected to strengthen competition in the mobile broadband sector, though the lack of a paired voice offering is likely to limit uptake of Jamii's services, as users have to carry multiple devices or SIM cards.

Table 2 Kenya ICT Sector Benchmarking

Indicator	Kenya	East Africa	North Africa	Mauritius (49 th on NRI, 1 st in Africa)	Korea (13 th on NRI)	Singapore (1 st on NRI)
Penetration:						
Internet Usage (%)	16.6	16.4	44.4	53.2	92.7	81
Mobile Cell. Subscription (per 100)	86.1	62.8	109.3	144.2	122.7	148
Fixed BB Subscription (per 100)	0.6	0.8	5.5	16.9	41.1	25.6
Source: ITU 2017						
Affordability:						
Fixed-BB basket (% of GNIPC)						
Mobile-cellular basket (% of GNIPC)	37.9	27.8	9.4	0.3	1.5	0.5
Mobile broadband 1GB (% of GNIPC)	4.0	9.7	2.9	0.6	1.2	0.2

²⁶ Gallup, 2014

²⁷ The global affordability target set by the Alliance for Affordable Internet (A4AI)

²⁸ Frost and Sullivan, Digital Market Overview, Kenya

Source: ITU 2017 & GSMA 2018 for Tariffs	4.0	9.7	2.3	1	0.4	0.3
Coverage:						
2G Population Coverage (%)	68.9	63.3	95.5	--		
3G Population Coverage (%)	85.0	58.3	95.9	95.4	99	100
4G Population Coverage (%)	36.8	20.1	43.4	36.7	99	100
Source: GSMA 2018						

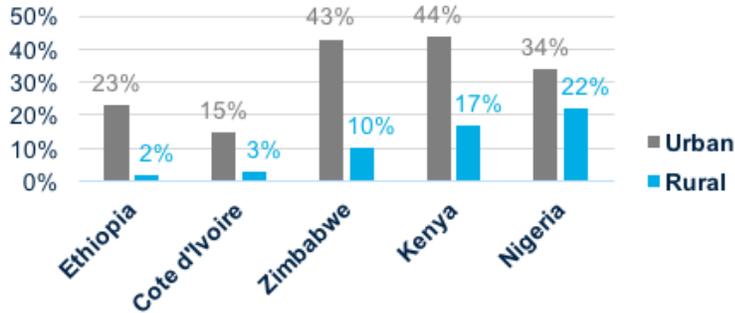
At the regional level, Kenya, together with Uganda, Rwanda and South Sudan are collaborating to remove cross-border roaming and reduce interconnection rates to lower consumer costs and increase cross-border traffic. This ‘One Network Area’ (ONA) collaboration has had remarkable success, resulting in massive growth in cross-border voice traffic, tripling in both Kenya and Uganda, increasing nearly five-fold in Rwanda and thirty-fold in South Sudan. However, recent reports suggest recent challenges with implementation due to uneven enforcement of tariff regimes by some countries.

As Kenya acts as a transit hub for international bandwidth (serving landlocked Uganda, Rwanda and South Sudan), improvements in the robustness and competitiveness of Kenya’s domestic backbone infrastructure and submarine cables is also helping to lower the costs and improve the user experience of its landlocked neighbors. This, in turn, is helping to build the size of the regional “online” market population and user base for Kenyan digital services and commerce, as well as building a stronger case for Kenya as a regional digital investment hub.

3.2.3 Constraints to High-Speed Internet Development

While Kenya’s connectivity infrastructure is competitive, the country’s rural reality poses many barriers to internet and data services access. The Government’s 2018-2023 Broadband Strategy notes that in some parts of the country, people have to walk more than two kilometers to access mobile cellular signal, with no fixed line internet access possibilities. This in part due to a high concentration of fiber and other connectivity infrastructure along the same limited routes and low investment in backbone infrastructure in counties and secondary cities. This remoteness and limited connectivity are particularly felt in 13 counties - from Turkana to Mandera, and further down to the Tana River. Studies from across the country have found that 1244 sub-locations had zero 3G coverage and a further 977 had less than 50 percent coverage. An estimated 22 percent of the country’s population is without access to 3G broadband services.²⁹ A 2014 Gallup survey reported that 44 percent of Kenya’s urban population uses internet, on a weekly basis, yet this figure is only 17 percent for Kenya’s rural population – see figure 2.2.

Figure 3-2 % weekly Internet use among urban vs. rural population (2014)



²⁹ Communications Authority, 2016, ICT Access Gaps Study

In terms of internet speed, Kenya is ranked second in Africa (10.11 Mbps), behind only Madagascar with (24.9Mbps) but lagging behind global players. While Kenya is one of only two countries in Africa with internet speeds above the minimum 10Mbps, which is considered to be the requisite for consumers “to fully participate in a digital society”, this is only 1/6th that of global peers such as Singapore with 60.39Mbps. Moreover, the high-speed experience near coastal submarine cables and major cities is not replicated throughout much of the country.

There are additional demand side constraints. These include lack of relevant digital content and applications, shortage of demand side skills to enable broadband services to be used effectively, and insufficient levels of trust and security of broadband infrastructure and services. *These issues are discussed in further detail in later chapters.*

3.2.4 First Mile: International Connectivity

The country’s coastal location, which gives it direct access to international connectivity, places Kenya at a distinct advantage when compared to its landlocked peers. Prior to 2009, the country’s only internet gateway was through costly satellite links, but since then, submarine cables have quickly surpassed satellite as the predominant means of connecting Kenya to the global Internet. There are currently four submarine networks³⁰ landing on Kenya’s shores, with an overall bandwidth capacity of 4,617 Gbps³¹. The total amount of available international bandwidth has rapidly increased, rising nearly 200 percent between 2015-2018.

However, international bandwidth capacity is rising much faster than consumption, though both metrics are increasing. The current utilization rate is 21percent. Although this is twice the rate for most African undersea cables,³² it has dramatically decreased from a rate of over 50percent in 2015. Despite the rapid fall in wholesale prices³³, international traffic growth appears to be muted due to both positive and negative factors. On the positive side, development of more robust internet exchange points and increased local hosting of content enables a much larger share of traffic to be retained domestically, avoiding the need for international transit. The excess capacity also creates an even greater opportunity to serve as the traffic and datacenter hub for the landlocked countries of the region. On the negative side, downstream constraints including deficiencies in middle and last mile infrastructure makes it difficult to stimulate demand (discussed below) at the same pace as growth in capacity. For example, the predominance of mobile broadband and limited “always on” broadband offerings skew user consumption patterns toward lower bandwidth services and content.

Demand for international bandwidth is expected to increase, with a growth in broadband subscriptions and increasing demand for digital services. Four operators are rolling out fiber-to-the-premises (FTTP) networks (Wananchi’s Zuku, Liquid Telecom, Telkom Kenya and AccessKenya), competing in Nairobi and other large cities. This is projected to increase demand for international bandwidth, based on an expected shift in consumer behavior in response to wider availability of “always on” and unlimited bandwidth. Private submarine cable operators are already positioning themselves to leverage this opportunity, which will also support growth in cloud-based services more broadly. Three new submarine cables are expected to land in Kenya, in the coming years, bringing some additional 100Tbps of capacity³⁴. This additional infrastructure is expected to provide redundancy and should also increase competition, driving down international wholesale bandwidth costs even closer to zero

³⁰ The four Submarine cables are: The SEACOM system (15,000 Km), The East African Marine System (TEAMS) (4,500 Km) the Eastern Africa Submarine Cable System (EASSy) (10,000 Km) and the Lower Indian Ocean Network 2 (LION2) (2,700 Km).

³¹ As of September 2018.

³² Xalam Analytics Report, 2016, The Future of African Bandwidth Markets: African International Capacity Demand, Supply and Economics in an Era of Bandwidth Abundance

³³ Increased supply, and competition for international traffic has resulted in a reduction of wholesale broadband prices by more than 90percent from about US\$7,500 Mb/s per month via satellite in 2007³³ to as low as US\$10 Mb/s per month via submarine cable today.

³⁴ These are i) Africa-1, a 12,000km cable which will link Africa, the Middle East and South East Asia, with onward connectivity to Europe, ii) The Pakistan East Africa Cable Express (PEACE) submarine system will span approximately 8,800km to connect South Asia (via Pakistan) and East Africa (via Djibouti and Kenya), and iii) Djibouti Africa Regional Express (DARE) a 5,400km cable connecting Somalia, Djibouti and Kenya.

and opening opportunities for new offerings and consumption of bandwidth-heavy applications and content.

3.2.5 Middle Mile: Backbone Networks

The country's terrestrial backbone network, which connects Kenya's submarine landing stations, population centers and neighboring countries, is fairly extensive. The government has deployed 70 percent of Kenya's terrestrial backbone infrastructure through three different entities: The National Optic Fiber Backbone Infrastructure (NOFBI), the Kenya Power and Lighting Company (KPLC) and the Kenya Electricity Transmission Company Ltd (KETRACO). The private sector contributes about 30 percent of Kenya's backbone infrastructure. Several mobile operators, together with Broadband Infrastructure providers such as Liquid Telecom, are competing to develop an extensive, albeit in some cases duplicative, backbones, as well as metro fiber which mostly serve Nairobi and Mombasa.

Kenya's supporting Internet Exchange Points (IXP) infrastructure is also playing a significant role in strengthening the middle mile. Kenya has two IXPs: the largest, KIXP, is located in Nairobi and was licensed in 2001; and the second was launched in Mombasa in 2016. KIXP is one of the largest and most efficient IXPs in Africa. It has about 68 members, ranging from ISPs, government, education networks, the country code top level domain (ccTLD) Operator, Internet Backbone Gateway Operators, mobile network operators (MNOs) and Value Add Services Providers. IXPs allow internet users to interconnect with each other and ensure local traffic/content is exchanged locally, improving latency and obviating high fees required for international transit.

The National Optic Fiber Backbone Infrastructure (NOFBI) which spans 9,000km, connecting all major cities, county and sub-county headquarters is effective, albeit with some performance challenges. Providing high-speed connectivity and interconnecting local area networks (LANs). NOFBI is a government-owned network, operated through a management contract held by Telkom Kenya. It offers both wholesale, active services and dark fiber to internet service providers and mobile operator. Thereby enabling them to offer last-mile connectivity services to retail customers and providing network redundancy for operators that wish to complement their own backbone infrastructure. While stakeholder consultations revealed that there is an appreciation for NOFBI's extensive geographic coverage, quality remains a significant challenge. Quality issues include frequent outages and slow response times for restoration of service due to the low quality of initial installation, inadequate maintenance and poor coordination with other government entities. This results in frequent cuts during infrastructure works (particularly along roadways). These quality issues have led several operators to deploy their own infrastructure, along critical routes, rather than rely on NOFBI. While the additional competition is positive, a lack of infrastructure sharing also raises the overall costs of service delivery.

3.2.6 Last Mile: Internet Services

Last-mile broadband connectivity is predominately provided by Mobile Network Operators (MNOs) - with Safaricom owning and operating the lion's share of Kenya's last-mile mobile infrastructure. As of May 2018, there were 6,600 mobile towers in Kenya, 18percent of which were independently owned, while 82percent were owned by MNOs (mainly Safaricom).³⁵

Independent tower companies are increasingly playing a key role in reducing the cost of mobile communications - While still a minority of the market in Kenya, tower companies are increasingly playing a key role in reducing the cost of mobile communications. Across Africa, it is estimated that the cost for space and energy is reduced by about 20 percent when towers are shared between operators. This is a critical component to the business case of rural service provision where profit margins and ARPU are extremely low. The tower market in Kenya consists of one independent tower company, Eaton Tower, and the three MNOs - Safaricom, Airtel and Telkom Kenya.

³⁵ IFC, 2018

ISPs are also playing a key role in providing connectivity to low margin geographic areas as well as to the lowest income customer base, where mobile (GSM) services are inadequate. Notable Operators include BRCK and which provides a free public Wi-Fi network in public places in Nairobi, and Mawingu which operates as an ISP and delivers secure, broadband standard high-speed Internet to homes and businesses in rural counties. The Government endeavors to reduce their infrastructure deployment and operating costs (including fees, planning permissions and taxes), boost digital awareness, literacy and services offerings, and lower the costs of accessing digital devices – all factors critical to further expansion of ISP business models.

Additionally, the Universal Service Fund (USF) and other government initiatives have been making progress to expand connectivity access to rural and underserved populations, although progress has been incremental. The USF, administered by Communication Authority (CA), has collected KSh 5.3bn (US\$53m) since 2013 to fund projects supporting connectivity access.³⁶

Table 2 Kenya ICT Sector Benchmarking

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Internet Usage (%)	16.6	16.4	44.4	53.2	92.7	81
Mobile Cell. Subscription (per 100)	86.1	62.8	109.3	144.2	122.7	148
Fixed BB Subscription (per 100)	0.6	0.8	5.5	16.9	41.1	25.6
Source: ITU 2017						
Affordability:						
Fixed-BB basket (% of GNIPC)						
Mobile-cellular basket (% of GNIPC)	37.9	27.8	9.4	0.3	1.5	0.5
Mobile broadband 1GB (% of GNIPC)	4.0	9.7	2.9	0.6	1.2	0.2
Source: ITU 2017 & GSMA 2018 for Tariffs						
Coverage:						
2G Population Coverage (%)	68.9	63.3	95.5	–		
3G Population Coverage (%)	85.0	58.3	95.9	95.4	99	100
4G Population Coverage (%)	36.8	20.1	43.4	36.7	99	100
Source: GSMA 2018						

3.2.7 Invisible Mile: Legal, Policy and Regulatory Environment

Strengthening cybersecurity and protecting citizens' data is key to the uptake of broadband services in Kenya. There are a number of challenges constraining demand stimulation and usage, including a weak trust environment for online transactions and unclear data protection policies. *These issues are discussed in further detail in the next chapter.*

Overall, there have been difficulties progressing critical sectoral regulations due to political economy and capacity constraints as well as overlapping regulatory mandates. Review and approval processes, which involve the Ministry of Information, Communication and Technology (MoICT), the Attorney General and Parliament, are cumbersome and fraught with structural delays. The requirement for Parliamentary approval of new regulations seems to be preventing new regulations from moving ahead and is contrary to best practice.

³⁶ 2018 figure

Some critical regulations for the sector that have been pending promulgation include, but are not limited to:

- The Kenya Information and Communications (Radio Communications and Frequency Spectrum) Regulations;
- The Kenya Information and Communications (Compliance Monitoring, Inspection and Enforcement) Regulations;
- The Kenya Information and Communications (Fair Competition and Equality of Treatment) Regulations;
- The Kenya Information and Communications (Interconnection and Provision of Fixed Links, Access and Facilities) Regulations;
- The Kenya Information and Communications (Tariffs) Regulations;

3.3 Recommendations & Next Steps

3.3.1 Improving Internet Service Availability & Connectivity

While Kenya is well above its regional peers in terms of leveraging digital technologies to create new markets and innovative services, more needs to be done to make the country globally competitive and ensure digital dividends are evenly distributed. The cost, quality and reach of telecommunications infrastructure is critical for innovation and developing services that are targeted to the poor. In line with the Government's objective for an inclusive and transformational growth agenda, a more comprehensive, robust and affordable nationwide network is required. Providing affordable broadband access to ALL Kenyans will require a combination of interventions at the national and regional levels that equally improve the supply and demand for digital infrastructure.

Proactive efforts are needed to increase market competition. Having a dominant player in the market threatens the viability of other players and affect their ability to invest in network expansion. It also limits consumer choice and undermine incentives for price reduction. The Communications Authority (CA) 2018 Market Competition Assessment made the following recommendations to address market dominance and improve competition, which have not yet been addressed: i) requiring Safaricom to provide other Tier 1 mobile operators with access to tower sites in some 7 designated counties, where there is the largest disparity between the number of Safaricom sites and the number of sites deployed by the other two Tier 1 mobile operators; ii) imposing retail price controls; iii) prohibiting on-net discounts; and ii) prohibiting surcharges for cross-platform money transfers. The report should be published, and the recommendations should be implemented.

The ICT Infrastructure Sharing Guidelines, pending since 2016, should be updated, adopted and enforced. The regulations should include clear guidelines for core telecom infrastructure, as well as complementary infrastructure, including that provided by the Utility Companies KPLC and Ketraco. More efficient sharing will help limit concentration and duplication of infrastructure in more profitable areas and redirect resources to underserved communities.

