THE STATE OF ICT IN KENYA

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RESEARCH ICT AFRICA

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EXECUTIVE SUMMARY

The 21st century ushers in a period of unprecedented connectivity, with half of humanity estimated by the International Telecommunication Union to be connected. However, a yawning digital divide remains at both international and national levels, afflicting the unconnected half of humanity. Regardless of whether or not they are actively engaged in building their digital futures, the implications of this hyperconnectivity, as well as the new technologies from cloud-based services and the digital platforms driving them to the emerging technologies associated with artificial intelligence and robotics, for nations is far-reaching. The impacts are potentially both creative and destructive, as global boundaries are dismantled, creating new online and digital communities, and the world of work is transformed, creating immense digital-skilling challenges.

Kenya seeks to position itself in the future of this digital world and global economy, spearheading innovation in the area of mobile money. With more than half of the Kenyan population now banked, the benefits are spreading to low-income households and individuals who are still largely unbanked. The digital economy and e-commerce are likely to take centre stage in the next few years. Kenya will need to position itself more aggressively in terms of strategies and policy direction to ensure that it fully reaps the benefits and opportunities presented, and to safeguard its citizens from the associated risks and potential harms.

This report looks at the information and communication technologies (ICT) sector in Kenya from both supply-side and demand-side perspectives, highlighting the dramatic changes that have taken place in this dynamic sector since the last sector performance review of Kenya was done by Research ICT Africa only five years ago (Waema & Ndung'u, 2012). The importance of understanding what happens 'after access' is revealed through the fieldwork survey undertaken in 2017, which covered 1 200 households across the country and 500 small and micro businesses. This is complemented by a supply-side analysis of policy outcomes in the country, primarily in relation to affordable access, and Kenya's readiness for what is now popularly referred to as the Fourth Industrial Revolution.

As with earlier versions, the purpose of this research is to enrich the evidence base supporting ICT sector development. Worth noting is that two recommendations made in the previous report have been implemented, namely, the creation of a detailed plan for ICT policy implementation aligned both to Kenya's Vision 2030 development blueprint and the new Constitution of 2010, and the need to address the overlapping mandates of government institutions in the ICT sector through the creation of an ICT Authority. However, the issue of lengthy and cumbersome procurement processes has not yet been fully addressed, despite the creation of an e-procurement portal.

The report notes that Kenya has shown some modest gains in global economic rankings, including in relation to the country's global competitiveness and its ease of doing business. Kenya is rated as a country having a 'medium' level of human development, with corruption in the public sector still a challenge.

Kenya's ICT sector is governed by national policy implemented in 2016, which in itself was an update of national policy from a decade earlier. Recent legislative changes have seen the replacement of the Communications Commission of Kenya (CCK) by the Communications Authority of Kenya (CA), with a wider mandate and greater regulatory powers. Furthermore, a new coordinating government structure, the ICT Authority, has been created to take over and centralise a number of ICT sector functions and responsibilities.

A number of key strategic documents have been developed and issued during this period, including a detailed National ICT Masterplan, a National Broadband Strategy and a somewhat more controversial National Cybersecurity Strategy. However, both the National ICT Masterplan and the National Broadband Strategy lack the necessary monitoring and evaluation components to guide ongoing implementation. Nevertheless, there has been progress on the ground in terms of the implementation of specific projects,

including the Huduma one-stop-shop government centres. A task force is also currently in place, reviewing and revising the master plan.

Several items of legislation pending for some time have been passed, including the Access to Information Act of 2016 and the Computer Misuse and Cybercrimes Act of 2018, with the Data Protection Bill of 2018 at an advanced stage. Unfortunately, many draft regulations remain stalled, awaiting finalisation by the Ministry of Information, Communications and Technology (MoICT). However, the Communications Authority has developed and implemented a framework for the assessment of service quality relating to telecommunication systems and services.

The migration to digital broadcasting was completed in 2015, albeit hindered by the slow uptake of set-top boxes by viewers, due to lack of stock, which led to a reversal and a postponement of the analogue switch-off to June 2015. The digital migration, however, did free up spectrum in the 800 MHZ and 700 MHz bands – some of which was provided to operators to roll out broadband 4G and long-term evolution (LTE) services.

The mobile market remains dominated by Safaricom, with nearly two-thirds of the market share. Market dominance has been a long-standing, unresolved issue, with Safaricom's reduced but still more than 60% share of voice, data and mobile money giving it significant power in these markets. Recommendations arising from an external market review commissioned by the regulator in 2016 included prohibiting surcharges for cross-platform money transfers, imposing agent-to-agent interoperability and addressing the imbalance in the 900 MHz spectrum holdings.[1]

The proposed merger of the two other large mobile providers, Airtel and Telkom Kenya, may go some way towards creating a stronger competitor to Safaricom, although this consolidation of the market will result in a much higher concentration of ownership in Kenya's already highly concentrated market. Mobile virtual network operators (MVNOs) Equitel and Mobile Pay remain bit providers on the fringes of the market. Internet access remains almost exclusively a mobile data phenomenon, with the more competitive Internet service provider (ISP) market accounting for less than half a million of the total 41 million subscribers.

The uptake and usage of mobile money remains strong, with about eight in ten of Kenyans making use of the service and transactions amounting to approximately USD 38 billion in the last financial year. This market is dominated by Safaricom's M-Pesa service, although anticipated regulatory interventions to ensure interoperability are expected to open up the market considerably. Furthermore, the overwhelming majority of small businesses use mobile phones for their business operations.

Social media, WhatsApp in particular, have been driving smartphone ownership and data usage. A careful balance needs to be struck between encouraging the uptake of online services and protecting freedom of speech and mitigating the risks of online fraud, cyberattacks and the proliferation of fake news and hate speech.

On the basis of the analysis presented in the report, several specific recommendations are made.

Active consideration should be given to streamlining the regulatory process, as it has caused a substantial backlog in regulation for the sector. The process, due to the involvement of the MoICT, the Attorney General and Parliament, is cumbersome and fraught with structural delays. International best practice suggests that the regulator – the Communications Authority – should be empowered to regulate in its own right, in accordance with legislation and informed by national policy.

Considering the large number of mobile money users in Kenya (85% from the survey), it is important that the government considers the potential negative outcome of imposing additional taxes on mobile services and, in particular, mobile money transactions. The experience gained from Uganda, where taxes on social networking platforms and mobile money use have had a negative impact on the transaction volumes of operators, as well as on direct and indirect revenues to the fiscus, should serve as a lesson to policymakers and regulators on the unintended consequences of fiscal interventions in

1 As at the time of writing of this performance review, the Analysys Mason report has not been finalised. The analysis presented here is therefore based on the interim report.

complex adaptive systems such as the Internet.

The issue of dominance in both the mobile voice and mobile money markets needs to remain an active area of regulatory concern going forward. While there is no concrete evidence of anti-competitive conduct on the part of Safaricom, such high levels of market concentration are unhealthy, and ongoing strategies need to be undertaken (a number of which were recommended by Analysys Mason) to promote a more diversified and competitive marketplace.

As noted, Kenya is well-positioned in the digital economy space, with e-commerce starting to take off. There are already several innovation hubs and Fintech platforms offering services, not just in the region, but globally. The government of Kenya should put in place e-commerce strategies and policies to guide the growth of this digital economy. However, these are not sufficient for digital take-off. Human capital requirements, both in the user and producer markets, are required preconditions for this.

Cybersecurity remains a real challenge in Kenya, as it does globally. Indeed, the World Economic Forum ranks cyberattacks second to climate change issues in its recent global risk analysis report (WEF, 2019)[2]. There is, therefore, a need to revisit the National Cybersecurity Strategy and Regulations comprehensively in order to address these emerging challenges. It is also important that this process is carried out within the context of the global consensus of human rights, which accords the necessary protection of fundamental rights, particularly to privacy and freedom of expression, so that the outcome can create not only a secure Internet, but a trusted one in which people feel safe to communicate, transact and produce.

Active consideration should be given to revising the Computer Misuse and Cybercrimes Act, and to re-examining the proposed Data Protection Bill, to ensure closer alignment with international best practice and a better balance between freedom of expression and privacy intrusion, defamation and spread of fake news.

What is increasingly apparent, with the cross-cutting nature of ICTs, is that the policy frame can no longer be a narrowly sectoral one and, particularly, can no longer focus on infrastructural or supply-side issues alone. The RIA *After Access* survey highlights the demand-side challenges of getting people online, and of shifting users from passive consumption to more productive use of the Internet in order to better harness its potential to contribute to job creation, poverty alleviation and economic growth. To address these challenges, there will need to be far greater state coordination across different economic and social sectors, as well as public and private sector collaboration to build globally competitive digital economies and societies. Institutional arrangements will need to be reviewed and the traditional regulation of nationally licensed and regulated players and industries aligned with global systems of Internet technical and data governance.

2 'Failure of climate-change mitigation and adaptation', 'Extreme weather events' and 'Natural disasters' come in ahead on impact and likelihood of 'Cyber-attacks' and 'Data fraud or theft'.

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LIST OF ABBREVIATIONS

ASP	Application Service Providers
B2C	Business-to-consumer
CA	Communications Authority of Kenya
CAMAT	Communications and Multimedia Appeals Tribunal
CBR	Central Bank Rate
CPI	Consumer Price Index
DeG	Directorate of e-Government
DLP	Digital Learning Project
GDP	Gross Domestic Product
GITS	Government Information Technology Services
ICT	Information and communications technologies
ICTA	ICT Authority
IoT	Internet of Things
KENIC	Kenya Network Information Centre
KICA	Kenya Information and Communications Act
KICTB	Kenya ICT Board
KIHBS	Kenya Integrated Household Budget Survey
KNBS	Kenya National Bureau of Statistics
KNEC	Kenya National Examination Council
M2M	Machine-to-machine Communications
MNO	Mobile Network Operator
MNP	Mobile Number Portability
MoIC	Ministry of Information and Communication
MoICT	Ministry of Information, Communications and Technology
MTP	Medium-term Plan
MVNO	Mobile Virtual Network Operator
NCS	National Communications Secretariat
NRI	Networked Readiness Index
NHIF	National Hospital Insurance Fund
NOFBI	National Optic Fibre Backbone Infrastructure
NSSF	National Social Security Fund
OPEC	Organisation of Petroleum Exporting Countries
OTT	Over-the-top Services
PRSP	Premium Rate Service Provider
QoS	Quality of Service
RIA	Research ICT Africa
RoK	Republic of Kenya
SMEs	Small and Medium Enterprises
SMP	Significant Market Power
SPR	Sector Performance Review
ULF	Unified Licensing Framework
USF	Universal Service Fund

1 INTRODUCTION

In this 2018 edition of our regular review of the performance of Kenya's information and communication technologies (ICT) sector, we examine both the supply-side and demand-side perspectives, providing an assessment of the current state of the Kenyan ICT sector, identifying key changes that have occurred in the last five years since the previous review (Waema & Ndung'u, 2012), and pointing towards issues and challenges facing the sector into the future.

The report is structured around five sections. This first section (Section 1) reviews the social, economic and political context for the ICT sector in Kenya. Section 2 explores the current policy, legal and regulatory framework governing and shaping the ICT sector, and further reviews the performance of the various institutions mandated to spearhead its development. Section 3 analyses the supply side of the sector. It examines the market structure and identifies the various providers, including their market share and financial status, penetration and pricing, in relation to fixed, mobile, Internet and broadband infrastructure and services. Section 4 focuses on the demand side of the equation, analysing access and usage. Section 5 addresses SME sector usage of ICT services, while Section 6 looks at future challenges and concludes the report.

This sector performance review makes use of both primary and secondary data sources. The primary source of data is the Global South 2017-18 After Access surveys conducted by Research ICT Africa in 10 and DERSI and LIRNEasia in 20 Latin American and Asian countries. These ICT surveys collect information on household and individual use of ICT, with a particular focus on access and use of the Internet. Secondary sources include: a national economic survey report (KNBS, 2018c); a national household budget survey (KNBS, 2018a); recent annual and statistical reports of the Communications Authority of Kenya (CA) up to and including June 2018[3]; Kenya's Vision 2030 document (Kenya, 2007)and its related 1st and 2nd medium-term reports; Kenya's ICT Policy (Kenya, 2016); and a number of global reports that rate and rank Kenya in relation to ICT and economic performance indicators[4].

1.1 ECONOMIC, SOCIAL AND POLITICAL DEVELOPMENT

It is important to have a contextual overview of the economic, social and political situation within Kenya, against which the role and development of the ICT sector can be positioned. Accordingly, the analysis starts with a general overview of the economic, social and political contexts.

1.1.1 Economic overview

According to the Kenya National Bureau of Statistics, Kenya's population was 45.4 million in 2016, with provisional data showing the population as 46.6 million in 2017 (KNBS, 2018c, p. 8), with nearly two thirds of the population living in rural areas, compared to some 36% who were urban dwellers.

The report pegs Kenya's Gross Domestic Product (GDP) at some USD76 billion, giving a per capita GDP level of USD 1 620 (KNBS, 2018c, p. 8). As of 2017, Kenya's gross domestic product (GDP) grew at 4.9 percent and reached 5.7 in 2018. It was projected that it will increase marginally to 5.8 percent in 2019 and 6.0 percent in 2020[5]. The slowdown in economic growth in 2017 (4.9%) from 5.9% in 2016 even as the global economy grew at 3.6% in 2017 (up from 3.1% in 2016), was partly attributable to uncertainty associated with a prolonged electioneering period coupled with the adverse effects of weather conditions.

3 The CA issues quarterly sectoral updates. We have chosen to use the report for the 4th Quarter June 2018, as the final benchmark.

4 Gillwald et al (2018) have elsewhere taken to task the reliance on such indicators as heavily supply side oriented, based on often inadequate data sources, and lacking in explanatory power.

5 https://www.worldbank.org/en/news/press-release/2018/10/10/kenyas-economy-poised-to-rebound-in-2018-and-remain-robust-through-2020

Key macroeconomic indicators for Kenya's market-based economy remained stable and supportive of growth in 2017 (KNBS, 2018c, p. 17). Inflation, as measured by the consumer price index (CPI), increased from 6.3% in 2016 to 8.0% in 2017. Interest rates declined due to the impact of capping that became effective in September 2016. In the money market, the Kenyan Shilling strengthened against most of the major trading currencies but weakened against the Euro and the US Dollar in 2017.

Performance across the various sectors of the economy varied widely, with accelerated growth, compared to 2016, being recorded in: accommodation and food services; information and communication technology; education; wholesale and retail trade; and public administration. In contrast, growth in other sectors (manufacturing; agriculture, forestry and fishing; and financial and insurance) slowed down, dampening the overall growth in 2017 (see Table 1.1).

The agriculture, forestry and fishing sector is substantially the largest contributor (31.5%) to Kenya's GDP, followed by manufacturing (9.1%). Drought, coupled with pests such as the fall armyworm and diseases, is likely to have led to the overall decline in agricultural production.

The energy sector witnessed increased international crude oil prices in 2017, following supply cuts by top producers under the Organisation of Petroleum-Exporting Countries (OPEC). Average urban crude oil prices rose to USD 54.91 per barrel in 2017, up from an average of USD 44.18 per barrel in 2016. Total installed and effective electricity capacity in 2017 was 2 339.9 MW and 2 264.4 MW respectively. The number of customers connected under Kenya's rural electrification programme expanded by 31% from 972 018 MW in 2015/16 to 1 269 510 MW in 2016/17 (KNBS, 2018c, p. 160).

Table 1.1: Socio-economic data

INDICATOR	SECTOR	2015	2016	2017 (EST)
GDP growth		5.7%	5.9%	4.9%
% contribution to GDP	Agriculture, forestry and fishing	30.2%	32.1%	31.5%
	Mining and quarrying	0.9%	0.8%	0.8%
	Manufacturing	9.4%	8.4%	9.1%
	Information and communication	1.5%	1.4%	1.4%
	wTransport and storage	8.1%	7.8%	7.7%
	Financial and insurance activities	6.7%	7%	7.5%
	Building and construction	4.5%	5%	5.8%
	Real estate	7.5%	7.4%	7.4%
	Professional, scientific and technical activities	0.9%	0.8%	0.8%
	Education	4.9%	4.3%%	4.1%
Total population (in millions)		44.2	45.4	46.6
Annual average inflation rate		6.58% (Dec 2015)	6.3% (Dec 2016)	7.98% (Dec 2017)
Interest rate	Central Bank rate at	11.5%	10%	10%
Literacy rate	Adult females (% of females aged 15 and older)	80.0% (2016)		
	Adult males (% of males aged 15 and older)	89.0% (2016)		

Source: (KNBS, 2018c)

The contribution of the ICT sector to Kenya's GDP – at 1.4% – is still low by international standards[6]. Nevertheless, the World Bank considers Kenya to be an 'emerging' ICT country, pointing to the country's business process outsourcing (BPO) sector and Safaricom's M-Pesa (World Bank, 2012, p. 11). However, the report does go on to list a number of potential 'roadblocks' to the sector's further development, namely:

- a small pool of qualified young tech graduates
- the high cost of entrepreneurship
- a low perception of quality and trust in Kenyan businesses
- limited exposure to foreign innovations and markets
- unclear government policy and protectionist tendencies (World Bank, 2012, p. 11).

Kenya's monetary policy remains steady. In 2017, the Central Bank rate (CBR) was retained at 10.0%. The maximum lending rate was capped at no more than 4.0% above the CBR. Average interest rates on deposits increased to 8.22% in December 2017 from 7.33% in December 2016.

Kenya's formal unemployment rate remains relatively low, at 7.4%[7] (KNBS, 2018c, p. 309). However, employment is largely in the informal sector, which accounted for 83.4% of total employment in 2017.

