RESEARCH REPORT

KONRAD
ADENAUER
STIFTUNG

Research report for the
Konrad-Adenauer-Stiftung Nairobi

THE KENYAN DIGITAL ECONOMY

WHICH FRAMEWORK DOES IT NEED ?

KONRAD ADENAUER STIFTUNG

FOREWORD

Konrad-Adenauer-Stiftung (KAS) is a political foundation, closely associated with the party "Christian Democratic Union of Germany" (CDU). As co-founder of the CDU and the first Chancellor of the Federal Republic of Germany, Konrad Adenauer (1876-1967) united Christian-social, conservative, and liberal traditions. His name stands synonymous with the democratic reconstruction of Germany, the firm alignment of foreign policy with the trans-Atlantic community of values, the vision of a unified Europe, and an orientation towards social market economy. Freedom, justice, and solidarity are the basic principles underlying the work of the Foundation.

With a focus on political education in Germany and with projects in over 120 countries, KAS makes a contribution to the promotion of democracy, rule of law, and social market economy all over the world and encourages a continuous dialogue at national and international levels.

Besides consolidation of democracy and empowering civil society, KAS focuses on the promotion of social market economy. Ludwig Erhard as former chancellor and former Minister of Economic Affairs in Germany and party member of the CDU advocated for a liberal social economic order. This led to steady economic growth in West Germany placing it in the front row of industrial and exporting countries.

We thus believe that private sector engagement is crucial for economic, social, and political development in all economic sectors. It thus seems to be high time to consider this aspect in the digital economy. Which actors are crucial for its development, which frameworks already exist, which others need to be created? How can Kenya learn from developments in other countries? And, most importantly for KAS as a political foundation: which political actions would be desirable in order to achieve a sound political framework for IT-markets in Kenya and the east-African sub region?

It is for this reason that KAS, together with Startup Lions and ConsumerCentriX elaborated this study in order to contribute to a better understanding of the process and key-actors in the digital market in Kenya and thus to ease targeted action of our Kenyan partners towards a successful development of enabling frameworks, considering the concept of social market economy.

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1 LIST OF ABBREVIATIONS

AI	Artificial Intelligence
ANN	Artificial Neural Networks
APC	Association of Progressive Communications
ASO	Analogue Switch-off
BBVA	Banco Bilbao Vizcaya Argentaria
BEA	Bureau of Economic Analysis
BPO	Business Process Outsourcing
CAK	Communication Authority of Kenya
CCK	Communications Commission of Kenya
CSO	Civil Society Organisations
DARE	Djibouti Africa Regional Express
EACO	East African Communications Organisation
EAIA	East African Internet Association
EBRD	European Bank for Reconstruction and Development
EDI	Electronic Data Interchange
GDPR	General Data Protection Regulation
GISC	Global Impact Sourcing Coalition
GITS	Government Information Technology Services
GSMA	Global System for Mobile Communications Association
ICANN	Internet Corporation for Assigned Names and Numbers
ICT	Information and Communication Technologies
ICTA	Information, Communication and Technology Authority
IGF	Internet Governance Forum
IoT	Internet of Things
IP	Intellectual Property
ISIC	International Standard Industrial Classification
ISP	Internet-service Providers
ITA	Information Technology Agreement
ITES	Information Technology-Enabled Service
ITIF	Information Technology and Innovation Foundation
ITR	International Telecommunications Regulations
ITU	International Telecommunications Union
KAS	Konrad Adenauer Stiftung

KCA	Kenya Communications Act
KICA	Kenya Information & Communications Amendment Act
KICD	Kenya Institute of Curriculum Development
KP&TC	Kenya Posts and Telecommunications Corporation
KYEB	Kenya Yearbook Editorial Board
MDEC	Malaysia Digital Economy Corporation
MOOC	Massive Open Online Courses
MTP	Medium-Term Plans
MVNO	Mobile Virtual Network Operators
NARC	National Rainbow Coalition
NAS	National Addressing System
SL	Startup Lions
ULF	Unified Licensing Framework
VR	Virtual reality
WTO	World Trade Organisation

2 EXECUTIVE SUMMARY

This study analyses the relevance and status-quo of the digital economy, first in general terms and then with respect to Kenya. In the general part, it becomes apparent that there are several conceptual **difficulties with the definition and measurement** of the digital economy, the most challenging one being the fact that many products and markets contain both digital and non-digital components. After contrasting various definitions and concepts, an own typology of the digital economy is proposed that builds on the differentiation between purely digital goods and services on the one side (such as software), and **hybrid goods and services** (such as e-commerce of physical goods) on the other. After reviewing the emergence of the digital economy globally, the key chances and risks that digitalisation brings with it are discussed, with a focus on developing countries. The key insight of this analysis is that a growing digital economy is neither good nor bad per se; in most affected domains such as economic growth, employment, sustainability, inclusion and democracy it **can bring substantial benefits or have very harmful effects,** depending on the concrete realisation and context. Digitalisation can spur innovation and increase efficiency, thus boosting economic growth and employment; however, it can also cause a substitution of workers for machines and to a re-shoring of production of previously outsourced industries back to developed countries, leading to shrinking economies and technological unemployment in developing countries. Digital technologies can improve sustainability through increased efficiency, but can also lead to a non-proportional increase in power use and thus a reversal of such efficiency gains. Information and communication technologies (ICTs) can improve democratic processes and equal access through developments like eGovernment, telemedicine and other innovative social impact projects, but can also be used for increased state oppression and create a new line of inequality, the digital divide. All this highlights **the important role of all stakeholders but especially policy makers** to direct and use digital technologies in a manner that allows to reap the gains but avoids the risks as much as possible.

The chapter on Kenya's digital economy presents a brief history of the events and technological developments that lead to and shaped the digital revolution in Kenya since the 1990s until today. What follows is a collection of different measures of the digital economy in Kenya. Despite greatly varying estimates depending on data source and methodology, the general picture that emerges is that Kenya's **ICT sector is smaller than in most developed but larger than in many developing countries** and has accounted for a substantial share of Kenya's economic growth in the last 15 years, **outperforming all other sectors** in terms of GDP growth. The subsectoral analysis reveals that the internet access, mobile money, IT hardware and audio and video content (incl. broadcasting) markets are the largest subsectors. However, the bad data availability and comparability of sources on the subsector level makes a detailed and reliable quantitative analysis challenging.

After the size and growth review, Kenya's existing digital economy framework is analysed with regard to its legal, institutional, and regulatory components as well as major strategic plans and key projects. An attempt to evaluate the resulting framework quality is made by drawing on various rankings and indicators, revealing that Kenya is generally on a good track and partly punches above its weight, i.e. that its **digital framework quality is more advanced than its level of economic development would predict**. An analysis of the international dimension of digital frameworks shows that Kenya is both a taker and a shaper of regional and international ICT regulations and agreements, though more often the former than the latter.

Finally, the examination of the (exploratory) **survey results** among international experts and Kenyan entrepreneurs yield an interesting and enriching insider perspective on the (perceived) quality of the existing framework, Kenya's performance in international comparison and potential areas of improvement. **The survey results complement the study's section on gaps, challenges and policy recommendations** in the areas of ICT skills, ICT access and use, competition and innovation, taxes and tariffs, promotion of

an inclusive digital economy, and the general business framework. Three key recommendations can be highlighted as most essential: First and foremost, Kenya needs to **improve the ICT skills** of its workforce to ensure that the country will not only be a consumer of digital goods and services, but also a producer, ideally beyond the national market. A strengthening of secondary education and a switch from an obsession with expensive, but impractical tertiary education that is disconnected business needs to more practice-oriented training and digital vocational skills have emerged as promising policy options. Second, Kenya's digital economy framework (especially the regulatory authorities) must deal with and at the same time seek inspiration from one of the key success factors in digital business models: **agility**. It must be questioned whether the plethora of regulatory agencies, strategic plans and long-term technological mega-investments such as Konza Technology City are agile enough to adapt to the fast-paced technological change of the ICT sector. Third, Kenya's **general business environment needs to be improved,** particularly with regards to the process of setting up a business and to the fight against corruption.

The study closes with an overview and mapping of the key national and international stakeholders in the Kenyan digital economy.

3 CONTEXT AND METHODOLOGY

3.1 INTRO & OBJECTIVES

This report was ordered by the Konrad-Adenauer-Stiftung in Nairobi and conducted in a consortium of the IT school and impact sourcing provider Startup Lions (Lodwar/Kenya) and the consultancy firm ConsumerCentriX (Geneva/Switzerland). The Konrad-Adenauer-Stiftung (KAS) is a German Political Foundation working in Kenya since 1974. With a focus on political education in Germany and with projects in over 120 countries, KAS makes a contribution to the promotion of democracy, rule of law, and social market economy all over the world and encourages a continuous dialogue at national and international levels. KAS is planning to implement activities on digital economy and products and their regulation to help change the mindset of civil society, as digital economy and products are an increasingly important issue for economic growth. digital economy is crucial for economic growth and development. This process demands that citizens of Kenya, civil society as well as other stakeholders are involved in the policy implementation process and the development of frameworks around existing policies on digital products, and gain knowledge and background information on the status and challenges of the digital economy. KAS has decided to conduct this study to gain in-depth information, and analysis of digital products in Kenya - existing market organization/ legislation and gaps in the Kenyan context and its current status and situation in the country - its challenges and its progress.

The main objective of the baseline study is to develop an in depth analysis on the status of digital economy, products and market organization and regulations in Kenya, its policies, laws and gaps and the challenges of implementing those as well as its role in politics and policy making. The study will be used by KAS to explore ways for further actions and to motivate stakeholders to commit to existing laws. The study is meant to:

- Inform on the range of digital products in Kenya
- Inform on the digital economy situation in Kenya and the legislation
- Inform on digital products and markets in Kenya and the gaps and challenges
- Inform on legislative policies regarding digital products
- Inform on policies and existing frameworks of digital market economy
- Evaluation of the need for new frameworks for digital economy and products
- Through the study stakeholders will be enabled to understand the impact of digital economy policies to their lives, trace down their MPs and enact political pressure that will lead to a new legal framework for digital economy
- Inform on security constraints and data protection
- Inform on the effect on Kenya through international legislation
- Kenya's effect on a (sub) regional IT-framework

3.2 AUTHOR CONSORTIUM

Now in its fourth year as innovator in qualifying young Kenyan talents for and organising the delivery of digital economy products in IT and Media from Kenya's most deprived county, Turkana, Startup Lions (SL) has first-hand experience of the subject matter and is well embedded in and linked to the country's digital ecosystem: providers, policy-makers, international and domestic clients and investors. Our Kenyan and international on-site staff at SL's local subsidiaries ensure an approach that is cognizant of Kenyan realities and avoids a purely Nairobi-centric perspective.

ConsumerCentriX (CCX) is a specialised research and strategy consultancy that has established itself as a thought-leader on matters of market insight and consumer-centricity especially in emerging markets,

on the one hand, and in creating a more inclusive and digital economy, on the other hand. CCX covers the full spectrum from field research (including in poor and rural households) via baseline studies, and policy environment analysis, to corporate strategies, product innovation and implementation assistance. In this way, the team has brought affordable financial services to more than 7 million unbanked across Sub-Saharan Africa, has helped financial institutions embrace female entrepreneurs as clients in Morocco and Croatia, shaped policy dialogue on gender-intelligent finance in Mongolia and is currently designing innovative youth employment schemes in Egypt.