Improve network reach, quality and management to maximize the benefits of NOFBI. Technical weaknesses in the network must be addressed and the management model should be reviewed with an eye toward incentivizing performance and utilization for downstream benefits. Once NOFBI performance and management issues are addressed the government could consider an integrated management of all the government owned fiber to create a seamless and open access wholesale fiber-optic backbone, which would have drop points in every county and sub-country, lowering the cost of last-mile infrastructure. NOFBI should continue to offer both dark fiber as well as active services without restriction or bias toward either offering to maximize the flexibility of last-mile providers to adopt the offering that best fits their business model. Further expansion of NOFBI should also be considered to extend reach to less commercially profitable, more rural areas and establish additional links to neighboring countries.

Empower the CA to enact and enforce critical regulations to unlock infrastructure investment, ensure competition, protect consumers and encourage innovation. Active consideration should be given to

streamlining the regulatory processes, which have led to a substantial backlog in modernization of the regulatory regime and adoption and enforcement of pending regulations. The raft of long pending regulations relating to spectrum, competition, interconnection, tariffs, infrastructure sharing, etc. should be updated and fast-tracked for review and adoption.

At the regional level, Kenya needs to look beyond its borders to build its digital economy – finding new customers for its digitally enabled firms across the region’s digital market. Given the importance of network effects and economies of scale in the digital economy and the benefits of collaboration with neighbors to invest in critical public goods including advanced digital skills, the domestic market alone is not sufficient to achieve the Government’s transformational aspirations. Kenya also needs to be more proactive in stimulating demand for the international bandwidth that is coming through its shores. More efficient pricing will provide additional opportunities for Kenya to serve as the traffic and datacenter hub, particularly for the landlocked countries of the region. There is an opportunity for the government to reassess TEAMS’ pricing and utilization to improve its competitiveness.

4 Digital Platforms

4.1 Importance of Digital Platforms

Key messages:

- Kenya ranks as a regional e-government leader. A wide range of public platforms and applications for service delivery, as well as internal efficiency and productivity have been deployed. Moreover, Kenya's institutional structures for supporting government digitization is emulated as best practice.
- Nevertheless, significant challenges remain in terms of achieving greater interoperability and integration, encouraging wider uptake and improving the end-user experience of public platforms and services.
- Duplication and fragmentation of digital public infrastructure, software and databases emerge as key issues, with a disconnect between central government and county government systems, as well as among various MDAs.
- Weak connectivity (for both service providers and customers) and human capacity constraints, including a lack of trust, awareness and training, prevent wider uptake.
- Systems suffer from weak user-centric design as well as adoption of digital business processes and are adversely affected by weak cyber and information security.
- While Kenya is also an e-commerce and digital services leaders on the continent, with a plethora of home-grown platform-based commercial solutions on offer - there is significant untapped potential for expansion, corresponding growth and job creation. Kenya still has a relatively small online consumer base, with limited purchasing power.
- Other issues that hamper related development include the cost of last-mile logistics for e-commerce; a weak trust environment (based on existing data protection and privacy, as well as counter-fraud and consumer protection provisions); a preference for face-to-face payment transactions; low adoption by SMEs; domestic and regional data localization as well as double taxation threats; and the tendency of global platforms to dominate the domestic market.

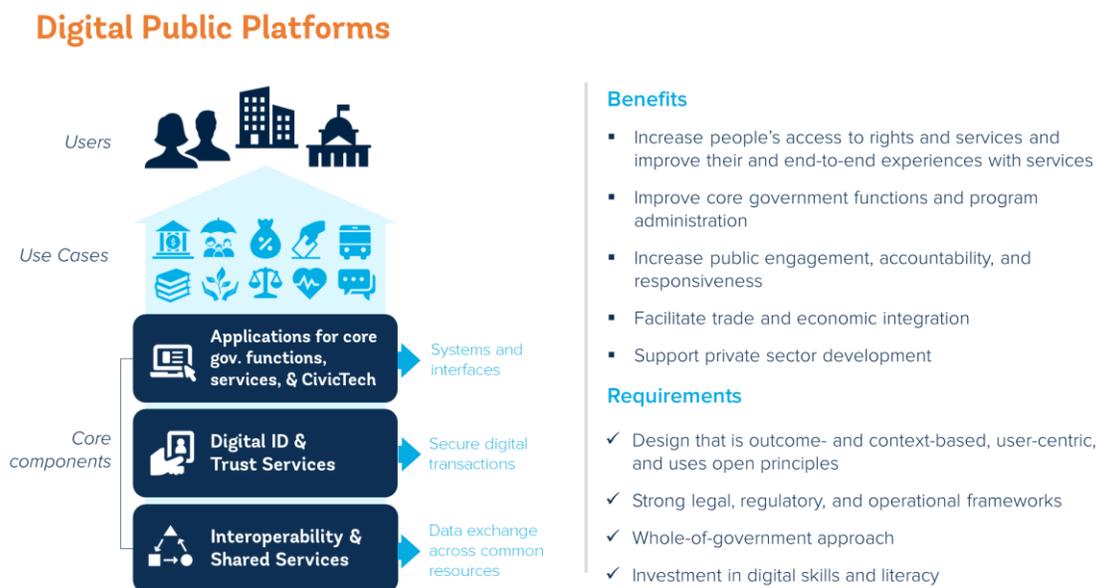
By connecting people and things, and facilitating digital transactions, digital platforms have the potential to transform the way Kenya's people, government, businesses, and civil society interact. As Kenya's digital economy continues to grow, digital platforms will play a crucial role in improving operational and economic efficiency, while simultaneously boosting service quality and accountability. Public, or Government platforms can provide new channels for service delivery, public engagement and feedback, as well as reduce leakage of public resources and corruption. Commercial digital platforms support the creation of a digital marketplace that can help foster greater competition and improve market intermediation. They can aggregate supply and demand, create new and inclusive markets and expand opportunities for Kenyan companies to scale domestically, across the region and beyond. Moreover, commercial platforms can offer innovative solutions and products that help bridge gaps in traditional service access or delivery, and address gaps in the market. As the largest and most digitized economy in East Africa, Kenya can position itself as the center of the region's e-commerce and digital services market.

4.1.1 Socioeconomic Rationale for Digital Platform Development

When public platforms leverage shared services and follow a "whole-of-government" approach, the digitalization of core government systems has the potential to revolutionize - Government-to-Government (G2G), Government-to-Citizen (G2C), and Government-to-Business (G2B) services leveraging shared platforms. This can lead to both operational and economic efficiency, as well as

boost service quality. The “build once, used by many” principle, associated with shared systems and infrastructure, can save the government both time and money by eliminating duplication.

Figure 3-4-1 Digital Public platforms: benefits & requirements



A robust digital ID platform can expand access to digitized services and transactions within Kenya and abroad. With the ability to reliably prove their legal identity through digital technologies, Kenyans can be empowered through easier secure access to basic services (e.g., financial, social protection, healthcare, and education), strengthened capacity to exercise rights (e.g., voting), and new economic opportunities (e.g., formal employment, property rights, and trade in digital products and services). When recognized across borders through regional frameworks, digital identities and e-signatures can also help accelerate trade and market integration by facilitating migration and secure digital cross-border transactions.

There is significant untapped potential to expand e-commerce in Kenya, which could help fuel future growth. While current usage and adoption of e-commerce is low, the potential is high, given the rapid uptake of digital products and services among the Kenyan population – notably mobile devices and services. Rapid adoption of e-commerce around the world has already fueled global GDP growth, harnessing a rich ecosystem of players including telecom operators, online businesses, startups, logistics and transport companies, shippers, manufacturers, sellers and the customers.³⁷ African e-Commerce is growing rapidly, at an estimated annual rate of 40 percent in terms of transaction value, albeit from a very low base and Kenya has an opportunity to capture a significant share of the market.

4.1.2 Alignment with Country Development Strategy & Goals

The government has established a clear vision for digital platforms in Vision 2030, particularly on the public sector side. Vision 2030 highlights the importance of digitizing government services.³⁸ Notably, MTP III emphasizes the role that public digital services will play in boosting access and improving the business environment.³⁹ However, the economic pillar of Vision 2030 also stresses the importance of linking SMEs to larger markets, where e-commerce can help play a major role. Digital platforms are also expected to play a key role in achieving the objectives of the Government’s 5-year Big 4 Agenda. Digital platforms can be used to optimize value-chains in manufacturing, health services, and link farmers to markets.

³⁷ https://unctad.org/en/PublicationsLibrary/tn_unctad_ict4d09_en.pdf

³⁸ Kenya’s Vision 2030, online at <https://vision2030.go.ke/>, accessed on 22/03/2019

³⁹ <http://www.doingbusiness.org/content/dam/doingBusiness/media/Annual-Reports/English/DB2018-Full-Report.pdf>

The importance of digital platforms is also indirectly articulated by various sector policies and strategies. The draft ICT Policy (2017) emphasizes the need to ensure that all government services are available online to enable easy access and quick delivery. Digital public platforms and public goods are central to these aspirations. The National Cyber Security Strategy (2014) emphasize the importance of trust and security to the development of digital platforms, such as e-commerce, as well as increased uptake of digital transactions and confidence among the users.⁴⁰

Box 1: Digital government and devolution

Devolution, as outlined under Article 174 of the 2010 Kenya Constitution, aims to promote social and economic development and the provision of proximate, easily accessible services throughout Kenya and to enhance government responsiveness to the needs of citizens. The devolved system of government also aims to promote equitable, efficient and prudent utilization of public resources.

Innovative use of technology can strengthen devolution, by for example:

- Promoting decentralized service delivery;
- Integrating otherwise separate islands of public systems through interoperable and shared digital infrastructure and systems; and
- Facilitating fiscal transfers

However, effective institutional and policy coordination between national and sub-national levels of government working on digital public platforms is a pre-requisite for technology adoption of key systems, as is adequate training and last-mile connectivity. This is exemplified by Kenya’s experience of facilitating county-level roll-out of key E-Systems – notably IFMIS and NEMIS.

4.2 Diagnostic Findings: Current State of Digital Platforms

4.2.1 Government Capacity to Offer Digital Government Services

Kenya has markedly expanded the use of digital public platforms over the last 10 years, with the introduction of various back-end and front-end IT systems, applications and services. Kenya ranks among Africa’s top performers in the United Nations’ global e-Government Development Index (EDGI) and among the leaders in East Africa. However, it is outperformed by small island states such as Mauritius, Seychelles, and Cabo Verde, upper middle-income countries such as South Africa and Namibia, as well as lower middle-income states such as Tunisia, Ghana, Egypt, suggesting significant scope for improvement.

Table 2 United Nations e-Government Development Index Scores

	EDGI 2018	Online services	Global ranking
Africa	0.34	0.36	-
Mauritius	0.66	0.72	66
South Africa	0.66	0.83	68
Tunisia	0.62	0.80	80
Seychelles	0.61	0.61	83
Ghana	0.53	0.69	101
Cabo Verde	0.49	0.48	112
Egypt	0.48	0.53	114
Rwanda	0.45	0.72	120
Namibia	0.45	0.45	121

⁴⁰ The strategy notes that a secure and trusted online environment will lead to added e-commerce applications and growth in the quantity of e-commerce transactions due to lowered business risk and uncertainty.

Kenya	0.45	0.62	122
Uganda	0.40	0.56	135
Tanzania	0.39	0.56	139
Nigeria	0.38	0.52	143
Ethiopia	0.34	0.63	151

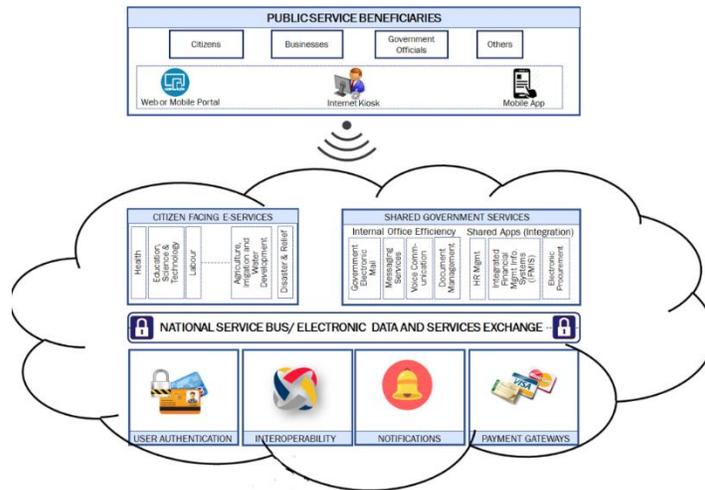
Source: UN

4.2.1.1 Interoperability layers and shared services

The Kenyan government is currently working to build a fully integrated and centralized “shared digital public services platform”, based on common digital infrastructure, software, information systems and services that can be re-used by any Ministry, Department or Agency (MDA) wishing to offer a citizen facing digital service. The platform is also expected to meet its back-office operational needs. Centrally shared services are also helping to create efficiency. Government email services are centrally hosted by ICTA. ICTA also manages the Shirikiana initiative⁴¹, which centralizes shared software license regimes and provision. See figure 3-2.

The government is moving towards a unified Government enterprise architecture, common IT standards and greater interoperability. The current Institutional framework (discussed further below) whereby the ICT Authority (ICTA) provides centralized technical expertise on all ICT-related projects and initiatives in government, has helped harmonize ICT infrastructure and standards across government. ICTA is guided by standards developed as part of a government enterprise architecture (GEA),⁴² designed to ensure alignment between the Government’s business and IT-related strategies, operating models, and principles, as well as support the implementation of technical standards that support greater interoperability and facilitate data exchange between various government platforms. While progress has been made in relation to achieving greater interoperability, many systems introduced remain rather fragmented.

Figure 4-2 Example of a “Shared Digital Public Services Platform”



Open application program interfaces (APIs) are increasingly enabling private sector developers to integrate government data directly into their platforms to offer new application and services. Likewise, government is able to integrate private sector platforms into their services offerings. For example, the government now pays pensions and remits funds to the elderly using commercially available mobile

⁴¹ Shirikiana was a Transparency Communication Infrastructure Project (TCIP) initiative supported by the World Bank for Oracle and Microsoft clouds and unified licenses. Microsoft was wound up in 2018 and Oracle license will lapse in 2020

⁴² <http://icta.go.ke/standards/general-guiding-principles-standard/>

money platforms, as part of existing social protection programs. Supporting greater integration of digital payment platforms on G2C and G2B platforms has enabled greater end-to-end digitization of public services, facilitating functions such as the payments of services fees or tax collection etc. via existing digital citizen-facing services offered, such as e-Citizen and iTax.

Moreover, the development of shared infrastructure (datacentres, networks and connectivity) and a secure private government cloud has helped yield efficiency gains and improve the security of digital public platforms. The Government Data Centre (GDC) hosts some of the most critical and sensitive digital assets (including data and information) necessary to support government services. It provides security, data backup and continuity of power supply. However, some MDAs run separate local databases. The GDC is connected to the Government's Common Core Network (GCCN), which connects all major government buildings within Nairobi's central business district. Shared infrastructure has helped to significantly reduce the unit costs of deployment of new digital platforms and services, as well as ongoing operations and maintenance of IT infrastructure.

4.2.1.2 *Core Government Functions - G2G Back Office Systems*

The Kenyan government has launched several back-office platforms with varying degrees of success, adoption and integration. The key digital systems deployed support the following core government functions (more detail can be found in the Digital Platforms background paper):

- **Financial Management** - An Integrated Financial Management Information System (IFMIS) that links planning, budgeting, expenditure management and control, accounting, audit and reporting functions.
- **Procurement** - An e-procurement system to support end-to-end digitization of the procurement process including multiple checks and balances, including tiered approval, that mitigate corruption and linked with IFMIS.
- **M&E and Project Management** - A National Integrated Monitoring and Evaluation System (NIMES), alongside an Electronic Project Management Information System (e-ProMIS) with over 3,500 projects uploaded by MDAs on this portal to date.
- **Education Information Management** - A National Education Management Information System (NEMIS) that aims to create a single database for all information pertaining to basic education, enabling access to reliable data that can support education planning and policy formulation.

Stakeholder consultations revealed challenges with uptake, training and connectivity of these systems.

A number of additional public platforms have also been envisaged as part of Government-wide public sector reform. These include a Public Investment Management Information System (PMIS), Payroll and Government Human Resource Management Information System (GHRIS), Debt Management System, an Agency and State Corporations Budgeting and Financial Reporting System and a Credential Management System.

4.2.1.3 *Digital Service Delivery (G2B and G2C)*

The government has also deployed a wide range of citizen-facing digital services platforms, which include:

- **e-Citizen** - which serves as a single point of access for a wide range of citizen-facing e-services. Currently, over 86 services, ranging from renewal of licenses to applications for business permits and birth certificates are offered through a web-based portal and mobile application, as well as in person at local Huduma Centers.