Kenya has shown some modest gains in global economic rankings. The current Global Competitiveness Report places the country 91st out of 137 countries assessed (6th in sub-Saharan Africa), up from 96th out of 138 countries (WEF, 2017, p. ix). For 2019, Kenya is ranked 61st out 190 countries in the World Bank's ease of doing business rating, up from 80th in 2018, ahead of South Africa and Botswana (World Bank, 2018b, p. 4).

The overall economic outlook that emerges is therefore a positive and improving one – a view shared by the World Bank, which suggests that a 'nascent rebound in economic activity in Kenya is gaining momentum' (World Bank, 2018a, p. iv).

1.1.2 Social development overview

A recent representative household survey by Kenya's National Bureau of Statistics (KNBS) gives a useful picture of social development levels and trends in Kenya. The KNBS concludes that the last decade 'has seen development gains of significant magnitude', pointing to 'improved maternal and child survival', 'increased primary school enrolments', 'poverty reduction and general improvements human wellbeing' (KNBS, 2018b, p. 78). Poverty levels have also reportedly dropped significantly over the last decade, from 47% in 2005/06 to 36% in 2015/16. As a result, the country's Gini coefficient, (which measures income inequality), has declined in recent years, and now stands at 40.8, making Kenya a society considerably more equal than the worst scorers, namely, South Africa, Namibia and Botswana, all of which have scores over 60 (Index Mundi, n.d.).

Kenya is rated as country with a 'medium' level of human development by the United Nations Development Programme, which ranks the country 142nd out of 189 countries considered (UNDP, 2018, p. 32). Life expectancy is given as 69.7 years for women and 64.9 years for men, with the HIV prevalence rate listed as 5.4%. The mean years of schooling are 5.7 years for girls and 7.1 years for boys, and the national literacy rate is 79%.

The KNBS tracks, inter alia, the household level of access to key goods and services (KNBS, 2018a). Their survey shows, for example, that the proportion of households in urban areas with access to electricity is 73%, compared to a dramatically lower 17% for rural households. The proportion of rural households relying on paraffin for lighting declined from 86% in 2005/6 to 49% in 2015/16. In terms of access to ICT goods, some 79% of the population8 listens to the radio, compared to 48% who watch television. There is a distinct urban–rural divide, particularly marked in the case of television viewership, which stands at 73% for urban residents versus 34% for those in rural areas. Mobile phone usage is given as 79% in urban areas versus 62% in rural areas

6 Methods of calculation vary, making cross-country comparison somewhat tentative. Nevertheless, by way of contrast, the figure in South Africa is nearly double – at 2.7% (Stats SA, 2017), – while the OECD average is about 6% (OECD, 2018).

7 This is conservative, as it is based on the narrow definition of unemployment, which includes only those who were actively looking for work but unable to find a job.

8 Only persons aged three years and older are considered for these calculations.

(national average 68%)[9]. Use of more advanced ICTs is dramatically lower, and again with a stark urban–rural divide, with only 17% reportedly using the Internet and some 10% making use of computers[10] in rural areas. Younger Kenyans (aged 18–35) are reportedly most active in their usage of ICT equipment and services, specifically: mobile phones (90%), radio (84%), television (61%), the Internet (37%) and computers (18%). Notably, a high proportion of people aged 70 years and older use the radio (66%) and mobile phones (59%), while their use of computers and the Internet is negligible.

1.1.3 Political overview

Kenya is a multi-party democracy under a directly-elected president, with a bicameral legislature under a new Constitution promulgated in 2010 (Kenya, 2010a). Kenya's devolved government consists of 47 counties and is primarily geared towards involving the people in governance and allowing better supervision and implementation of policies at the grassroots level. Each county government comprises a county assembly and county executive.

According to the new Constitution, legislative power is vested in two houses – the 349-seat, mainly constituency-based National Assembly and the 67-seat, mainly county-based Senate.

Kenya's judicial system adheres to a hierarchical structure, with the Supreme Court being the highest judicial body, followed by the Court of Appeal, the High Court, the Magistrate's Courts and other subordinate courts. Kenya's judiciary is independent of the executive and the legislature.

Since the promulgation of the new Constitution in 2010, two elections have been held, in 2013 and in 2017. Both were tightly and sometimes bitterly contested, but neither was marred by the violence that occurred in 2007. Both elections were deemed free and fair by international observers, and both were won by President Kenyatta by relatively small margins over main rival Raila Odinga, who mounted unsuccessful challenges to both sets of results. It since appears that UK-based firm Cambridge Analytica, infamous for its role in both the Trump election victory and the Brexit vote, may also have had a hand in both sets of elections in Kenya (Moore, 2018; Chege, 2018).

The Economist's Intelligence Unit classifies Kenya as a 'hybrid regime'[11], placing it 95th out of 167 countries ranked, behind Zambia, Tanzania and Malawi, but ahead of Uganda and Mozambique (EIU, 2018). The Economist notes in particular that 'journalists routinely face harassment and intimidation while carrying out their work' (EIU, 2018, p. 57).

Transparency International's Corruption Perception Index (CPI) places Kenya 139th out of 176 countries assessed, behind Tanzania and Malawi but ahead of Uganda and Mozambique, suggesting that corruption in the public sector is relatively prevalent (TI, 2018). The renewed energy at the independent Ethics and Anti-Corruption Commission (EACC), with the support of the recently appointed Director of Public Prosecution and the Director of Criminal Investigations, however, suggests the intention of government to curb the problem.

Freedom House's annual review of freedom on the Internet, scores Kenya relatively highly, rating the country as 'partly free', slightly behind South Africa and well ahead of Nigeria and Zambia, in the 12 sub-Saharan countries assessed (Freedom House, 2017).

1.2 CONCLUSION

Kenya, therefore, emerges as a country somewhat in the midst of an economic slowdown, emerging from a period of political turmoil, but one ready to embrace the ICT sector as a key enabler for future economic growth. As we look at the challenges of actualising this for the future, we shall see the need for a steady hand and firm vision on the part of policymakers, regulators and other ICT sector stakeholders.

9 These numbers are rather lower than those recorded in the RIA *After Access* Survey (see Section 4.5), but they derive from an earlier date in a market with rapidly growing uptake.

10 Internet usage is reportedly 9% in rural areas versus 31% in urban areas, with computer usage reportedly 5% versus 19% respectively.

11 The classification is done on a scale from 'full democracy' (19 countries), through 'flawed democracy' (57 countries) and 'hybrid regime' (39 countries) to 'authoritarian' (52 countries).

2 KENYA'S ICT POLICY, LEGAL AND REGULATORY SETTING

2.1 ICT POLICY FRAMEWORK

Kenya's ICT sector is governed by national policy implemented in 2016 (Kenya, 2016), which in itself was an update of national policy from a decade earlier (Kenya, 2006). Although both the vision ('a prosperous ICT-driven Kenyan society') and mission ('to improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services') remain unchanged, the policy has been updated to ensure alignment with the 2010 Constitution (Kenya, 2010a) and Vision 2030. The policy review was also driven by the 'new developments [that] have taken place in the field of ICT, especially [the] convergence of ICT technologies' (Kenya, 2016, p. 9).

The policy is premised on the following principles:

- ICT is a developmental tool that should be widely accessible and utilised by the general population.
- There will be a technology-neutral approach in the adoption and regulation of ICT systems and services in the promotion of competition.
- Innovation will be promoted for the benefit of consumers, producers and service providers, while at the same time protecting the interest of innovators.
- Investing in human resource development and capacity building will be prioritised. (Kenya, 2016, p. 8)

The national ICT policy is guided by: adherence to constitutional values; recognition of technological change and convergence; promotion of universal service and open access; stimulation of competition and innovation; adherence to international standards; promotion of national cohesion; protection of privacy and security; and recognition of the sustainable development goals (SDGs) of the UN (Kenya, 2016, pp. 9, 10). In addition to the standard range of ICT policy issues covered (such as universal access, spectrum and competition), the policy addresses a number of newer issues, such as cybersecurity, the knowledge economy, e-government, the Internet of Things (IoT), machine-to-machine (M2M) communications and over-the-top (OTT) services.

The following earlier ICT-related policy and strategy documents, (which will be discussed below), remain in force:

- The National Broadband Strategy, launched in 2013 (Kenya, 2013a)
- The National ICT Master Plan, launched in 2014 (MoICT, 2014a)
- The National Cybersecurity Strategy, adopted in 2014 (MoICT, 2014b).

There are also several draft policies currently on the table, including:

- a draft wireless broadband spectrum policy, released in 2017 (MoICT, 2017), which aims to ensure proper planning and management for the efficient use of spectrum in support of the implementation of the National Broadband Strategy
- a draft data protection policy, released in September 2018 for public comment (MoICT, 2018), which lays the foundation for future legislation that will be aligned to international good practice and will protect the data rights of citizens, including children and vulnerable groups.

2.2 LEGAL FRAMEWORK

The following pieces of legislation provide the legal underpinning for the ICT sector and its regulation:

- *The Kenya Information and Communications Act (KICA), 1998* (Kenya, 1998), as amended in 2013, which established a sector authority to regulate telecommunications, broadcasting and postal services, with jurisdiction over, inter alia, licensing, spectrum, consumer protection, and price and competition regulation for the sector
- *The Competition Act, 2010* (Kenya, 2010b), as amended in 2012 and 2014, which established a Competition Authority and Competition Tribunal, with economy-wide powers, to oversee mergers and acquisitions, and to address a range of anti-competitive practices

- *The Computer Misuse and Cybercrimes Act of 2018* (Kenya, 2018a), which covers, inter alia, critical infrastructure, mobile money, cybersquatting, blockchain and cryptocurrency, and which is intended to curb a range of cybercrimes and computer-related offences[12].

Aside from replacing the Communications Commission of Kenya (CCK) with the Communications Authority of Kenya (CA), as discussed below, the 2013 amendment also established the Communication and Multimedia Appeals Tribunal, with an expanded mandate to cover multimedia services, a move that was not taken well by the media fraternity, which argued that the existing Media Council of Kenya was sufficient.

Several Bills covering issues pertaining to the ICT sector are currently in process. These include:

- *the Data Protection Bill of 2018* (Kenya, 2018b), which establishes data rights, regulates the processing of personal data, creates data-related offences and sets up a Data Protection Commissioner – but which is viewed by several human rights NGOs as having a 'number of significant shortcomings' (PI, 2018); the window for public comments on the proposed Policy and Bill ended in October 2018
- *a draft Critical Infrastructure Protection Bill*, which is reportedly under consideration (Angop, 2018; KICTANet, 2018) and expected to be tabled soon.

In its recent June 2018 budget, the government opted to hike the taxation of airtime and data (from 10% to 15%) and money transfers (from 10% to 12%). This move, which runs counter to best practice advice from the IMF (Matheson & Petit, 2017), was not well received by businesses or consumers, considering the predominance of mobile money in the financial sector. The long-term impact of the hike in terms of transaction volumes and government revenues is yet to be seen. A similar move undertaken by Uganda has reportedly led to a decline in traffic and transaction volumes, with a net negative impact on the fiscus (RIS, 2018).

2.3 REGULATION OF THE SECTOR

Regulation of the ICT sector is undertaken by the Communications Authority of Kenya (CA), the successor since 2014 to the Communications Commission of Kenya (CCK) as originally established in 1999 under the KICA. The replacement of the CCK seems largely to have been driven by the need to provide for greater regulatory independence, along with a somewhat broader scope and a greater degree of authority (Kagwe, 2012). The CA has authority over a wide range of ICT sub-sectors, including telecommunications, broadcasting, multimedia, electronic commerce, and postal and courier services.

Not too long after the name change, the CA was rocked by a corruption scandal that led to the dissolution of the board, amid allegations of falsified mileage claims, and, far more seriously, soliciting bribes from one of the operators (Mark, 2016a). In April 2016, a new board was put in place with a three-year tenure, and it appears to have practised a greater degree of transparency.

Licensing in the sector operates in terms of a unified licensing framework (ULF), implemented since 2008 and based on the principle of technology neutrality. This principle allows any form of communications infrastructure to be used to provide any type of communication services, and provides for three broad types of licence, namely:

- *network facilities provider (NFP)*, which covers the provision of network infrastructure for both long-distance backbone transmission and for local access
- *applications service provider (ASP)*, covering all forms of services to end users, using the infrastructure services of an NFP provider
- *content service provider (CSP)*, which covers the provision of content services, such as broadcast (TV and radio), and other information and data processing content services.

The unified licensing was well received by the operators and entrepreneurs, leading to innovations and targeted applications in the market. Applications developers have partnered with, in particular, established

12 This Act was initially introduced in 2016 as the Computer and Cybercrimes Bill. Although the Act has been welcomed by some, the provisions dealing with 'fake news' and 'cyber-harassment' have been viewed as 'problematic' by others (Okal, 2018).

mobile operators and developed mobile applications that address the common needs of the citizens. These include apps to access the national examination results immediately they are released and apps to integrate with utility service providers (power, water), as well as with government services, for example online renewal of driving licenses and passports through the eCitizen portal.

Over the last 10 years, Kenya has engaged in an abortive series of interventions aimed at enforcing registration of mobile subscribers, allegedly in order to combat criminal activities and money laundering. A first attempt back in 2010 floundered in the absence of the necessary enforcement mechanisms (Balancing Act, 2010). A second attempt used new powers rushed through by a 2012 amendment to the KICA for the CCK to issue an 11th hour[13] set of regulations requiring mobile subscribers to register their SIM cards by 31 December 2012 (CCK, 2012). According to the regulator, only marginally more than 80% of subscribers complied (CCK, 2013, p. 41), meaning that nearly 5 million Kenyan mobile subscribers would had have to be summarily disconnected, spelling financial disaster for operators (Nyabiage, 2013). The regulations were therefore revised by the CA in 2014 (CA, 2014) and again in 2015 (CA, 2015a). However, the regulator and the licensees remained at loggerheads over the regulations and their enforcement (Mamabolo, 2018), while ongoing enforcement directives continued to emanate from the CA (Mwita, 2018).

Only a limited number of regulations have been issued by the CA in recent years – specifically the Broadcasting (Transitional Provisions) Regulations, 2012, which sought to regulate broadcasting during the transition to the new licensing regime.

However, in 2014, the CA reported commencing the process to review a number of existing sets of regulations, specifically with the intention to promulgate the following:

- The Kenya Information and Communications (Radio Communications and Frequency Spectrum) Regulations, 2015
- The Kenya Information and Communications (Postal and Courier Services) Regulations, 2015
- The Kenya Information and Communications (Compliance Monitoring, Inspection and Enforcement) Regulations, 2015
- The Kenya Information and Communications (Numbering, Naming and Addressing) Regulations, 2015
- The Kenya Information and Communications (Fair Competition and Equality of treatment) Regulations, 2015
- The Kenya Information and Communications (Interconnection and Provision of Fixed Links, Access and Facilities) Regulations, 2015
- The Kenya Information and Communications (Tariffs) Regulations, 2015
- The Kenya Information and Communications (Consumer Protection) Regulations, 2015
- The Kenya Information and Communications (Licensing and Equality of Service) Regulations, 2015
- The Kenya Information and Communications (Type Approval, Importation and Distribution of Communications Equipment) Regulations, 2015. (CA, 2015b, p. 13).

These revised regulations remain stalled. The subsequent annual report states that they are 'currently resident with the Attorney General for further input and legislative drafting' (CA, 2016, p. xxviii), and this remains the status quo as at the time of writing.

Subsequently, the CA reviewed a further three sets of existing regulations and developed three news sets of regulations (CA, 2016, p. xxviii).

The following regulations were reviewed:

- The Kenya Information and Communications (Broadcasting) Regulations, 2009
- The Kenya Information and Communications (Universal Access and Service) Regulations, 2010
- The Kenya Information and Communications (Electronic Certification and Domain Name Administration) Regulations, 2010.

The following new regulations were developed:

- The Kenya Information and Communications (Infrastructure-sharing) Regulations
- Kenya Information and Communications (Cybersecurity) Regulations
- Kenya Information and Communications (Electronics Transactions) Regulations.

13 The regulations were issued on 27 December 2012, only a short four days ahead of the deadline!

The six sets of regulations were reported as having been 'forwarded to the Cabinet Secretary, MoICT, for promulgation' (CA, 2016, p. xxviii), but they do not appear to have been finalised or promulgated.

Quality of service (QoS) has been an ongoing area of concern for the Regulator, particularly in relation to dropped calls, with licensees repeatedly being fined for failure to meet the necessary benchmarks (Mumo, 2016; ITNewsAfrica, 2018). As a result, in 2016 the CA embarked on a substantial revamp of its existing QoS framework, extending it to include data and SMS services, and to take customer input into account. The resultant new regulations (CA, 2017d) were phased in during the course of 2018.

Much of the CA's work involves notice and comment procedures leading to the finalisation of draft regulations[14]. Among these are consultations on the sale of foreign SIM cards, which led to guidelines gazetted in mid-2017 (CA, 2017b), and on network redundancy, resilience and diversity on information and communication networks in Kenya (CA, 2017a).

2.4 INSTITUTIONAL ARRANGEMENTS

Overall responsibility for the ICT sector sits with the Ministry of ICT (MoICT), which is responsible for formulating, administering, managing and developing information, communications and broadcasting policies in Kenya. With the intention of promoting innovation in the ICT sector, a 2016 Executive Order split the Ministry into two: the State Department of Broadcasting and Telecommunications, and the State Department of ICT and Innovation.

In order to improve coordination in the ICT sector, the government established a new agency, the ICT Authority (ICTA). Partly a replacement to the existing Kenya ICT Board (KICTB), the ICTA also took over functions and responsibilities previously assigned to the Government Information Technology Services (GITS) and the Directorate of e-Government (DeG), but transferred by Presidential Executive Order, from The Treasury and Cabinet Affairs respectively, to the MoICT).

The ICTA is a state corporation under the MoICT, with a broad mandate to foster the development of ICTs in Kenya (including businesses, innovation and capacity-building), to implement and maintain systems and technologies for the government, to oversee the development of integrated ICT projects, and to develop and enforce ICT standards for the government.