The leadership at SL and CCX have been personally involved in and enthusiastic about the opportunities of the digital economy and start-up entrepreneurship already for many years. We are committed to the opportunities the digital market offers for a more inclusive and diversified growth model in emerging markets. Jointly, SL and CCX combine analytical rigour with practical experience and enthusiasm for creating impactful and actionable recommendations at the crossroads of public policy and regulation, development and private sector initiative, corporate strategy as well as the demand and supply-side of digital products and services. Both consortium members are equally familiar with East Africa's dynamic digital ecosystem and Kenya's economy from projects in recent years and are immersed in relevant debates, best practice and trends in Germany, Europe, and North America in the political and business spheres.

CCX's team has produced baseline and best practice studies for clients like European Bank for Reconstruction and Development (EBRD), Women's World Banking, the World Bank / IFC, and has recently completed such assignments in Mongolia, Tunisia and Morocco.

3.2.1 CONCEPT AND TIMELINE

The study is based on a substantial part of desk research as well as a quantitative survey, which is explained in more detail below. The desk research inspired the survey, and the survey results were then woven into the report that was largely based on desk research. The research and write-up of the study was conducted between June and September 2018.

3.2.2 SCOPE

To keep the scope of the study somewhat under control, this study has a clear economic focus. It does not go into technical details nor too deep into social or civil society aspects of digitalisation (e.g. human rights, participation, democracy). However, as the KAS adheres to a social-market economy understanding and operates in a developing country, the study goes beyond a "GDP only" view on things, but also touches (though not focuses) upon issues of distribution, inclusive growth and development. The study will not focus in detail on how digitalisation can be used in non-economic domains such as government, non-profit sector or politics. However, wherever digitalisation creates opportunities or negative externalities in theses domains to a substantial degree, the study will at least point towards these chances and risks. Stakeholders (incl. policy makers) need to be aware also of the non-economic effects of technologies in order to be able to derive meaningful action plans. The scope of this study is thus the economic aspects of the digital economy, where digital refers to all parts of the economy that are substantially powered or influenced by computers and the internet. Because most information and communication technologies (ICTs) are of digital nature today and analogue ICTs are playing a constantly decreasing role in the economy, this study uses the terms ICTs and digital technologies interchangeably. The process of the economy becoming more and more digital (i.e. the increasing role of computers and the internet) is referred to as digitalisation, not making any difference to

digitisation, like some studies do.

3.2.3 SURVEY

The objectives of the primary research was to collect first-hand information and insights from Kenyan stakeholders, entrepreneurs and experts, as well as from international experts who are familiar with the digital economy field and the developing markets.

Given by the tight timeline of the project and the budgetary considerations, quantitative surveying methodology was chosen for the research. An online survey was created, handled and distributed relatively quick and easy, while inquiring about the core fields that the research wanted to understand. As an alternative data collection method, two team members attended the ICT Conference on the framework for digital markets in Kenya organized by KAS in September 2018 and distributed paper-based questionnaires to the participants.

More than 30 international expert gave their opinion on the background for digital economy development in Kenya's and developing countries' context as well. During the primary research phase, 36 international experts were interviewed using an online survey about the ideal conditions for the digital economy to grow in Kenya. The questionnaire was distributed using snowball sampling methodology, first among the consultants' professional networks and a list of potential respondents identified by the team using desk research and then the interviewees were asked to refer the survey to people in their own network who could be a good fit to fill it out. The responses came in from Europe, North America, Africa, Asia and even from Australia, mainly from people occupied in the private sector (71%) and being owners/managers (66%). Awareness of the situation in Kenya was not a requirement – 71% reported to have some, while 86% reported to have some understanding on emerging markets in general. An additional 12 local experts were also surveyed, 9 of them being a Kenyan citizen too, but all of them with extensive experience and knowledge on the Kenyan digital business markets .Half of the local experts worked in the private sector, mainly as topical experts, managers and activists with the others from the public sector/academia / NGOs.

The surveys consisted of 18-29 questions (being different length for different type of respondents) taking approximately 15-20 minutes to answer all, covering a basic demographic introduction and zooming on the opinions on how they see the status of the digital economy and the policy / regulations affecting it. There were optional open comment sections for most questions to enable the respondents to give a more detailed reasoning for their choices.

3.2.4 LIMITATIONS

Desk research: The broad and general scope of the study did not allow to dig particularly deep into specific aspects of the digital economy. It thus remains a relatively general baseline study that gives an up-to-date overview of Kenya's digital economy, its strengths and weaknesses and recommended policy options, but can't serve as a detailed guidebook for solving each individual challenge.

Survey: Because of the snowball sampling methodology and the contribution of the sample and its low sample size, the research was more exploratory and not representative. However, it can still give an idea about key issues and attitudes and support further research in the topic.

4

THE DIGITAL ECONOMY: DEFINITION TAXONOMY AND RELEVANCE

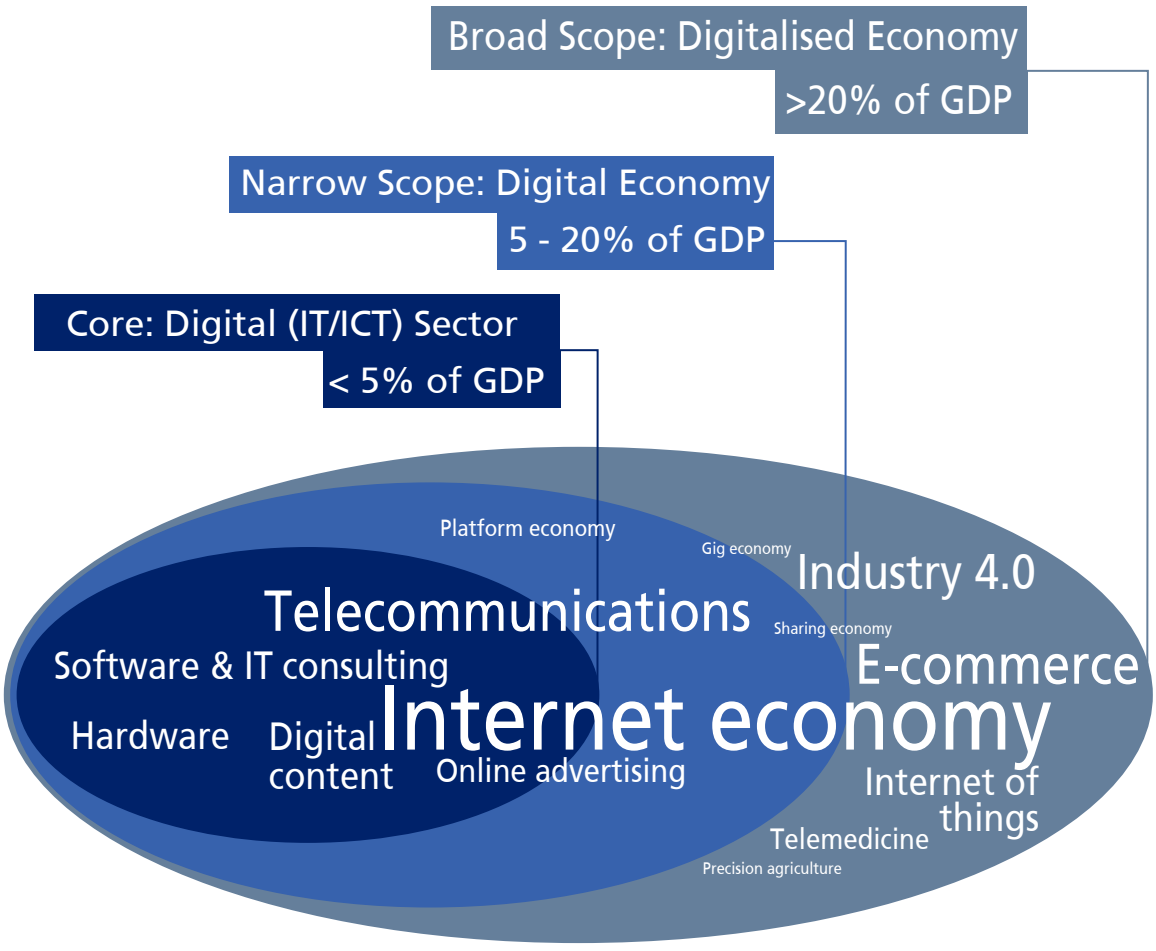
4.1 WHAT IS THE DIGITAL ECONOMY?

4.1.1 DIGITAL ECONOMY (UN-)DEFINED

According to an IMF report "there are no agreed definitions of digital sector, products or transactions, let alone the digital economy." Depending on the way the digital economy is defined its share of a modern economy can be tiny (when defined narrowly) or very large (when defined broadly). The terms digital sector, digital economy and digitalised economy reflect these differences in scope, where the digital sector is the most narrow definition and the digitalised economy the broadest. Because the broader the definition the more blurry and unspecified the concept of the digital economy gets, most studies and experts prefer a rather narrow and more clear-cut definition that focuses on core elements of the digital economy such as ICT infrastructure and purely digital goods and services. If using such narrow definitions the contribution of the digital economy to income (GDP) or employment is between 5 and 10% in most countries.

FIGURE 1.

Different Scopes: Digital Sector, Digital Economy and Digitalised Economy



[1] *Source: OECD (2017): 'Summary of responses of the Advisory Group: Survey on Digital Economy typology*

The size of the items corresponds to their estimated share of global GDP (own research)

The OECD formulated the following definition of the ICT sector:

"The production (goods and services) of a candidate industry must primarily be intended to fulfill or enable the function of information processing and communication by electronic means, including transmission and display" [2]. Translating this understanding into the international standard industrial classification (ISIC, revision 4), the ICT sector would be composed of:

- ICT **manufacturing** industries (ISIC Codes: 261,262,263,264,268)
- ICT **repair** industries (951)
- ICT **trade** industries (4651,4652)
- ICT **services** industries (582,61,62,631)

However, **digital content is not or not fully included** in these definitions (music, film, graphics, ebooks, online radio, online news). For the OECD, these goods and services fall under the wider concept of the 'Information Economy', which additionally includes:

- Publishing of books, periodicals and other publishing activities (581)
- Motion picture, video and television programme activities (591)
- Sound recording and music publishing activi (592)
- Programming and broadcasting activities (60)
- Other information service activities (639).

Evaluation of the need for new frameworks for digital economy and productsThe US Bureau of Economic Analysis (BEA) has a more inclusive definition that consists of digital enabling infrastructure (hardware, software, IT structures), e-commerce and digital media (books, newspapers, music, and videos)[3]. However, the BEA points towards a key challenge in defining (and especially measuring) the digital economy: Goods and service categories derived from common international industry classifications (such as ISIC) often include digital goods and services as well as non digital goods and services (e.g. books vs. ebooks). Additionally, some products and services are hybrid and contain a digital part and a non-digital part (with e-commerce being a prime example, where many non-digital products are traded digitally).