- **iTax** – the Integrated Tax Management System (ITMS) is a web-enabled tax collection platform, run by the Kenya Revenue Authority (KRA) to create a unified taxpayer database, leading to high-quality data on tax payers, increased efficiency in the tax administration, identification and treatment of risks. It enables users to file value added tax (VAT), income tax, Pay-as-you-earn (PAYE) and standards levies for Kenya Bureau of Standards (KEBS).

TIMS – the Transport Integrated Management System (TIMS) incorporates all functions related to the registration, licensing, inspection and enforcement of motor vehicles online.

- **Online land registry**, Tthe new system (yet to go live) leverages blockchain technology and hopes to enable end-to-end land-related transactions online, including ownership transfers, registration of charges, discharges, cautions and withdrawals, as well as payments of land rent, stamp duty and capital gains tax (where applicable), land searches and submission of other relevant applications. The use of blockchain technology will allow the system to reliably capture transaction histories, weeding out cases of corruption and fraud, and link land and property entitlements to their rightful owner. The system has been inspired by electronic registration systems used in Netherlands, UK and Canada (considered examples of international best experience).

The digitization of several other key G2B services, notably the automation of business and property registration, has markedly improved the environment for businesses – earning Kenya the title of one of the most improved economies in the 2019 ‘Doing Business’ Report⁴³.

4.2.1.4 CivicTech and Open Data

While the CivicTech landscape appears to be nascent, Kenya still emerges as a top performer in Africa in the E-Participation Index (EPI). Many MDAs appears to be leveraging social media to support e-information sharing, through channels such as Facebook, Twitter, and YouTube, but may still only be reaching part of the population. As of early 2019, there were some 8 million recorded Facebook users in Kenya (equivalent to a 16percent share of the population).⁴⁴ Meanwhile, GSMA estimates that mobile social media penetration was roughly 14percent in Kenya in 2018. There is currently limited e-consultation and e-decision making.⁴⁵ Some purpose-build platforms for civic engagement are present, but their use could be expanded. Examples include locally developed civic engagement platforms such as *Ushahidi*,⁴⁶ as well as platforms designed to source feedback on service delivery such as *Maji Voice*⁴⁷.

Table 3 E-Participation Index (EPI) Scores

	Ranking	Score
South Africa	39	0.84
Tunisia	53	0.79
Rwanda	59	0.75
Uganda	87	0.62
Tanzania	92	0.61
Togo	107	0.54
Kenya	110	0.53
Senegal	114	0.50
Nigeria	117	0.48
Mozambique	122	0.44
Sierra Leone	129	0.41

⁴³ Kenya was ranked 7th among the 10 most improved economies in the 2019 report.

⁴⁴ FB users aged 13+ (4.7M male, 3.3M female) – out of ~50M – Figures extracted from the Facebook advertising tool which tell users how many people can be targeted.

⁴⁵ <https://publicadministration.un.org/egovkb/en-us/About/Overview/E-Participation-Index>

⁴⁶ <https://www.usahidi.com/about>

⁴⁷ Belcher, Martin & Abreu Lopes, Claudia. (2017). *Maji Voice Kenya: Better complaint management at public utilities.*

Many key public records and datasets have been digitized. Government Digitization and the Kenya Open Data Initiative (KODI)⁴⁸ have increase transparency, created opportunities for data-driven innovation and improvements to service delivery. Kenya launched KODI in 2011, making government datasets accessible for free to the public through a single online portal. Entrepreneurs have leveraged KODI to provide data-driven insights that support innovation, however, there is scope to improve access and use.

4.2.1.5 Digital ID

Kenya has a well-established national ID system that has among the highest levels of use and coverage of the eligible population in the world, let alone in Sub-Saharan Africa. For example, 94 percent of Kenya’s population aged 18 and over have a national ID card, according to the 2017 Global ID4D-Findex Survey. The current generation national ID system – operated by the National Registration Bureau (NRB), under the Ministry of Interior, but with services offered at the local level through county commissioners and Huduma Centers – was launched in 2011 and comprises a nine-digit national ID number, a plastic card, and registration that includes the collection of ten-fingerprints⁴⁹ that are used only for deduplication of records and not authentication.

The government is in the process of developing a National Integrated Identity Management System (NIIMS) with the initial mass registration being concluded in May 2019 after collecting data on approximately 36 million people. The intention of the NIIMS is to establish a population registry that would act as the “single source of truth” on the identity of Kenya’s citizens, aliens and refugees, and would issue a *Huduma Namba* that would be deduplicated through biometrics. The NIIMS is being managed by a secretariat in the Ministry of Interior with support from the Ministry of ICT. The initial mass registration has pioneered the use of biometric registration tablets; more than 30,000 of which have allowed the NIIMS to register a very large amount of people in a short time.

However, the NIIMS has been met by opposition from civil society and the media at least partially because of limited public consultations and the absence of a clear enabling law and a general data protection prior to implementation. While registration continued as planned, the High Court has placed limitations on the NIIMS rollout, including that it cannot be mandatory, and that data collected cannot be shared with any other entity. The Government has yet to provide a comprehensive description of its features beyond registration. While the Government’s ambition with respect to the NIIMS should be recognized, consideration should be given to reviewing the present approach.

4.2.2 State of the Domestic E-Commerce Industry

In 2018, the UNCTAD Business-to-Consumer E-commerce Index ranked Kenya 89 out of the 151 countries surveyed. In 2017, there were estimated to be some 21 million online shoppers across Africa, with Kenya ranking third on the continent, behind Nigeria and South Africa. Estimates available suggest that there are between 2.6 and 3.3 million online shoppers in Kenya.⁵⁰ In 2015, e-commerce transactions were thought to be generating approximately US\$47mn in revenue.⁵¹ While Kenya’s vibrant innovation ecosystem has contributed to the expansion of a range of local platforms, most of the leading e-commerce platforms offered in Kenya are not home-grown. Leading platforms include e-commerce giants such as Alibaba, Amazon, eBay and Jumia, but also smaller consumer to consumer platforms such as OXL.

⁴⁸ <http://www.opendata.go.ke/>

⁴⁹ On paper and not electronically.

⁵⁰ Roughly 7 percent of Kenyans were thought to be using e-commerce services in 2015 (equivalent to 3.3 million online shoppers). <https://www.oxfordbusinessgroup.com/overview/bright-outlook-improving-economic-conditions-and-changing-consumer-preferences-point-strong-years>. In 2017, there were an estimated 2.6 million online shoppers.

⁵¹ <https://www.oxfordbusinessgroup.com/overview/bright-outlook-improving-economic-conditions-and-changing-consumer-preferences-point-strong-years>.

e-Commerce has high growth potential in Kenya, though current adoption is low. Growing access to mobile devices and broadband, as well as one of the highest mobile money penetration rates in Africa are considered key enablers. This has created a sizable potential consumer base, particularly for mobile-based e-commerce platforms and transactions. While Kenya leads the way in East Africa in terms of e-commerce, related transactions only accounted for roughly 5 percent of all transactions made, suggesting that there is ample room for growth in this sector.⁵² In 2017, a mere 29 percent of adults were using the Internet to pay bills or to buy something⁵³.

4.3 Constraints facing the development of Digital platforms

Focus Box: Cross-cutting barriers to the development of Digital Platforms

- **Internet access:** Issues relating to access and affordability can dampen demand for the services and products offered via digital platform. Though Kenyan mobile internet prices are competitive, the cost of being online to search and compare prices for different products and services may not be affordable to all Kenyans.
- **Adequate Digital Skills:** Gaps in digital skills hamper the process of migrating users and customers onto digital platforms and impede the development of new platforms. Diffusion of platforms relies both on the advanced digital and e-business skills needed to develop, commercialize and integrate them, but also on basic user skills in terms to encourage adoption and safe usage.
- **Enabling environment for business and innovation:** For the development and application of new platforms to thrive in Kenya, Government will need to foster an enabling environment for related businesses and innovators
- **Data sharing and ownership:** Ultimately, all services offered through digital platforms are data-driven, and thus rely on the ability to safely and easily store, process and transfer data both within Kenya and beyond. For example, the ability to share data across borders, be it for customs, immigration, or e-commerce purposes, will be a key prerequisite for developing a larger single digital market in the region. However, draft national ICT Policy currently contain ambiguous data localization provisions.
- **Data protection and privacy:** Data Survey data suggests that data protection and privacy concerns have been a key factor deterring many Kenyans from making online transactions and migrating onto digital platforms. Many Kenyans are used to face-to-face transactions. Boosting consumer trust will be critical to supporting the development of digital platforms. The absence of a comprehensive legal and regulatory framework on data protection and privacy has created concerns about the security of sensitive data, collected by both the private sector and government.
- **Cybersecurity:** Cybersecurity suffers gaps in detection and response capacity, as well as a lack of cyber awareness - all of which jeopardize the integrity of both key public and commercial digital infrastructure, as well as the security of their users. User awareness appears to be a key factor determining exposure.

The prohibitive costs of logistics, transport and customs is adversely impacting SMEs engaging in goods-based e-commerce and pushing up the prices for consumers. The absence of an effective National Addressing System (NAS) has left many online businesses unable to establish the locations and verify the identities of their customers, which significantly raise costs of logistics. Further compounding this is poor infrastructure, which increases both costs and timeliness of delivery, particularly to rural areas. While this barrier to scale keeps unit costs high for all players, it particularly

⁵² <http://www.monitor.co.ug/Business/Prosper/Uganda-advised-consider-e-commerce/688616-4329744-tww6d0/index.html>.

⁵³ Findex (2017)

affecting smaller Kenyan firms who cannot absorb these costs.⁵⁴ Lack of access to working capital, coupled with high transaction and administrative fees for online payments and sales, create challenges of liquidity and scalability for SMEs operating storefronts on digital platforms. Without adequate access to immediate credit facilities, fulfillment of the order may not be possible without the means to fund manufacture/procurement/shipping of the products without upfront payment

Lack of cross-border harmonization of policies and legislation relating to cross-border e-commerce means that the costs of cross-border shipment are still high, despite progress made under initiatives such as the East African Community Common Market Protocol (CMP). This also affects the affordability of cross-border payments. Limited interoperability between other payment platforms available nationally and internationally and high transaction fees make related transactions cumbersome and costly.

Agile legal and regulatory frameworks, as well as the institutional capacity to deal with the many competition issues that may stem from an increasingly platform-based economy, are missing. Managing competition issues related to digital platforms has become increasingly challenging for regulators. Winner-takes-all dynamics are typical in platform-based economies, where network effects benefit first movers and standard setters, and may also disadvantage smaller players.⁵⁵ The impact of network effects on competition in Kenya is illustrated in digital financial services, where M-Pesa's dominant network scale has enabled it to maintain high pricing power and prevent successful new entrants from taking significant market share.

Consumer protection needs to be improved - many Kenyan consumers have lost money through online transactions, and are hesitant to buy goods and services online, especially from unknown, small vendors. This challenge is further amplified through poor reverse logistics and returns policies. Consequently, Kenyans typically insist on payment post-delivery to determine that products are delivered, as advertised, adding to the logistics costs.

While the Kenyan government has made marked progress in terms of rolling-out public platforms, several challenges remains. The effectiveness and efficiency of new G2C and G2B platforms has been hampered by insufficient interoperability. The Government currently lacks a strategic roadmap for further standardization, integration, and consolidation of public data. Finally, while the government has introduced a shared datacenter and foundational back-office systems, uptake has not been optimal. Some new systems introduced have not been user-friendly, pointing to gaps in business process re-engineering and the application of user-centric design.

4.4 Recommendations & Next Steps

4.4.1 Building Support for Digital Platforms

Prioritize the development of a digital identity and electronic signatures ecosystem – with the aim of rolling-out a system that is aligned with global best practice and recognized regionally. A trusted and inclusive digital ID system will accelerate growth in Kenya's digital economy by enabling citizens and residents to transact securely online, which will allow more services to be digitized. Furthermore, if recognized across borders in Africa and beyond, such a digital identity system will boost the competitiveness of Kenya in regional and global digital trade. As part of this process Government is

⁵⁴ Lions go Digital: The Internet's transformative potential in Africa", McKinsey Global Institute, 2014

⁵⁵ Platform providers who collect large volumes of data are able to gain a significant market advantage, particularly if they also control distribution channels. This limits market opportunities for smaller domestically developed digital platforms and increases the risk of anticompetitive practices. Many Kenyan SMEs and innovators display an understandable preference for utilizing larger and well-established (often international) platforms, as they are able to (i) quickly access a large user-base of potential customers and suppliers; (ii) access superior services refined through data analytics, enabled by their access to a larger amounts of data; and (iii) leverage the brand and reputations of larger platforms to reassure customers, who often distrust local providers.

⁹⁸ https://unctad.org/en/PublicationsLibrary/presspb2019d2_en.pdf

encouraged to review its approach to National Integrated Identity Management System (NIIMS). (Detailed specific recommendations can be found in the Digital Platforms background paper)

Accelerate the government digitization programs – (i) enhancing and adding new digital services, (ii) fully digitizing government records and data, (iii) ensuring a whole-of-government approach to digital integration and interoperability, and (iv) consistently applying user-centric design. Government is encouraged to address unresolved issues related to data standardization, consolidation of informational management systems, and system interoperability etc. This is likely to improve the user experience of key services, which can in turn boost uptake, as well as increase usage of shared services/infrastructure. People should be at the heart of digital economy, yet front- and back-end service delivery platforms and applications are often designed with little input from those they are designed to serve. Greater attention is needed to business process re-engineering to ensure the success of new services, utilizing user-centric design principles to streamline processes that are automated, ensuring that unnecessarily complex processes are not simply replicated online. Government should also focus more on the development of CivicTech solutions that can improve services, user satisfaction and accountability, as well as continually update the KODI portal, with new critical data sets, improved functionality and launch a regular dialogue and exchange with the users of Open Data.

Enhance ICTA's capacity and mandate, allowing it to continue to spearhead government digitization – ensuring a whole-of-government approach to digital integration and interoperability, as well as strengthening its support for the change management associated with government digitization. ICTA should be adequately funded and staffed, empowering the agency to carry out its mandate, as well as increasing its clout to rationalize government ICT functions, coordinate and standardize digital systems used by Government. Moreover, MDAs could benefit from further support in relation to change management and training. ICTA might consider extending its physical presence to the county-level, by creating liaison offices, to ensure that related functions are implemented not only at national level, but also at county-level.

Support greater interagency cooperation and coordination on the e-commerce agenda. A more holistic approach and shared vision for e-commerce development is needed, which reduces institutional overlap and effectively tackles key enabling areas such as transport, post, etc.

4.4.2 Improving the Legal, Policy & Regulatory Environment

Finalize and enact the draft data protection bill and policy - applying a more nuanced approach to data localization as well as harmonizing provision with other regional frameworks. Completion and promulgation of the Data Protection Bill and Policy (2018) should be prioritized and expedited. Kenya's regulation would also benefit from reviewing the European Union's General Data Protection Regulations (GDPR), the Organization for Economic Co-operation and Development (OECD) Privacy Principles, and African Union (AU) Convention on Cybercrime and Personal Data Protection (adopted in 2014), as examples of international best practice. Further, developing an agile approach to key legal and regulatory frameworks that affect the diversity of digital services offered, including competition, IP/copy-right etc. – along with increasing institutional capacity to deal with enforcement (Detailed specific recommendations can be found in the Digital Platform background paper)

Strengthen detection and response capacity in relation to cyber security. At the national level, investment and capacity building in threat intelligence, monitoring, prevention and response capabilities are required to maximize Kenya's cyber resilience within acceptable risk tolerance levels. A fragmented institutional and governance framework in relation to cyber security requires greater clarity on roles and budgeted mandates. Moreover, an incomplete cybersecurity legislative framework, which has encountered challenges, requires amendments based on a new consensus. Equally, and the ability of MDAs require significant capacity building and resource support to better prevent and respond to cybersecurity threats requires significant capacity building and resource support.

4.4.3 Engaging Key Stakeholders

Take deliberate action to instill virtuous values and business ethics in the digital space and across the e-commerce value chain, as well as boost cyber awareness among consumers. Players in the digital economy ecosystem need work together to create a robust trust environment that instills confidence among users of digital platforms, as well as encourages safe and responsible usage of digital platforms. Government is encouraged to act as a convener, supporting the development of shared principles and approaches to consumer protection and cybersecurity together with private sector, education providers, civil society, etc.

Leverage regional partnerships and harmonization to strengthen detection and response capacity in relation to cybersecurity and consumer protection. At the regional level, the government should support unified and progressive cyber laws and policies; such partnerships could also boost cybersecurity capacity development and optimize the use of scarce cybersecurity knowledge available in the region and increase collective security. Government should also support harmonized consumer protection policies across borders, including reciprocal agreements to recognize and enforce each other's approaches.