The broad scope of the ICTA's mandate can be seen from its founding proclamation:

- Set and enforce ICT standards and guidelines for human resources, infrastructure, processes, systems and technology for the public office and public service.
- Deploy and manage all ICT staff in the public service.
- Facilitate and regulate the design, implementation and use of ICTs in the public service.
- Promote ICT literacy and capacity.
- Promote e-Government services.
- Facilitate optimal electronic form, electronic record and equipment use in the public service.
- Promote ICT innovation and enterprise.
- Establish, develop and maintain secure ICT infrastructure and systems.
- Supervise the design, development and implementation of critical ICT projects across the public service.
- Implement and manage the Kenya National Spatial Data initiative.

(Kenya, 2013b)

Other key institutions that influence the formulation and implementation of Kenyan ICT policy are the:

- *Ministry of Information, Communications and Technology (MoICT)*, which is in charge of national ICT policy formulation and is divided into two state departments: Broadcasting and Telecommunication, and ICT and Innovation
- *National Communications Secretariat (NCS)*, which advises the MoICT on ICT policy
- *Communications Authority of Kenya (CA)*, which is the regulator that licenses and regulates telecommunications, radio communications, postal services and broadcasting
- *Communications and Multimedia Appeals Tribunal (CAMAT)*, established under the 2013 amendment to the KICA, which arbitrates cases where disputes arise between parties subject to the Information Communication Act

14 The CA website also publicises legislative consultations conducted by the Ministry.

- *Parliamentary Committee on Communications Information and Innovation*, which provides Parliamentary oversight on ICT and innovation matters
- *Senate Committee on Information, Communication and Technology*, which provides similar oversight at the level of the Senate
- *Competition Authority of Kenya (CAK)*, which was established under the Competition Act (Kenya, 2010b) to promote and protect effective competition in markets, address anti-competitive conduct in markets, and respond to consumer complaints (the CAK was previously the Monopolies and Prices Commission).

Under the current arrangement, the duplication of roles and mandates has been addressed. For instance, all ICT projects are managed through a project coordination office domiciled at the ICTA. Based on the project, a committee is set with representatives from all relevant state departments, but the coordination is done through the centralised coordination office.

2.5 POSITIONING ICT IN GOVERNMENT

The complexity of the institutional framework set out above suggests the importance attached to ICT in Kenya.

2.5.1 The role of ICT in Kenya's 2010 Constitution

Although not dealing with ICTs specifically, Kenya's 2010 Constitution does contain what has been described as a 'comprehensive and progressive Bill of Rights' (KHRC, 2014, p.20). The Constitution sets out a number of fundamental rights and freedoms, including: the rights to freedom of opinion, conscience and expression; the right to privacy; the rights of access to information and freedom of the media; the right to consumer protection; the right to fair administrative action (Kenya, 2010a, Chapter 4). Furthermore, as both an enabler and a channel of communication and information, ICT plays a key role in attaining many of the objectives of the Constitution (Kenya, 2010a).

The KHRC has, however, pointed to a number of existing laws on the statute books that potentially undermine these constitutional provisions, and suggested that some recent legislation, including the KICA, may serve to undermine these constitutional protections (KHRC, 2014). More recently, KFCB regulations requiring, inter alia, YouTube subscribers to be licensed before uploading video clips, have been criticised as unconstitutional (iAfrikan, 2018).

2.5.2 The role of ICT in Vision 2030

Kenya's economic and social blueprint, Vision 2030, aims to make Kenya 'a globally competitive and prosperous nation with a high quality of life by 2030' (Kenya, 2007). The vision comprises three key pillars – economic, social, and political – and envisages a 'country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities, and telecommunications' (Kenya, 2007, p. viii).

The economic pillar aims to achieve an average economic growth rate of 10% per annum and to sustain the same until 2030. The social pillar seeks to engender just, cohesive and equitable social development in a clean and secure environment, while the political pillar aims to realise an issue-based, people-centred, result-oriented and accountable democratic system.

Despite committing itself to:

… extending access to information on markets [sic] trends through enhanced use of electronic communication media, particularly the Internet and mobile phones. This will require expediting of the ongoing efforts to build digital villages, and investments in telecommunication infrastructure, including fibre optic cables, and creating awareness about the use of these facilities.
(Kenya, 2007, p. 68).

Vision 2030 gives limited attention to ICT infrastructure and services, other than in relation to business process outsourcing.

Nevertheless, ICT remains critical for the vision of a knowledge-based economy, which aims at shifting the current industrial development path towards innovation. To ensure that ICT plays a key role, Kenya has embarked on a number of strategic actions such as: rolling out the national optic fibre backbone infrastructure (NOFBI); completing migration to digital broadcasting in order to release digital dividend spectrum; supporting ICT innovation and implementing the rollout of 4G mobile networks; implementing a digital learning

project (DLP); and rolling out the Huduma Centres[15] and e-citizen portals, among others. Although the Universal Service Fund has finally been operationalised and a board appointed to manage the fund, its presence has not yet been felt in the sector industry or in the underserved areas in the country.

2.5.3 National ICT Master Plan 2014–2017

Kenya's National ICT Master Plan was launched in April 2014, with a vision of 'Kenya as an ICT hub and a globally competitive digital economy' (MoICT, 2014a, p. 34). Drawing on Vision 2030, it sets out six guiding principles, namely: partnership; equity and non-discrimination; technology neutrality; environmental protection and conservation; and good governance; and incentivising. The Master Plan has three foundations and three pillars.

The foundations are:

- *ICT human capital and workforce development*, which aims to develop quality ICT human resources as a prerequisite for the development of a viable ICT sector
- *integrated ICT infrastructure*, which seeks to provide the integrated infrastructure backbone required to enable cost-effective delivery of ICT products and services to Kenyans
- *integrated information infrastructure,* which aims to improve the quality of e-Government services, enabling the country to transition to a knowledge-based society.

The pillars are:

- *e-Government services,* which aims to ensure the provision of e-Government information and services as key to improving productivity, efficiency, effectiveness and governance in all key sectors
- *ICT as a driver of industry*, which aims to transform key Vision 2030 economic sectors to significantly enhance productivity, global competitiveness and growth
- developing *ICT businesses* that can produce and/or provide exportable quality products and services that are comparable to the best in the world.

For each of the foundations and pillars, the Master Plan identified the driving forces, the desired outcomes by 2017, the objectives and the strategies for realising these objectives. There were 15 flagship projects identified in the Master Plan. However, one of the challenges is that the Master Plan has no in-built mechanism for monitoring and evaluating performance in the implementation of these flagship projects, nor does it have a mechanism for collecting data to measure broadband expansion performance and the related quality of service. Consequently, there are no reviews or reports in the public domain to determine the status and outcomes of the indicators.

However, there has been progress on the ground. For example, the award-winning Huduma Kenya Programme has rolled out some 52 one-stop-shop Huduma Centres countrywide. These service centres, which give citizens access to about 86 services provided by 34 different government agencies, have served about 21 million customers in five years (Doyle, 2018).

The digital learning programme is also progressing, through the Presidential Digital Talent Programme (PDTP), which offers IT internships to young people, and the Ajira Digital Programme, which provides young people with access to digital job opportunities.

Furthermore, a task force is currently in place to review and update the existing master plan in preparation for a 10-year master plan covering the period 2018–2027. The following key principles have been identified to guide its future implementation:

- *Digital inclusivity*, which is the equitable and non-discriminate availability of and access to ICTs across county governments, urban and rural areas, gender, women, youth, the marginalised and people living with disabilities
- *Innovation*, which encourages the use of local solutions by both public and private sectors to promote a culture of research and development, and value addition
- *Partnership*, which involves the conscious or deliberate efforts to engage and collaborate with county governments, the private sector, academic institutions, and local and international partners.
  (Obam, 2018)

15 One-stop government service centres.

2.5.4 National broadband strategy 2013

In 2013, Kenya adopted a national broadband strategy as a key infrastructure intervention, seeing broadband rollout as 'critical to the achievement of Vision 2030' and aiming to 'transform Kenya to a knowledge-based society driven by a high capacity nationwide broadband network' (Kenya, 2013a, p. 3).

The broadband strategy recognises the need for both supply-side and demand-side interventions, and identifies the following five issues as 'core to national broadband development':

- Infrastructure, connectivity and devices
- Content, applications and innovations
- Capacity building and awareness
- Policy, legal and regulatory environment
- Financing and investment.
  (Kenya, 2013a, p. 15)

2.5.5 National cybersecurity strategy

Cybersecurity has become a real challenge in Kenya, with losses totalling about USD 210 million in 2017, inter alia, through phishing, credit card fraud and illegal SIM card swaps (Serianu, 2018). To address such challenges and to facilitate the adoption of e-commerce, government developed a national cybersecurity strategy in 2014, with the following goals:

- To enhance the nation's cybersecurity to facilitate the country's growth, safety, and prosperity
- To raise cybersecurity awareness and develop Kenya's workforce to address cybersecurity needs
- To foster information sharing and collaboration among stakeholders to facilitate an information-sharing environment
- To provide national leadership by defining the national cybersecurity vision, goals and objectives, and coordinating cybersecurity initiatives at the national level. (Kenya, 2014)

This cybersecurity strategy and its goals served as the basis for a series of draft regulations (Cybersecurity Regulations, 2016; Electronic Transactions Regulations, 2016; and Electronic Certification and Domain Name Administration Regulations, 2016) that followed, along with a Cyber Security and Protection Bill, which was tabled in 2016. Together, these regulations and bill created a number of Internet-based offences and imposed a series of regulatory obligations upon ISPs and operators, but were criticised by Article 19 as having been insufficiently subjected to 'public scrutiny and debate'. Beyond procedural issues, Article 19 suggested they would 'unduly restrict legitimate expression' and were 'lacking a proper basis in statute' (Article 19, 2016, p. 2).

The Bill was withdrawn later that same year (Odero, 2016), but resurfaced to become the Computer Misuse and Cybercrimes Act of 2018, which proved equally controversial, drawing opposition from both journalists (CPJ, 2018) and academics (Muendo, 2018).

2.6 CONCLUSION

As noted from the analysis, there is no shortage of policy issues, implementation challenges and regulatory imperatives affecting the ICT sector in Kenya. The difficulties lie in implementation, monitoring and evaluation. There are pending regulations from the CA dating back to 2015, stalled either at the Ministry or the Attorney General's (AGs) office that need to be fast-tracked. Indeed, active consideration needs to be given to revising the structural procedures governing regulation within the sector. The complexities and overlapping jurisdiction between the CA, the MoICT, the AG's office and Parliament have given rise to cumbersome procedures and unnecessary and unwarranted delays. A fully independent regulator needs the authority to issue regulations in its own right, in accordance with international best practice and having followed due process, if it is to to regulate and manage the sector effectively and in accordance with its enabling legislation.

Further, with the Computer Misuse and Cybercrimes Act in place and the Data Protection Bill expected to be finalised soon, responsible and accountable use of ICT services and infrastructure is expected. As citizens continue to be aware of their digital rights, further challenges to the provisions in this Act and Bill are likely, as well as calls for them to be brought into line with international good practice – hence a need for the arbitration services offered by the Communications and Multimedia Appeals Tribunal.

3

KENYA'S ICT MARKET – SUPPLY-SIDE ANALYSIS

Section 3 presents a supply-side analysis of Kenya's ICT market. The Kenyan ICT sector has been vibrant in recent years. The enabling legal and policy environment has seen many innovations, such as M-Pesa, which was launched in 2007 by Vodafone for Safaricom and Vodacom clients, and which spread quickly with many applications linked to it. Multinationals in the ICT sector, such as IBM, Intel and Google, have also established regional headquarters in Nairobi.

According to the Communications Authority (CA), as of June 2018, Kenya had 45.6 million mobile 'subscribers', giving a national mobile penetration rate of 97.8% (CA, 2018, pp. 6, 7)[16]. In contrast, the fixed-line market had a mere 70 000 subscribers. The Internet data subscriptions stood at 41.1 million, of which 20.5 million were broadband subscriptions. Total international Internet bandwidth available in the country stood at 3,278 Gbps, with some 28% utilisation of this capacity. The total number of registered Internet domain names stood at 75 000, of which '.co.ke' comprised some 93%.

ICT has transformed society and spurred the economy by offering access through online platforms to government services, by enabling business and stimulating e-commerce, research and transfer of knowledge. The value of ICT output in the economy increased by 10.9% to USD 3.4 billion in 2017 (KNBS, 2018c).

National ICT infrastructure has continued to grow, with at least one new player entering the market, and another exiting the market. For example, existing fibre provider and ISP, Jamii Telecom, entered the mobile market at the end of 2017, having acquired a 4G spectrum licence under controversial circumstances, which allegedly saw it allocated high-demand spectrum in the 700 MHz band without this being auctioned (Kamau, 2017). In contrast, after failing to make significant inroads into the Kenyan market, India's Essar Group sold off its troubled subsidiary, yuMobile, which was Kenya's smallest mobile and data operator, holding a 9% share of the market, to Safaricom and Airtel[17] at the end of 2014 (Malakata, 2015). Similarly, in 2016, France's Orange sold off its 70% stake in loss-making Telkom Kenya, which held 10% of the market, primarily to UK-based Helios Investment Partners, which now holds a 60% stake[18] and which has provided a capital injection of some USD 300 million (Mark, 2016b). Further market consolidation appears to be in the offing, with negotiations for a merger between Airtel and Telkom Kenya reportedly in its final stages (Agbugah–Ezeana, 2019).

Operators in the private sector have continued to develop their own national ICT infrastructure. The mobile and data operators, Safaricom, Airtel, Telkom Kenya and Jamii Telecom, have deployed infrastructure in most parts of the country. This massive deployment has led to competition, and in turn to a relative reduction of tariffs and consequently increased usage of mobile phones and Internet.

3.1 MARKET STRUCTURE AND PLAYERS

The mobile service sector has seen considerable consolidation in recent years, with the sale of yuMobile and Orange's stake in Telkom Kenya, as discussed above. All the operators have long switched over to the ULF, under which licensing is technology- and service-neutral. The business model in the mobile ecosystem is revenue sharing, with each player benefiting. The ecosystem is expected to keep on evolving and changing to adapt to

16 'Subscribers' refers in fact to the number of active SIM cards. The actual number of users will be fewer, because of duplicate SIM ownership, M2M SIMs, and so on.

17 Safaricom acquired the infrastructure, while Airtel bought over its subscriber base

18 Government increased its shareholding in Telkom Kenya from 30% to 40% in the divestment.

new market developments, innovations and disruptions. The main players in the ecosystem are the regulator (CA), mobile network operators (MNOs), application service providers (ASPs), and content service providers, including premium rate service providers (PRSPs). Other players include the customers in households and businesses (both formal and informal).

Currently, there are four mobile operators and three mobile virtual network operators (MVNOs). Safaricom[19] and Airtel[20] have been in the market longest. Telkom Kenya[21] joined the mobile phone market in 2007, followed by the ill-fated yuMobile in 2008, and, most recently, Jamii Telecom launched its 4G mobile network in December 2017 under the brand name Faiba, making it more an ISP than a mobile operator.

The first virtual mobile (MVNO) licences were issued by the regulator in 2014 to Finserve Africa (trading as Equitel), along with Sema Mobile and Mobile Pay (Mumo, 2017b). All three operators are hosted on the Airtel network, with Equitel contributing nearly 2% to Airtel's bottom line in 2016. However, the MVNO market has struggled to take off in Kenya, with Equitel barely reaching 0.4% share of mobile voice traffic in 2016/17 (it has a far higher percentage subscribers – 4.2%) (CA, 2018, pp. 13, 14). Both the traffic and subscriber shares of Sema Mobile and Mobile Pay remain too insignificant to report. The relative success of Equitel has been attributed to its positioning as a value-added service for Equitel's existing banking clients[22], designed to 'deepen the bank's offering to its customers' (Ochieng, 2018).

In the miniscule fixed-services market, Telkom Kenya has remained the main player. With regard to the Internet and data services, the main market players are the four mobile operators, plus other operators, such as Jamii Telecom providing fibre, Access Kenya, Wananchi Online and Liquid Telkom (formerly Kenya Data Network), an independent data, voice and IP provider that supplies fibre optic, satellite and international carrier services to mobile network operators, ISPs and businesses.

It is worth noting that the global shift to data-based telecommunications services has yet to have an impact on Kenya's market. Although SMS traffic has been declining slightly (1.4% per quarter), voice revenues continue to grow at nearly 10% per quarter (CA, 2018, p. 6).

Table 3.1: Mobile operators – voice subscribers

OPERATOR	SUBSCRIBERS DEC 2016	SUBSCRIBERS DEC 2017	SUBSCRIBERS JUNE 2018	MARKET SHARE (%) JUNE 2018
Safaricom	27 738 727	29 564 174	29 780 048	65.4
Airtel	6 849 493	7 370 035	9 744 440	21.4
Telkom Kenya	2 897 545	3 860 559	3 995 365	8.8
Equitel	1 496 153	1 930 337	1 959 009	4.2
Mobile Pay		89 892	90 062	0.2
Sema Mobile	270	112	112	0.0
Total	**38 982 188**	**42 815 109**	**45 569 036**	**100.0**

*Source (CA, 2018, p. 10).**

** The figures in the analysis that follows in this section are likewise drawn from the same report, unless otherwise stated.*

19 Formed in 1997 as a fully-owned subsidiary of Telkom Kenya, with Vodafone acquiring both a 40% stake and management responsibility in 2000. The current shareholding is: Government of Kenya (35%), Vodacom South Africa (35%), Vodafone UK (5%) and free float (25%).

20 Launched as Kencell, the company was rebranded as Zain in 2008, and finally as Airtel in 2010.

21 Rebranded as Orange following the acquisition of a 51% stake by France Telecom in 2007, and then back to Telkom Kenya, following the sale of that stake to Helios Investment Partners.