In addition to the somewhat unclear scope of the digital economy, there are substantial problems with **measuring** it. One issue arises because of the hybrid character of some goods, where it is difficult to **discern the digital and non-digital part of goods and services**, especially on a grand scale like national accounting. The Bureau of Economic Analysis has made some first steps into this difficult terrain by examining the extent to which ICT may be used to facilitate trade in services for their published trade in ICT statistics. Here, BEA measures potentially ICT-enabled services rather than real ICT-enabled services because for many types of services the actual mode of delivery is unknown. Another issue in measuring the digital economy is the problem of **how to value the ubiquity of free goods and services** and the 'sharing economy' (such as email accounts, online storage, social media, online search, open-source, etc.). It is a common misperception that only what is paid for is relevant in estimating the size of the economy. If GDP calculation is taken seriously, the availability of free goods and services should lead to a respective decrease in the inflation rate that is used to determine real GDP. Why that? Because the inflation rate measures the price change of a representative basket of goods that delivers the same utility. If more and more services are available for free, the number of goods someone needs for reaching the same utility decreases over time, leading to a reduced price of the basket of goods. This deflationary tendency (negative inflation rate) then increases real GDP. In short: If the availability of free goods and services rises and this is accounted for by the inflation rate, real GDP rises. That said, many statistical agencies around the world don't follow this approach, mainly due to problems in objectively estimating the utility of free digital goods and services. Therefore, free digital goods and services are indeed rarely included in market size estimates or national accounts, at least not to the full extent. Because many free digital goods and services are offered in return for showing **advertisements** or in return for **collecting user data** to be sold to other companies for advertising purposes, the value of these goods is in part captured in national accounts through advertising revenues. However, these advertising revenues rarely or never end up in measurements of the digital economy, because it is hard to identify which portion of advertising revenues

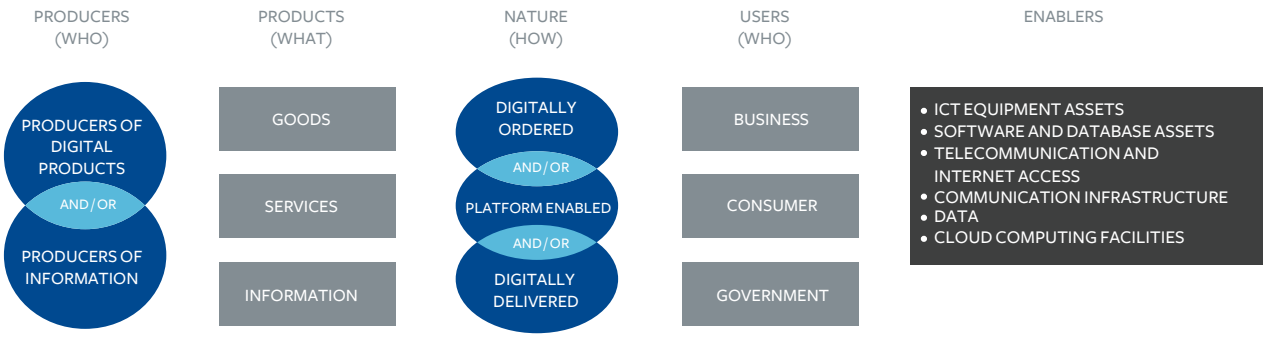
is associated to digital goods. As BEA admits, they currently do "not have the data needed". Even where the sharing economy is commercialised and non-free for customers, it is rarely included in national accounts. According to the OECD, sharing economy suppliers of short-term property rental services (such as AirBnb) or labor services (such as Uber) may be informal, i.e., unregistered and untaxed, and therefore don't feature in GDP accounting of many OECD member states. Another measurement problem that is particularly relevant in view of the digital economy arises from the use of different size indicators. Because many digital business models are still relatively young and at an early (commercial) stage, they may not yet be profitable (thus having little, **zero or negative GDP contributions**) despite already being very large in terms of turnover or market capitalisation. Even though this study will primarily use GDP-related size measures for comparability and availability reasons, it should be noted that they tend to underestimate the economic relevance.

The diversity of products and industries that are subsumed under the Digital Economy is also reflected in the **great variety of revenue models** [4]:

1. Advertising-based revenues
2. Digital content purchases or rentals
3. Selling of goods (including virtual items)
4. Subscription-based revenues
5. Selling of services
6. Licensing content and technology
7. Selling of user data and customised market research

4.1.2 TYPOLOGY AND STRUCTURE

FIGURE 2.
Dimension of Digital Economy



Source: OECD (2017): 'Summary of responses of the Advisory Group: Survey on Digital Economy typology

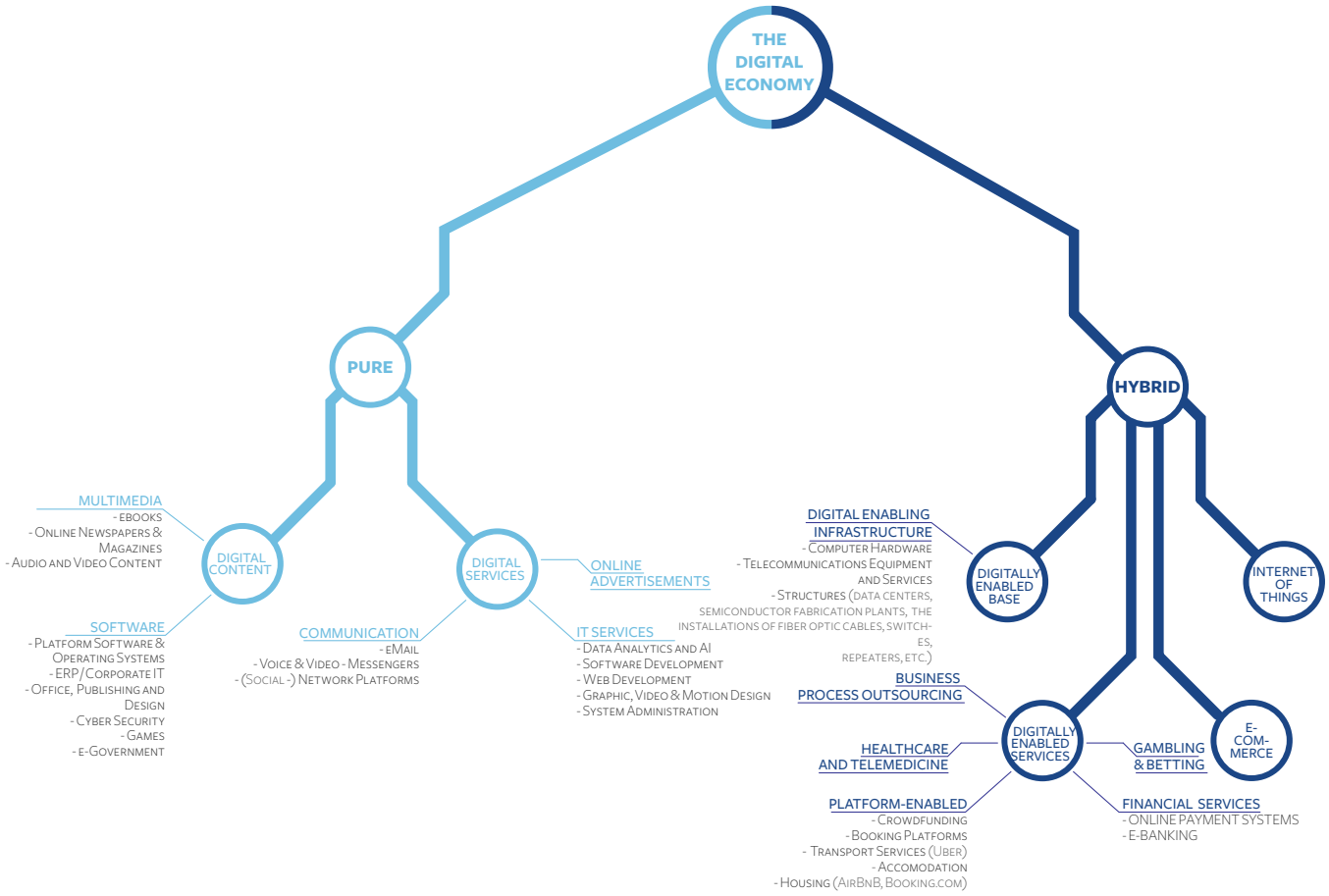
When attempting to structure, group and classify the digital economy, it soon becomes clear that there are various dimensions and angles from which a typology of the digital economy can be undertaken. In a recent dialogue between national accounts statisticians aiming to develop a framework of digital economy transactions, the OECD approached the digital economy from **five dimensions** (see Figure): Producers, Product, Nature, Users and Enablers. Depending on which dimension is chosen as the primary approach, different breakouts would occur on the second level of a potential categorisation. Common international classifications such as the ISIC generally apply the view of the second column and differentiate by type of product and service. However, for a inclusive typology of the digital economy it is often not enough to ask the 'What?' question (or: 'Is this product / service digital?'), but column 3 and 5 are of major importance too: 'How is this product / service ordered, processed and delivered?' and 'Which enabling infrastructure is part and

parcel of the digital economy while not necessarily being digital in character itself?' Otherwise, important aspects of the digital economy might be left out.

A synthesis of the most common approaches (among them OECD, IMF, BEA) yields the following typology of the digital economy:

FIGURE 3.

Structure of Digital Economy



Source: OECD (2017): 'Summary of responses of the Advisory Group: Survey on Digital Economy typology

It needs to be noted that the above classification is somewhat simplifying and does not reflect the blurriness between many goods and service categories. Neither the distinction between purely digital and hybrid economy nor the one between goods and services is as clear-cut as presented in the typology. As the OECD puts it: "Increasingly the digital economy has become intertwined with the traditional economy making differences between them less clear". [5] Because of the many measurement issues and the differences in definitions size estimates of the digital economy should always be handled with care, especially when comparing different sources.

TABLE 1.