5 Digital Financial Services

Key messages:

- Kenya is home to one of the leading DFS markets globally, which has been instrumental in boosting financial inclusion. In 2017, 73 percent of adults reportedly owned a mobile money account, and some 82 percent owned a financial account, placing it ahead of countries like China.
- Kenya's DFS market stands for successful services brought to scale and a permissive regulatory environment that encourages experimentation.
- Kenya has been at the forefront of embracing fintech, with multiple successful examples of banks and MNOs partnering with fintechs and other financial services providers, allowing third-parties to connect through open APIs. Kenya has thus evolved into a sophisticated market with increasingly blurred lines between service offerings, such as transfers, savings, credit, investments and insurance.
- However, differential application of regulation based on entity type as opposed to services, is creating an uneven playing field, which now hampers competition.
- Moreover, a de facto MNO wallet monopoly, benefitting Safaricom's M-Pesa, creates a challenging environment for competition, with ripple effects on both the mobile communications and broadband market.
- Despite Kenya's impressive DFS development to-date, more can be done to future-proof market development and encourage greater market discipline. With growing market maturity, regulatory policy must move towards the adoption of industry-wide quality standards, clear criteria and requirements for DFS instead of an institutionalized fintech sandbox. Key policies needed include the adoption of advanced consumer protection practices.
- Banks must be encouraged to overcome their own internal reluctance to supporting DFS business models.
- Moving forward, partnerships will be key to building increasingly relevant skillsets in demand, such as data analytics, as well as leveraging expertise and technology across the DFS sector.

5.1 Importance of Digital Financial Services

The role of DFS in Kenya's socio-economic development has been transformational, in terms of widening financial inclusion for the unbanked. The success of mobile money – with the rise of Safaricom's M-Pesa, in particular – has enabled widespread access to DFS. This has been a critical enabler for ensuring that all Kenyans are able to transact online and actively participate in the digital economy, creating a larger market pool for digital services and e-commerce providers.

5.1.1 Socioeconomic Rationale for Digital Financial Services Development

The continuous innovation of Kenyan DFS providers has created an ever-increasing range of financial services relevant to both consumers and businesses. This usage quickly evolved from a simple means of sending and receiving cash, to full transactional accounts. DFS products on the Kenyan market offer a secure place to save, provide widespread access to credit, cheaper remittances, and tools to smooth consumption. Kenya has achieved one of the highest rates of financial inclusion in Africa, in no small part due to the high levels of DFS usage. Research in 2016 on M-Pesa in Kenyan households showed that access to DFS was directly associated with lifting 194,000 Kenyan households, or 2 percent of the total population, out of extreme poverty

5.1.2 Alignment with Country Development Strategy & Goals

The Government of Kenya (GoK) recognizes the potential of DFS to drive economic growth, reduce poverty, boost shared prosperity in the MTP-III. According to the MTP-III, important mechanisms for

achieving these objectives include improving the business environment, and accelerating financing sector and capital market development, in alia by leveraging technology and digital infrastructure. The MTP-III also details planned revisions to the Banking Act, in order to (i) operationalize regulations for Credit Reference Bureaus (CRBs) to facilitate credit information sharing, (ii) promote a competitive, sound and efficient banking sector, including strong microfinance institutions that are well-regulated and supervised, (iii) promote financial literacy and education, and (iv) establish non-bank financial institutions that will increase the depth of financial sector as well as access of financial services through digital financial services

5.2 Diagnostic Findings: Current State of Digital Financial Services

5.2.1 Availability of Digital Financial Services

Kenya has emerged as the digital finance hub in East Africa, boasting one of the most developed DFS markets on the continent, with banks, MNOs and an increasing number of fintechs offering a wide range of services, both for general use and tailored to specific market segments. Most Kenyans own at least one mobile money account, while over half of the adult population also has some kind of bank account. The last 14 years have seen enormous progress in Kenya's rate of formal financial inclusion - rising from 26.7 percent in 2006 to 82.9 percent in 2019. DFS usage is high across a wide range of transactions, including in-store (merchant) payments, savings, and access to loans. DFS has thus become a fundamental part of the Kenyan financial landscape. Despite these noted improvements, the financial health of Kenyans has dropped to 21 percent, from 39 percent in 2016⁵⁶.

There is, however, a persistent gender gap in access and usage of financial services. The mobile money usage gap narrowed slightly to 7 percent in 2019 from 8 percent in 2016. Despite this, there is no gender gap in the use of digital loans applications.

The Kenyan DFS market features **three core types of DFS services**: mobile wallets, mobile and agent banking, and FinTech.

4.2.1.1 Mobile Wallets

Kenya has four main mobile wallet providers: Safaricom, a Mobile Virtual Network Operator (MVNO) called Equitel, Airtel and Telekom Kenya. Safaricom's M-Pesa dominates the mobile money market, with a 70 percent share of subscribers and an 85 percent share of transactions. M-Pesa contributed 28 percent of Safaricom's total revenue in 2018, and most of its annual growth. With over 20 million active customers performing an average of 11 transactions per month, a total value of US\$81bn was transferred by the M-Pesa system in 2018. Equitel, owned by Equity Bank, was launched primarily to support its mobile banking activities, and is currently in second place with an estimated 20 percent share of customers. Airtel Money and Telkom's T-Kash come in at 3rd and 4th place. However, as noted above, the two MNOs announced plans to merge their respective mobile, enterprise and carrier services businesses in Kenya, in February 2019. While they would operate under a joint venture company named Airtel-Telkom moving forward, it is not yet clear if their respective mobile wallets will be merged.

⁵⁶ According to the 2019 FinAccess Household Survey, financial health refers to the ability of Kenyans to use financial services for managing daily needs, protecting themselves from shocks, and helping to achieve their main goals.

Focus Box: Impact of lack of competition in the mobile financial service space

A Consultative Group to Assist the Poor (CGAP) analysis of competition in mobile financial services in Kenya and Tanzania, outlines the conflict of interest for a provider, like Safaricom, as other FSPs are effectively both customers and competitors.

The provider with the dominant channel can thus restrict market access through its pricing, resulting in adverse outcomes in terms of competition and consumer welfare, by: a) creating barriers to DFS market entry, especially for providers competing in the same space as the MNO; b) limiting the available product range; c) limiting the scope for innovation; and d) potentially passing on any high cost of channel access to end consumers.¹

Critically, there has been wide merchant acceptance for in-store mobile money payments for goods and services, which has helped propel the success of mobile money in Kenya. An estimated 109,000 shops accept M-Pesa across Kenya and, in 2018, nearly one million customers per day used mobile money to make in-store purchases. Yet, despite this rapid adoption and innovation around digital payments, cash remains king for most daily expenses and payments.

There are now an estimated 49 digital loan applications available to consumers through MNOs, banks and Fintechs; with M-Shwari providing over 75 percent of all digital loans disbursed in 2018. Roughly a third of all mobile phone owners have reported borrowing from a digital lender. Safaricom also offers Fuliza, an M-Pesa transaction overdraft service, enabling individuals to complete a transaction when they have insufficient funds in their mobile wallet. There has been strong uptake of the product, with customers borrowing some KSh6.2bn (around US\$62mn) in January 2019. Other mobile wallet innovations include the Mbao pension plan, which targets informal sector workers with the aim of encouraging voluntary savings contributions towards their retirement, and M-Akiba, the mobile-only retail bond which allows micro-investments in government securities, bought through unstructured supplementary service data (USSD) via both Safaricom and Airtel.

Kenyan's increased access to bank accounts has not decreased mobile wallet activity; rather, bank accounts have become one of several financial tools at customers' disposal. There is widespread usage of 'bank-to-wallet' transfers as a route to cash out, given the far higher availability of agents than automated teller machines (ATMs). In an attempt to keep funds in the formal banking sector, the Kenyan Bankers Association has, however, worked closely with major Kenyan banks to create PesaLink, enabling real-time transfers between bank accounts, by entering the account owners' phone number. PesaLink operates as a switch between the sender, who can choose a branch, mobile, ATM or agent to send funds, and the recipient, who is notified of the transaction via SMS.

4.2.1.2 Mobile and agent banking

Kenya now has 17 commercial banks offering mobile banking. Many also have their own agent networks, totaling 40,000 banking agents that offer a range of over the counter (OTC) services, plus cash-in and cash-out. By early 2016, bank agents had already facilitated 171 million transactions, worth some US\$8 billion.

The leading DFS bank is Equity Bank, which focuses on the consumer, micro, small and medium-sized enterprises (MSMEs) as well as the agriculture sectors. However, CBA has acquired the largest retail bank customer base in the country, via the M-Shwari service, although they have no direct relationship with account holders with Safaricom.

4.2.1.3 FinTech

Through the growth of DFS, particularly mobile money services, the market for digital credit has expanded rapidly in Kenya, with digital credit now being offered by three of Kenya's largest banks⁵⁷, as well as a growing number of fintechs and non-bank institutions. Beyond credit, Kenya's ecosystem of fintech startups that are offering DFS has transformed the financial services industry, with the support of dedicated accelerators and incubators (*discussed further in the next chapter*). A wide range of other payments services, such as Kopo Kopo, PayPal, and Cellulant, have been established that leverage existing mobile money platforms, alongside insurtech offerings through DigiFarm, and forex transactions such as Kwanji and Forex. Fintechs are also increasingly exploring healthcare, blockchain, agritech, Forex, group savings and business solutions.

In particular, DFS and technology-enabled information services are developing products and services catered for the agricultural sector in Kenya, which help strengthen farmers' ability to increase the economic benefit from their product, as well as efficiency and productivity in the wider agri-business sectors. Mobile apps such as iCow, M-Shamba and platforms such as DigiFarm have enabled smarter farming through customized information on farming best practices and financial services. *This topic is discussed further in 'Issue Focus', at the end of this report.*

5.2.2 Enabling Environment for Digital Financial Services

Kenya is an attractive launch pad for businesses pushing digital products and services. This is driven by the large, tech-engaged consumer market already actively using DFS. It was home to over 30 tech hubs and 56 Fintech startups in 2017. Alongside South Africa and Nigeria, Kenya has attracted the highest startup investments in Africa in recent years, which will further drive Kenyan innovation and Fintech growth. *Kenya's digital innovation and entrepreneurship ecosystem is discussed further in the next chapter.*

Multiple stakeholders are playing a role in supporting this enabling environment. The country's banks and MNOs are taking a positive approach to encourage innovation by providing APIs where possible to allow for integration and innovation. Kenya's regulatory framework already encourages fintech experimentation. However, as the market had now matured, the regulatory framework should now move towards industry-wide quality standards, clear criteria and requirements for DFS instead of an institutionalized fintech sandbox.

5.2.3 Constraints to Digital Financial Services Development

5.2.3.1 Market Development

Access to credit is a considerable barrier for MSMEs, limiting their potential contribution to growth and employment. The interest rate caps have had adverse effects on access to credit in the banking sector but have in part contributed to the growth of digital lending in Kenya as customers have had to access alternative sources of credit outside the formal banking sector. These constraints have also been exacerbated by the series of shocks over the past three years, including three bank failures.

5.2.3.2 Laws, Policy & Regulation

While the National Assembly has voted to remove controls on savings rates, it has retained the cap on lending, restricting access to credit (as noted above). The 2016 Kenya Banker's Act capped interest rates at 4 percent. To address the financing gap, the Government adopted the Kenya Credit Guarantee Scheme Bill in 2018 to guarantee lenders for credit extended to MSMEs and priority sectors.

Kenya is evolving into a sophisticated market with increasingly blurred lines between service offerings from different types of providers, such as transfers, savings, credit, investments and insurance. While consumers benefit from a wider choice of DFS, providers are regulated by institutional type, with some discrepancies in regulation depending upon the organization providing the DFS.

⁵⁷ Kenya Commercial Bank, Equity Bank, and Co-operative Bank

Given the proliferation of digital lenders, it has become increasingly important to monitor transparency and consumer protection in the DFS marketplace. A majority of new Fintechs remain unmonitored, and it is difficult to track over-indebtedness and multiple borrowing. At present, the Credit Reference Bureau (CRB) does not differentiate between a default on a digital micro-loan, and bad debt on a large loan from a bank. This may lead customers who are new to credit, and lack financial education, to unwittingly face years without access to credit, by defaulting on a loan amounting to no more than a few dollars. Moreover, this policy may arguably lead low-income customers to rely more on informal high-risk borrowing. At present, only a limited number of digital lenders provide the information on their loans to the CRB. Increasing that number, through legislative tweaks, strengthened credit information sharing, and adoption of good practices could lead to greater transparency with the DFS sector and more responsible lending practices.

In 2018, the National Treasury developed the Financial Markets Conduct (FMC) Bill to provide guidelines for the establishment of a Financial Markets Conduct Authority (FMCA), whose objective will include the protection of retail financial customers, the promotion of competition, innovation and development in the financial sector, as well as support for the government's economic policy. If passed, the FMCA will now have the legal mandate to issue prudential guidelines to banks, provide consumer protection, and, to improve the terms and conditions for credit access in Kenya. The bill is set to promote legislation and policies that will encompass all lenders that are not banks, protect the retail financial customer, and, increase the transparency of lenders with regards to the interest rates, charges, and fees on credit facilities.

The banking sector remains concerned about know your customer (KYC) requirements, enforcing restrictive policies and requirements on DFS stakeholders. Banks in Kenya require the collection of the customers' KRA Personal Identification Number (PIN) when opening a bank account. This measure aims to increase the number of KRA PIN registrations and improve tax revenue collection. While attaining a pin is relatively easy in an urban environment with an internet-enabled device, it is more complex for rural populations without access to internet connectivity and devices. This additional obstacle may thus increase the risk of exclusion for the unbanked.

Market Entry

While it is the stated intent of the Kenyan banking sector to modernize, digitize, and participate actively in providing DFS, there are clear obstacles to their full engagement, including unequal regulatory constraints compared with non-banks. Across DFS providers, there are different regulations for different entities (banks, non-bank financial institutions, MNOs etc.), creating an uneven playing field. Additionally, banks must overcome their own internal reluctance to supporting DFS business models with unfamiliar business cases that produce lower margins per transaction than their traditional, typically less efficient and less customer-friendly offerings.

Interoperability is key to creating greater market competition in the mobile money sector. Concerned by the near-monopoly of Safaricom, the CBK decided to intervene and insist upon interoperability between mobile wallets in the hope to improve efficiency and competition. The CBK ruled that interoperability for domestic remittances must be made available by early 2018. Interoperability between mobile wallets came into full effect in April 2018, limited to allowing customers to transfer funds across the three MNO wallets in real time, at low cost, and in a secure environment. Moreover, the NPS regulations have supported interoperability by creating a payment service provider management body (PSPM) to act as a clearing and settlement house for mobile money transactions.

Managing Risks of Digital Finance

There are several risks related to the continued success of the DFS ecosystem, including the near monopoly of M-Pesa, Anti-Money Laundering (AML) regulations, consumer debt risks, and asymmetric regulations for banks and other DFS providers. M-Pesa's majority market share depends on the availability Safaricom network, and if it is unavailable, then so is M-Pesa. Commerce grinds to a halt

during outages, as it did in December 2018. This creates systemic risks for an economy that relies heavily on mobile money.

The Central Bank of Kenya (CBK) is also highly concerned with Amendment Section 33C to the Banking Act. The amendment could endanger adherence to Anti-Money Laundering and Combating the Financing of Terrorism (AML/CFT) international best practice. The amendment was drafted without consulting with the CBK and required the CBK to develop regulations prescribing conditions on deposits and withdrawals by customers, within thirty days, while nullifying all existing guidelines or regulation on deposits and withdrawals.

5.3 Recommendations & Next Steps

5.3.1 Building the Infrastructure for Digital Financial Services

Encourage data analytics skill development: DFS increasingly relies on having a skilled workforce, particularly in the area of data science. Performance reporting and traditional business intelligence are enabled by descriptive and diagnostic data analytics, while further information optimization can be achieved using predictive and prescriptive data analytics.⁵⁸ Consultations revealed that Kenya has an insufficient pool of trained business intelligence and data science specialists. There is an opportunity for businesses to increase their in-house data analytics capacity. To achieve long-term impact, the Kenyan education system, both public and private, is advised to build related capacity. *This issue is discussed further in the Digital Skills chapter.*

Allow cloud hosting services to be used by all financial service providers and, in parallel, ensure consumer protection and improved risk management of consumer data. Robust financial and data infrastructure is critical to supporting an enabling environment for DFS. Regulations on data governance will need to ensure consumer privacy rights and adequate protection of consumer data (as discussed in the previous chapter), while simultaneously allowing reliable and cost-efficient cloud services, and the use of alternative data as a source to build a credit history to be used by banks and fintechs alike.