22 South Africa's most successful MVNO, FNB Mobile, is similarly positioned as a value-added service for its banking clients.

3.2 OPERATOR MARKET-SHARE PENETRATION

3.2.1 Mobile network voice services

As noted above, Kenya's mobile market comprises four MNOs (Safaricom, Airtel Kenya, Telkom Kenya and Jamii Telecom[23]) and three MVNOs (Equitel, Sema Mobile and Mobile Pay (see Table 3.1 below).

Mobile Internet is a lucrative and growing segment for telecommunication firms, with Kenyans increasingly having access to 4G-enabled handsets and devices. As of June 2018, Safaricom was the overwhelmingly dominant market leader with a subscriber (SIM card) market share of 65.4% while Airtel's market share stood at 21.4%.

Like most other countries in Africa, Kenya's mobile market is overwhelmingly prepaid. The number of prepaid and post-paid mobile subscriptions stood at 44.4 million and 1.2 million respectively as of June 2018, meaning that post-paid subscribers make up a miniscule (and shrinking) 2.6% of the customer base. Safaricom has the highest proportion of post-paid customers (1.1 million, or 3.6% of its customer base), with far fewer numbers registered by Airtel and Telkom Kenya.

Both Airtel and Telkom Kenya have recorded a significant increase in subscriber numbers, at the expense of Safaricom, over the past year, and significantly so for Airtel. As a result, Safaricom has seen its market share drop from 73% in June 2017 to 65% in June 2018, while that of Airtel has increased from 15% to 21% (See Figure 3.1). Marginal market-share growth was recorded by Telkom Kenya. Safaricom's share of voice traffic remains at a dominant 70%, although this represents a decline from the 80% it held in the previous financial year.

Voice traffic continues to grow by a little over 16% per annum, registering some 49.5 billion minutes for the current financial year (2017/18). SMS traffic, although still performing robustly, appears to have begun to decline in the face of inroads from data-based messaging alternatives such as WhatsApp, falling from an average of 157 messages per subscriber per month in the first quarter to 108 messages per subscriber per month in the last quarter[24].

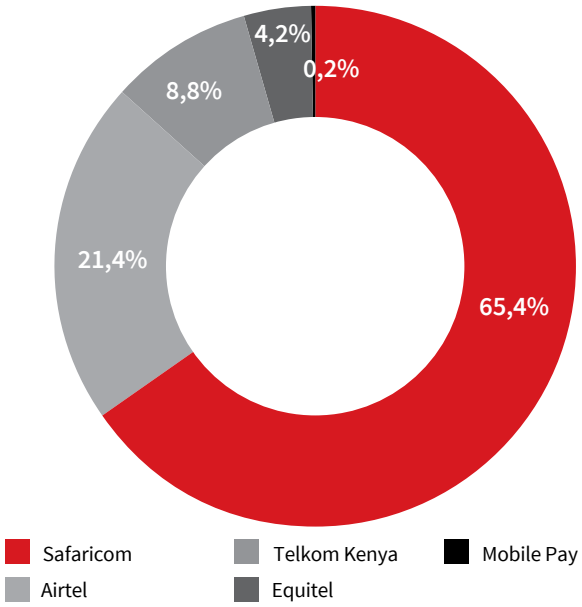

Figure 3.1: Mobile voice market share (%) (June 2018)*

Source: (CA, 2018, p. 10)

** Sema Mobile appears subsequently to have exited the market.*

Although the number of ported numbers has more than doubled in the current financial year, rising from 1 243 to 2 857, it is clear that mobile number portability is an insignificant feature of the Kenyan market, likely because of the preponderance of post-paid subscribers among those who subscribe[25].

3.2.2 Mobile network data / Internet services

Mobile data and Internet usage have continued to experience rampant growth following the deployment of 4G long-term evolution (LTE) networks by the operators. The regulator points to a number of likely drivers for growing rates of Internet penetration, including: the impact of Universal Service Fund projects, the availability of affordable smartphones and cheaper Internet bundles, and the rise of social media, e-commerce and e-government services (CA, 2018, pp. 19, 20). As earlier noted, a new player for LTE / 4G services through the assignment of 700 MHz and 800 MHz was licensed at the end of 2017, increasing market competition.

23 As noted above, Jamii is primarily an ISP.

24 July–September 2017 vs April–June 2018: A total of 66.8 billion SMSs were sent in the current financial year, compared to 56.7 billion in the previous financial year.

25 MNP benefits post-paid subscribers, for whom number stability is more likely to matter. Pre-paid subscribers simply need to buy a new SIM, albeit with a different number, to switch networks.

Statistics from the regulator show that data / Internet subscriptions have climbed from 29.6 million in June 2017 to 41.1 million in June 2018, an increase of nearly 39%. However, more than 99% of Internet users access the Internet via smartphones and other hand-held devices rather than via laptop or PC[26].

LTE was first deployed in the country in 2014, when Safaricom re-farmed part of their 1 800 MHz spectrum after withdrawing from the much-delayed, state-backed consortium model envisaged for LTE's deployment.

Safaricom subsequently deployed LTE on the 800 MHz spectrum, initially via a test licence and using base stations acquired from yuMobile, but later purchasing the spectrum for USD 25 million. Other operators that have also deployed the technology are Airtel in 800 MHz, Telkom in 800 MHz, and Jamii Telecom, somewhat controversially, in 700 MHz. The LTE network offers voice over LTE (VoLTE) and data services in selected towns in Kenya. Currently, LTE coverage is mainly confined to urban centres and a few more-densely populated rural

Table 3.2: Mobile operators: Data pricing

	SAFARICOM	AIRTEL	TELKOM KENYA	JAMII
Daily	15 MB+15 SMS – Ksh 10	8 MB – Ksh 5	25 MB – Ksh 9	1 GB – Ksh 50
	35 MB+35 SMS – Ksh 20	25 MB – Ksh 10	80 MB – Ksh 19	
	60 MB+60 SMS – Ksh 30	70 MB – Ksh 20	400 MB – Ksh 49	
	150 MB+150 SMS – Ksh 50	200 MB – Ksh 50	1 GB – Ksh 99	
	1 GB – Ksh 99	250 MB – Ksh 20 (night)		
		2 GB – Ksh 99		
Weekly	5 MB – Ksh 10	6 MB – Ksh 5	40 MB – Ksh 19	8 GB – Ksh 300
	10 MB – Ksh 10	15 MB – Ksh 10	150 MB – Ksh 49	15 GB – Ksh 500
	30 MB – Ksh 0	150 MB – Ksh 50	400 MB – Ksh 99	
	65 MB – Ksh 50	350 MB – Ksh 100	2 GB – Ksh 249	
	200 MB – Ksh 99	2 GB – Ksh 250		
	10 GB – Ksh 999			
Monthly	350 MB – Ksh 249	1 GB – Ksh 300	1 GB – Ksh 249	25 GB – Ksh 1 000
	1 GB – Ksh 499	3 GB – Ksh 500	3 GB – Ksh 499	40 GB – Ksh 2 000
	3 GB – Ks 999	10 GB – Ksh 1 000	6 GB – Ksh 999	70 GB – Ksh 3 000
	5 GB – Ksh 1 499	15 GB – Ksh 1 500	10 GB – Ksh 1 499	120 GB – Ksh 4 000
	7.5 GB – Ksh 1 999	20 GB – Ksh 2 000	15 GB – Ksh 1 999	210 GB – Ksh 6 000
	12 GB – Ksh 2 999	36 GB – Ksh 3 000	30 GB – Ksh 2 999	
2–3 months		12 GB – Ksh 3 000		
		40 GB – Ksh 6 000		
		70 GB – Ksh 9 000		

Source: Mobile operators' websites, 2018

26 This administrative data is collected from data supplied by operators on the number of active SIMS and not unique subscribers. This explains why supply-side figures by NRAs and supplied to the ITU on this basis are highly inflated. In prepaid markets, where the majority of subscribers own more than one SIM card, it is only through nationally-representative surveys that accurate and disaggregated data can be collected. Nationally-representative demand-side surveys are the only means through which reliable estimates on gender, urban–rural ratios and income groups can be drawn. This is why the mobile phone and Internet penetration rates used in global indices based on the ITU indicators are far lower than those provided in the demand-side analysis of this report.

areas. Dominant provider Safaricom, for example, only claims to reach about 33% of Kenya's population (IT News Africa, 2017).

Safaricom remains overwhelmingly dominant in the mobile data / Internet access market, with a June 2018 market share of 70% – down from 77% at the end of the previous financial year. This may be attributed to a campaign that saw subscribers boycotting the use of Safaricom services and products after the national elections in August 2017 because the company was seen to be sympathetic to the ruling party. On the other hand, the smaller players have benefited, with Airtel's market share jumping to 23%, a rise of 44%, and that of Telkom Kenya posting a small improvement to end at 7%. The remaining MVNOs (Equitel, Mobile Pay and Sema Mobile) account for less than 1% (CA, 2018, p. 22).

Jamii Telecom's recent launch of its 4G network, branded under Faiba4G and offering data at prices aggressively cheaper than the competition (see Table 3.2), is likely to transform the market. However, Jamii does not have countrywide coverage, and lacks devices that support their 4G band.

The pricing for data and voice has dropped significantly, with Faiba4G offering subscribers free on-net calls and charging KSh 0.2 across the network as long as the subscriber has an active data bundle package. Table 3.2 also shows how operators structure their offerings to make comparability difficult for consumers.

3.2.3 Fixed Internet / data services

The far smaller fixed data Internet service provider (ISP) market is much more evenly divided between Wananchi (30%), Safaricom (21%) and Mawingu Networks (21%), with recent entrant Jamii Telecom making an early showing (12%) (CA, 2018, p. 22) (see Table 3.3).

The data / Internet market has continued to grow as Kenyans embrace and take up e-commerce services. Internet service providers have rolled out infrastructure, albeit mainly in major towns, to provide fast and steady Internet connections. The increased uptake of social media platforms, OTTs and other technological developments, such as video-on-demand (VoD), has resulted in increased demand for and use of bandwidth in the country through fixed and mobile devices. Furthermore, growth of e-commerce services, social networking, online mobile banking and research has pushed demand for Internet use (see Table 3.4).

As Table 3.4 shows, the uptake of data services has continued to grow significantly at almost 40% year-on-year (with the exception of 2016/2017). However, this figure is almost exclusively driven by the overwhelming preponderance of mobile access, which makes up 99% of subscriptions. Of interest in the fixed segment of the data access market is the swing away from fixed DSL access, along with the burgeoning growth of fibre and fixed wireless.

Table 3.3: Fixed Internet / data subscriptions

OPERATOR	SUBSCRIBERS (JUNE 2018)	MARKET SHARE (%)
Wananchi Companies	112 155	30.4
Safaricom	78 104	21.2
Mawingu Networks	77 722	21.1
Jamii Telecommunications	43 529	11.8
Poa Internet Kenya (formerly Argon Telecom)	25 810	7.0
Internet Solutions (formerly Access Kenya)	15 227	4.1
Liquid Telecommunications Kenya	9 720	2.6
Telkom Kenya	4 178	1.1
Iway Africa Kenya Limited	635	0.2
Mobile Telephone Networks Business Kenya	603	0.2
Others	1 603	0.4
Total	**369 286**	**100.0**

Source: (CA, 2018, p. 22)

Table 3.4: Internet / data subscriptions by type

	JUNE 2014	JUNE 2015	JUNE 2016	JUNE 2017	JUNE 2018	% GROWTH 2017–2018
Mobile	13 930 694	19 809 709	26 758 789	29 419 164	40 743 570	38.5
Fixed terrestrial wireless	17 169	17 721	13 449	47 231	122 037	158.4
Satellite	646	635	280	693	1 165	68.1
Fixed DSL	12 129	2 597	3 063	2 715	1 254	–53.8
Fixed fibre optic	69 373	93 598	27 571	54 700	135 964	148.6
Fixed cable modem	25	25	77 319	99 971	101 508	1.5
Other fixed data subscriptions	–	–	–	–	7 352	–
Total Internet subscriptions	**14 030 036**	**19 924 285**	**26 880 471**	**29 624 474**	**41 112 850**	**38.8**

Source: (CA, 2015c, p. 27; CA, 2017c, p. 29; CA, 2018, p. 25)

Increased connectivity and growth in m-commerce is expected to drive Internet demand, coupled with the adoption of Internet of things (IoT), cloud solutions and open data. UNCTAD already reports that 24% of Internet users in Kenya engage in online shopping (UNCTAD, 2018b, p. 15). There is growing demand for mobile-enabled high-definition video, gaming services and digital television. In addition, the growth of industries such as manufacturing and financial services is expected to drive demand for broadband activities.

3.2.4 Fixed network voice services

The fixed network, now miniscule in comparison to the mobile market, has exhibited a downward trend over time, which can be attributed to the slow expansion of the network and adoption of its services due to the stiff competition from mobile networks that are easily accessible and less prone to vandalism. As of June 2018, there were 23 099 fixed terrestrial subscriptions compared to 26 821 at the end of the previous financial year (CA, 2018, p. 18). This despite tariffs having come down, with Telkom Kenya charging KSh 2 per minute for on-net calls and KSh 3 for off-net calls. To some extent, the decline in fixed subscriptions has been offset by the uptake of fixed wireless access, which grew by 120%, albeit off a very low base, to 751.

3.2.5 International Internet bandwidth (Gbps)

As of June 2018, the total international Internet bandwidth available in the country (Lit/equip capacity) stood at 3 277 Gbps (see Table 3.5), having grown by 13% over the financial year (CA, 2018, p. 25). Satellite Internet bandwidth, although a small proportion of the total, was 5.7 Gbps – a 'significant increase of 10-fold', mainly due to 800 public high schools having been connected via satellite under the School Broadband Connectivity project funded through the Universal Service Fund (USF) (CA, 2018, p. 25). SEACOM, nevertheless, remains Kenya's primary source of international connectivity, accounting for almost 68% of the total capacity.

The total international Internet bandwidth used was 931.4 Gbps, an increase of 5.5% on the previous financial year. This translates to 28.4% of the total international available bandwidth being used in the country. The usage rate on satellite is far higher, marginally over 80% (CA, 2018, p. 26).

Phases I and II of the National Fibre Optic Backbone Infrastructure (NOFBI) have been completed. Phase 1 covered 4 300 km from 2005–2009, while Phase II covered 2 100 km from 2015–2017. The Phase II Expansion is expected to cover 2 500 km by 2019, of which 1 200 km had already been laid by end July 2018. Phase II connected all the county headquarters to the National Backbone, while Phase II expansion will

Table 3.5: Available international Internet bandwidth (Gbps)

	JUNE 2014	JUNE 2015	JUNE 2016	JUNE 2017	JUNE 2018	% CHANGE 2017–2018
SEACOM	565.4	770.0	950.0	2 020.0	2 220.0	9.9
TEAMS	120.0	820.0	702.0	702.0	702.0	0
EASSY	120.9	39.1	39.1	83.0	161.3	94.3
Lion 2	41.0	39.2	39.2	101.4	188.8	86.2
Satellite	0.2	0.3	0.5	0.5	5.7	1 040
Total	**847.5**	**1 668.6**	**1 730.7**	**2 906.9**	**3 277.8**	**12.8**

Source: (CA, 2015c, p. 27; CA, 2017c, p. 29; CA, 2018, p. 25).)

connect sub-counties to county headquarters, providing high-speed connectivity to the Internet in county headquarters, sub-county headquarters and interconnecting LANs. The project will offer dark fibre capacity for operators' services along the fibre route, enabling last mile solutions and providing network redundancy for existing links.

The connection to fibre submarine systems provides Kenya with numerous investment opportunities and presents great prospects for spurring economic growth through reliable and affordable high-capacity bandwidth.

3.3 MOBILE TERMINATION RATES (MTRS)

Discussions on mobile termination rates (MTRs) were extensive and heated until late 2012, when, after some hesitation, the CCK finally established a glide path to cut MTRs over three years (Aptantech, 2012), following a study carried out by UK-based consultancy Analysys Mason, which recommended successive cuts of 35%, 20% and 15%. Currently, the prevailing MTR, which has been in force from July 2014, is KSh 0.99 per minute for calls and KSh 0.05 per text message. The mobile providers now invoice each other on a quarterly basis for accrued interconnection charges.

It was expected that the rates would be reviewed in July 2015, but this did not happen. Cutting MTRs further would be a distinct advantage to smaller operators, which pay more to the rival operators under the current rates since a substantial proportion of their customers' calls terminate on a rival network (see Table 3.6) – 24% and 33% respectively for Airtel and Telkom Kenya, compared to a mere 5% for Safaricom. As a result, Safaricom's market dominance made it a net recipient of KSh 694.3 million in interconnection fees, in the first quarter of 2018, mainly from Airtel and Telkom Kenya.

Table 3.6: On-net and off-net traffic (minutes, quarterly)

Q1 2018 (JAN–MARCH)					
	ON-NET	OFF-NET	TOTAL	MARKET SHARE (%)	CALLS TERMINATING OFF-NET (%)
Safaricom	8 077 151 028	397 625 724	8 474 776 752	66.5	4.7
Airtel	2 787 845 102	871 955 639	3 659 800 741	28.7	23.8
Telkom Kenya	387 787 772	193 962 426	581 750 198	4.6	33.3
Finserve Africa	4 166 956	32 951 790	37 118 746	0.3	88.9
Sema Mobile Services	3 258	36 453	39 711	0.0	91.9
Mobile Pay	3 154	26 853	30 007	0.0	89.7
Total	**11 256 957 270**	**1 496 558 885**	**12 753 516 155**		

Source: (CA, 2018, p. 14)

An asymmetric call termination rate regime of the kind implemented in South Africa[27], would have a similar effect of reducing interconnection fee outflows from smaller operators, with a resultant impact on their financial bottom line. It is likely that these considerations induced both Airtel and Telkom Kenya to lobby in 2016 for asymmetric MTRs to be introduced (Piot, et al., 2017, p. 107). This was rejected by the regulator, which opted, on the advice of its consultants, to retain the status quo (Mumo, 2017a).