Digital Dictionary - Techslang Explained

3D PRINTING	Also referred to as additive manufacturing. Describes a production process that uses an additive approach to the creation of a good by adding small material parts together until a final 3D object arises. It differs from the common subtractive techniques such as drilling and cutting. Additive manufacturing usually, allows for more custom-tailored shapes at fast production speeds. That makes it ideal for prototyping. Due to its greater flexibility it can also be cheaper at low production volumes and thus be used more decentrally. This makes 3D printing particularly interesting for the context of developing countries.
ARTIFICIAL INTELLIGENCE (AI)	Machines performing human-like functions that require a certain degree of autonomy and adaptability (or learning). Draws heavily on machine learning and big data. Some applications are autonomous driving, human-machine-interfaces (e.g. chatbots) and pattern recognition (such as in radiology)

AUGMENTED REALITY (AR)	Different than virtual reality (VR) in that a user does not see an entirely different reality from his own (e.g. in VR movies or games), but an augmented version of his own reality / sourroundings. Popular applications are mobile phones or glasses that show useful additional information to the environment around you, e.g. names of buildings, navigation directions, or alike.
BIG DATA	Analysis of large amounts of user or transaction data with the purpose of establishing patterns and correlations that can help to improve and custom-tailor services or to make predictions about actor behaviour. The range of applications is very broad, but one key application is the use of big data for machine-learning and artifical intelligence (AI)
BITCOIN	Most widely used Cryptocurrency based on Blockchain technology. Created in 2009. Limited to 21 million bitcoins. In Kenya, Bitcoin inspired and enabled services such as BitPesa and Abra which use Bitcoin as a means to send international remittances.
BLOCKCHAIN	Distributed ledger technology that allows to store any type of (transaction) data in a secure, tamper-proof register without the need of a trusted third party. New information is first dectrally validated and then appended as a block in chronological order to the previous chain of blocks. Most popular application: Bitcoin
CLOUD	Synonym for a pool of shared computation power or storage, often over the internet.
CROWD	Group of internet users. Usually used in context where many small-scale activities contribute to a larger project, such as in crowdfunding, crowdsourcing, crowdworking.
CRYPTOCURRENCY	Used to group digital currencies such as Bitcoin that are based on blockchain or other crypto-technologies and do not rely on a central bank.
DARK WEB	Part of the internet not indexed by search engines (Deep Web) and only accessible by specific software that guarantees anonymity. Often used for illegal trade such as in drugs, but also for escaping oppresive government surveillance.
DIGITAL TRANSFORMATION	The development of digitising more and more data and processes in an organisation or economy as a whole.
DIGITAL DIVIDE	Referring to inequality in access, capabilities and use of digital technologies, often in international comparison or between genders, but also used for unequal treatment of different types of internet users, see net neutrality.
ECOMMERCE	Trading of goods and services through online shop systems and platforms. Both trade in traditional, non-digital goods as well as digital goods falls under this category.
EGOVERNMENT	The digitally-enabled delivery of public services. Examples: schooling (eLearning), information dissemination (open data), tax filing, all sorts of license and permit applications, business registration, utility payments, disaster management, citizen identification.
ELEARNING	Digitally-enabled education that draws on the cost-advantages of substituting real-teachers with software that can provide custom-tailored learning assistance. The zero-marginal-cost characteristic of ICT has brought up inclusive educational programs such as MOOCs (massive open online courses) that can help to provide high-quality education to more people than a privileged elite in developing countries.
FINTECH	Industry providing digital financial services (such as M-Pesa or Paypal) or digitally-assisted financial services (such as big data-based credit ratings).
GIG ECONOMY	The delivery of digitally-enabled services through online platforms. In case of digital services, also referred to as Digital Labour, Platform Work, Online Outsourcing, Crowdwork, Microwork. Usually low-value and small in scope, hence the terms gig and micro. Often sourced from developing or emerging countries such as India, Pakistan or Malaysia. The Physical Gig Economy describes physical services that are digitally enabled (such as Uber, TaskRabbit).
IMPACT SOURCING	An approach to avoid the social risks of the digital gig economy (no worker protection and work standards) and turn digital labour into a chance for development. Generating social impact by paying fair wages and connecting underprivileged digital workers in global value chains.
INDUSTRY 4.0	Automation, robotisation and digitalisation of industrial processes. Related to the internet of things. Can lead to a reshoring of production from developing to developed countries due to little involvement of costly workforce.
INTERNET OF THINGS (IOT)	The idea of an extension of the internet (currently connecting primarily computers, handheld devices and servers) to all kind of products and machines, ranging from cars over fridges to production facilities. Heavily drawing on improved sensors, communication infrastructure and automation capacity (AI).
LEAPFROGGING	Refers to the chance of less developed countries to skip certain development milestones (particularly technologies) and jump straight to the most up-to-date and cost-efficient technologies. A prominent example is to skip fixed-landline connections and jump straight to cellular networks. Empirical evidence is scarce, however.
MACHINE LEARNING	The ability and process of a computer to learn from experience (i.e. data sets) to become better at its designed purpose (e.g. image recognition), thereby qualifying as an artificial intelligence
MOBILE MONEY	Mobile-phone based financial services, e.g. P2P transfers, bill payments or remittances. Often using mobile phone credit or a seperate mobile currency (such as M-PESA) stored in mobile wallets. Conventional bank accounts that are accessible through mobile apps are typically not considered as mobile money, neither are intermediaries like PayPal. [6]

NET NEUTRALITY	The vision that access and use of the internet shall remain free from any type of discrimination. Recent trends towards vertical integration of internet-service providers (ISPs) into the multimedia domain have lead some ISPs to start discriminating between their own multimedia services and others in terms of bandwidth.
(ARTIFICIAL) NEURAL NETWORKS	Artificial neural networks (ANNs) are attempts to emulate the neuronal structure of animal brains in machine learning that allow for learning of tasks purely by consideration of examples and not by specific task rules that need to be programmed.
OPEN DATA	Online provision of (public) data sets for free and in a easy to use manner, aiming to achieve accountability as well as to encourage research.
PLATFORM ECONOMY	Part of economy that is enabled or facilitate through online platforms that mediate (or match-make) between users, buyers, sellers or other economic actors.
PRECISION AGRICULTURE	Type of modern agriculture that is supported by digital technologies such as drone-based imagery, GPS-equipped vehicles and machines, big data analysis of fields, etc.
SHARING ECONOMY	Referring to platform-enabled sharing of economic assets, such as cars, bikes, tools, flats. Also referred to as P2P-Economy or Collaborative Economy.
SMART CITY	Application of IoT on cities, which are characterised by a high degree of interconnectedness, automation and data-driven management. Applications: smart meters, ride sharing, smart tolling, e-government
TELEMEDICINE	Extension of medical outreach to rural and underserved areas through ICT-enabled remote diagnosis and consultation. Also, improvements of traditional health services through digital technologies can be subsumed under telemedicine.
VIRTUAL REALITY (VR)	The emulation of a different reality than the one of the user, e.g. in movies or games, often mediated through special glasses and equipment that can enhance the virtual experience. Different from augmented reality.
WEARABLES	Technology that you can wear, often connected to your phone or other digital devices: e.g. smart watches.
QUANTUM COMPUTING	Computation technology that builds on quantum-mechanical-phenomena rather than classical physics, aiming to deal with computational problems which ordinary binary computers cannot solve.. Still more of a scientific development and not yet available for mass-usage.

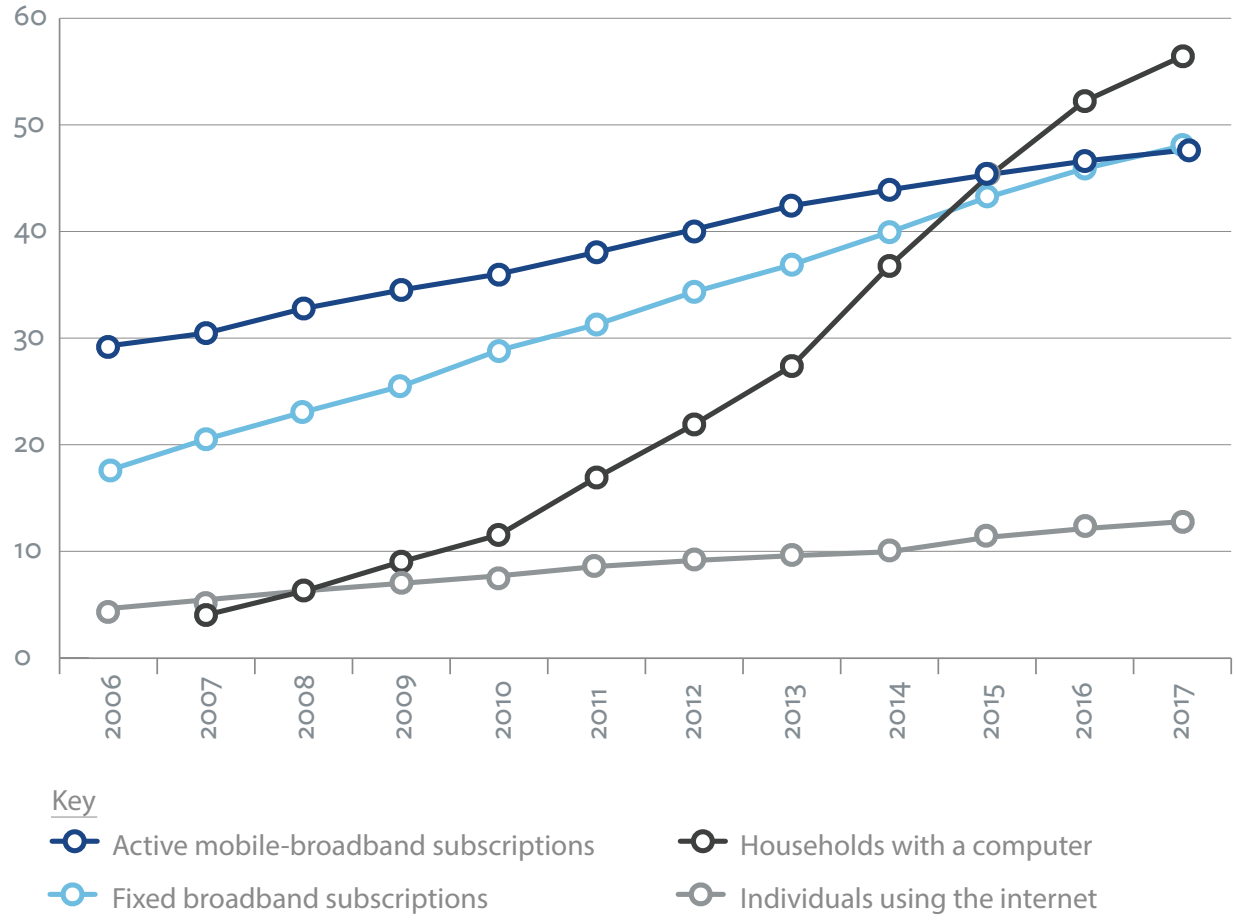
4.2 THE EMERGING RELEVANCE OF THE DIGITAL ECONOMY

While computers and even the internet have been around for some decades, it is only since the dotcom times and even more so since the launch of social media, search algorithms and the cellphone and later smartphone as fastest adopted consumer technology with global reach that the effects of the Digital Economy have gained major relevance. Given the large disruptions which the technologies have caused in recent years and are expected to bring in the near future, we are apparently experiencing a "Fourth Industrial Revolution" (Klaus Schwab), comparable in its disruptive force to the invention and spread of steam power, electrification and electronics. The growing relevance of the digital economy is reflected in the emergence and rise of modern economic industries such as the Sharing Economy, eCommerce, the Internet of Things, Industry 4.0, Online Advertising, Artificial Intelligence & Big Data, Precision Agriculture, Telemedicine, Online Outsourcing, eLearning and eGovernment (see "Digital Dictionary" box). Today, more than 50% of the global population is using the internet and has access to a computer [7]. In 2018, 48% of the global population were active on Social Media, and two thirds own and use a phone[8]. While the rise of the Digital Economy has started earlier and has reached higher levels in Europe, North-America and East Asia, African countries are increasingly catching up and even pioneering in some domains. Senegal has been the first country to implement a blockchain-based digital currency. Kenya became the world leader in Mobile Money (M-Pesa) in the recent years and was the first country to launch a mobile-only retail bond (M-Akiba) in 2017. In South Africa, the crowdfarming

concept of Livestock Wealth allows you to invest into "the oldest way of banking" through buying cattle. In Nigeria, award-winning Tuteria allows learners of any subject to connect to experienced tutors easily. And in Togo, WoelLabs developed the first 3D printer from e-waste (such as printers and computers), thereby not only facilitating low-cost dispersion of the a cutting-edge technology but also reducing the strain on the environment.