Support greater usage of a regional switch to facilitate the single digital market ambitions of the East Africa region, and to contribute to increase financial inclusion through interoperability at the regional level. This could be managed by central banks of the region, or alternatively a local private switch could establish itself as a regional switch. Both scenarios require close cooperation between the regulators and the private sector.

5.3.2 Reforming the Policy & Regulatory Environment

Adopt measures to establish a level playing field in competition practices and regulation. The current framework regulates by institution type, and there is scope to adapt this framework - regulating the services as opposed to the provider. Service-based regulation will be important as the traditional roles played by various industry actors are being extended and increasingly start to overlap. Regulating according to service-type could address long approval-periods for banking agents, go-to-market time for products launched by commercial banks as well as support the alignment of KYC requirements. The latter could also support the introduction of tiered KYC requirements for risk-based registration for products and services by customers. Another element restricting level playing field is in the mobile money space - the absence of agent interoperability that would permit customers to cash in/ out through any agent also reinforces Safaricom's dominance. This interoperability issue provides an incentive for the regulator to consider a more prescriptive solution that provides clear governance rules. Such measures to establish a level playing field could significantly contribute to Kenya's DFS evolution, by supporting the design of products and services centered on customers' needs and means, including low-income consumers, which could in turn help boost both accessibility and affordability.

⁵⁸ The IFC Handbook Data Analytics and DFS describes the Data Science Analytics Framework for Business Intelligence on page 27 ff. (IFC, 2017)

Develop advanced consumer protection practices through improved supervision, transparency and digital and financial literacy. Beyond oversight of business practices among DFS providers, increasing efforts to enable the consumer to make informed use of DFS, based on accessibility, affordability and appropriateness criteria is critical to further advance DFS. Improved financial and digital literacy will expand access to valuable DFS solutions and products among the unbanked and low-income segment. Any training should go hand-in-hand with awareness-raising campaigns explaining the benefits and risks of new DFS products and services.

Modernize supervision of DFS usage to address misuse and fraud. This would include improving SIM-card registration procedures, through better agent network management, and adhering to the CA ruling to switch-off unregistered SIM cards. Additionally, through CBK's soon to be improved data center, continue to explore the use of suptech and regtech solutions to modernize supervision and regulation of DFS. Further to this, there is a strong need for industry-wide quality standards, criteria and requirements in the DFS space to enable continued innovation and to bolster the six strategic priorities of the CBK, which include trust, accessibility, usefulness, affordability, stability and efficiency.

5.3.3 Engaging Key Stakeholders

Empower DFS consumers through improved consumer welfare and controls on information sharing, allowing consumers to approve the use of alternative data to assess their creditworthiness. This would allow for an expansion of credit, and digital loans in the low-value segment as consumers could be appropriately matched with a different rating policy than higher-value loans. For instance, including utility bill payment data and other information into the credit information system will improve segmentation of credit rating profiles and allow for increased market innovation and competition through product diversification.

Encourage FSPs to improve DFS offerings that target MSMEs and Savings and Credit Co-Operative Societies (SACCOs) through digitizing analog and paper-based savings groups. New DFS could help bridge the MSME financing gap created by the cap on interest rates. They could create opportunities for new products and services tailored to SACCOs.

Customer awareness on interoperability and mobile money provider options in the market can be encouraged. While mobile money interoperability is now technically possible, it is not yet adequately offered and has subsequently seen little customer uptake. This is, first and foremost, due to a lack of customer awareness of the function. While it is fully offered by the smaller MNOs, it has been buried away in the M-PESA menu and, as a result, is hardly used. Marketing restrictions on brand usage limit opportunities for raising consumer awareness.

Encourage partnerships between successful non-digital entrepreneurs and fintechs to learn from each other. While small-scale fintechs offer exciting technology-driven ideas and solutions, they would benefit from stronger linkages to local businesses to achieve scale and sustainability. Equally, successful non-digital entrepreneurs can improve their digital affinity and generate new ideas from cooperation with fintechs.

6 Digital Entrepreneurship

Key messages:

- Kenya is popularly recognized as the ‘Silicon Savannah’. It is the only country in the region that has been consistently highlighted as an ‘Innovation Achiever’ – a country whose performance on innovation far exceeds its level of development.
- Innovation has largely been spearheaded by Kenya’s digital entrepreneurship community, with leading examples including tech-led firms like M-Pesa, Twiga Foods, Cellulant, etc.
- Digital entrepreneurs have benefitted from Kenya’s young workforce, a high-risk appetite, proximity to regional markets, growing access to connectivity, and a vibrant network of tech-hubs and incubators.
- Nevertheless, Government could do more to foster innovation and entrepreneurship, including developing conducive taxation and procurement policies.
- Weak access to capital and digital talent continues to hamper digital entrepreneurs, who want to start and grow a business.
- More could also be done to support women in the technology, since they are typically underrepresented in the digital entrepreneurship space.
- While a rural-urban divide continues to characterize Kenya’s entrepreneurship ecosystems, virtual acceleration models would help connect urban innovation hubs with rural communities.
- Addressing key constraints in the digital entrepreneurship space would help unlock new value and drive economic growth, particularly in tech and ICT sector where there is considerable scope for new high-quality job creation.
- More can be done to foster technology adoption by industry, allowing digital innovation to trickle down to boost productivity in traditional sectors such as manufacturing.

6.1 Importance of Digital Entrepreneurship

6.1.1 Socioeconomic Rationale for Building the Digital Entrepreneurship Ecosystem

Historically driven by agriculture and extractive industries, economic development in Kenya is dramatically shifting towards innovation-led development. Innovations have manifested in new production processes, new marketing approaches, new ways of conducting training, and new products and services, serving traditionally underserved or excluded markets. A bulk of these have come from technology, particularly in the digital entrepreneurship space - M-Pesa, Ushahidi and m-Farm, among others. Sub-Saharan Africa has performed relatively well on innovation, with Kenya being the only country in the region that has been consistently highlighted (since 2011) as an innovation achiever.⁵⁹

New opportunities for digitally enabled entrepreneurship and self-employment are rapidly growing in the ICT and related sector.⁶⁰ Technology-enabled startups are leading to new sources of employment.

⁵⁹ Global Innovation Index report, World Intellectual Property Organization (WIPO), 2018

⁶⁰ “World Development Report 2016: Digital Dividends”, World Bank Group, 2016

A positive correlation has been observed between growth of the ICT industry of a city and job creation.⁶¹ Therefore developing proficiency can have substantial gains in creating and expanding employment, particularly for countries like Kenya, which have a high percentage of youth. For example, the M-Pesa digital payment system has created additional income for more than 80,000 agents.

6.1.2 Alignment with Country Development Strategy & Goals

As noted above, **Vision 2030 aims to transform Kenya into a newly industrialized, globally competitive, middle-income country.** The Ministry of Industry, Trade, and Cooperatives (MoITC) leads this agenda, and has developed the Kenya Industrial Transformation Program (KITP) to implement it. Among other areas, KITP highlights the importance of technology and innovation⁶² to the development of industry and recognizes the centrality of firm-level support to Kenya’s industrialization. As a key part of KITP, the MoITC is supporting the innovation and enterprise sectors, which can help boost jobs and growth.

The **National ICT Master Plan (2014-2018) has initiated flagship projects such as Science & Technology Parks and an IT-Enabled Services (ITES) center in Konza Technopolis.** A new policy framework for Science, Technology and Innovation (STI) was developed in 2012, strengthening the governance framework through new agencies, including the National Commission for Science and Technology (NCST)⁶³, Kenya Innovation Agency (KENIA)⁶⁴, and the National Research Fund (NRF)⁶⁵. The government has also launched specific programs focused on developing the entrepreneurship ecosystem, including Constituency Digital Innovation Hubs⁶⁶ and Pasha Centers,⁶⁷ which are digital centers set up across the country to bridge the rural-urban digital divide.

6.2 Diagnostic Findings: Current State of Digital Entrepreneurship

6.2.1 State of the Digital Entrepreneurship & Innovation Ecosystem

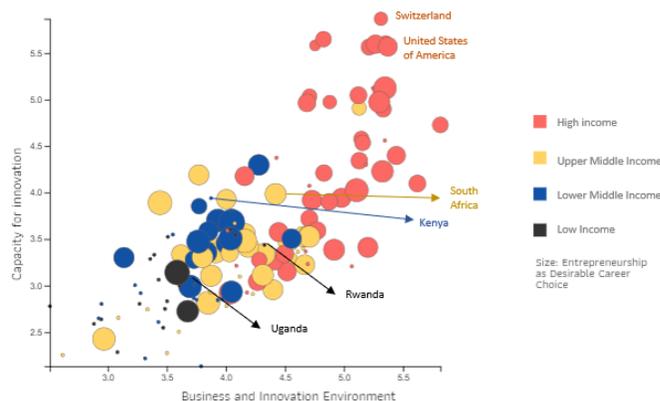


Figure 6-1 Countries’ position on ‘Capacity to Innovate’ and ‘Business and Innovation Environment’, split by level of income

Source: TCdata360, World Bank Indicators

⁶¹ “Growth and sustainability of tech innovation ecosystems in city environment”, Mulas, V., Mingos, M., Appelbaum, H., World Bank Group, 2015

⁶² Innovation is key whether it is coupled with technology or not, and it can be as simple as a novelty in a given context (for example, a modest managerial improvement in an informal firm in a remote village is an innovation).

⁶³ National Commission for Science, Technology and Innovation

⁶⁴ Kenya National Innovation Agency, online at <http://www.innovationagency.go.ke/>, accessed at 05/03/2019

⁶⁵ National Research Fund, online at <http://www.researchfund.go.ke>, accessed at 05/03/2019

⁶⁶ Constituency Digital Innovation, according to the Ministry of Information, Communications and Technology,

⁶⁷Pasha Centers, Launched in 2011 by the Information, Communications and Technology Authority

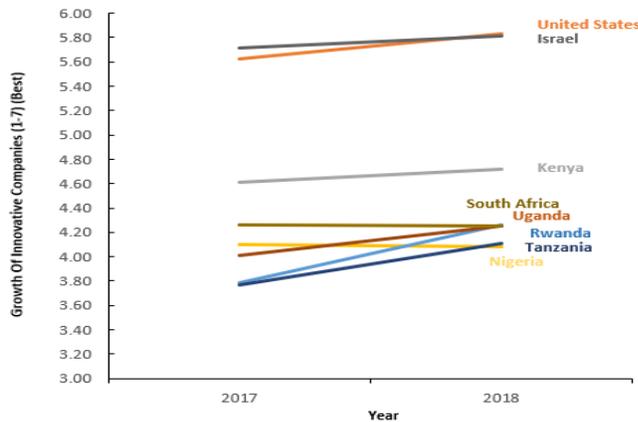


Figure 6-2 Growth of Innovative Companies

Source: World Economic Forum, Global Competitiveness Index

6.2.2 Hurdles to Digital Entrepreneurship

While Kenya has set in place some solid fundamentals, consultations with local

stakeholders have revealed pain points that are hindering further development of the entrepreneurship ecosystem. These include; accessibility to capital, particularly for early stage enterprises, limiting their growth and expansion; availability of digitally-skilled talent (particularly experienced talent) to support the ICT sector; locational bias of tech ecosystems creating a rural-urban divide; lack of representation of women in technology, resulting in social exclusion; and insufficient support from the government with regard to tax incentives, procurement policies and availability of open data, which has created a disconnect between the private players and the public sector. The entrepreneurship intermediaries (accelerators, incubators, tech hubs etc.) play a key role, but are limited in reach and scale, primarily due to lack of adequate and appropriate support. Further, many counties and rural communities lack representation in the programs run by intermediaries given that it is not always economically feasible for intermediaries to establish operations in counties outside of Nairobi.

6.2.3 Regulations, Policies and Institutions

Women entrepreneurs in Kenya face cultural biases and lack adequate infrastructural support. Research showed that while Kenya has the highest number of women entrepreneurs in East Africa (49 percent)⁶⁸, they face significant barriers such as lack of time, information, and business networks disproportionate to their male peers.⁶⁹ Further, women entrepreneurs in Kenya face the challenge of managing work alongside family and household obligations. While the government has tried to support the community through the *Access to Government Procurement Opportunities (AGPO)*,⁷⁰ which mandates 30 percent procurement from groups such as youth, women, and persons with disabilities, this effort is still focused on larger SMEs, and does not necessarily cater to the entrepreneurship space, as it does not encourage procurement of innovative products from the community. Further, it is easy to manipulate the system since most firms can include women in ownership positions as nominal heads with no functional powers, in order to benefit from AGPO, which only looks at women ownership, without assessing leadership and the day-to-day role of these women in the companies.

There is insufficient government support in taxation and procurement policies for emerging businesses. Players in the entrepreneurship ecosystem often actively avoid registering their businesses due to the heavy regulatory burdens and taxation, and this lack of formalization limits their expansion plans and fundraising abilities. Relaxing or simplifying taxation would support the growth and formalization of early-stage startups, however existing taxation and procurement policies do not cater to start-ups with new business models and limited track records.

⁶⁸ WBG Enterprise Survey: <http://www.enterprisesurveys.org/data/exploretopics/gender>

⁶⁹ KIEP, Integrating a Gender Equality Lens, Alicia Hammond and Katerina Koinis, World Bank, 2018

⁷⁰ AGPO, Access to Government Procurement Opportunities, online at <https://agpo.go.ke/>, accessed at 06/03/2019

6.2.3.1 *Ecosystem Support & Infrastructure*

Nairobi has emerged as a tech hot spot, drawing entrepreneurs from other counties. Nairobi was named among the ‘most intelligent cities’ in Africa by the Intelligent Community Forum in 2015⁷¹-largely owing to high mobile penetration, and the capital being home to regional headquarters for global tech giants such as Google, IBM, and Intel, and multiple start-ups, investors, innovation hubs, and accelerators. This has resulted in a burgeoning entrepreneurship ecosystem. Startups outside Nairobi are establishing operations in Nairobi hubs, seeking better networks and opportunities that are lacking in areas outside of the capital. While this agglomeration has been beneficial to entrepreneurs and talent in Nairobi, it has limited the opportunities outside the capital.

Kenya could better utilize its human capital. The WEF Human Capital Index⁷², measures the extent to which countries and economies optimize their human capital through education and skills development, and found that Sub-Saharan Africa, on average, currently only captures 55 percent of its full human capital potential, compared to a global average of 65 percent. Kenya ranks slightly higher than the average at 58 percent, but lower than Mauritius, Ghana and South Africa, all within a range of 63 to 67 percent. Employers reveal that there is a significant gap in local availability of talent. The gap focuses on three areas: (i) Highly digitally skilled talent. Since highly skilled staff are few in numbers, they command higher prices and are also prone to poaching by larger players, creating a high attrition problem; (ii) Experienced staff with managerial expertise in the tech space; and (iii) Workers skilled with basic digital and soft skills. Additionally, access to soft skills is limited predominantly to major urban areas. This becomes a major hindrance, as basic soft skills are usually in demand by employers. This is despite Kenya’s high rank among Sub-Saharan African countries for quality of education (Kenya scored a 4.5, above the Sub-Saharan average of 3.8 on a scale of 1 to 7).

6.2.3.2 *Markets & Culture*

Consultations with local ecosystem players reveal that it is accessibility, and not necessarily availability, of capital that is limiting funding in the market, particularly for early-stage enterprises. The 2018 Global Innovation Index (GII) ranks Kenya 22nd out of 127 economies on the strength of Credit mechanisms in the country. While this high score is mainly driven by the strong microfinance systems in the country, Kenya exhibits low scores in the channels of investments typically accessed by entrepreneurs, market capitalization and venture capital funds. Stakeholders have pointed out lack of information on existing sources for financing and lack of know-how on how to pitch a compelling proposal as the main impediment to accessing finance.

A persistent lack of availability of accurate and timely data affects the opportunities available to entrepreneurs and businesses. This leads to businesses not being able, for instance, to assess the viability of expanding to a different county for lack of availability of market data. Consultations with stakeholders reveal that this problem affects primarily startups, SMEs and women-led businesses, while large businesses can leverage personal contacts to access the needed data. Despite the establishment of the Open Data Initiative in 2011, progress remains slow; only 31 out of 262 MDAs are contributing to the initiative. While some firm-level data exists in Kenya, accessing this data in usable formats is a challenge.

⁷¹ Intelligent Community Forum (ICF), 2015

⁷² The Future of Jobs and Skills in Africa, WEF, 2018

6.3 Recommendations & Next Steps

6.3.1 *Building the Digital Entrepreneurship Ecosystem*

Government policies need to better engage with the digital innovation ecosystem and provide targeted support to the entrepreneurship community. Consultations revealed that local stakeholders, the government, and private sector entities feel a disconnect between government programs and policies and the interests of local players in the ecosystem. There is a level of disconnect between government programs and policies, and the interests of local players in the digital ecosystem. The public sector has set up organizations such as the Kenya Private Sector Alliance (KEPSA) and the Kenya IT and Outsourcing Society (KITOS), but these may not be structured well enough to support digital innovators, as they focus mainly on larger businesses.