3.4 FINANCIAL PERFORMANCE – MOBILE VOICE AND DATA / INTERNET

Revenue in the mobile services market segment has grown steadily over the last five years, having climbed by just over 70% across the period (see Table 3.7). Data and Internet service revenue makes up an increasingly significant proportion of the total, nearly 15% by June 2018, up from 6% five years earlier. However, mobile voice remains the dominant revenue stream, accounting for just less than 42% of total mobile revenue in the 2017/18 financial year. Investment has been flat for most of the period.

3.5 DEALING WITH MARKET DOMINANCE

In Kenya, market dominance has been a long-standing but unresolved issue. Safaricom's market share for voice, data and mobile money has consistently been above 60%, well above the standard threshold for significant market power (SMP), at which regulatory intervention to address potential abuse of market dominance is usually prescribed (NERA, 2011). As far back as 2010, the then regulator had clashed with Safaricom over CCK's attempt to introduce pro-competitive regulation, leading to the promulgation of the Competition Guidelines the following year (Waema & Ndung'u, 2012, pp. 5, 6).

In 2015, Airtel sought to have Safaricom declared a dominant player. In terms of the legislation, the CA has the power, in conjunction with the competition regulator, to define markets and market segments, to assess the level of competition and to determine dominance where an operator has more than 50% market share (Kenya, 1998, Section 84W). This, in turn, allows the minister to issue regulations aimed at addressing market dominance[28]. With some 67% share of subscribers, Safaricom was considered dominant, and draft regulations were drawn up and tabled in Parliament, but were subsequently withdrawn, following the intervention of the Attorney General, on the grounds of insufficient consultation (Wainaina, 2016).

Following these developments, Analysys Mason, a UK-based consulting firm, was contracted by the Communications Authority in 2016, to analyse the state of competition in the market and to propose appropriate remedies. A draft of the report, leaked in early 2017, generated considerable controversy (Kemibaro, 2017). Among its recommendations were the unbundling of the M-Pesa platform from Safaricom's voice and data

Table 3.7: Mobile voice, data / Internet revenue and investment

	2014	2015	2016	2017	2018
Mobile voice and other services revenue (KSh billions)	162.3	206.3	225.1	196.4	252.3
Mobile data / Internet revenue (KSh billions)	10.2	8.5	15.9	36.2	43.2
Mobile investment (KSh billions)	32.1	52.2	40.9	41.0	41.5

Source: (CA, 2018; CA, 2017c)

27 South Africa recently reduced termination rates, opting to retain a significant degree of asymmetry. For example, mobile operators with less than 20% market share (based on minutes of traffic) pay 33% less to terminate calls on mobile operators with a market share above that threshold.

28 As the State still has interests in two operators in the sector, the issuing of regulations by the Ministry represents a significant conflict of interest. The regulation of dominance should be left to the impartial regulator.

services, to be run as an independent entity on the grounds that the vertical integration gave Safaricom an unfair advantage. The report further recommended the imposition of price capping and suggested that Safaricom be compelled to share its network and towers with competitors to level the playing field in areas such as 4G service provision. Worth noting is that the report did not say that Safaricom was abusing its dominant position in relation to customer subscriptions and mobile money market share.

The National Assembly Committee on Communication, Information and Innovation sought views from stakeholders on the draft report in August 2018 (Mwiti, 2018). Apart from the operators with clearly vested interests, among institutions that presented views was the Competition Authority of Kenya, which opposed anti-dominance regulation and dismissed as punitive the recommendation on price capping. The CAK argued that dominance is not illegitimate per se, as long as the dominant position is not being abused.

The final version of the report backed down from its most controversial recommendation, the unbundling of M-Pesa (Analysys Mason, 2018), but held firm on others. Using a best practice methodology from the EU, the report examines five retail markets and eight associated wholesale markets and finds Safaricom dominant in several of these. With respect to wholesale markets, it recommends requiring the provision of access to Safaricom's towers in poorly served areas and supports the status quo on termination rate regulation. In respect of retail markets, it recommends the enforcement of roaming in poorly served areas, as well as a variety of interventions, such as the prohibition of on-net call discounts, intended to address discriminatory pricing practices on the part of Safaricom. With regard to the mobile money market, the report recommends the prohibition of surcharges for cross-platform money transfers and regulation to ensure full 'wallet-to-wallet interoperability'.

It is likely that the CA will only accept and act upon the various recommendations early in 2019, although some of the smaller operators have already begun to press for it to do so sooner rather than later, particularly in respect of mobile money (Wainainah, 2018).

3.7 DIGITAL MIGRATION

Kenya completed its migration from analogue to digital terrestrial television in 2015, a process documented more fully elsewhere (GSMA, 2017). Suffice it to note that the process was not without its hiccups, with a slow uptake by viewers of the necessary set-top boxes, leading to an outcry from both the public and media houses when analogue signals were switched off in December 2013, followed by a court-ordered reversal of the switch-off (Ramah, 2013). The process was finally completed in June 2015, several years after the original June 2012 deadline.

Consequent upon the successful completion of the digital migration, a considerable amount of 'digital dividend' spectrum was freed up in the 800 MHZ and 700 MHz bands, and made available for operators to roll out broadband 4G and LTE services. Three lots, of 20 MHz each in the 800 MHz band, were allocated respectively to Safaricom, Airtel and Orange on a trial basis in June 2016. A further 28 MHz block in the more desirable (because of better propagation characteristics) 700 MHz band was controversially allocated to Jamii in December 2017 (Kamau, 2017). A process to license further digital divided spectrum attracted 10 applicants, but remains stalled at the time of writing (Business Daily Africa, 2017).

3.8 DIGITAL ECONOMY AND E-COMMERCE IN KENYA

Drawing on the central role of mobile money services in Kenya's economy, Chakravorti and Chaturvedi find that the country's digital economy has high momentum and excellent potential for growth, emerging as the fourth-fastest growing digital economy in the world after China, Malaysia, and Bolivia (Chakravorti & Chaturvedi, 2017). It was perhaps appropriate then that UNCTAD's inaugural Africa e-Commerce Week was held in Nairobi in December 2018. Under the theme of 'Empowering African Economies in the Digital Era', it set out to examine ways to enhance the ability of African countries to engage in and benefit from e-commerce and the evolving digital economy.

The business-to-consumer (B2C) e-commerce market in Africa remains poorly developed. Although worth about USD 5.7 billion in 2017, it makes up less than 0.5% of GDP, far below the world average of over 4% (UNCTAD, 2018b, p. 16). Nevertheless, Kenya ranks relatively

well, placing 7th out of the continent's 44 economies, behind Mauritius, Nigeria and South Africa, but ahead of Uganda, Botswana and Namibia (UNCTAD, 2018b, p. 17). The transformative role of mobile money, in Kenya in particular, plays large part in this: 'While mobile money initially enabled people to make financial transactions on their phones, thereby eliminating travel costs, it now extends to mobile credit, insurance, cross-border remittances, bill payments, airtime top-ups, and savings' (UNCTAD, 2018a). As a result, UNCTAD notes that 'the digital economy, including electronic commerce, is growing quickly in Africa, creating new opportunities for entrepreneurs and businesses to expand their market access and join value chains' (UNCTAD, 2018c).

The conference resulted in a number of recommendations that focused on: the development of national e-commerce strategies; bridging the digital divide through digital skills; investing in sustainable and secure ICT infrastructure that is conducive to innovation; fostering cooperation among all stakeholders in support of the digital transformation; and creating an enabling regulatory environment to promote the adoption of mobile payments solutions. (UNCTAD, 2018c).

Overall, the future of Africa e-commerce is considered bright, and the steps taken by the specific countries will dictate its success.

3.9 CONCLUSION

The ICT sector continues to experience steady growth. However, despite the entry of Faiba as a 4G player, and some shrinkage of its subscriber base, Safaricom remains the dominant player in the mobile market. In contrast, the ISP market is much more competitive, although data and Internet access take place almost exclusively via mobile smartphone. The prices of voice and data services have continued to fall with the continued implementation of the MTR regulatory intervention, making operators focus more on the quality of service as their competitive edge. With improved technologies for measuring operators' quality of service, as well as the recent associated guidelines, the market appears to be becoming more sensitive to the needs of users.

4

DEMAND ANALYSIS: ICT HOUSEHOLD AND INDIVIDUAL DATA

The demand-side analysis of the ICT sector in Kenya presented in this section derives from a nationally-representative *After Access* survey of ICT access and usage at *household* and *individual* levels, conducted in 10 African countries (Ghana, Kenya, Lesotho, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania and Uganda) by Research ICT Africa as part of a wider survey of 20 countries across the Global South, conducted by DERSI in Latin America and LIRNEasia in Asia.

The survey sample is drawn from the census frame, which divides the country into enumeration areas (EAs), each with a household density of around 200. To select the sample, the national census sample frame was split into urban and rural EAs, and each was sampled for each stratum, using probability proportional to size (PPS). For the data to be nationally representative, a weighting scale was applied. Two listings were compiled for each EA – one for households and one for businesses. The listings served as a sample frame for the simple random sections of households and businesses[29]. The resultant randomly-selected sample of households and individuals is, therefore, representative of all adults aged 15 years and older.

4.1 DEMOGRAPHIC INFORMATION

In Kenya, 1 200 households were sampled, using simple random sampling within each selected EA. The head of the household was interviewed in each case in terms of access to a variety of household indicators, including fixed line and mobile phones, television sets, radios and electricity. Then, from within each household, including any visitors staying the night, an individual aged 15 years or older was selected, based on simple random sampling, for the individual (mobile) survey.

Similar to the World Bank's estimates of 2017, the survey shows that 74% of Kenyans reside in rural areas, with majority of the population (55%) being female. The majority of Kenyans aged 15 years and older have primary education (42%), while 39% have secondary education, 15% have tertiary education and only 4% have no form of education (see Table 4.1).

Table 4.1: Kenya's population statistics for gender, location and education level

GENDER	LOCATION	EDUCATION
Male (45%)	Rural (74%)	None (4%)
		Primary (42%)
Female (55%)	Urban (26%)	Secondary (39%)
		Tertiary (15%)

Source: RIA After Access Survey, 2017; ITU Statistics, 2016b

29 For more information on the methodology, see RIA (2017).

Table 4.2: Mobile and Internet penetration rates in seven African countries

COUNTRIES	MOBILE PHONE PENETRATION – AFTER ACCESS 2017	MOBILE PHONE PENETRATION – ITU STATISTICS 2016	INTERNET PENETRATION – AFTER ACCESS 2017	INTERNET PENETRATION – ITU STATISTICS 2016	AVERAGE SIM CARDS PER SUBSCRIBER	MAXIMUM SIM CARDS PER SUBSCRIBER
Ghana	74%	139%	26%	35%	1.4	8
Kenya	87%	81%	26%	26%	1.2	4
Mozambique	40%	66%	10%	18%	1.3	3
Nigeria	64%	82%	30%	26%	1.6	5
Rwanda	48%	70%	8%	20%	1.5	3
South Africa	84%	142%	50%	54%	1.2	5
Tanzania	59%	74%	14%	13%	1.5	5

Source: RIA After Access Survey, 2017; ITU Statistics, 2016b

4.2 ICTS: ACCESS AND USAGE

The 2017–2018 *After Access* surveys provide policymakers with the most up-to-date and unbiased estimates of ICT access and use in Africa. The nature of the ICT market and, more specifically, the mobile market, which is predominantly prepaid and has subscribers owning multiple SIM cards to leverage cheaper on-net discounts, renders the supply-side estimates biased and likely to misinform policy formulation. Hence, the only way to provide data for evidence-based policy formulation is to use survey data. For example, according to the International Telecommunication Union (ITU) ICT estimates, which rely on the data provided by country regulatory authorities who source this data from mobile operators, mobile phone penetration rates in most African countries is much higher than 100%. The 2017 ITU Statistics estimate mobile penetration rates in South Africa to be at 156% of the population and at 127% in Ghana[30].

The ITU data, which over-estimate penetration rates, is used for compiling global indices such as the ITU ICT Development Index (IDI), the World Economic Forum Networked Readiness Index (NRI), the Affordability Drivers Index (ADI) from the Alliance for Affordable Internet, the GSMA's Mobile Connectivity Index and the most recent, the Economist Intelligence Unit's new Inclusive Internet Index (3i). All of these indices seek to measure ICT digital developments between countries over time. While these indices have become the reference point for assessing national performance, they are generally limited to supply-side factors and are not able to establish the cause of any identified problems, other than in the broadest terms and, as such, cannot be used to propose specific remedies for individual countries. Table 4.2 shows the discrepancies or the upward bias in subscription rates when policymakers depend on supply-side information.

Kenya's performance in the affordability index is average, with a ranking of 37th out of 61 countries, although this positon is the worst of all the African countries surveyed. Despite this ranking, the cost of communication in Kenya is lower than that of Mozambique and its penetration rate is higher than the penetration rates in all the African countries surveyed. On the Networked Readiness Index (NRI), which is a more comprehensive measure consisting of four sub-indexes with individual indicators, Kenya is ranked 86th out of 139 countries, performing worse than Rwanda (80) and South Africa (65). The NRI consists of the following four sub-indexes:

- The environment sub-index indicators measure a country's political and regulatory environment, as well as its business and innovation environment.
- The readiness sub-index indicators assess a country's infrastructure and digital content development, affordability and skills.
- The usage sub-index indicators measure the individual, business and government usage in a country.
- The impact sub-index indicators assess the economic and social impacts in a country.

30 See: https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx

Table 4.3: ICT indicators

	ADI	3I	IDI	NRI	1 GB PREPAID DATA USD	ACTIVE SIM CARDS PER 100	INTERNET SUBSCRIBERS PER 100
Nigeria	18	65	143	119	2.79	76	28
Kenya	37	64	138	86	2.49	86	18
Ghana	20	70	116	102	2.62	128	39
Mozambique	31	94	150	123	2.01	40	21
Rwanda	28	79	153	80	2.36	72	22
Senegal		83	142	107	6.35	99	30
South Africa	19	50	92	65	7.84	156	56
Tanzania	35	79	165	126	2.20	70	16
Uganda	36	85	152	121	1.88	58	24
Sources	**A4AI, 2018**	**EIU, 2017**	**ITU, 2017**	**WEF, 2016**	**RAMP Index (Q2 2018)**	**ITU ICT Statistics, 2017a**	**ITU ICT Statistics, 2017a**

The NRI seems to give more weight to supply-side issues, such as infrastructure development, while attributing a smaller weight to penetration rates, inequalities and the digital gap. This condition in terms of the NRI weighting would explain why Rwanda performs better than Kenya.

In line with the Sustainable Development Goals, which acknowledge ICTs as prerequisites to human development in contemporary society, where human development is a necessary condition of equitable and inclusive participation by the citizenry in the contemporary society, the ITU IDI seeks to look beyond simple connectivity indicators to the level of evolution of ICT development over time. It uses a number of sub-indices to assess the development potential of ICTs and the extent to which countries can use them to enhance growth and development. Kenya is ranked 138th out of 176 countries, after South Africa (92) and Ghana (116), but better than Nigeria (143) and Rwanda (153), despite Rwanda performing better than Kenya in all other indicators.

While these global indices provide some insights into the challenges facing the country, and differences in country's score may demonstrate progress or deterioration, variations in a country's ranking might reflect changes in the country's GDP per capita and have less to do with the ICT sector. Affordability indicators, on the other hand, might vary, not because of price differences, but because of changes in GDP per capita, something over which ICT policymakers and regulators have no control.

More importantly, global indices cannot be disaggregated to provide insights on the intersectionality of gender, income and locality factors, which is critical for policy development to remedy the existing digital divides. Without nationally representative demand-side data, it is impossible in the prepaid markets to provide an accurate measure of access to the Internet and to mobile phone penetration rates. The *After Access* survey provides policymakers with up-to-date measures of ICT access and use, which can be used to develop the evidence needed for policy formulation, tailored for a specific country of interest. The data can be disaggregated by gender, income levels and location, which allows specific developmental issues to be targeted. Evidence from the *After Access* survey demonstrates that ICT penetration rates are aligned with GNI per capita, with relatively richer countries more likely to have high penetration rates than poorer countries (see Figure 4.1).

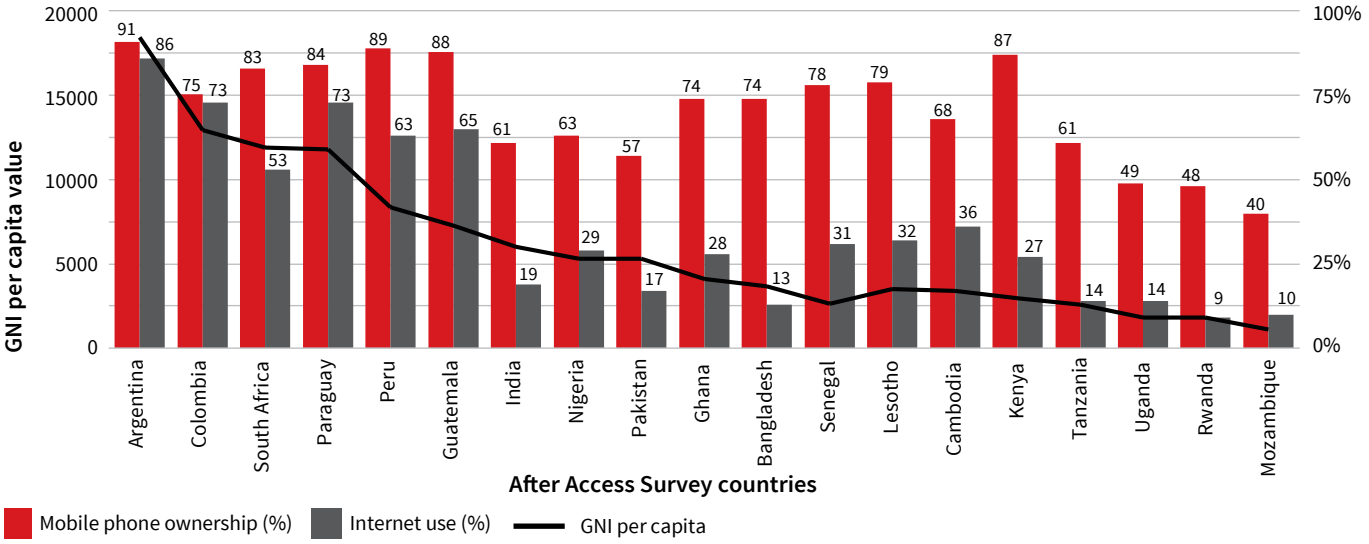

Figure 4.1: Mobile phone and Internet penetration rates overlaid on GNI per capita

Source: RIA After Access survey data, 2017–2018
Notes: The Lesotho survey was done in 2016.