FIGURE 4.

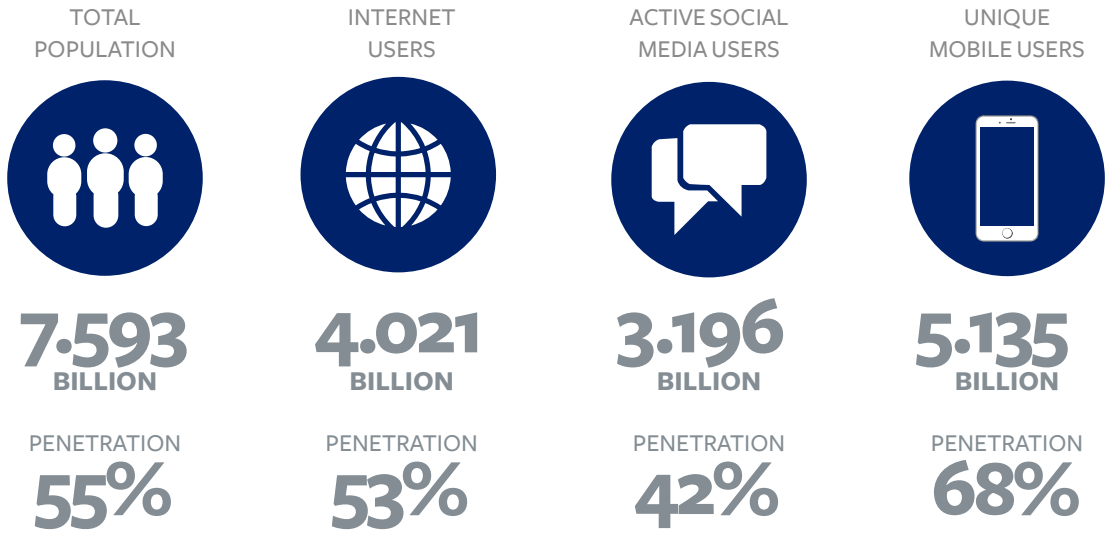
Growing Access Chart



Source: ITU (2018), "ICT Facts and Figures 2017", https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx, Accessed 17 Sep. 2018

FIGURE 4.1

Growing Access Chart



Adapted from: We Are Social (2018), "Digital Report 2018" https://digitalreport.wearesocial.com/, Accessed 17 Sep. 2018

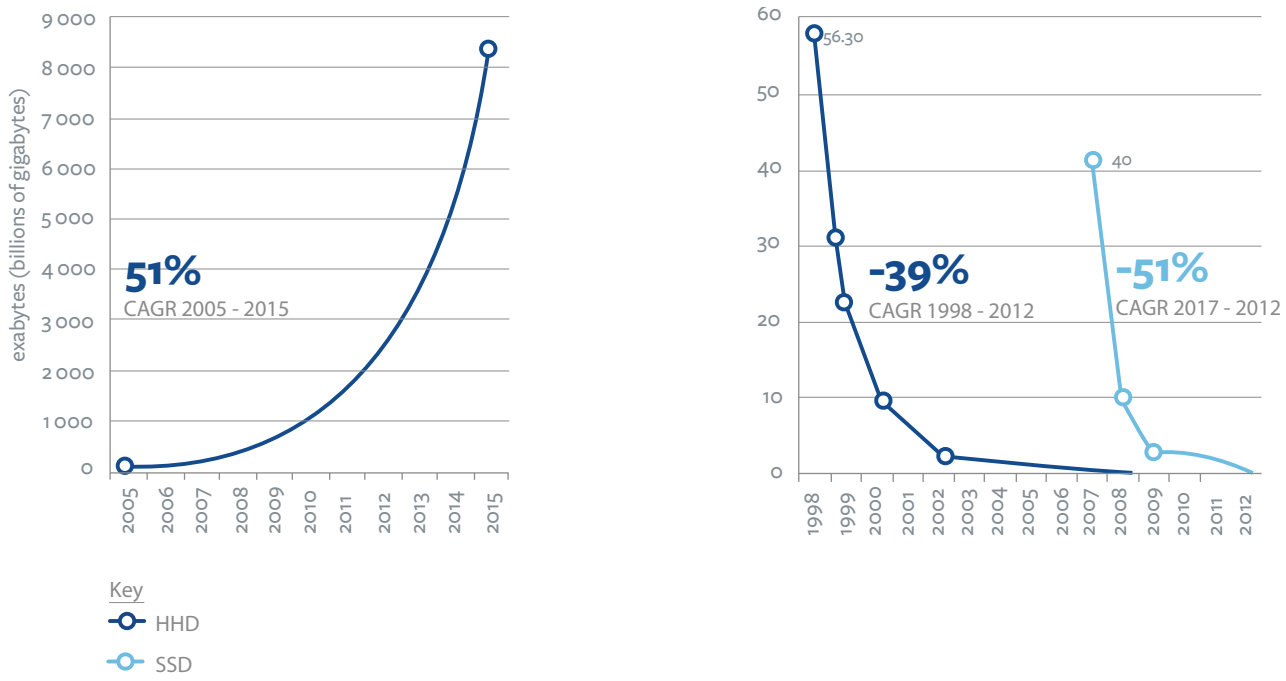
There are a few reasons for why the Digital Revolution is gaining full speed only recently despite the fact that

most of the key ingredients have been around for some centuries. The two MIT scholars Erik Brynjolfsson and Andrew McAffee explain what they call "The Second Machine Age" mainly by three phenomena: exponentiality, zero-marginal-cost and combinatorics[9]. The first one is connected to Moore's law, a prediction made by Gordon Moore of IBM in 1965, stating that the computational capacity of computers will double every year until at least 1975. As it turned out, his predictions were about right. Even today the computing power is still growing exponentially, even though with less speed. Kurzweil (1999) coined the term "the second half of the chessboard" to visualise how an exponentially growing factor is first modest, and then becomes immense and has huge impacts on the economy. Knowing that the division of a (principally infinite) geometrical series cannot truly be divided in halves, Brynjolfsson and McAffee estimate that the second half of the ICT age began in 2006, as most technological breakthroughs happened thereafter: Among these were smartphones, self-driving cars, artificial intelligence and machine learning, as well as cheap and affordable robot technology. Exponential growth of computing power and storage capacity have lead to an immense fall in prices that has made digital technologies affordable for the masses. In addition to exponential growth, the second characteristic of the current wave of technological change highlighted by the authors is the non-rivalry in consumption and production at quasi-zero marginal cost of digital products. In the digital world, problems only have to be solved once. A brilliant and complex algorithm, a beautiful piece of digital art or the collection of massive amounts of information such as in Wikipedia might initially require a high investment of work or money. Once there, however, digital goods can nowadays be reproduced and distributed for quasi-zero marginal cost (e.g. an additional unit of a google search or a digital copy of a movie). The third argument brought forward by Brynjolfsson and McAffee is connected to combinatorics: while many of the basic technologies involved in the ICT revolution have been around for a while (such as computers, the internet, mobile networks, robotics), the rediscovering and linking of existing technologies is what truly makes this period of technological change different. Open-innovation and crowdsourcing, they argue, help to connect existing ideas and harness the full potential offall technologies. Klaus Schwab of The World Economic Forum has referred to this phenomenon as possibilities being multiplied [10].

The growing relevance of the digital economy manifests itself through different channels [11]:

- Datafication = an expansion of the phenomena about which data are held
- Digitisation = conversion of all parts of the information value chain from analogue to digital
- Virtualisation = physical disembedding of processes
- Generativity = use of data and technologies in ways not planned at their origination through reprogramming and recombination

FIGURE 5.
Data Storage and Cost



Adapted from: OECD (2013), "Exploring Data-Driven Innovation as a New Source of Growth: Mapping the Policy Issues Raised by "Big Data""

The growing political prominence of the digital economy (monopoly-power, political influence, taxes and other controversies, share of the market value) have brought the digital economy increasingly into a political spotlight in a way it has not been before - with the possible exception of the Microsoft anti-trust case. This has put the digital economy in the USA and in some other advanced economies into a position that interestingly only few other industries have had before, such as banking, railroads, telecommunications and energy. This is another feature that links today's digital economy to the role these other "catalyst" sectors which influence the fate of many other sectors have played, before.

4.3 PROMISE OR PERIL? CHANCES AND RISKS OF A RISING DIGITAL ECONOMY FOR AFRICA AND BEYOND

"There has never been a time of greater promise, or greater peril"
Klaus Schwab, World Economic Forum 2016

The digital revolution bears a number of chances as well as risks, both for society in general but also for the economy in particular. In the 2017 "Global Risk Report" of the World Economic Forum it is highlighted how all key emerging technologies that carry some benefits also come with a risk. Overall, the risk-benefit-perception of the report (which builds upon an international and multi-stakeholder survey) is balanced, while some specific technologies bear substantially higher risks than benefits and vice versa [12]. The following section will review the most widely discussed chances and risks of a growing digital economy, highlighting what is most relevant in the African context.

4.3.1 OPPORTUNITIES

Economic Growth: Reviewing the potentially positive effects of digitalisation on the economy, there seems to be a widely acknowledged observation: **digitalisation drives economic growth** [13]**,** both due

to the increasing ICT sector itself as well as by allowing for productivity increases in most other sectors [14]. Interestingly, it seems that this effect is subject to increasing returns to scale, i.e. the more advanced the economy of a country, the stronger the positive effect of digitalisation on economic growth. This might be a result of the network effects inherent to digital technologies and the resulting combinatorics introduced in the previous chapter. While digitalisation is increasing overall economic growth, the digital sector is growing faster than other sectors, suggesting that the positive impact of digitalisation on growth can to a large extent be explained by the growth of the digital sector itself. Given the already established fact that digitalisation creates many free goods which are not captured in GDP, the true economic effect of digitalisation must be considered to be much larger than estimated in most studies that focus on GDP contributions.

Many reasons and explanations for the positive relation between digitalisation and economic growth (beyond the growth of the ICT sector itself) have been discussed and analysed. The most prominent arguments are centred on 1) transaction-costs, 2) innovation, and 3) leapfrogging. The idea that **advances in ICT can help to bring down transaction cost** is relatively straightforward due to the improvements in communication, data storage and automation. All major types of transaction costs are affected [15]:

- Search costs: internet search engines; comparison platforms; generally increased amount of available information
- Screening costs: reduced information asymmetry and uncertainty through online platforms, particularly with reputational mechanisms such as user ratings; big data helps with auto-generated ratings such as for credit ratings
- Bargaining costs: reduced cost of communication and increased speed through eMail, Skype, etc.;
- Transport costs: reduced demand for physical interaction through affordable and high-quality digital communication; increased efficiency in logistics through ICT; greater transparency
- Monitoring: improvements and greater availability of powerful measurement devices, sensors, cameras to assess product or service quality; automated testing routines
- Enforcement: automated claims management, dunning process and other reminders; possibility of leaving a bad rating as a means of policing

Another popular explanation for the positive link between digitalisation and economic growth is pointing towards increased levels of innovation through advances in ICT. These advances are strongly linked to the transaction cost reductions introduced above. In addition to the direct effect on growth (lower costs allow for increased output by same levels of input [16]), digitalisation can also boost growth through its supportive role in innovation and research. Successful innovation and research result in higher productivity, which again allows for increased economic output by constant input. Digital technologies can thus be perceived as meta-technologies or general-purpose-technologies that influence all economic processes and can allow for positive feedback loops. To illustrate this with an example: Technological advances in agriculture that allow for less harvest-loss might be of huge short-term relevance for the economy in terms of lowering the cost of food, but have only limited spill-over effects to other industries. On the other hand, improvements in ICT affect nearly each production process of modern economies and stimulate research and innovation.