Establish channels to increase access to alternate sources of financing for early-stage enterprises. Consider programs that reinforce intermediaries like incubators and accelerators in their work supporting startups and entrepreneurs on available sources of financing and how to access them. Business Angel Networks (BANs) can be strengthened through instruments including elements of third-party risk absorption, particularly for early-stage enterprises.

6.3.2 *Reforming the Business Environment*

Design specific programs to support women's participation and growth in the entrepreneurship ecosystem. Key steps may include (i) boosting access to information and networks for women founders and women-led SMEs, (ii) encouraging BMOs and WBAs to better meet the needs of women entrepreneurs and strengthen their capacity and (iii) increasing access to finance for women entrepreneurs through targeted funds and incentives.

Account for differences between entrepreneurship ecosystem players and traditional businesses in taxation policy and regulatory norms. Policies and programs can be tailored to support the entrepreneurship community through tax exemptions for nascent businesses and startups. Additionally, using advanced technology services from local entrepreneurs as part of public procurement processes, can help drive local demand and viability of startups while simultaneously helping transform digital programs, such as e-citizen, digital IDs, and more.

6.3.3 *Engaging Key Stakeholders*

Expand and encourage the tech ecosystem at the county-level, continuing to bridge the rural-urban divide. Establish basic infrastructure and connectivity needs to allow for the entrepreneurship ecosystem to expand, potentially through PPP models. Targeted support for county-level tech-ecosystem partners could be offered through tax incentives and subsidies, and the creation of specialized regional hubs. For example, government programs such as the Kenya County Connectivity Project, which aims at providing infrastructure connectivity across counties and the Constituency Hubs and Pasha Centers that are focused on creating digital innovation centers across the country are good steps that have received praise from local stakeholders. Similarly, the private sector has also taken significant steps towards decentralization of the tech industry. For example, tech hubs have sprouted in Kenyan cities and towns, including Mombasa (SwahiliBox), Kisumu (LakeHub), Eldoret (Dlab Hub), Voi (Sote Hub), Machakos (Ubunifu), Nyeri (Mt. Kenya Hub and DeHub), amongst others – these can be supported by the government.

Formalize informal networks to allow coordinated discussion around policy formulation and provide a one-stop-shop for entrepreneurs to bridge the information gap. While informal events offer networking opportunities, there is potential to formalize these, leveraging existing platforms to initiate structured discussion and dialogue between private and public sector entities.

5.3.4 *Open data for business, and disseminating information in the market*

Open key data sets (including census, agriculture, labor, taxes and tariff, commodity pricing, among others), to better equip digital innovators to launch new businesses, optimize operations, create jobs,

and improve the climate for foreign investment. Additionally, the provision of this data in machine-readable format would increase its accessibility and ease of use. The ICTA can ensure that the tech and innovation communities can fast-track requests for government open data.

Create a central repository for entrepreneurs to disseminate information regarding the entrepreneurship ecosystem. Entrepreneurs have expressed a shared pain concerning the lack of information regarding government programs and even private sector opportunities in the market, and are often uninformed about the networks, opportunities, and resources that exist. In particular, efforts to disseminate information regarding IP protection can help entrepreneurs protect their innovations.

Key messages:

- Kenya has made concerted efforts to embed digital skills in the national education system, through - the new competency-based curriculum, the flagship Digital Literacy Project and Kenyan TVET institutions and Universities offering advanced level IT-related courses
- Despite these efforts, gaps in basic digital skills still permeate, limiting wider and more active usage and application of digital tools and services - perpetuating the digital divide. Low enrollment in STEM, low completion rates of related courses and weak quality and relevance of related training limit the pipeline of digital talent with advanced or high-end digital skills.
- A weak supply of digital talent emerges as a key constraint for the development of new, innovative and home-growth digital services and business-models. As it stands, Kenya does not appear to be producing enough ‘work-ready’ digital and e-business specialists to keep pace with market demand and propel further digitization.
- As the demand for basic digital skills is likely to become ubiquitous, and more and more jobs are expected to become ICT-intensive, broadening the digital skills base will be key to protecting jobs and facilitating access to new ones.
- Enhanced data collection practices are needed to better track digital skills supply and demand, as is better synergy between skills development and the labor market, to support alignment.
- While the government should play a strong role in ensuring basic digital literacy for all citizens, through reforms and investments in the formal education system. There is also considerable scope for “crowding in” the private sector in more areas pertaining to digital skills development and at all digital skills levels, including in areas such as content creation, curriculum design and through performance-based contracting and formal industry-academia partnership.

7.1 Importance of Digital Skills

Digital skills form an essential building block of the digital economy, critical to maximizing the uptake, impact and benefits stemming from greater access to connectivity and technology and new jobs. Digital skills can help bridge the digital divide, bringing more people online and empowering individuals to utilize digital tools and services in a personal and professional capacity. A digitally skilled citizenry is likewise critical to creating the consumer base for new digital products and services created by local entrepreneurs. A digitally skilled talent pool can also actively participate in the upcoming gig economy.

7.1.1 Socioeconomic Rationale for Investing in Digital Skills Development

Equipping Kenya’s future and existing workforce with digital skills will open doors to new forms of employment. – notably, in the emerging services and ‘gig economy’, where Kenya has already sought to position itself as a hub for global digital business process outsourcing (BPO) through schemes like Ajira. However, at present, a mere 7,000 Kenyans currently work in BPO. An estimated 286,000 are currently thought to be employed by Kenya’s burgeoning digital services platforms, in areas such as transport, logistics and e-commerce. According to International Labor Organization (ILO), future jobs are likely to be found in sectors such as green technology and IT infrastructure. Many advances in facilitating better access to quality healthcare, as well as food security are being driven by technology-enabled solutions. For Kenya to foster a vibrant digital innovation ecosystem, Kenyans need to be equipped with the skills to not just use, but also create new technology and technology-enabled business solutions.

7.1.2 Alignment with Country Development Strategy & Goals

Kenya has long considered embedding ICT in the national education system to be a priority. As early as 2006, this was reflected in the National ICT Strategy for Education and Training, which articulated the need to (i) develop a competent and ICT-savvy workforce that meets industry needs; (ii) increase

ICT penetration and usage at all levels of education; (iii) develop education leadership and teachers' capacity and capability in and through ICT; (iv) enhance teaching, learning and research through ICT integration in higher education (HE) and Technical and Vocational Education and Training (TVET). This strategy appears to have influenced subsequent policies and strategies related to ICT and education, such as the 2014 National Education Sector Plan (NESP) and flagship Digital Literacy Program.

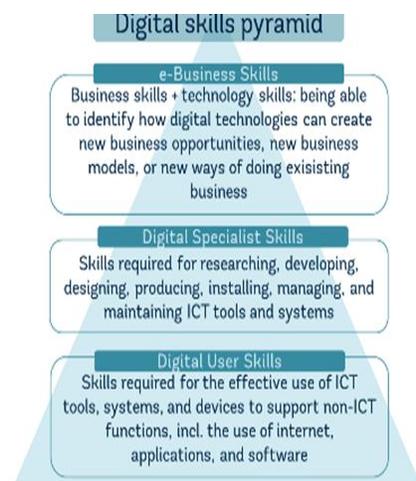
A clear commitment to developing the nation's digital skills base is also articulated by numerous strategic government documents, such as the Kenya National ICT master plan, which establishes the development of ICT human capital as a core priority, and indirectly refers to both basic digital literacy (needed to ensure universal participation in the digital economy and effective usage of ICT products and services) and advanced or 'high-end' digital skills (needed to innovate and transform industry, business and government operations). Notably, this sentiment is echoed in Vision 2030, which focuses on mainstreaming ICT in schools.

7.2 Diagnostic Findings: Current State of Digital Skills

This report applies a tiered definition or typology of digital skills – see figure 6-1 - including basic and core digital user skills, as well as more advanced digital specialist and e-business skills:

- In most cases, **basic digital user skills** are taught at primary and secondary school level, and involve the foundational digital literacy needed to use basic digital tools and applications.
- **Digital specialist skills**, however, are needed to develop, design, install and maintaining digital tools and systems, and technology-enabled solutions. These skills are typically taught at universities, and to a lesser degree at TVET institutions.
- Finally, **e-business skills**, also often referred to as 'digital entrepreneurship', typically combines intermediate and advanced digital skills and business acumen to design new commercial products and services, or new business-models based on technology.

Figure 7-1 Overview of digital skills required for the digital economy



7.2.1 Market Analysis of Digital Skills Demand & Availability

7.2.1.1 Basic Digital Skills

While the average Kenyan citizen appears to have a higher level of digital literacy than peers in neighboring countries, there is significant scope for improvement. While no quantitative data on the level of basic digital skills attainment is currently available, several proxy indicators can help provide insights. The 78.7 percent adult literacy rate in 2014 would suggest a corresponding digital literacy gap of at least 21.3 percent⁷³. Kenya is known for widespread DFS usage – estimated at 72 percent (Global Findex 2017) - which signals broad coverage of at least some basic digital skills as users must be able to navigate USSD menus on their phones. However, only 29 percent of adults used the internet to pay bills or to buy something online in 2017⁷⁴ and as of early 2019 there were only 8 million Facebook users,⁷⁵ equivalent to a mere 16 percent share of the population, suggesting a potentially lower level of basic digital skills penetration.

⁷³ UNESCO Institute for Statistics (2014)

⁷⁴ Findex (2017)

⁷⁵ FB users aged 13+ (4.7M male, 3.3M female) – out of ~50M. Figures extracted from the Facebook advertising tool which tell users how many people can be targeted.

There are substantial gaps in the delivery of basic digital skills training in primary and secondary education. Out-of-school youth are likely to miss out on basic digital skills training altogether. This latter group is currently estimated to account for roughly 6 percent of the total labor force.⁷⁶ However, if we use the collective figures for current levels of wage employment, enrollment in TVET, and tertiary education as proxy for basic digital literacy levels in the workforce this would equate to roughly 26 percent, equivalent to a 74 percent point digital literacy gap.⁷⁷ While the figures presented above paint a mixed picture of basic digital skill skills attainment, they suggest that the basic digital skills gap is likely to be at least 21 percent points and likely far higher. A more rigorous and routine data collection exercise is recommended to assess the full extent of the basic digital literacy gap and create tailored programs to address it

The Government's flagship Digital Literacy Program (DLP) offers students and teachers at primary school level the tools to leverage ICT in teaching and learning, but no equivalent for secondary schools. DLP includes the distribution of tablets and laptops preloaded with digital learning content, alongside electricity. As of February 2019, this program covered 20,000 out of 22,000 public primary schools, a 90 percent coverage rate. While 1.2 million devices have been distributed, utilization has been less pervasive - only an estimated 36-38 percent of primary schools are using the equipment as intended.⁷⁸ There is no equivalent DLP for secondary schools, and in 2018, only 56 percent of Kenyan secondary schools had access to ICT equipment. This figure is worse public secondary schools, of which only 34 percent had access to computers. Moreover, only 12 percent of all secondary schools were estimated to have Internet access,⁷⁹ reducing scope for integrating and leveraging ICT in teaching and education by limiting resources to offline content. Just 12 percent of all senior schools currently offer applied sciences courses, including computer science.⁸⁰ These gaps are adversely affecting the quality and attainment of digital skills among secondary school leavers

1.1.1.1 Digital Specialist Skills

Kenya's TVET institutes offer various engineering programs, which include courses in IT that help build digital specialist skills, but often fail to offer cross-cutting digital skills courses for all students. For instance, Kabete National Polytechnic offers computer studies and both a diploma and certificate in ICT, which covers use of various IT applications including web and graphic design, programming, computer support maintenance and networking etc. The school is thus producing programmers, system administrators, computer technicians, web designers, and network administrators, but not necessarily graduates with a strong practical understanding of how they can access and use the wider digital ecosystem.

While there are some relevant courses available, low enrollment in science, technology, engineering, and mathematics (STEM)-related courses suggests that the tertiary education system is producing few graduates with digital specialist skills. Kenyan universities currently offer bachelor's, master's and doctorate degrees in computer science, information technology (IT), IT security, and management of information system. There are some 74 accredited universities across Kenya, however, only a few appear to offer advanced-level courses in emerging technology, covering topics such as AI, as part of related degree-programs, such as the University of Nairobi's Master's program in Computational Intelligence. A conservative estimate of 2 percent enrollment in IT-related courses, based on 2018 enrollment figures, would suggest that TVET institution produces no more than 27,500 digital specialists per year⁸¹ with enrollment figures for women in STEM significantly lower. At university level,

⁷⁶ UNESCO, based on latest figures available.

⁷⁷ In 2018, Kenya's total labor force (between the age of 15-64) was estimated to be 20 million (equivalent to 40% of the total population). The share of wage employment was estimated to be about 2.7 million (i.e. 13% of total labor force). Some 275,000 students were enrolled in TVET (i.e. 1% of total labor force) in 2018; some 540,000 (or 3% of total labor force) were enrolled in tertiary education in 2016.

⁷⁸ Ministry of Education

⁷⁹ As of December 2018, 30 schools were connected through last mile connectivity solution provided by Wananchi and 4 secondary schools were connected via the Kenya Education Network (KENET).

⁸⁰ KICD (2017)

⁸¹ Based on author calculation: In 2018, some 275,000 students were enrolled in TVET education. Assuming TVET education is typically two year's long, and approximately 2 percent take IT-related courses - i.e. $(275,000/2)*0.2=27,500$. Assumption related to share of enrollment in IT-related course is based on corresponding enrollment figure at secondary level.

25 percent of undergraduates are estimated to be pursuing a degree in STEM, and only 20 percent of those enrolled in STEM courses at public universities graduate with a degree in STEM.⁸² Based on 2016 enrollment figures, and a conservative assumption that roughly 5 percent are enrolled in IT-related degrees, this would not yield more than 8,995 digital specialist graduates per year.⁸³ Moreover, while most Kenyan STEM graduates leave with a bachelor's degree, in industrialized countries a majority of STEM graduates hold a Master's degree or above.⁸⁴

The quality of ICT-related tertiary education is also a concern - interviews revealed that many universities are prone to teaching outdated coding languages and emphasizing theory more than practical applications. Together these factors limit the number of graduates equipped with the requisite experience demanded by employers. Much more needs to be done to continuously update and align the curriculum and training with new and shifting demands of the labor market, in relation to advanced-level digital skills training.

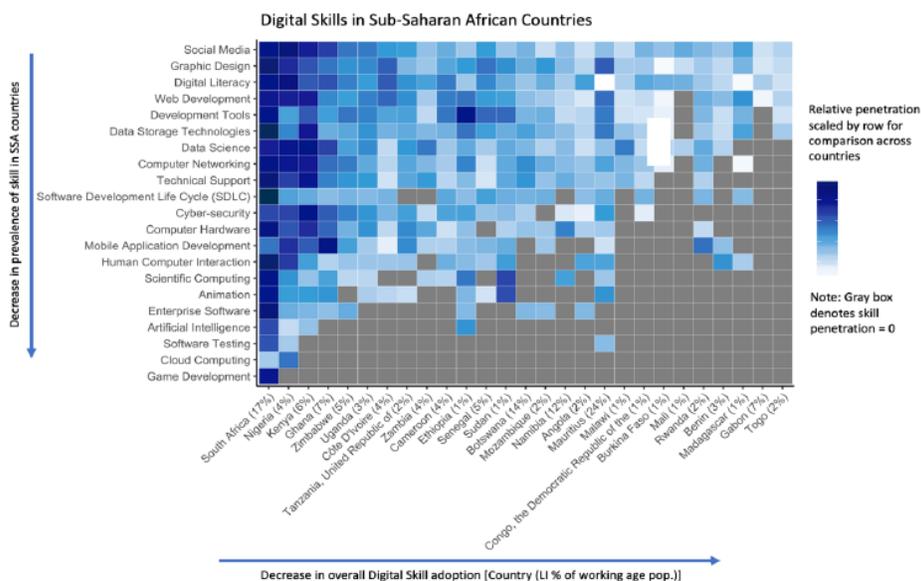


Figure 7-2 Digital Skills Benchmarking

Source: World Bank, Future of Work in Africa.

*staff calculation using LinkedIn data. Note that Kenya has small population of LinkedIn users relative to the total labor force, which skews sample.

7.2.1.2 E-Business Skills

E-Business skills, typically combining advanced digital skills and business skills to design new commercial products and services, are taught as optional courses at secondary school, TVET and university level. There is clear scope to integrate more business skills in the advanced-level digital skills curriculum, with a focus on creating new technology-enabled business solutions.