4.3 HOUSEHOLD INDICATORS

Kenya is among the top 10 biggest economies in Africa, with a GDP value of USD 79.5 billion, and ranked eighth after Nigeria (USD 376 billion), South Africa (USD 349.3 billion), Egypt (USD 237.1 billion), Algeria (USD 178.3 billion), Morocco (USD 109.8 billion) and Ethiopia (USD 80.9 billion) in 2017 (IMF, 2017)[31]. Kenya's pivotal role in East Africa, as well as its dynamic private sector, highly skilled workforce and innovative capabilities, and improved infrastructure, are some of the factors that drive economic growth in the country. However, there are number of other developmental issues that should be put in place to allow the country to benefit fully from its highly-skilled, tech savvy innovative youth in order to reach accelerated economic growth, inclusive growth and human development. The Kenyan electrification plan has a target of connecting 95% of households to the main electricity grid by 2020. Despite this target, the 2017 *After Access* data shows that the country still has a long way to go. Only 42% of households are connected to the main grid and 16% of households use solar panels. These figures are substantially similar to those from the Bureau of Statistics, which has a national average of 41.4% of households connected to the grid, and 14.1% using solar power (KNBS, 2018a, p. 55). While Kenya has the highest rate of electrification among East African countries including Tanzania (33%), Rwanda (28%) and Uganda (18%), it does not perform well against South Africa (89%), Ghana (85%), Nigeria (66%) and Senegal (58%).

Electricity is a prerequisite for access to ICTs, both in terms of network rollout and also for powering consumers' devices (phones, computers, radios and television sets). The digital gap between urban and rural areas in Africa is not only explained by human factors such as education and income, but can also primarily be seen as an outcome of lack of electricity and low infrastructure in the rural areas. Evidence from previous research shows that the lack of electricity in rural areas is one of the main factors that explains the urban–rural digital divide. Countries that have a larger electricity gap between urban and rural areas, such as Mozambique, have large digital divides between the urban and rural areas.

The proliferation of new technologies and the dynamic effects of convergence are changing the way in which consumers can access and view audio-visual content. With the advent of these technologies, audio-visuals today can be provided through multiple platforms: analogue or digital terrestrial broadcasts, satellite, cable or Internet Protocol (IP), and over-the-top

31 See: https://businesstech.co.za/news/finance/257337/the-biggest-economies-in-africa/

Table 4.4: Household access to electricity across 10 surveyed African countries

	NO ELECTRICITY	CONNECTED TO THE MAIN GRID	GENERATOR	SOLAR	OTHER
Ghana	14%	85%			1%
Kenya	34%	42%		16%	8%
Lesotho	87%	11%	1%		
Mozambique	52%	24%		22%	2%
Nigeria	22%	66%	11%		
Rwanda	68%	29%		3%	1%
Senegal	14%	58%	11%	10%	7%
South Africa	6%	89%	1%	1%	3%
Tanzania	53%	33%		13%	1%
Uganda	45%	18%	0.2%	25%	12%

Source: RIA After Access survey data, 2017–2018

(OTT) television. The transition of networks to IP data transmission is central to the changes affecting traditional broadcasting. Combined with significant broadband penetration, increases in bandwidth and the increased uptake of digital devices, this transition has enabled different devices to use the same networks and has facilitated the capability of the communication industry to offer new and bundled services (OECD, 2013). Despite this transition, radio is by far the most commonly used and most important mass medium of communication in Africa. Radio has been identified by many governments as an easy way of communicating policies. Despite its low cost, the radio market remains less developed in Africa with few radio stations per African country. The under-development of the radio market can be attributed to government intervention and the lack of government desire to let go of national broadcasting stations.

The After Access survey shows that compared to other broadcasting media, radio is the most common with about 78% of households in Kenya owning a radio set, followed by Senegal, South Africa and Ghana, where 68% of households have a radio set. Household radio ownership is lower in Mozambique (38%) and Rwanda (49%), and higher than 50% in other countries. Evidence from the After Access survey shows that radio outstrips television in reaching most people in the surveyed African countries, with less than half of households not owning a television set except in South Africa (81%), Senegal (71%), Ghana (67%) and Nigeria (60%). As of 2017, there were only two subscription TV service providers on the Digital Terrestrial Television (DTT) platform, namely, GoTV and Star Times, and 66 free-to-air DTT channels, with the digital signal covering 78% of the Kenyan population. However, less than half (38%) of households in Kenya own a television set.

Only 13.2% of people in Kenya use a computer, either a desktop or a laptop. This shows a significant drop from the 21.2% recorded in the previous RIA survey (Waema & Ndung'u, 2012). However, this percentage is similar to the 9.5% reported by KNBS (2018a, p. 147), which draws on the sampling frame using different age parameters and which may explain moderate differences. The drop is likely due to the increased uptake of smartphones in Kenya. Nevertheless, 86.8 % of individual respondents had never used a desktop computer or a laptop. Only 5.5% owned a personal desktop computer or laptop. Despite the emergence of cheaper Internet-enabled devices, such as wireless devices with capacity of connecting 10 or more devices, household Internet access and use in Africa remains very low. Only South Africa and Kenya have more than 10% of households with a working Internet connection (see Table 4.5). Countries with fewest household Internet connections are Tanzania and Mozambique (1%), Uganda (2%), and Rwanda and Africa's most populous country Nigeria

Table 4.5: Aggregate household device ownership statistics across 10 African countries

	FIXED-LINE CONNECTION	TELEVISION	RADIO	WORKING DESKTOP	WORKING LAPTOP	INTERNET CONNECTION
Ghana	0.3%	67%	68%	4%	8%	6%
Kenya	1%	38%	78%	2%	6%	10%
Lesotho	2%	30%	53%			4%
Mozambique	1%	23%	38%	2%	4%	1%
Nigeria	1%	60%	56%	2%	5%	3%
Rwanda	1%	11%	49%	1%	2%	3%
Senegal	9%	71%	68%	8%	5%	5%
South Africa	8%	81%	68%	9%	17%	11%
Tanzania	0.1%	28%	59%	2%	4%	1%
Uganda	2%	18%	51%	1%	2%	2%

Source : RIA After Access survey data, 2017–2018

(3%). Respondents without a working Internet connection at home were asked to indicate reasons for not using the Internet. Of these, 27% indicated that they did not have a need for the Internet, while 22% said the cost was too high and 17.6% said they did not know how to use the Internet (see Figure 4.2).

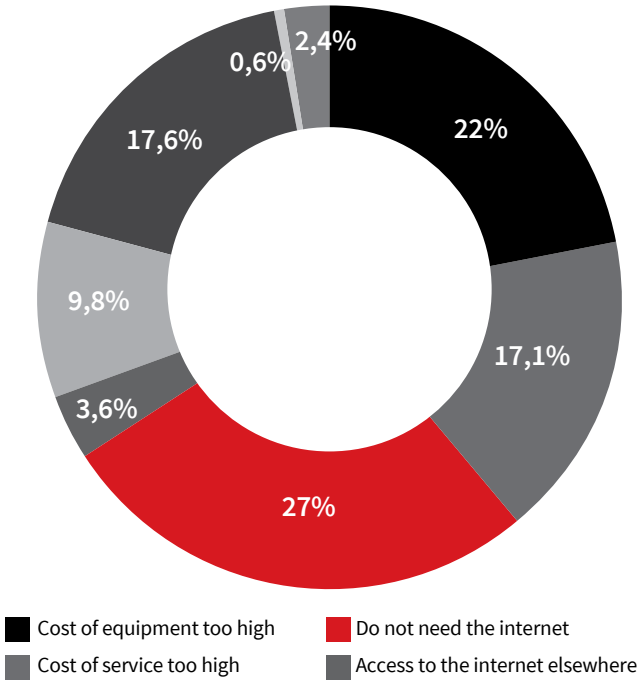

Figure 4.2: Reasons for not having Internet connectivity

Source: RIA After Access ICT Survey, 2017

4.4 MOBILE PHONES AND THE INTERNET DIVIDE IN KENYA AND THE GLOBAL SOUTH

According to the 2017–18 nationally representative *After Access* survey, conducted by Research ICT Africa in 10 African countries including Kenya, as part of the Global South ICT Access and use survey in 20 countries conducted by RIA in Africa, DIRSI in Latin America and LIRNEasia in Asia, Internet use and the digital divide track GNI per capita. Of all the surveyed countries, Kenya is ranked 15th in respect to GNI per capita, which at USD 2 961 is higher than Tanzania (USD 2 557), Uganda (USD 1 820), Rwanda (USD 1 811) and Mozambique (USD 1 093). Despite, its lower GNI per capita, Kenya has the highest mobile phone penetration rate (87%) among all the surveyed African countries and only lower than Argentina (91%), Paraguay (89%) and Guatemala (88%). The survey shows that disparities in Internet use and access are broadly defined by GNI per capita. Despite South Africa having a similar GNI per capita at USD 11 923 to the wealthier Latin American countries, only slightly more than half the population (53%) use the Internet, compared to Argentina (75%) and Colombia (73%). Even though Kenya's GNI per capita is much lower than that of South Africa, almost a third (27%) of Kenyans aged 15 years and older use the Internet, compared to only 53% of South Africans.

Kenya, which has a higher mobile phone penetration rate, has not benefited from these technologies, with

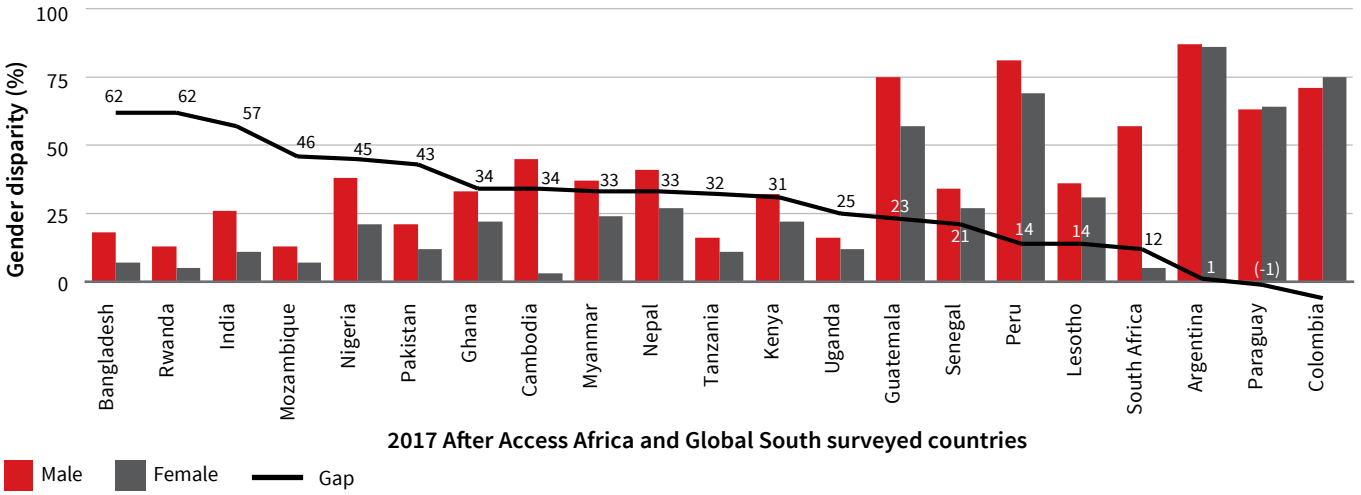

Figure 4.3: Gender disparity in Internet use in Africa and the Global South

Source: RIA After Access Survey data, 2017

less than a third (27%) of the population using the Internet. Rwanda has the least Internet use, at 9%, followed by Mozambique at 10% (see Figure 4.1), despite Rwanda's heavy investment in telecommunication infrastructure, with 95% of the population covered by 4G long-term evolution (LTE) technologies.

As Figures 4.3 and 4.4 clearly show, the Internet gender gap and location gap are larger in developing countries. Rwanda and Bangladesh have the highest Internet gender gap (62% each), followed by India (57%), Mozambique (46%) and Nigeria (45%). The Internet gender gap is lower in wealthier countries, with the lowest gaps in Argentina (1%), Paraguay (–1%) and Colombia (–6%). Interestingly, the survey shows that in Paraguay and Colombia, a higher percentage of women are using the Internet than men. In Africa, South Africa has the lowest Internet gender gap (12%), with Lesotho a close second (14%) – two countries that share a border. However, the Internet gender gap is significant in Kenya (31%). The survey shows that a higher percentage of males (32%) than females (22%) use the Internet.

The urban–rural divide is more pronounced than the gender gap. The high urban–rural gap can be attributed to lack of desire to roll out infrastructure in rural areas and the lack of electricity. Other factors that might explain the high divide include a lack of digital skills and affordability issues, which are more persistent in rural areas. An urban–rural gap of 69% in Kenya is only lower than Uganda (70%), Rwanda (77%), Tanzania (84%) and Mozambique (87%) (see Figure 4.4).

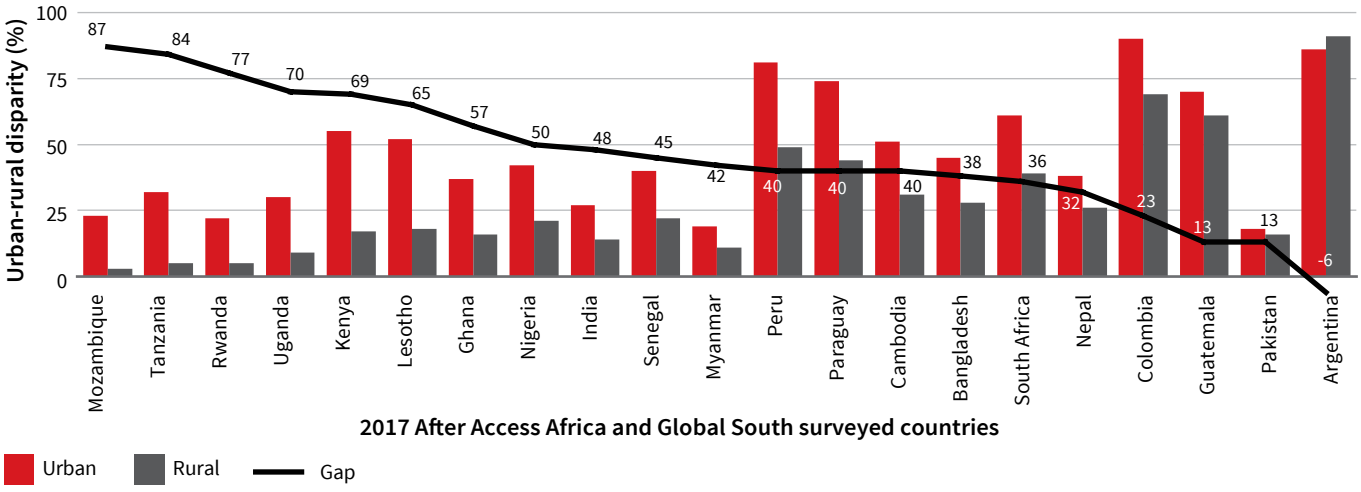

Figure 4.4: Urban–rural disparity in Internet use in the Global South countries surveyed

Source: RIA After Access Survey data, 2017

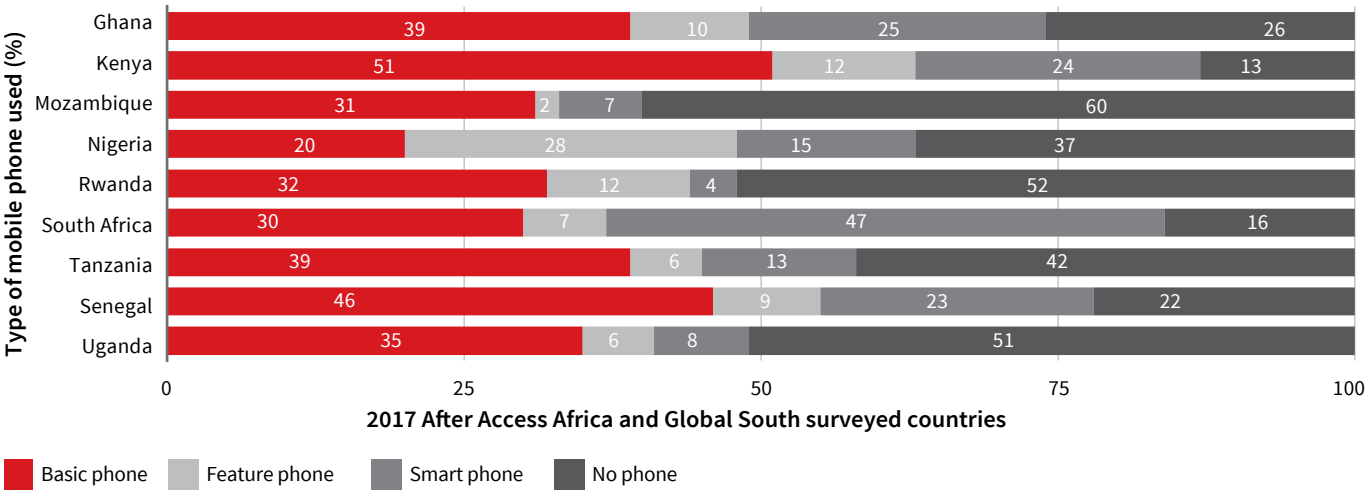

Figure 4.5: Penetration level by type of mobile phone

Source: RIA After Access Survey data, 2017

The 2017 *After Access* Survey shows that countries with high smartphone penetration levels are likely to have high Internet use. OECD countries, which have high Internet use, have smartphone penetration levels ranging between 70% and 80%, compared to low penetration rates in Africa, which range between 8% and 47%. South Africa, which has the highest Internet use among the surveyed African countries, has the highest smartphone penetration level (47%). Despite Kenya having the best performance in terms of mobile phone penetration rates, only about a quarter of Kenyans own a smartphone. Rwanda and Mozambique have the lowest smartphone penetration levels, with only 4% and 7%, respectively, of the entire population owning one, which translates into 9% and 17% percent of mobile phone ownership respectively (see Figure 4.1).