These are a few examples of how **digitalisation spurs innovation** by facilitating scientific research [17]:

Pre-Data Analysis

- Lower cost and greater speed of desktop research (e.g. through online catalogues, libraries and databases)
- Easier data collection (e.g. through online surveys)

- Better data access (e.g. through Open Data initiatives)

Data Analysis

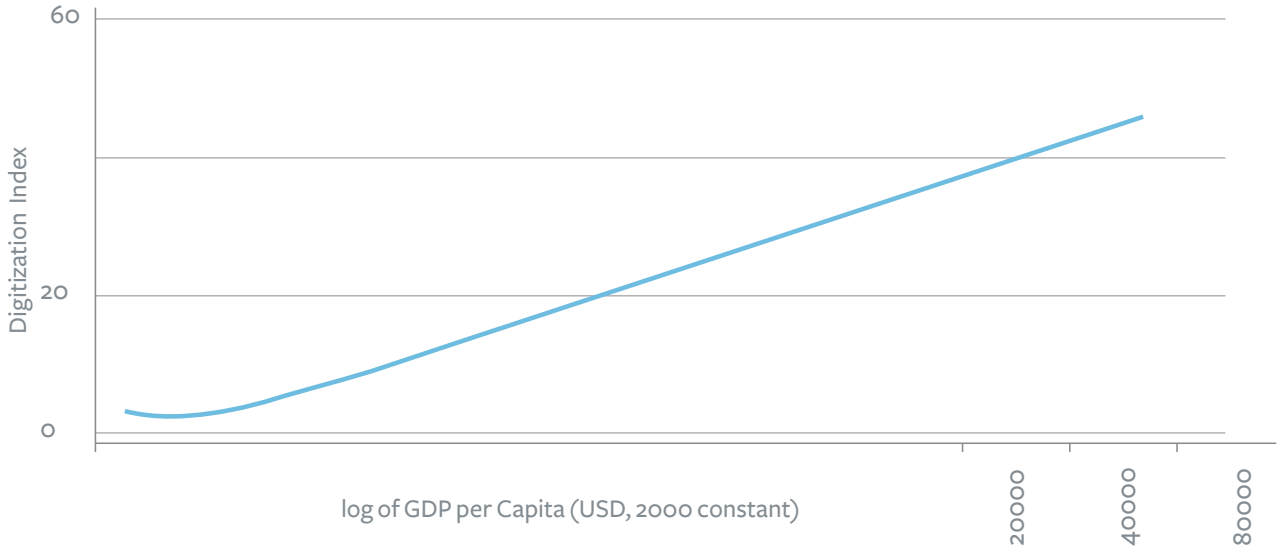
- Higher computational power
- Greater availability of (free) statistical software
- Transcription automation

Post-Data Analysis & Publication

- Greater ease of writing and visualising research results with modern software
- Fast & Easy submission of manuscripts to journals and communication between
- Improvement of Peer-Review-Process (e.g. through scientific-community platform such as Peerage of Science)
- Plagiarism detection through comparison algorithms

The third most common explanation for the link between economic growth and digitalisation is connected to the concept of leapfrogging. **Leapfrogging** refers to the chance of less developed countries to skip certain development milestones (particularly technologies) and jump straight to the most up-to-date and cost-efficient technologies. A prominent example is to skip fixed-landline connections (both phone as well as internet) and jump straight to mobile phone and data networks. Another one is to make use of decentralised solar energy to avoid building up a centralised energy system with few, large power-production plants and the associated problems of distribution. In theory, leapfrogging has two advantages. First, developing countries can profit from the experimentation with different technologies of more advanced countries and choose the most promising and cost-efficient ones. Secondly, it could even give developing countries an advantage over developed countries by avoiding lock-in effects and path-dependencies. Technologies often involve network effects and highly specific knowledge so that once a certain penetration and development status in one technology is reached there is a hurdle to jump to a new technology even though it might be superior. Despite the popularity of the concept and the appealing argumentation, the evidence for leapfrogging is scarce [18]. Recalling the observation introduced above about higher growth effects of ICT in developed than in developing countries speaks against the existence of leapfrogging, at least on a grand-scale. It seems that the sceptical view of a majority of scholars about the empirical relevance of leapfrogging does not generally conflict with the view that leapfrogging happened in a few cases and could happen more often if the right (political and economical) circumstances are given [19].

FIGURE 6.
Digitization and GDP



Source: Katz and Koutroumpis (2012), "Measuring socio-economic digitization: A paradigm shift"

Employment

While it is strongly debated whether the new technologies create more jobs than they destroy or vice versa, there seems to be a consensus that **digitalisation can be beneficial for employment when it happens in a complementary rather than a substitutional fashion**. When digitalisation is complementary it rises worker's productivity and makes them more likely to be employed. This is often the case for workers with non-routine and high-skill tasks which can be complemented very fruitfully by digital technologies, but hardly be substituted by it [20].

Additional considerations on the net impact of the digital economy on employment, in general and in an African context, are discussed in the sub-chapter on risks, below.

Sustainability

When it comes to the ecological chances of the Digital Economy, it has often been brought forward that the ICT can help to increase resource efficiency and dematerialise the economy, thereby reducing the strain on the environment. On the one hand, ICTs may help **reduce the resource intensity of other products**. This effect can be achieved by reducing the cost of a certain process along the value chain, such as a reduction of overhead costs by more efficiency means of communication. Quantitative studies have largely confirmed this effect [21], even though the resource cost of the technology itself seems to be neglected in many studies. The second type of dematerialisation effects is related to the creation of specific goods (**ICT-goods**) such as digital music, software, online services, etc. These goods are often dubbed **'intangible' goods** and are commonly believed to have little or even no material basis. However, the material basis of ICT-goods is greater than commonly perceived. In the end, every digital product or process is material as processing of information that is involved in ICT-goods consumes energy and requires substantial processing hardware and network infrastructure. In 2012, ICT usage (without production) accounted for about 5 % of global electricity consumption and was responsible for carbon emissions comparable to those of airline transportation [22]. Applying a more encompassing definition, 18% of total electricity consumption were ICT-related in 2014. Even though the efficiency of ICT could potentially rise, there are physical boundaries

again. The most important one seems to be 'Landauer's principle' that places an upper limit on how many computations can be performed per kilowatt-hour [24]. While attempts are made to circumvent the Landauer limit by achieving partly-reversible computations, [25] the ultimate boundary of efficiency increases is given by the thermodynamic laws again. Given current physical insights, completely reversible (adabiatic) processes are not conceivable. Because of these drawbacks in the energy aspects of the digital economy, the recent **decline of energy efficiency** in some countries might well be driven by increased usage of ICT [26].

Inclusion & Development

As for the social benefits of the Digital Economy , there are indeed a number of promising developments, mainly in the domains of a) Economic and Political Inclusion and b) the Facilitation of the Existing Aid and NGO-sector. In terms of **economic inclusion**, there is one the one hand the intra-national inclusion of previously marginalised parts of the population. Here, branchless banking is a prominent example of how technology can help to achieve financial and thus economic inclusion by reaching the previously unbanked with alternative and digitally-enabled products. Digitalisation also facilitates international economic inclusion through sectors like the gig economy, business process outsourcing and impact sourcing. Particularly the latter with its focus on fair wages and great social impact appears to be promising for developing countries and does not face the criticism brought forward against classical Fair Trade, i.e. that it locks-in developing countries in low-tech, small-scale agriculture and handicraft. Indeed, the opposite must be said for Digital Fair Trade. The above-local-average wages for digital labour in the global South could thus potentially lead to a global convergence of incomes [27]. In terms of **political inclusion**, the Digital Revolution has increased transparency and chances of political participation through e-government, blockchain-based services and Open Data. Some digital platforms in the global South can thus provide an escape route from ineffective, corrupt political and economic institutions. In addition to the inclusive potential of digitalisation, it also acts as a **catalysator for the existing aid and NGO sector**. New technologies and the reduction in prices of existing ones allow for new social ventures and activities (e.g. the medical outreach to extremely rural areas which now became possible through cheaply available telemedicine). Approaches like "Give Directly" (unconditional cash transfers as development aid) are achieving phenomenally high aid-efficiency rates (i.e. how much of an initial aid / donation amount reaches the recipient) which are only possible through the use of ICT-enabled means (in this case: mobile money transfers). Vodafone's "School in a box" is an example of how cheaply available IT equipment and content can boost education for the very remote and poor. On the fundraising side of NGOs, the rise of crowdfunding has been beneficial to many NGOs to be able to tap into previously unreached donor sections.

4.3.2 RISKS

Economic Growth & Unemployment

As indicated before, there is no consensus about the net effect of (future) digitalisation on jobs and there are goods arguments and evidence on either side of the spectrum. However, given that some well-respected scholars have estimated that as much as 47 percent of US jobs are susceptible to computerisation and thus replacement [28], unemployment driven by digitalisation must at least be considered a serious risk. With regards to Africa, there are arguments supporting the view that the risk of technological unemployment is lower than for more developed countries. The argument goes that wages are so low that technological substitution (automation, robotisation) is not affordable yet. This is in line with McKinsey data [29] which

claims that, globally, the Internet creates 3.1 jobs for every job that it destroys, with this effect higher in aspiring economies (3.2 created) than in developed economies (1.6 created). However, when at some point the cost of automation and robotisation becomes cheaper than labour even in Africa, then these job creation trends could reverse and Africa could be hit by skill and routine-biased technological change, where only the very skilled workers that can provide non-routine labour will be able to provide complementary work to machines. As (high-tech, non-routine) skill levels of workers are still relatively low, Africa might be hit hard by technological unemployment in the future. If this scenario should become reality, then the associated "re-shoring" of production to developed countries and the "premature deindustrialisation" of Africa would also have substantially negative effects on economic growth [30], particularly if the digitalisation and robotisation of the continent is not driven by African, but by foreign-held firms. Another risk factor for economic growth both in the developed as well as developing world is given by a consumption problem due to increased inequality [31]. If technological unemployment is not dealt with by social measures the resulting rise in inequality can have a dampening effect on growth due to a lack of purchasing power and thus demand. In general, there seems to be a key difference between developed and developing countries when it comes to the potential effects of digitalisation: While the former will in the worst case only suffer from higher unemployment, **developing countries could in the worst case be hit both by unemployment and shrinking economies.** Whilst developed countries can think about unconditional basic income or reductions of work time to deal with unemployment, developing countries will not be able to afford those measures. It seems the only way to prevent this catastrophe is to invest heavily in (ICT-) education, build up a competitive digital economy and potentially even protect this economy as a crucial, but 'infant industry'.