A network of tech hubs and incubators play a key role in fostering e-Business skills by offering training and encouraging idea exchange, mentorship and partnership between those that possess advanced digital and business skills. Key institutions include iHub, NaiLab, Gearbox, iLab, Fab Lab, etc. A strong

⁸² Based on figures between 2012 and 2015.

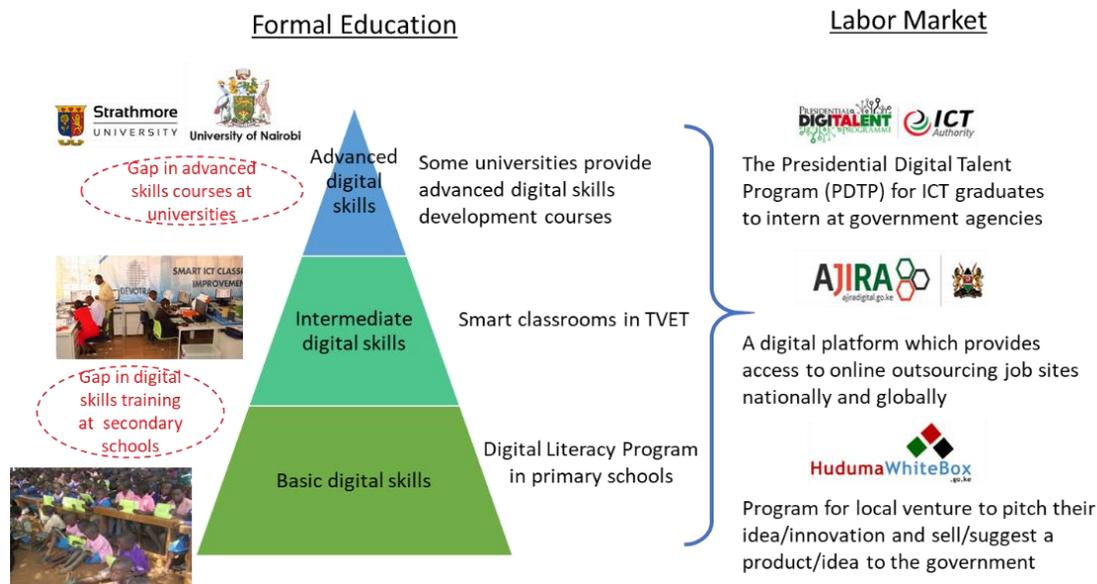
⁸³ Based on author calculations: School age population was 4,628,087 in 2016, with 11.66 percent total enrollment – i.e. approximately 540,000 students enrolled. Divided by three years of undergraduate education, yields 179,900 potential graduates each year, of which 5 percent are enrolled in IT-related courses– i.e. $179,900 \times 0.05 = 8,995$ graduates in IT-related courses. However, if only 20 percent actually graduate this figure would be 1,799 graduates ($179,900 \times 0.05 \times 0.2$)

⁸⁴ In comparison, the average share of STEM graduates of the total number of tertiary graduates in the EU is around 19-20 percent with significant variations at country level. Germany is in the lead position with 28.1 percent that graduated in a STEM related discipline in 2012, while at the other end of the spectrum the Netherlands and Luxembourg had around 10 percent of STEM graduates in that year

example of this is the 2016 launch of Kuhustle, an online freelancing job platform by NaiLab, targeting the domestic job market that is tailored to the local business culture and working environment.

The Ministry of ICT and the ICT Authority have also launched a series of labor market initiatives geared toward nurturing and placing digital talent in the workplace. These include the Presidential Digital Talent Program (PDTP), a government-run internship scheme, which provides interns with specialized training, mentorship and career guidance, allowing graduates to gain work experience and better understand government services. To date, two cohorts of interns, totally around 500 people, have been trained, helping to infuse greater use of ICT within government and prepare graduates for the private workforce or public IT service.

Figure 7-3 Overview of Government-led initiatives and gaps identified in the delivery of digital skills training



7.2.1 Constraints to Developing & Attracting Digitally Skilled Labor

Adequate access and usage of connectivity and ICT Equipment in schools, and supply of requisite teacher training is a key constraint in the delivery of quality digital skills training, particularly at secondary level. Creating a digital learning environment requires teachers to possess basic digital skills to deliver training. However, stakeholder consultations suggested that not all teachers were motivated to leverage new ICT equipment that has been made available. The Digital Literacy Programme (DLP) has sought to address teaching capacity gaps at primary level, but a similar initiative is missing at the secondary level - as of February 2019, some 60,000 primary school teachers had received a one-week course in the delivery of basic digital skills training and use of digital content in the classroom via the DLP, through the Teacher Service Commission (TSC). However, despite this training, the TSC reports that some 80 percent of primary school teachers felt they still lacked the ICT knowledge to translating training into practice. Moreover, the absence of qualified teachers, at university and TVET level, is adversely affecting the quality and breadth of advanced-level courses in digital skills. Bridging this gap will most likely require a multi-pronged approach, including skills upgrading of existing teachers, provision of ongoing training as well as the recruitment of new or visiting faculty members from overseas or the private sector.

Adequate alignment of curricula and teaching materials with market needs is critical to ensuring that the future labor market has the depth and breadth of digital skills required. Availability of teaching material and digital content is largely missing, and likely to adversely affect the level of basic and core digital skills acquisition among school leavers. Private sector providers have proved more attuned to the need for collaboration with potential employers to tailor the curriculum to market needs. Interaction between traditional education providers (i.e. academia) and industry has been much weaker and could be remedied by expanding the application of strategic industry-academia partnerships, allowing for the creation of a more demand-driven curriculum. Lessons learnt from industry-academia partnerships could be leveraged and replicated more broadly.

7.3 Recommendations & Next Steps

7.3.1 Creating an Enabling Climate for Digital Skills Development

Update, consolidate, and refocus the overarching strategic policy framework on ICT and education, creating a streamlined and holistic framework for digital skills development. The government is advised to broaden focus beyond leveraging ICT for teaching and learning and expanding access to ICT equipment in schools, to include quality delivery of digital skills training and attainment of basic and core digital user skills among school leavers. This strategic framework should also be attuned to the various types of digital skills needed, and to the rapidly shifting rate of technology development. To this end, it should be regularly reviewed and updated, and provide continuous learning opportunities. Moreover, the strategy should be geared toward actively encouraging more students to pursue training in STEM related subjects.

Consider modifying the curriculum by infusing a value driven approach to skills development, ensuring that students can navigate the internet safely and effectively, avoiding fraud, scams and breaches to data protection and privacy, and leveraging the full range of benefits available through digital tools, platforms and services. The government should consider offering a basic digital skills course at primary level, in addition to embedding it in teaching of other subjects. Moreover, it should consider making core digital skills courses mandatory at lower secondary school and TVET, rather than offering it as an optional course, as well as infusing applicable basic and core digital skills across the board, as it applies to technical vocations at TVET and specialization at upper secondary level. TVET institutions and universities could also mandate basic digital skills assessments upon enrollment and address any gaps through complementary training. The government should also consider offering more digital specialist skills training, such as computer programming at upper-secondary level. Finally, business skills could be more readily integrated in the advanced digital skills curriculum to build the e-business skills base.

Equip all students and educators with the requisite tools to embed applied digital skills training in the curriculum. This would involve broadening the coverage of the DLP and subsidized broadband schemes to cover more secondary schools and TVET institutions, with the overarching aim of achieving universal coverage and access to connectivity and ICT devices. Specifically, the government needs to urgently address gaps in connectivity and access to ICT tools at secondary level; this could also support further roll-out of advanced-level courses at secondary schools. Further to this, ongoing and regularly updated teacher training needs to be offered, allowing educators to effectively teach digital content.

Expand opportunities for online and agile learning through digital platforms, for all levels of digital skills development, particularly to address gaps in adult education identified. There is scope to scale-up distance learning infrastructure currently provided by a handful of universities to support re-skilling and up-skilling of adults as well as out-of-school youth. Equally, a scale up of online digital skills related courses offered on these platforms is needed.

7.3.2 Engaging Key Stakeholders

Increase industry-academia exchange to enhance the synergies between skills development and labor market needs. The government is advised to expand the application of strategic industry-academia partnerships to support the development of a more demand-driven curriculum that is attuned to the needs of the labor market and the challenges faced by employers, who currently struggle to recruit staff with the requisite skills. Greater collaboration between the Ministry of Education, Ministry of ICT, and Ministry of Labor will assist in identifying the demand of digital skills and effectively incorporating them into education system, while also reaching of out-of-school youth.

Source content and lecturers from the private sector. The government could leverage partnership with the private and non-profit sector to source suitable teaching material that both helps to bridge existing gaps in access to content and serves to align the curriculum with labor market demand. By doing so, the education system would also stay abreast of rapid technological change, which typically outpaces

the cycle of content development in the education sector. This would require improvements in monitoring, oversight and quality control, in close collaboration with relevant stakeholders.

Leverage non-state actors of basic and advanced digital skills training. As noted above, the government should also contemplate leveraging non-state actors more readily to expand access to training in rural areas and to neglected groups. This could be undertaken through a more comprehensive mapping of existing providers and their respective strengths, including modest government sponsorship to support their expansion and the replication/scale-up of successful models.

Focus Box: Role of the private sector in digital skills

A wide range of ready-to-market and rapid skills training schemes run by private providers are supplementing the higher education system and helping bridge the gaps in market needs. Short courses in basic to intermediate programming are offered by organizations such as iHub and AkilaChix, with Andela and Moringa schools offering certificate programs in advanced-level coding and software development. Moreover, Gearbox and Fab Lab Nairobi at the University of Nairobi both offer facilities and training that support foundational skills in digital fabrication and electronic board design, using 3D printing and computer numerical control (CNC) milling machines. Several IT companies, such as IBM, Google, and Intel, run in-house training, in collaboration with the universities, to equip graduates with the advanced digital specialist skills in subjects such as AI, blockchain, and IoT required by the labor market. For example, IBM has created a research lab at Catholic University to conduct advanced ICT-related research and support innovation and also runs IBM Africa Skills Academy to train students and educators. Intel runs an AI Academy, available to both students and professors, including a regional AI Student Ambassador Program.

The success of many of these training programs relies on their strong practical application focus and linkages with potential employers. The programs rely on the employers to (i) survey the skills that are in demand, (ii) regularly update, tailor and inform their curriculum, and (iii) facilitate work placements and real-world training. These are elements that ought to be emulated by universities to strengthen advanced-level training. There is also scope to expand the use of private public partnerships (PPPs) aimed at increasing the level of privately-run training schemes beyond urban hubs, as many current schemes are concentrated in urban areas.

8 Conclusion: The way forward

The rise of digital technologies and the digital economy represent a once-in-a-generation opportunity to transform the prospects for Kenyan citizens, businesses and government. Kenya's digital evolution has already been a significant success story, however, much remains to be done to not only keep pace as the world digitizes, but to lead. By taking bold, decisive action, the Government can help build a future in which seamless and efficient public services are available at the touch of a button, where individuals are equipped with the technology and soft skills to find meaningful employment in a knowledge- and services-driven economy, and where Kenyan businesses and entrepreneurs are pushing the frontiers of innovation, creating new jobs, and accelerating the country's economic growth. Perhaps most importantly, this future must include everyone – ensuring that all Kenyans are able to meaningfully participate and benefit from the digital economy.

Achieving this future will require attention to addressing both the investment needs, but also to carry out the policy reforms– some of which will take significant political will to overcome vested interests and old ways of thinking. It will also require a bold vision, leadership, institutions and resources that match this level of ambition. Finally, it will require a view beyond Kenya's borders, removing the barriers to digital trade and the transmission of ideas, talent and data across the region and across the globe while maintaining security and privacy. The launch of the Digital Economy Blueprint, adoption of the new National Broadband Strategy, increasing emphasis on ICT infrastructure and skills investments in the national budget, and championship of the digital agenda by President Kenyatta are all promising signs.

The World Bank Group stands ready as a committed partner to support Kenya's journey toward digital transformation. This thought piece provides a detailed analysis of the challenges and opportunities within the digital economy in Kenya. It also pioneers a point of view on the possible ways that can help Kenya leapfrog into the category of digital leaders of the future. This study has helped inform Kenya's Digital Economy Blueprint, which outlines a vision and roadmap for the creation of “a nation where every citizen, enterprise and organization has digital access and the capability to participate and thrive in the digital economy.” The digital diagnostics continue to act as a basis for developing policy thinking around the issues of digital development. ('Annex 1: Overview of Recommendations' provides a summary of key recommendations disaggregated by priority and time duration). In line with government priorities - The World Bank Group will also support the Government of Kenya in distilling key recommendations and lessons from these studies into national policies and programs where applicable.

In Focus: Digital technology enabling agricultural outcomes

Applying digital technologies in the agriculture sector can help increase Kenyan farmers' productivity, efficiency and competitiveness, facilitate access to markets, improve nutritional outcomes and enhance resilience to climate change. These digital innovations are disrupting the status quo of the system by providing significant benefits to smallholder farmers and agribusinesses.

A forthcoming World Bank study illustrates the strong emergence of the agricultural technology sector in Kenya. It identifies 58 agricultural startups, 74 percent of which are digital in nature. Of those which are digital in nature, 50 percent operate as an e-platform or e-marketplace catering to different agricultural challenges. Digital technologies for agriculture can cater to different challenges such as productivity, market linkages, financial inclusion and data analytics and intelligence through different digital tools (see below for details)

Digital Agricultural Technologies have demonstrated early signs of creating an impact. While adoption of digital technologies for agriculture is still low in Kenya, evidence exists that DATs are starting to amplify the impact of traditional investments (irrigation, inputs, etc.). The reach of the leading platforms and technologies range from 1,000 farmers to over 600,000, suggesting a reasonable uptake but also significant scope to expand.

Box 1: Digital Technology Solutions for Traditional Agricultural Challenges

Agricultural Challenge	Challenge definition	Digital tools for agriculture
Agricultural Productivity	Extension services and Climate Smart Agriculture advisory, delivery of credible and actionable information, labour, input and resource-intensive practices	<ul style="list-style-type: none"> • Video tools & SMS with agronomic information, climate-smart advisory, weather information, extension services • Chatbot services, peer-to-peer learning platforms for farmers • Pest and disease management tools, medical assistance tools for livestock • Digital services increasing the access to inputs, mechanization and bio-products for agriculture
Market Linkages	Tools to help farmers produce high quality, high yield crops as well as help link them to markets, including digital platforms to sell farm produce	<ul style="list-style-type: none"> • Services linking farmers with buyers (buyers could be intermediaries, households, industry or govt.) • Solutions providing livestock trading to • Supply chain logistics and traceability
Farmer Financial Inclusion	Credit and savings products, insurance, and other innovative financial services for farmers	<ul style="list-style-type: none"> • Digital services increasing access to credit (which may lead to increase in access to inputs and mechanization) • Services/Solutions increasing access to crop insurance, generating credit scoring and worthiness of farmers • Online crowdfunding platforms for farms
Data Analytics and Agricultural Intelligence	Data infrastructure, remote sensing and mapping technologies, precision agriculture tools, and computing power to enable data-driven decision-making	<ul style="list-style-type: none"> • Livestock identification, livestock/cattle management software, fish management software

	by policymakers, public agencies, and private service providers in the agriculture sector	<ul style="list-style-type: none"> • Data infrastructure, remote sensing and mapping technologies, drone, satellite or aerial imagery • Precision agriculture tools such as IoT devices, soil sensors, farm-management software, cloud-based management information systems
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Box 2: Examples of Promising Kenyan Agritech Startups

Agricultural Productivity Theme

			
<p>Digital Green uses a video approach to amplify extension providers' effectiveness to improve farmers' livelihoods. They partner with existing extension officers to provide videos with highly localized content, human mediators to reinforce key messages and use near real-time data and feedback from farmers to inform adjustments on the content of the videos.</p>	<p>Farmers Pride leverages technology and franchising to break down barriers that have limited success of farmers. They provide a one stop village level online mobile app/web platform popularly known as DIGISHOP that ensures access to all the necessary inputs, services and information farmers need.</p>	<p>DigiCow provides extension services to farmers using an innovative mobile phone solution. They provide training through a mobile app in which farmers can also chat and share ideas. Voice-based training coupled with SMSs is provided to farmers without access to smartphones.</p>	<p>Precision Agriculture for Development provides low-cost mobile agronomic advice to farmers that is accessible, relevant, and customized to boost yields.</p>