Respondents without mobile phones were asked to list reasons for this[32]. Of these, 58.3% pointed to lack of affordability as a reason, while 44.3% cited lack of access to electricity as a barrier (see the discussion above), and

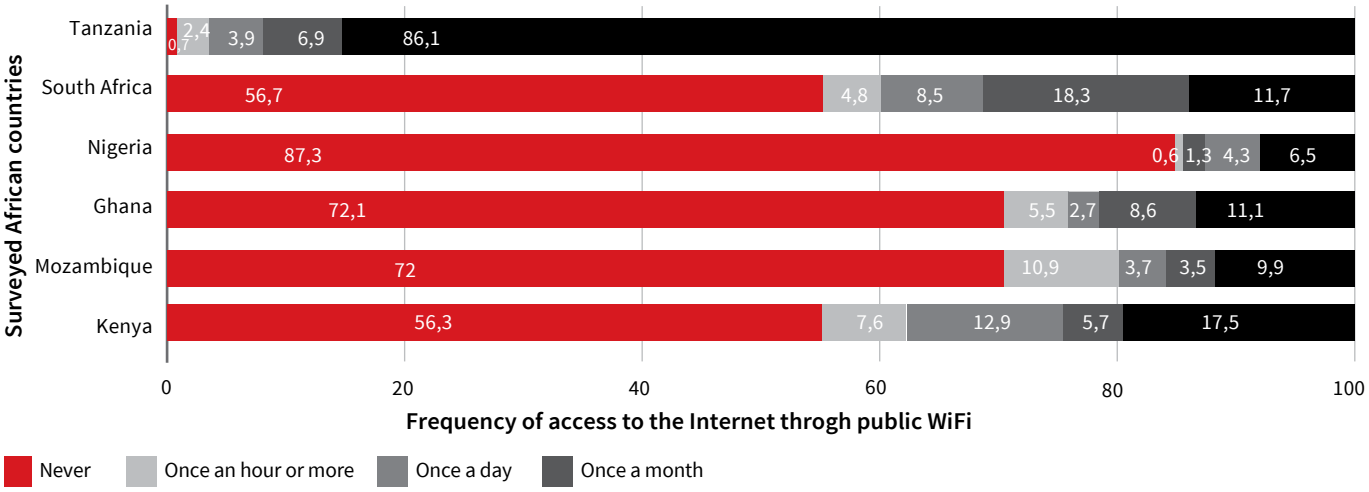

Figure 4.6: Internet access through public WiFi

Source: RIA After Access ICT Survey, 2017

32 Respondents were permitted to cite more than one reason.

22.6% said they did not have mobile coverage. Nearly 24% said they had no need for a mobile phone, with 18.2% indicating lack of knowledge on how to use mobile telephony as a reason for not owning a mobile phone, and 5.4% pointing to privacy concerns. As noted above, while basic phones are still the most commonly-used device (58.5%), smartphones now make up more than a quarter of the mobile devices in use. When respondents with basic and feature phones were asked why they did not have a smartphone, 35.8% replied they did not have a need for it, 42.3% said that they could not afford one, and 13.8% said that they found smartphones too complicated to use.

The use of public WiFi is relatively limited in all the countries surveyed, with 56.3% of Kenyan Internet users indicating that they never use public WiFi (see Figure 4.6).

4.5 INHIBITORS TO INTERNET USE IN KENYA

A large proportion of Kenyans aged 15 years and older do not use the Internet. The majority of non-Internet users in Kenya are people who live in the rural areas (84%) and who are mostly female (58%). This is further evidence that digital inequalities exacerbate the traditional social inequalities. The Internet today is a one-stop shop, where economic agents can get information about job opportunities, policies and markets, and the exclusion of marginalised societies from the Internet is more likely to widen societal inequalities. Furthermore, the survey shows that Internet use is positively correlated with income and education. The majority (95%) of individuals in Kenya either with no form of education or without at least a primary certificate do not use the Internet, and 93% of individuals with a primary certificate do not use the Internet. Surprisingly, a significant proportion of Kenyans who have a secondary school certificate do not use the Internet. This is evidence that lack of education is not only the inhibitor to Internet use, and that other factors such as affordability, time and content might explain the low levels of Internet use in Kenya.

Evidence from the 2017–18 After Access survey shows that the main limitation to Internet use in Kenya is data costs (45%). A significant proportion of respondents surveyed on Internet use stated that they do not have time to spend on the Internet. This result shows that the majority of Kenyans still see the Internet as a non-economic platform that provides no economic benefits and is a waste of time.

4.6 MOBILE MONEY AND FINANCIAL INCLUSION IN KENYA

Mobile and digital technologies have helped to boost financial inclusion in Africa. As of 2014, a third (34%) of adults had a bank account. The 2017–18 *After Access* survey shows that while account ownership is almost universal in developed countries, less than a third (29%) of the population in the surveyed African countries have a bank account. Mobile money services provided by Fintech and mobile phone operators have completely revolutionised the way in which people in Africa transact, providing financial services to the majority of Africans who could not afford to use traditional banking services.

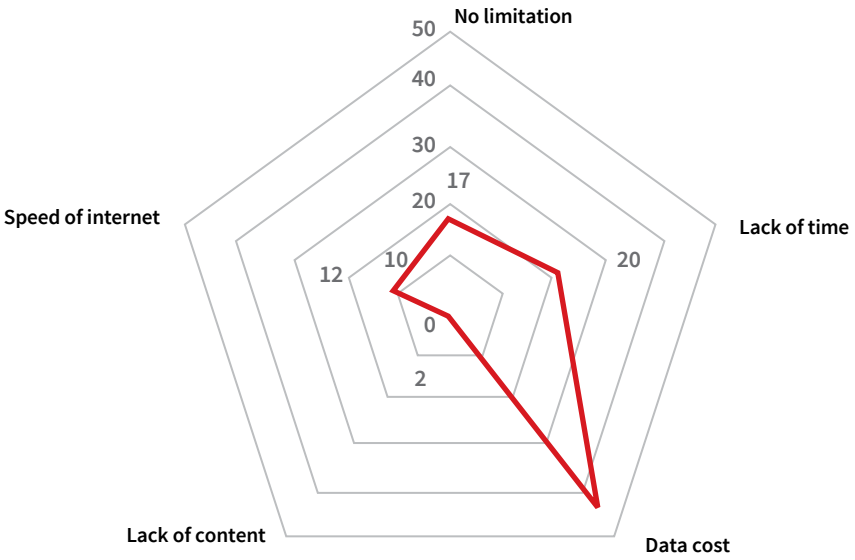

Figure 4.7: Inhibitors to Internet use in Kenya

Source: RIA After Access ICT Survey, 2017

In contrast to traditional banking services, mobile money services do not require substantial investment in physical infrastructure for bank branches. Instead, mobile money services depend on agents and mobile money transfers, which are able to serve low-population density areas at a significantly lower cost than traditional banks. Traditional bank account ownership in the countries surveyed is very low, with only 11% of individuals aged 15 years and older owning a bank account in Tanzania and Mozambique, and close to a third in Ghana (27%), Kenya (34%), Nigeria (33%) and Rwanda (28%). South Africa, where account ownership has surged to 57%, is the only exception. Low bank account ownership in Africa is linked to traditional social exclusion and inequalities between men and women, as well as to marginalised communities. The gap in account ownership is pronounced between the urban and rural areas (56%) and smaller between males and females (24%).

The high penetration rate of mobile phones in Africa, with 66% of the population in the surveyed countries having a mobile phone, coupled with the advent of new mobile technologies, such as mobile money, has broadened access to financial services in Africa and changed the way in which people send and receive money, save, borrow and manage risk. Close to half (45%) of the population living in the surveyed countries have access to either a bank account or mobile money account, with 26% of them using mobile money services to carry out transactions. However, mobile money services are common in East African countries, with Kenya leading at 85% of the population, followed by Ghana (55%) and Tanzania (45%). Financial inclusion in Uganda is primarily driven by mobile money services. While account ownership is as low as 2%, mobile money services are used by majority (39%) for transactions. In contrast, Nigeria and South Africa have the lowest mobile money usage among the surveyed countries at 5% and 8% respectively. However, these countries are leading in bank account ownership. The impact of mobile money on financial inclusion is huge in Kenya and Ghana, where 86% and 59% of the population respectively have access to some sort of financial services (see Figure 4.9). The low adoption of mobile money in Nigeria is due to the Central bank regulatory requirement for users to have a bank account. In South Africa, mobile money has not been successful due to the developed financial market and people preferring digital financial services such as e-wallet and Internet banking platforms to mobile money services.

In 2018, the Central Bank of Kenya (CBK), announced that the country has more than 45 million active mobile money accounts, with nearly 9.44 million accounts opened between October 2017 and October 2018. The Central Bank further reported that deals worth Sh 3.90 trillion (USD 38.9 billion) were settled via mobile phone in the same period, which was Sh 289.42 billion

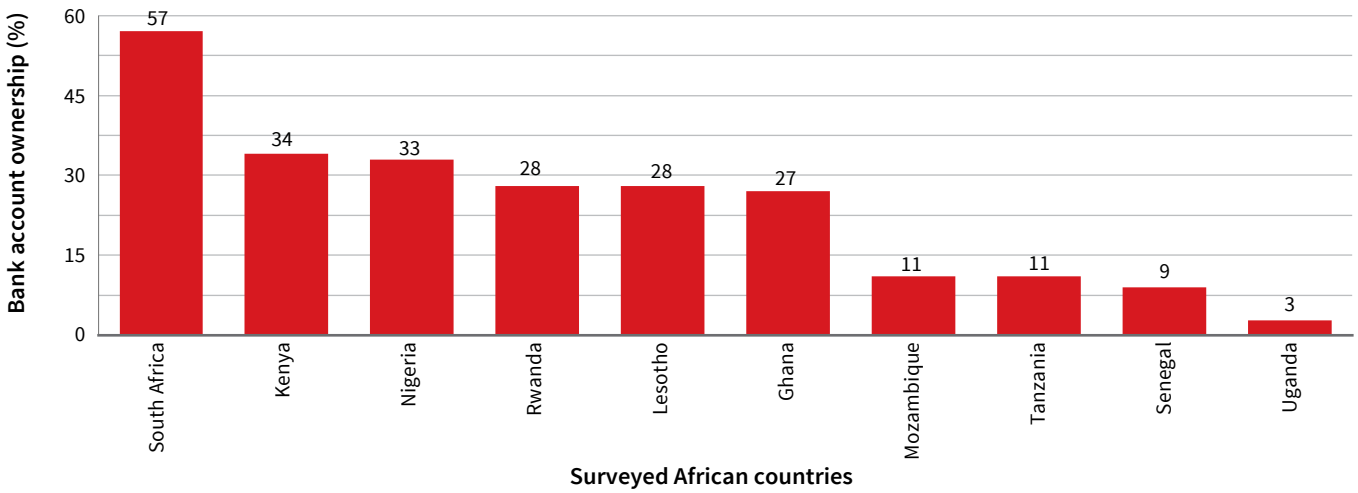

Figure 4.8: Bank account ownership in surveyed countries

Source: RIA After Access Survey data, 2017

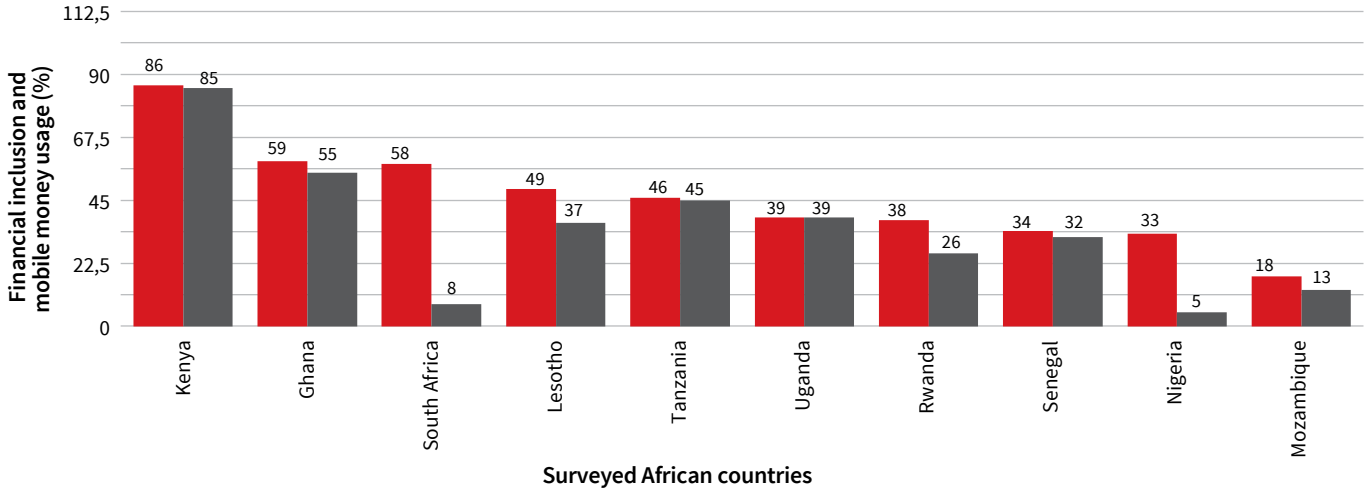

Figure 4.9: Financial inclusion and mobile money services

Source: RIA After Access Survey data, 2017

(USD 2.8 billion) more than for deals settled over the same period a year earlier (Business Daily, 2018)[33].

When questioned on their reasons for using mobile money, the overwhelming majority of respondents (89.3%) said that they were motivated by the fact that most of their friends also used mobile money services. Most (74.7%) indicated that the agent network and coverage were adequate for their use whenever they needed the service. Of those who did not use mobile money services, 28.2% indicated that they do not do so because they do not have facilities for mobile money use. Just less than half of the respondents (47.8%) do not consider the mobile money system risky, while a smaller number (21.6%) were concerned that the technology could fail.

Mobile money is the preferred mode for those sending or receiving cash (less than a third of respondents do not send or receive money), with 61% using mobile money to send cash to others and 55% receiving money through this channel. Only 0.7% used bank account transfers (see Figure 4.10).

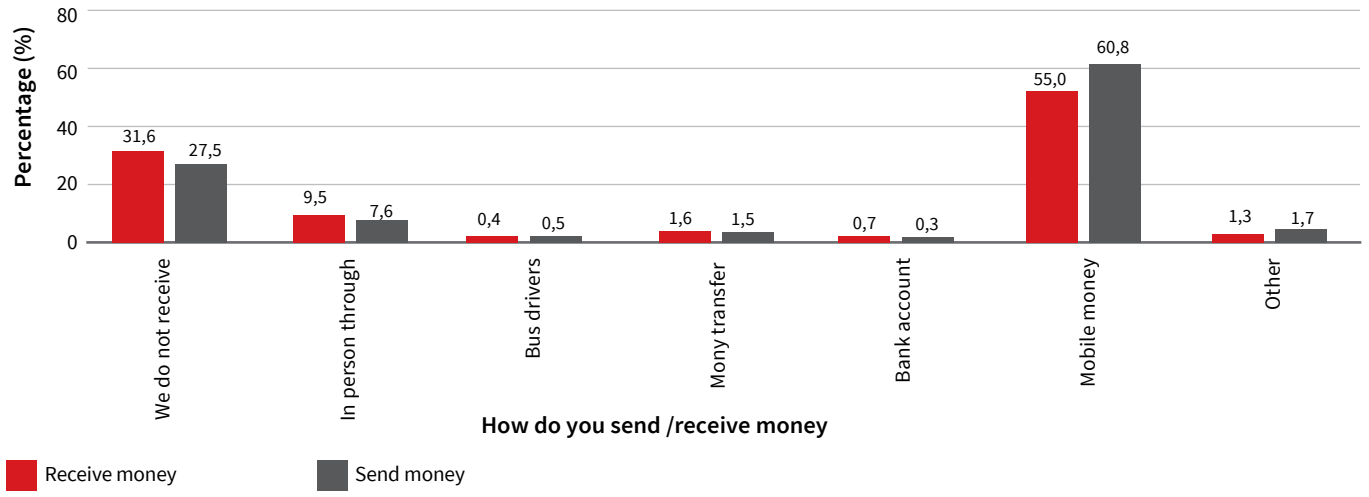

Figure 4.10: Mode of receiving and sending money

Source: RIA After Access ICT Survey, 2017

33 See: https://www.businessdailyafrica.com/markets/marketnews/Business-deals-push-mobile-money-accounts-to-45m/3815534-4898484-nbhccyz/index.html

Mobile money is clearly the channel of choice for sending or receiving money. Most of the respondents (64.8%) make exclusive use of mobile money services for this purpose, compared to only 5.6% who use mobile banking exclusively and an even smaller proportion who use both channels.