Social and Ecological Risks

As indicated in the previous section, it is a popular but not necessarily evidence-based view that Digitalisation can help to reduce the strain on the environment in terms or increased efficiency and decreased resource-consumption. However, currently the growth of the ICT sector itself is outpacing its efficiency increases (e.g. the growth of data storage is larger than the decrease of storage cost). This observation points towards the existence of rebound-effects, i.e. the phenomenon that the efficiency increases of a technology are accompanied by an increase in demand (e.g. because of falling prices), so that the overall effect of these technologies can be an increased absolute resource consumption [32].

In addition to the many promises that digitalisation has for social welfare and development, there are also a number of risks, particularly for the more-vulnerable developing countries. On a very obvious level, there is a great risk of exclusion from the Digital Economy of less digitally literate people, both within and between countries [33]. Gig workers that work on online outsourcing and clickworking platforms such as Fiverr, Upwork, Amazon Mechanical Turk or Figure Eight (CrowdFlower) bear the risk of being **neglected by work protection and social security legislation** which have been designed for traditional employment careers. The flexible, non-contracted freelance work of the gig economy does often not protect the workers against exploitation in terms of wages and working hours and does not take care of health insurance and other social security precautions (such as for unemployment or retirement) . The very asymmetric bargaining power of few huge platforms on the one side and millions of small-scale gig workers on the other side exacerbates the exploitation problem. However, there are approaches such as gig worker unions and coordination platforms(e.g. the Fair Work Foundation, Turkopticon, faircrowd.work) as well as concepts of mobile social security accounts that you can take with you from 'gig' to 'gig' and employer to employer. Digitalisation must thus not automatically and inevitably worsen social security and worker's protection, if accompanied by new

legal and economic institutions. Another social risk associated with the Digital Economy is its tendency to favor monopolies due to networks effects and quasi-zero-marginal costs. Network effects arise when each additional user of a product or service adds value to other users, as is strongly the case for Social Media, e-commerce or sharing economy platforms (such as Uber). Quasi-zero marginal costs allow firms such as Google to offer their (expensively developed) search, communication, office, and data handling tools for nearly zero cost to additional users [34]. Due to both effects there is thus a natural tendency towards few large players that came either early enough (first-mover-advantage), provide the best service, or can shoulder the immense initial setup costs of many digital platform industries. Monopolies, in turn, affect social welfare through reduced to no competition, resulting in decreased innovation (probably less the case for digital monopolies yet), unnecessarily high prices (e.g. of digital advertising with Google) and increased inequality [35]. Finally, digitalisation creates tax challenges that can lead to an erosion of state revenues and raise issues of fairness both in carrying the tax burden as well as in competition [36].

Security & Privacy

With ever more information being held digitally and a rapidly increasing interconnectedness of digital systems, privacy as well as data and systems security is gaining major importance. While privacy is foremost a non-economic issue and about the protection of civil liberties and human rights, it has gained more economic relevance in the context of **monetarisation of user data for digital advertising.** The most frequently used free digital services are financed through advertisements (Wikipedia being the exception), and the majority of those use user data to custom-tailor the displayed ads to achieve 'targeted' advertising and thus higher influence. Users of those free services are thus accepting more or less explicit contracts with the service providers about the trading of personal information against free services. There is the risk that users are not aware of this deal and the consequences in detail, which can result in suboptimal usage of these services or unfair prices (i.e. users get too little free services in return for their precious data) [37]. Both from an economic as well as privacy perspective it thus seems to be required to increase **transparency and awareness** in this domain. From a business perspective, data-theft and other cybercrime present an even more pressing issue that comes with digitalisation. According to a recent survey for the World Economic Forum, **cyberattacks** are perceived as among the top 5 risks for doing business in East Asia, Europe and North America [38].

5

ASSESMENT OF THE STATUS QUO IN KENYA

5.1 BRIEF HISTORY AND TIMELINE OF KENYA'S DIGITALISATION

Kenya has recently experienced a relatively short phase of rapid dispersion of ICT technologies. In around 25 years - from the 90s until today- Kenya has grown from a digital desert to a country now offering faster internet than in some areas of the US and IT-hubs of international importance. In the early 1990s, only 0.8% of the population had access to a fixed telephone line, and only a handful of people had a mobile phone, a personal computer or access to the internet [39]. A key hurdle to a development of the ICT sector was that the Kenyan government and its telecommunications state monopolist Kenya Posts and Telecommunications Corporation (KP&TC) were blocking the development of the internet in Kenya: In 1995, KP&TC made a declaration that **Internet services were an illegal use of leased lines,** while the **internet was banned entirely in the government civil service** until 1999 [40]. On a technological level, internet connectivity was mainly satellite-based with a distribution within Kenya through radio or copper landlines. Local entrepreneurs, international NGOs and African internet civil society organisations (CSO) pioneered in the use of the internet and worked towards its diffusion and regulatory backing. Among them: The East African Internet Association (EAIA), Association of Progressive Communications (APC), Telecommunications Foundation of Africa and African Regional Centre for Computing.

The hostile environment came to an end with regulatory changes. In 1998, the Kenyan government enacted the Kenya Communications Act which broke down the monopolist giant KP & TC into three entities: Telkom Kenya (retaining fixed line services), the Kenya Postal Corporation, and the regulator Communications Commission of Kenya (CCK, later evolved to Communications Authority of Kenya/CAK). The CCK introduced competition in the cellular and internet service provision industries and allowed new players to compete with Telkom Kenya. In 2000, the **first competition** in the cellular sector arose: Safaricom - founded as a subsidiary of Telkom Kenya- was converted into a limited liability company of which Vodafone acquired 40%. In the same year, Celtel entered the market as a cellular operator. In 2002, the Kenya Internet Exchange Point (IXP) was launched and has become one of sub-Saharan Africa's largest, with 36 members - by facilitating local connectivity directly, it has helped limit the need for international bandwidth and speed up Kenya's internet usage. The state monopoly on international connectivity and last-mile-infrastructure remained a challenge until the end of 2004 when Telkom's exclusivity ended. From then, Safaricom and Celtel were allowed to operate as international gateway and local providers as well, driving done prices through increased competition [41]. During this time, Kenyan politics increasingly realised the importance of the internet and a solid ICT framework, which resulted in the formation of a dedicated Ministry of Information and Communications. As well in 2004, Safaricom launched Kenya's first cellular internet service through GPRS, followed by improvements through EDGE technology in 2006 and 3G networks in 2007. The same year, Telkom was privatised and Orange (France Telecom) acquired 51% of its shares.

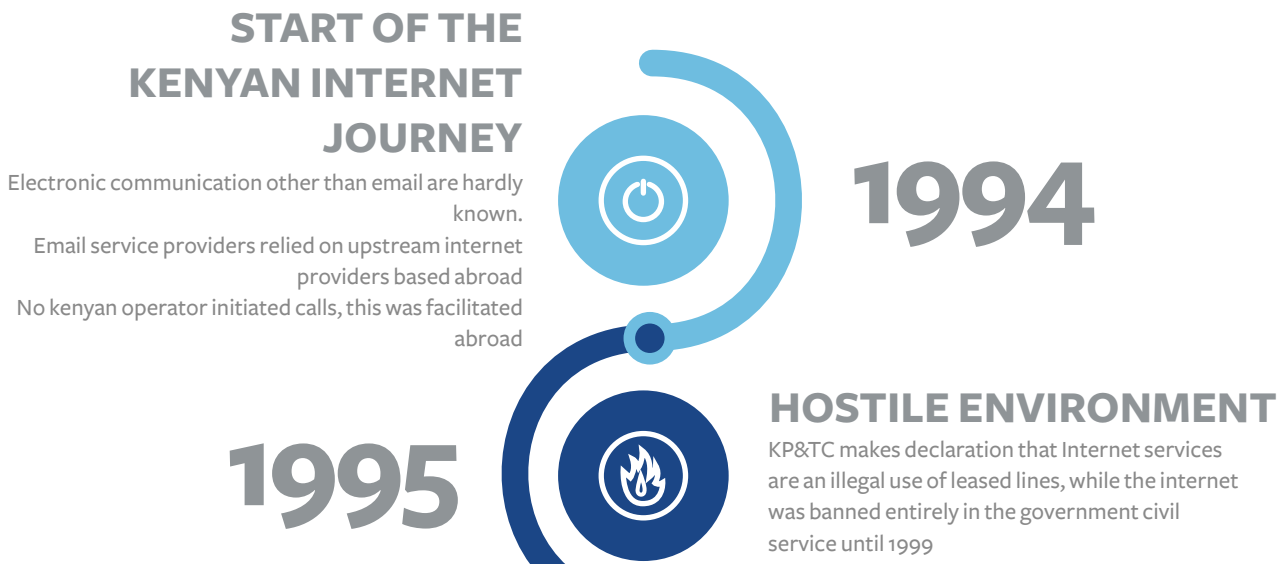
2007 was also the year when Safaricom started its success story with **M-Pesa**, a mobile-money service that exploits functionalities (USSD) available on every phone, not only smartphones. The low-tech (and thus low-cost) approach of M-Pesa to mobile money (as opposed to Java or smartphone app-based approaches of PayPal or many of the previous mobile banking offers) allowed for a rapid diffusion of the technology. Today there are 23.6 million M-Pesa users and 5.5 million users of other mobile money services inspired by M-Pesa, representing over 50% of the population [42]. The success of M-Pesa had a catalyst effect on the (digital) economy in Kenya, providing a cheap and fast payment means available to everybody. It enabled

more advanced branchless banking services such as a link between mobile and real bank account (M-Kesho), interest-bearing savings accounts (M-Shwari) and mobile-only government bonds (M-Akiba). Similarly, the infant-stage Kenyan E-commerce was boosted through M-Pesa as many potential customers could previously not be reached due to a lack of credit cards [43].

The Kenyan government confirmed its strong commitment to ICT by placing it at the heart of its prominent "Vision 2030" released in 2008. A year later, the government demonstrated that it was serious about its commitment by successfully connecting Kenya to the **undersea fibre cable** The East African Marine System (TEAMS), a project the government had spearheaded. It was connected only a few month after the SEACOM cable, the first undersea fibre cable ever to reach East Africa. The East African Submarine Cable System (EASSy) followed in 2010, and the Lower Indian Ocean Network 2 (LION2) cable in 2012. A fifth cable - Djibouti Africa Regional Express (DARE)- is scheduled for 2018. The undersea cables contributed immensely to the pace of the digital data and internet revolution in Kenya: in 1995, the entire country's international bandwidth was 64Kbps through a satellite link [44]. By 2018, bandwidth had reached 3.2Tbps [45], representing an increase by a factor of 50 million.