Market Linkages Theme

		
<p>M-shamba is a Nairobi based Start-up that has been working with farmers across East Africa to effectively deploy farming technologies among smallholder farmers using basic mobile phones. The innovation focuses on the use of simple phones commonly known as feature phones to deliver vital information to the smallholder farmers even in remote areas.</p>	<p>TruTrade is a social enterprise that digitizes value chain transactions making rural agricultural markets work better for farmers, aggregators and buyers. TruTrade's service provides farmers with reliable routes to market and fair prices as well as agribusinesses and wholesalers with traceable produce to meet their quality specifications.</p>	<p>Tulaa is a marketplace for smallholder farmers in Africa. Using mobile technology and artificial intelligence, Tulaa provides quality inputs like fertilizer on credit, tailored advice, and access to reputable buyers to smallholder farmers.</p>

Farmer Financial Inclusion Theme

		AGRI-WALLET
<p>ACRE is a service provider that links farmers to insurance products so that they can confidently invest in their farms. ACRE automates weather risk modeling, payments and communication through SMS and USSD platforms, claims calculations, and disbursement through mobile money.</p>	<p>Arifu is a social enterprise making it possible for the least served people to access the knowledge they need on financial services from the organizations they trust on any mobile phone. Arifu provides both an education technology platform and a content digitization service.</p>	<p>Agri-wallet is a platform that enables financial inclusion of all value chain actors around smallholder farmers.</p>

Data Analytics and Intelligence Theme

		
<p>Astral Aerial is a drone operator. Offers up to date, problem-specific data to farmers using drones (a drone covers 1000 acres per flight, with sensors to detect crop health at an affordable price).</p>	<p>Oakar's solution package offers farmers and other stakeholders access the latest knowledge, training, practices, data and mechanization best suited for them. Oakar's Analytics platform incorporates dynamic datasets that can provide market information and facilitate easy links between producers and markets.</p>	<p>UjuziKilimo provides a simple and fast way for smallholder farmers to monitor soil fertility. UjuziKilimo's proprietary Sensor technology SoilPal is a GPS and internet enabled device with sensors that is used in farms to monitor the levels of macro nutrients, weather, soil pH and moisture content which directs water, lime and fertilizer nutrient application rates based on local requirements.</p>

Annex 1: Overview of Recommendations

Cross-cutting themes:

- Ensuring that the digital economy is more inclusive.
- Increasing competition
- Supporting more agile and enabling regulation and policy
- Creating a trust environment
- Stimulating cross-pollination of digital and traditional sectors
- Supporting integration and economies of scale

Digital Infrastructure			
Action	Responsible Agency	Time Frame	Priority
Objective: Improve the service quality, geographic reach, price competitiveness and utilization of public digital infrastructure investments			
Review the management model and improve performance of existing NOFBI network <ul style="list-style-type: none"> ▪ Network audit + repairs; Review management model + incentives for ops and maintenance (ideally a neutral, wholesale only service provider) 	ICTA	Short	High
Invest in further NOFBI network expansion, resilience and cross-border links	ICTA	Medium	High
Objective: Stimulate private sector led digital infrastructure and services deployment and efficiency			
Ensure a transparent, cost-based, and efficient allocation of spectrum to encourage operators and other network providers to expand internet access throughout the country <ul style="list-style-type: none"> ▪ Release remaining 700MHz spectrum for mobile broadband; Strategy for 5G spectrum; Trial licenses and unused spectrum for new tech and rural deployment 	CA	Short-Medium	High
Create a streamlined process to obtain rights of way (“ROW Single Window”) and access to passive infrastructure	CA, MINICT, KENHA, others?	Medium	High
Review incentives and obligations for rural broadband deployment <ul style="list-style-type: none"> ▪ Differentiated spectrum, licensing, tax regime (white spaces, proactive spectrum re-farming, fee and tax reduction/elimination, etc.) 	CA, MINICT	Short	High
Objective: Strengthen the institutional, legal and regulatory enabling environment to promote competition, investment and affordability			
Strengthen the Communication Authority’s (CA) independence, efficacy and coordination with other partner institutions (Competition Authority, CBK)	CA	Medium	High
Update and promulgate pending telecoms regulations to modernize the sector regulatory framework	CA	Short	High
Enact key recommendations of the 2018 market competition study	CA	Short	High

<ul style="list-style-type: none"> Tower sharing in specified counties, retail price caps for dominant operators, etc. 			
<p>Remove or reduce retail level taxes to improve affordability and access and to stimulate demand</p> <ul style="list-style-type: none"> 15% VAT on voice and data; Import duties and/or retail taxes on digital devices up to specific threshold 	MINICT, KRA, Treasury	Medium	High

Digital Platforms			
Action	Responsible Agency	Time Frame	Priority
Objective: Create a trust environment			
<p>Prioritize the development of a digital identity and electronic signatures ecosystem with the aim of rolling-out a system that is aligned with global best practice and recognized regionally</p> <ul style="list-style-type: none"> Review NIIMS rollout to adopt best practices, including inclusion, privacy and public trust 	Ministry of ICT / Ministry of Interior	Short-medium	High
<p>Finalize and enact the draft data protection bill and policy applying a more nuanced approach to data localization, as well as harmonizing provision with other regional frameworks</p> <p>Adopt data privacy provisions that are practical for government to enforce and companies to comply with, as well as support stakeholder consultations</p>	Ministry of ICT	Short	High
<p>Instil virtuous values and business ethics in the digital space and across the e-commerce value chain, as well as boost cyber awareness among consumers to support consumer protection</p> <ul style="list-style-type: none"> Support joint and concerted effort among players in the digital economy ecosystem to create a robust trust environment that instils confidence among users of digital platforms, as well as encourages safe and responsible usage of digital platforms Government is encouraged to act as a convener, supporting the development of shared principles and approaches 	ICTA / Ministry of Education / Private Sector	Medium-Long	High
<p>Strengthen the strategy, policy, legal, institutional and governance framework for cybersecurity, as well as capacity to monitor, detect and prevent:</p> <ul style="list-style-type: none"> Leverage regional partnerships and harmonization to strengthen detection and response capacity in relation to cyber security. Support unified and progressive cyber laws and policies at regional level 	Ministry of ICT	Medium-Long	High
<p>Harmonize consumer protection policies across borders, including reciprocal agreements to recognize and enforce each other's approaches.</p>	Ministry of ICT	Medium-Long	Medium
Objective: Expanding access to innovative and user-centric public and private digital services, via digital platforms			
<p>Employ a whole-of-government strategy to accelerate the government digitization agenda with due consideration to digital integration and interoperability:</p> <ul style="list-style-type: none"> Enhance and add new digital services, consistently applying user-centric design and paying greater attention to business process re-engineering 	ICTA / MDAs	Medium	High

<ul style="list-style-type: none"> Fully digitize government records and data Address unresolved issues related to data standardization, consolidation of IMSs, and system interoperability 			
<p>Develop more CivicTech solutions that can improve services, user satisfaction and accountability:</p> <ul style="list-style-type: none"> Formulate a more conscious and targeted sub-strategy for CivicTech, which identifies key models that have been successful and scale them, moving beyond mere information-sharing via social media. 	Ministry of ICT / ICTA / MDAs	Long-	Medium
<p>Continually update the KODI portal, with new critical data sets and improved functionality to enable the development of data-driven analytics and services by both government and public sector (e.g. on Big Four):</p> <ul style="list-style-type: none"> Make data and records available in standardized, machine-readable and easily accessible formats Incentivize MDAs to collect and publish their datasets on the portal on a routine and continual basis Install sensors, GPS and other internet of thing (IoT) enabling equipment to strengthen access to real-time government data Encouraged SMEs to make use of the KODI portal 	Ministry of ICT / ICTA	Medium	High
<p>Develop an agile approach to key legal and regulatory frameworks that affect the diversity of digital services offered, including competition, IP/copy-right etc. along with increasing institutional capacity to deal with enforcement.</p>	Ministry of ICT / Regulators	Medium-Long	High
<p>Support moderate incentives that reduce the dominance of large international platforms and encourage the development of local platforms.</p>	Competition Authority	Medium-Long	Medium
Objective: Improve institutional frameworks			
<p>Enhance ICTA's capacity and mandate, allowing it to continue to spearhead government digitization, ensuring a whole-of-government approach to digital integration and interoperability, as well as strengthening its support for the change management associated with government digitization:</p> <ul style="list-style-type: none"> Adequately fund and staff ICTA to e.g. support training Increase ICTA's clout to rationalize government ICT functions, coordinate and standardize digital systems used by Government 	Ministry of ICT / ICTA/ Parliament	Short-medium	High
<p>Support greater interagency cooperation and coordination on the e-commerce agenda, supporting a holistic approach and shared vision for e-commerce development:</p> <ul style="list-style-type: none"> Support the identification and development of key enabling areas such as transport, post, addressing system, trade and customs, etc. Identify opportunities for both platform development and adoption in priority value chains and sectors (e.g. Big Four). 	Ministry of ICT, Ministry of Industry, Trade and Cooperatives, Ministry of Foreign Affairs and International Trade	Medium- term	High

Digital Financial Services			
Action	Responsible Agency	Time Frame	Priority
Objective: Enhance financial stability by modernizing financial systems			
Adopt measures to establish a level playing field in competition practices and regulation beyond institution type to product or service	Central Bank of Kenya (CBK) / National Treasury	Medium	High
Modernize supervision of DFS usage to address misuse and fraud. This includes improving SIM-card registration procedure, through better agent network management, and the introduction of tiered KYC requirements for risk-based registration for products and services by customers	Financial Sector Regulators/Communications Authority of Kenya	Medium	High
Encourage FSPs to improve DFS offering that target MSMEs and SACCOs. The big financing gap of MSMEs in Kenya could be addressed through solutions that combine innovative and digital credit, payments, savings, and insurance products	CBK/Association of Microfinance Institutions (AMFI)/Sacco Societies Regulatory Authority (SASRA)	Short	High
Objective: Boost trust through the development of robust financial and data infrastructure			
Empower the consumer of DFS through improved consumer welfare and control on information sharing.	Ministry of ICT/Central Bank of Kenya/National Treasury	Short	High
Develop advanced consumer protection practices through improved supervision, transparency and digital and financial literacy	Central Bank of Kenya/National Treasury	Short	Medium
Allow cloud hosting services to be used by all financial service providers and, in parallel, ensure consumer protection and improved risk management of consumer data	Ministry of ICT	Medium	Medium
Objective: Strengthen ecosystem co-operation and thought leadership			
Ensure cooperation between government and regulators, as well as continuous engagement with the private sector	All Financial Sector Regulators	Long	Medium
Support greater usage of a regional switch to facilitate the single digital market ambitions of the EAC	CBK	Long	Medium
Support thought leadership in the public and private sector: Encourage research and evidence-based decision-making	All Financial Sector Regulators and players	Long	High
Encourage data analytics skill development	Financial sector and private sector players	Long	High

Digital Entrepreneurship			
Action	Responsible Agency	Time Frame	Priority
Objective: Make policies more conducive through providing accessibility of capital and targeted incentives			
Explore alternate sources of financing for early stage ventures and educating investors and investees <ul style="list-style-type: none"> ▪ Employ credit guarantee schemes, leverage business angel networks and investment promotion agencies, support accelerators/incubators 	Treasury/Ministry of Industry, Trade and Cooperatives/Ministry of ICT	Short	High
Institute tax incentives and favourable procurement policies for entrepreneurs and start-ups <ul style="list-style-type: none"> ▪ Use tax breaks, tax holidays, procurement for digital programs like e-citizen 	Treasury/KRA/ Ministry of ICT/Ministry of Industry, Trade and Cooperatives	Short	High
Objective: Developing a digitally skilled and industry relevant talent pool			

Encourage digital skills and soft skill integration in traditional curriculum <ul style="list-style-type: none"> Integrate internship programs at university and encourage technology bootcamps etc. 	Ministry of Education/Ministry of ICT/Ministry of Labour	Medium	Medium
Objective: Encouraging greater collaboration with the private sector through information dissemination and involvement			
Involve ecosystem players in policy dialogues through newly formed association ASSEK and policy events etc.	Ministry of Industry, Trade and Cooperatives, Ministry of ICT	Long	Medium
Open key datasets for business and disseminate information in the market <ul style="list-style-type: none"> Supply market data and other relevant data on industries Create a one-stop-shop of information for entrepreneurs 	Ministry of ICT/Ministry of Industry, Trade and Cooperatives	Long	Medium
Objective: Bridge urban-rural divide pertaining to ecosystem support			
County level programs for creating digital infrastructure <ul style="list-style-type: none"> Existing programs such as Constituency Hubs and Pasha centers that create digital innovation centers can be expanded 	Ministry of ICT/Ministry of Industry, Trade and Cooperatives	Long	High
Supporting country based accelerators or virtual accelerator models through incentives like county challenge funds or tax/subsidies <ul style="list-style-type: none"> Expanding on County Innovation Challenge Fund programs to support local accelerators in counties, or using other instruments of tax incentives or subsidies 			
Objective: Foster links between the digital entrepreneurship ecosystem and more traditional industries			
<ul style="list-style-type: none"> Accelerate and scale the implementation of the Industry-Start-up Linkage Program and the Industry-Academia Platform under the Kenya Industry and Entrepreneurship Project Support technology adoption for Kenyan firms, including the acceleration of the SME Upgrading component of the Kenya Industry and Entrepreneurship Project 	Ministry of Industry, Trade and Cooperatives	Short	High

Digital Skills			
Action	Responsible Agency	Time Frame	Priority
Objective: Create an enabling environment for digital skills development within the National Education system			
Update, consolidate and refocus the overacting strategic policy framework on ICT and education, creating a stream-lined and holistic framework for digital skills development: <ul style="list-style-type: none"> Broaden focus beyond leveraging ICT for teaching and learning and expanding access to ICT in education to include quality delivery and skills attainment Include more initiatives to boost STEM-enrolment 	Ministry of Education / Ministry of ICT	Short	High

<ul style="list-style-type: none"> Update said strategy on a regular basis to ensure it is attuned to shifting demands in the labor market 			
<p>Modify the curriculum:</p> <ul style="list-style-type: none"> Infuse a value-driven approach to skills development Consider offering a basic digital skills course at primary level, in addition to embedding it in the teaching of other subjects Make core digital skills courses mandatory at lower secondary school and TVET Infuse applicable basic and core digital skills across the board, as it applies to technical vocations at TVET and specialization at upper secondary school level Offer a mandatory basic digital skills assessment upon enrollment in TVET institutions and universities to address any skills gaps through complementary training Offer more digital specialist skills training, such as computer programming, at upper secondary level. Create digital skill program in secondary and tertiary education to accelerate the growth of local industry in priority sub-sectors. 	<p>Ministry of Education / Kenya Institute of Curriculum and Development (KICD)</p>	<p>Medium</p>	<p>High</p>
<p>Equip all schools and teachers with the requisite tools to embed applied digital skills training in the curriculum:</p> <ul style="list-style-type: none"> Broaden the DLP's coverage to secondary schools Commission an evaluation of phase I of the DLP to maximize the return of investments already made and address key issues ahead of phase II Review KENET's current business and financing model to ensure consistent and quality services delivery with the view of supporting future expansion to TVET and secondary schools Make more pre-approved KICD content available and easy to access. E.g. scope to draw on readily available content, or commission new content, developed by private or non-profit providers Open up the content market, shifting KICD's role from digital content development to digital content evaluation Employ a different approach to teacher education in relation to digital 	<p>Ministry of Education / ICTA / KICD</p>	<p>Short/medium</p>	<p>High</p>
<p>Objective: Expand access to other basic and advanced digital skills training (beyond the national education system)</p>			
<p>Crowd in private and non-profit education providers to bridge rural-urban and generation gaps in access to both basic and advanced digital skills training, expanding the availability of rapid skills training for adults, mature students and out-of-school youth.</p> <ul style="list-style-type: none"> Consider a mix of market-led, government-run and voluntary complementary schemes to boost available training e.g. Digital Ambassadors Program 	<p>Ministry of Education / ICTA</p>	<p>Short-medium</p>	<p>High</p>

<ul style="list-style-type: none"> Facilitate accreditation process of for private training providers – e.g. coding bootcamps 			
Expand opportunities for online and agile learning, through digital platforms	Ministry of Education / ICTA	Medium	Medium
Objective: Improve synergies between the skills development and labor market, making it more responsive to shifting market dynamics			
Improve labour market data pertaining to digital skills and encourage wider dissemination: <ul style="list-style-type: none"> Consider adapting the KLMIS Source real-time data from the private sector 	Ministry of Labor Ministry / Ministry of Education	Medium-long	Medium
Expand the application of strategic industry-academia partnerships at universities and TVET institutions. <ul style="list-style-type: none"> Encourage the development of a more demand-driven curriculum Expand access to practical training through industry placements 	Ministry of Education / ICTA / Universities / TVET	Short	High
Source teaching content and lecturers from the private sector	KICD / Universities / TVET	Short	High