4.7 DIGITAL PRESENCE

Individual respondents were asked about the degree of online presence for their network of friends in relation to mobile telephony, email, social networking and instant messaging. In terms of mobile telephony, Kenya (55%) was third after South Africa (62%) and Tanzania (56%) in the number of respondents with their five closest friends having a mobile phone.

Other aspects of digital presence rank lower across the board. With regard to social networking (such as Facebook or Twitter), Kenya ranks third of the African countries surveyed behind South Africa and Nigeria. For instant messaging (such as WhatsApp, Viber, BBM), Kenya ranks fourth, behind South Africa, Nigeria and Ghana. Finally, with regard to email addresses, Kenya lies second after South Africa (see Figure 4.11).

4.8 CONCLUSION

While Kenya is doing relatively well in terms of mobile phone penetration, with mobile phone penetration rates closer to those in relatively wealthier countries such as Argentina, Paraguay and Guatemala, and higher than the rate in South Africa, Internet use in Kenya is significantly lower. Close to a third of the population (28%) uses the Internet. An implication of this is that the country has not yet optimised the network effects of investing in telecommunication infrastructure. The digital divide is still a reality in Kenya and more pronounced between rural and urban areas, with an urban–rural Internet gap of 69%. The gender gap is minimal at (31%), but significantly higher than the gap in South Africa (12%).

Kenya has benefited much from its mobile money innovations. Mobile money services in Kenya have led to the country reaching high levels of financial inclusion and deepening, with about 86% of the population transacting either through bank accounts or mobile money accounts. The country, however, still faces challenges as majority of people are still not connected due lack of devices and digital illiteracy.

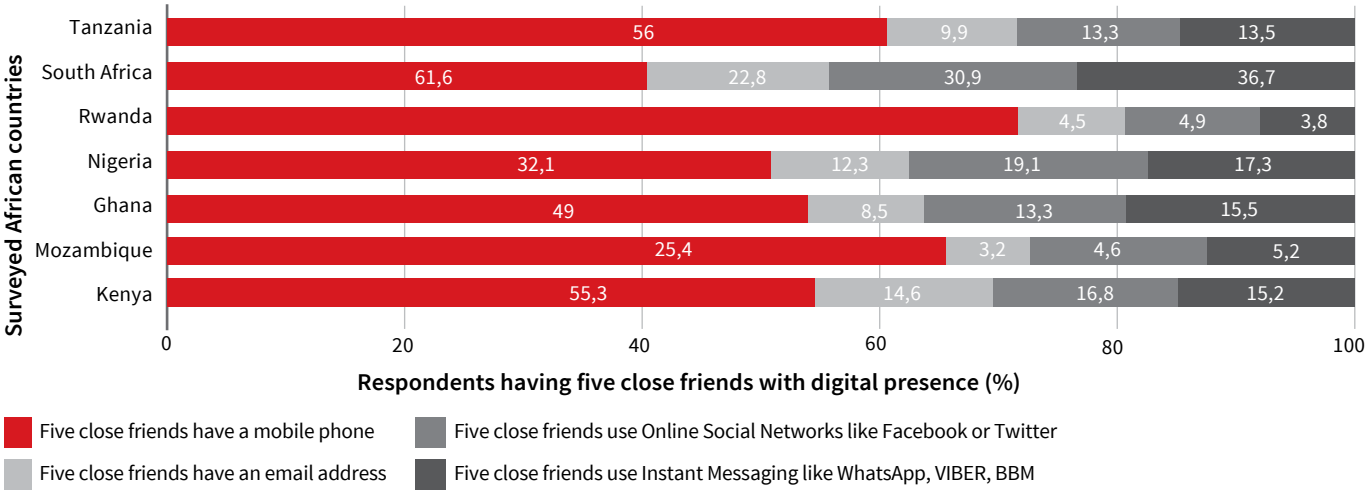

Figure 4.11: Respondents having five close friends with a digital presence

Source: RIA After Access ICT Survey, 2017

5 SMALL ENTERPRISES AND ICTS

5.1 BACKGROUND INFORMATION

The small and medium enterprise (SME) sector constitutes the largest proportion of businesses in Kenya. As we noted earlier, employment in the informal sector accounts for 83.4% of total employment in 2017. Accordingly, in 2017 RIA undertook an Informal Sector Survey, which interviewed 500 micro enterprises with turnover of less than KSh 500 000 and fewer than 10 employees[34]. The survey was conducted along with the After Access survey, by identifying businesses within the cluster as well. From these identified businesses, 10 were randomly selected and surveyed per cluster.

The demographics of the survey sample suggest that there is gender balance in ownership of Kenyan SMEs, with 43.6% male-owned, 44.2% female-owned and 12.1% jointly owned. Nigeria had relatively more female ownership, while Rwanda, South Africa and Tanzania had more male ownership (see Table 5.1).

5.2 ICT USAGE PATTERNS IN THE INFORMAL BUSINESS SECTOR

The ICT technology most widely used by the small and informal businesses surveyed in Kenya is the mobile phone, with 71.6% of respondents using their private mobile phones for business, and only 3.7% having a dedicated business phone. This trend is similar to the other countries surveyed, with only Rwanda having a relatively high proportion of business-dedicated mobile phones (53%), as opposed to use of their private mobile phones. In Kenya, the use of computers and the Internet was very limited, at 1.4% and 3.7% respectively (see Table 5.2 below).

Table 5.1: Informal sector SME ownership by gender

	MALE	FEMALE	BOTH
Kenya	43.6%	44.2%	12.1%
Mozambique	45.5%	49.8%	4.7%
Ghana	44.2%	48.8%	7.0%
Nigeria	36.8%	58.9%	4.3%
Rwanda	67.9%	21.4%	10.7%
South Africa	57.4%	29.5%	13.0%
Tanzania	61.5%	33.8%	4.7%

Source: RIA Informal Sector Survey data, 2017

Table 5.2: SMEs' use of ICTs (multiple responses)

	FIXED LINE	MOBILE PHONE			COMPUTER	INTERNET
		YES, PRIVATE MOBILE	YES, BUSINESS MOBILE	BOTH		
Kenya	0.3%	71.6%	3.7%	6.8%	1.4%	3.7%
Mozambique	0.1%	64.8%	1.4%	1.4%	1.3%	0.7%
Ghana	2.5%	68.1%	2.8%	8.4%	4.2%	7.9%
Nigeria	1.7%	33.8%	0.9%	23.4%	2.0%	7.2%
Rwanda	0.5%	22.4%	53.0%	0.8%	100%	1.4%
South Africa	14.6%	75.4%	7.8%	9.6%	19.9%	23.6%
Tanzania	0.1%	78.8%	2.7%	0.6%	3.5%	3.4%

Source: RIA Informal Sector Survey data, 2017

34 As per the official definition given in the Micro and Small Enterprises Act No. 55 of 2012.

Table 5.3: Highest level of education among business owners

	NONE	PRIMARY	SECONDARY	TERTIARY
Kenya	2.2%	26.6%	49.3%	21.9%
Mozambique	4.4%	46.0%	45.1%	4.5%
Ghana	18.3%	41.9%	31.0%	8.9%
Nigeria	36.7%	15.2%	34.0%	14.2%
Rwanda	63.0%	28.0%	5.7%	3.3%
South Africa	5.2%	70.8%	18.9%	5.1%
Tanzania	50.7%	32.8%	3.4%	13.1%

Source: RIA Informal Sector Survey data, 2017

Table 5.4: SMEs' mode of financial transactions

	SEND OR RECEIVE MOBILE MONEY	BANK ACCOUNT	
	YES	YES, DEDICATED BUSINESS ACCOUNT	YES, USE PRIVATE ACCOUNT FOR BUSINESS PURPOSES
Kenya	68.1%	19.0%	9.2%
Mozambique	15.7%	0.7%	6.4%
Ghana	40.9%	18.2%	15.0%
Nigeria	4.4%	4.9%	19.8%
Rwanda	43.3%	32.4%	0%
South Africa	8.2%	23.8%	28.8%
Tanzania	15.9%	1.3%	8.0%

Source: RIA Informal Sector Survey data, 2017

Table 5.5: Means of communicating with suppliers (multiple answers)

	MOBILE PHONE	LANDLINE	EMAIL	SMS	FAX	IN PERSON	SOCIAL MEDIA
Kenya	93.6%	0.1%	0.4%	39.8%	1.3%	86.3%	1.6%
Mozambique	21.4%	0.2%	0.0%	3.7%	0.0%	97.8%	0.5%
Ghana	72.0%	0.8%	0.9%	6.7%	0.2%	86.5%	6.3%
Nigeria	46.5%	0.0%	0.4%	9.2%	0.3%	95.1%	3.0%
Rwanda	77.6%	1.4%	1.7%	29.2%	1.1%	87.3%	1.5%
South Africa	48.8%	9.0%	10.5%	6.7%	2.9%	76.3%	5.2%
Tanzania	22.0%	0.0%	0.0%	1.9%	0.4%	98.2%	0.7%

Source: RIA Informal Sector Survey data, 2017

In the RIA study, the business owners across the surveyed countries had varied levels of education, as shown in Table 5.3. In Kenya, 49.3% of the respondents had education up to secondary level, while 26.6% had only primary level education and 2.2% had no formal education. However, 21.9% had tertiary education, which was the highest among all the countries surveyed (see Table 5.3). However, the survey, as with its predecessor, did not seek to establish possible relationships between the owner's education level and the success of the business.

For financial transactions, 68.1% of the Kenyan businesses surveyed use mobile money, the highest among the surveyed countries, followed by Rwanda (43.3%) and Ghana (40.9%). Only 19% of the businesses surveyed in Kenya had a dedicated bank account, while 9.2% used the owner's private account. South Africa recorded the highest use of bank accounts, with 23.8% of the respondents having a dedicated business account and 28.8% using a private account for business purposes (see Table 5.4).

Notably, in all the countries surveyed in 2012, and again in 2017, the usage of mobile telephony and SMS has increased, and the already minimal usage of fixed-line and fax services has reduced considerably. The use

of email and in-person (face-to-face) communication has also declined, while new alternatives, such as the use of social media, have surfaced. In-person communication remains the most widely used form of communication between the surveyed SMEs and their suppliers, followed by the use of mobile phones – apart from in Kenya, where mobile phones are more used than face-to-face communication at 93.6% and 86.3% respectively (see Table 5.5).

While social media use is increasing, it is not yet widely used as a form of communication with suppliers, with only 1.6% of the Kenya respondents indicating that they use social media to communicate with suppliers. However, use of social media is higher than the use of landlines and email in the surveyed countries. The use of SMS is notably high in Kenya at 39.8%.

5.3 INNOVATIONS AND ICT APPLICATIONS IN SOCIO–ECONOMIC DEVELOPMENT

Since the launch of M-Pesa in 2007, Kenya has emerged as an African ICT hub in innovative technologies in the mobile sector and subsequent mobile money innovations. The last few years have seen a rapid growth of local ICT development groups, such as iLab, iHub, Nailab, the University of Nairobi's C4DLab and infoDev's M-Labs, which are all promoting diverse innovations. In addition, multinational ICT companies have set up their regional hubs in Kenya with research and innovation being given a high priority. Among those who have set up regional offices are IBM's first African Research lab, Nokia's Africa Headquarters and Google's first Sub-Saharan Africa office (outside of South Africa).

In recognition of the many innovations within the country, an inaugural conference was held in March 2015 that aimed at sharing game-changing innovative ideas among high-level stakeholders within key sectors of the economy such as manufacturing, tourism, financial, health, agriculture, education, transport, energy and water. Consensus was created around the state of ICT innovation, the prevailing challenges and distilling actionable solutions, and steps on how to unlock the value in the ICT innovation space were defined. Consequently, the University of Nairobi has been holding an innovation week conference every year since then.

The Kenyan government has started several initiatives aimed at serving citizens better through the use of ICTs. In the last seven years, national examination results have been released online for access through the Kenya National Examination Council (KNEC) website or via mobile phone. Mobile operators now have dedicated short code numbers for this.

The eCitizen portals have also eased service delivery. All government services, including passport applications, business registration and tax returns, among others, can be done online, and payment options through mobile money are available.

5.4 CYBERSECURITY

Digital inclusion and connectivity have brought with them associated challenges. With the rapid expansion of the ICT sector and the adoption of digital technologies and products, Internet security has become important both for businesses and on a personal level. Cybersecurity threats and attacks have become commonplace. Kenya has set up a cybersecurity intelligence structure, the Kenya Computer Incident Response Team Coordination Centre (KE-CIRT/CC), to analyse cyber threats and attacks, and to inform other relevant bodies for mitigation and action.

Online mobile fraud is another emerging challenge that has hit Kenya hard. Identity theft is increasing, with scammers illegally obtaining access to personal data and users' bank accounts via fraudulent SIM swaps. Subscribers have lost millions in these fraudulent activities. In recognition of this challenge, the Communications Authority has taken steps to warn consumers about this scam and increase consumer awareness about being very cautious when disclosing any personal information to third parties.

5.5 CONCLUSION

As noted, the informal sector employs a significant percent of the Kenya's population. Also mentioned is that 82% of the businesses surveyed use mobile phones (dedicated or private number) for their business operations. Considering the large number of mobile money users in Kenya (85%) from the survey), it is important that the government considers the potential long-term outcomes of imposing additional taxes on mobile services, particularly mobile money transactions. The experience from Uganda should guide policymakers and regulators when formulating and setting out policies and regulation guidelines.

6

CHALLENGES AND RECOMMENDATIONS

6.1 CONCLUSION

The last five years have seen substantial growth in the ICT sector in Kenya. With devolved government, the counties have been competing on effective and efficient service delivery to the citizenry through innovations, a number of which use digital technologies.

Telecommunications has continued to register positive growth, with increased uptake and usage of mobile phone services. The increase in mobile network coverage has led to a decline in fixed-line networks as we mentioned earlier.

The positive growth witnessed in the mobile money services market has been driven largely by the widespread use of mobile money solutions, and by Kenya's commitment to advancing financial inclusion. Widespread adoption of mobile money services among traditionally underserved groups has been facilitated by an enabling regulatory environment for digital financial services. However, the dominance of Safaricom's M-Pesa in the space remains a concern, although recent moves towards enforcing interoperability as per the recommendations of the Analysys Mason report (Sunday, 2018) are likely to go some way towards levelling the playing field.

As high-bandwidth Internet infrastructure becomes more widely available, mobile video traffic is anticipated to increase substantially. The rollout of 4G infrastructure by the MNOs has already led to substantial growth in subscriptions to data and Internet services. With expansion of fibre-optic infrastructure across the country, more homes will be connected to better-quality, higher-speed broadband services, which will be extended to the rural areas.

This growth poses challenges and opportunities for the regulators and policymakers. More regulations and guidelines will be needed in the sector to address the emerging situations. With the state still having interests in the sector, it is important that the authority to issue regulations resides with the regulator and not the Ministry to avoid any conflict of interest.

As noted, the recommendations made by Analysys Mason on market dominance are to be revisited in 2019, probably leading to a number of regulatory interventions. This is likely to create ripples across the sector, and possibly lead to litigation.

Finally, although Kenya performs relatively well by African standards with regard to access to the Internet, with less than a third of its population connected to the Internet, it will be unable to harness the benefits of e-commerce and e-government until more of its citizens are online. With a decline in Internet figures since the 2012 survey, there is an indication that the market will also require the more-productive rather than simply consumptive use of the Internet. However, this is dependent on making devices and services more affordable.

On the basis of the preceding analysis, a number of recommendations can be made.

- Active consideration should be given to streamlining the regulatory process, as it has caused a substantial backlog in regulation for the sector. The process, with the involvement of the MoICT, the Attorney General and Parliament is cumbersome and fraught with structural delays. International best practice suggests that the regulator – the Communications Authority – should be empowered to regulate in its own right, in accordance with legislation and informed by national policy.
- With prices relatively low, but still not affordable to large numbers of people, alternative and complementary access strategies such as free public WiFi, lower cost dynamic and secondary spectrum deployment and scaling up of community network and microcell operators will need to be urgently considered.
- Considering the large number of mobile money users in Kenya (85% from the After Access survey), it is important that the government considers the potential negative outcome of imposing additional taxes on mobile services, and particularly mobile money transactions. The experience from Uganda, where transaction volumes and revenue to the fiscus have

both fallen, should serve as a lesson to policymakers and regulators when formulating and setting out policies and regulation guidelines.

- The issue of dominance in both the mobile voice and mobile money markets needs to remain an active area of regulatory concern going forward. While there is no concrete evidence of anti-competitive conduct on the part of Safaricom, such high levels of market concentration are unhealthy, and ongoing efforts need to be undertaken (a number of which were recommended by Analysys Mason) to promote a more diversified and competitive marketplace.
- As noted, Kenya is well-positioned in the digital economy space, with e-commerce starting to take off. There are already several innovation hubs and Fintech platforms offering services, not just in the region, but globally. The government of Kenya should put in place e-commerce strategies and policies to guide the growth of this digital economy.
- Cybersecurity remains a real challenge in Kenya, as it does globally. Indeed, the World Economic Forum ranks cyberattacks second to climate change issues in its recent global risk analysis report (WEF, 2019)[35]. Therefore, there is a need to revisit the National Cybersecurity Strategy and Regulations, to address these emerging challenges comprehensively.
- Active consideration should be given to revising the Computer Misuse and Cybercrimes Act, and to re-examining the proposed Data Protection Bill, to ensure closer alignment with international best practice, and a better balance between freedom of expression and consumer protection.

35 'Failure of climate-change mitigation and adaptation', 'Extreme weather events' and 'Natural disasters' come in ahead of the impact and likelihood of 'Cyberattacks' and 'Data fraud or theft'.

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