The last decade of Kenya's Digitalisation was able to build on the the great enabling factors of strong government support, increased competition, the emergence of mobile money and the connection of undersea fibre cables. Mirroring the buzzing tech scene that came to being in Nairobi, Erik Hersman's iHub opened in 2010 as a coworking space and technology hub. The government rolled out **two major e-government projects**: the Kenya Open Data portal in 2011 (making hundreds of publicly relevant data sets easily and freely accessible), and the eCitizen website in 2014 (serving as a one-stop-shop for many government services). The governments continued ICT commitment became manifest in various strategic documents (e.g. ICT Masterplan 2014-2017) and drafted bills (e.g. Critical Infrastructure Protection Bill), of which only few were enacted, however. Since the announcement in 2008, the government is working on a massive public infrastructure project called Konza Technology City which is supposed to host tech firms and workers of all sorts, centered in an enabling IT-Hub. Safaricom introduced high-speed 4G mobile internet services in 2014 and was enjoying a monopoly in this domain until Airtel, Telkom and Jamii entered the 4G cellular market in 2018. After a long and tedious preparation phase, the digitalisation of the broadcasting sector was finally completed in 2015 with a migration from analogue to digital radio and TV-broadcasting.

FIGURE 7.
Kenyan Digital Evolution Timeline



LIBERIZATION

The government enacts the kenya communications Act implemented by the CCK

1998

2000

THE FIRST COMPETITION

Celtel Kenya , formerly Kencell enters the market as the second mobile operator.
Vodacom buys 40% shares of safaricom

GPRS COMES IN

General packet radio services are introduced

2001

2004

FIRST MOBILE INTERNET

Ministry of Information and communication is formed .
Internet service providers are licensed.
Safaricom launches its GPRS

MOBILE MONEY REVOLUTION

Safaricom launches 3G and M-PESA, Telkom becomes orange

2007

2008

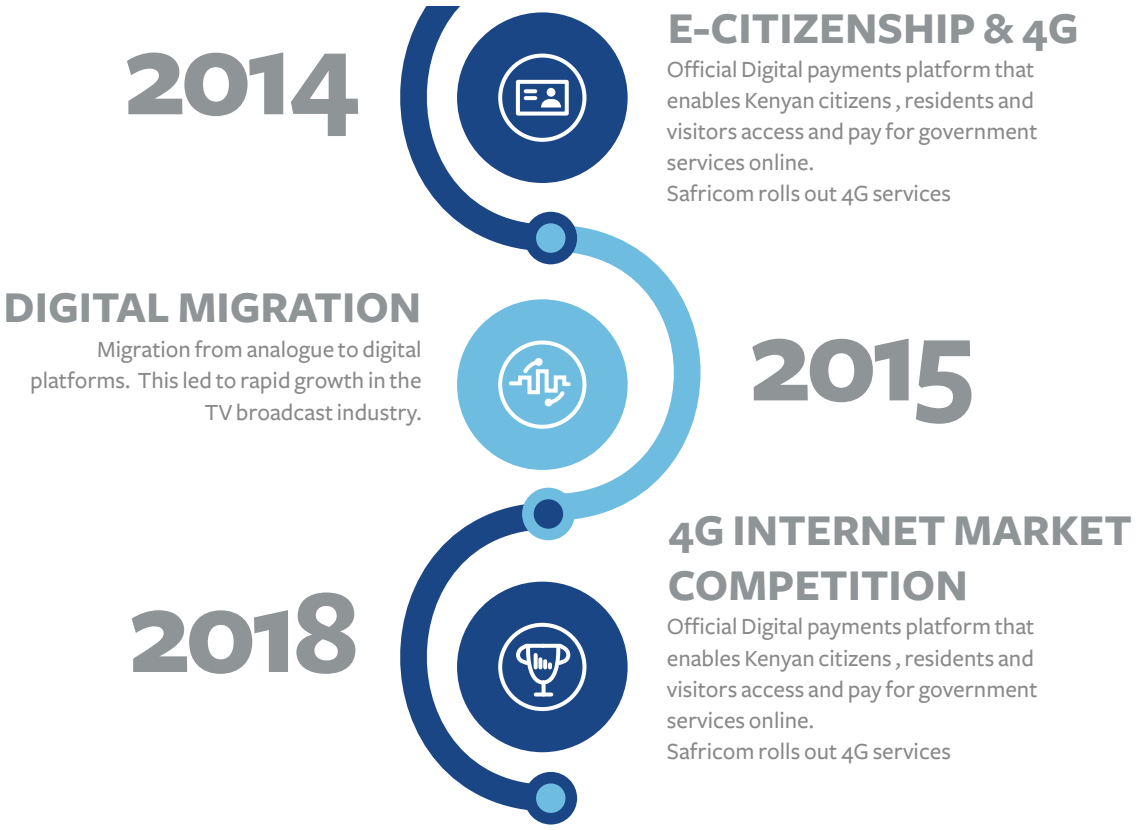
VISION 2030

The Kenya Vision 2030 aims to transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030 in a clean and secure environment.

FIBRE OPTICS

SEACOM and TEAMS undersea fibre cables connected in Mombasa (EASSy cable followed in 2010, and LION2 cable in 2012, and a fifth cable (DARE) is scheduled for 2018.

2009

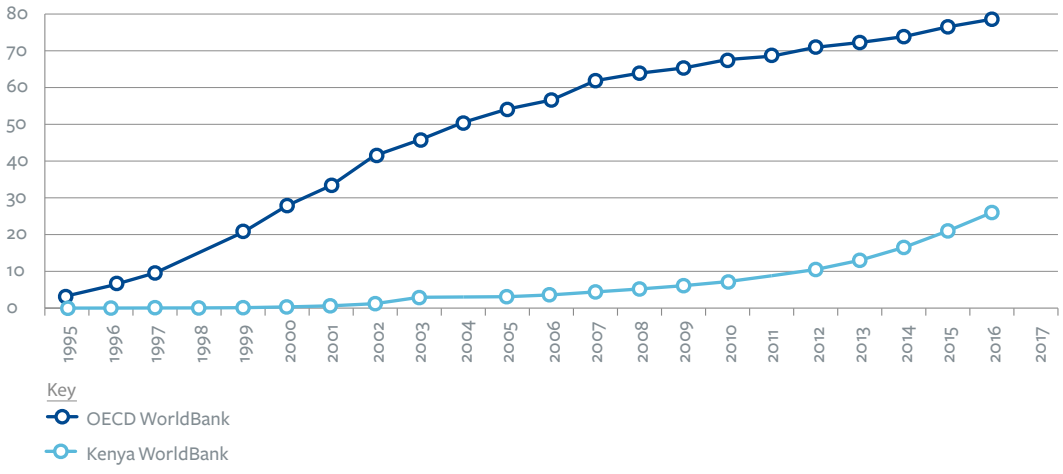


5.2 MARKET SIZE ESTIMATES AND GROWTH TRENDS

As indicated in the previous Chapter, providing quantitative data on the Digital Economy is not straightforward due to the problems in definition and measurement discussed before. Despite these challenges the following sections shall give an indication of the size as well as development over time of the Digital Economy and its sub-sectors. For means of comparison, references to neighbouring countries (Uganda and Tanzania), other Sub-Saharan African (digital) success stories (Senegal, Nigeria and Rwanda), Asian emerging economies (India and China), as well as (selected) OECD members will be made. Data sources that have shown to be helpful are the online data portals of the UN, UNCTAD and OECD as well as the Kenya Open Data portal and Kenya National Bureau of Statistics Reports (mainly the yearly Economic Survey).

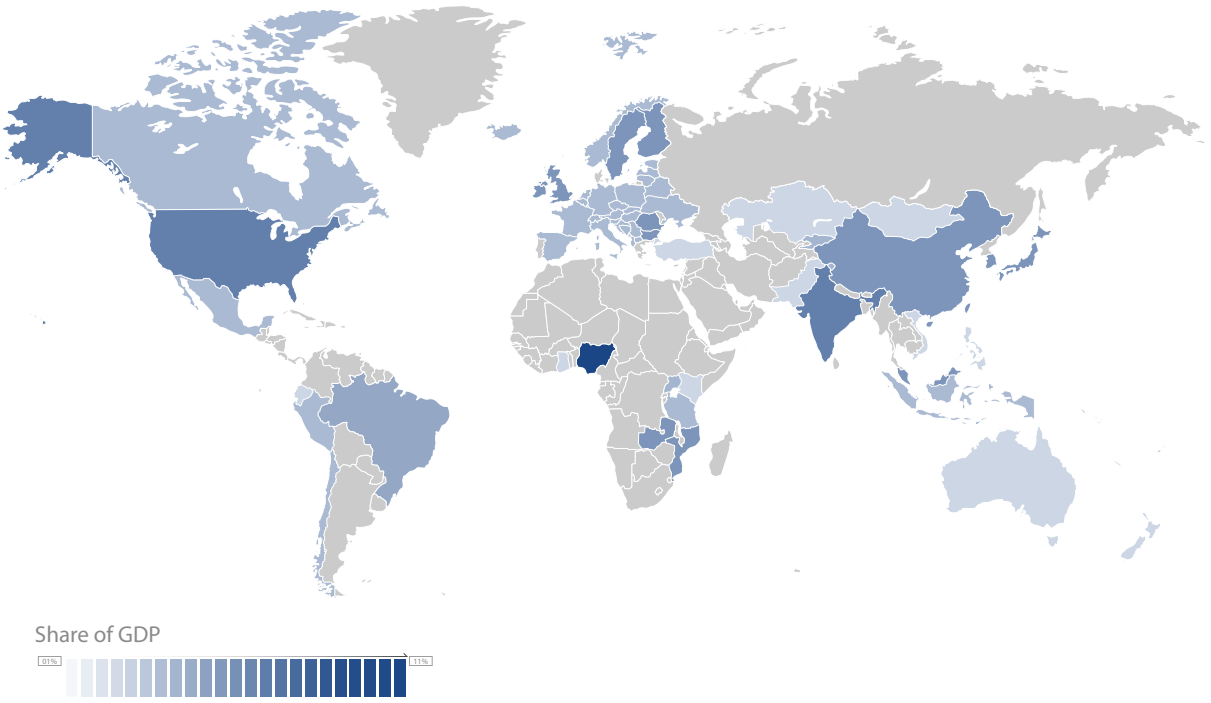
5.2.1 THE OVERALL KENYAN DIGITAL ECONOMY

FIGURE 8.
Kenya Internet Users



Kenya's National Bureau of Statistics is using the ISIC classification and reports figures for the '**Information and Communication' Sector** (Section J: Divisions 58-63). However, this classification includes non-digital goods and services of the information economy such as printed newspapers and books. Additionally, it does not cover manufacturing, trade or repair of ICT equipment. It is thus an imperfect measurement of the digital economy, but one of the few useful data sources there are in the case of Kenya. With access to more detailed data in terms of ISIC-hierarchy, it would be possible to develop a more encompassing and accurate estimate of the size of the Digital Economy in Kenya as has been done for the USA [46]. According to this measurement, the GDP created in the Digital Economy amounts to 109,388 million KSh in 2017, contributing with **1.6%** to the total economic output of the country. Measured this way, **the Kenyan Digital Economy is relatively small**, both for African as well international standards (UN data for 2013-2016 [47], see World Map graphic): **In neighbouring Tanzania and Uganda, the sector makes up 2.2% and 3.5%,** respectively. Nigeria is leading the statistics with a share of 11% of GDP. **The OECD average is 4%** of GDP, or 6% if using the more encompassing definition of ICT value added which goes beyond the Information and Communication sector. When using a very encompassing scope, the Kenyan ICT sector was already as large as 12.71% of GDP in 2013 according to government-sponsored research [49].

FIGURE 9.
Information & Communication Sector Share of GDP

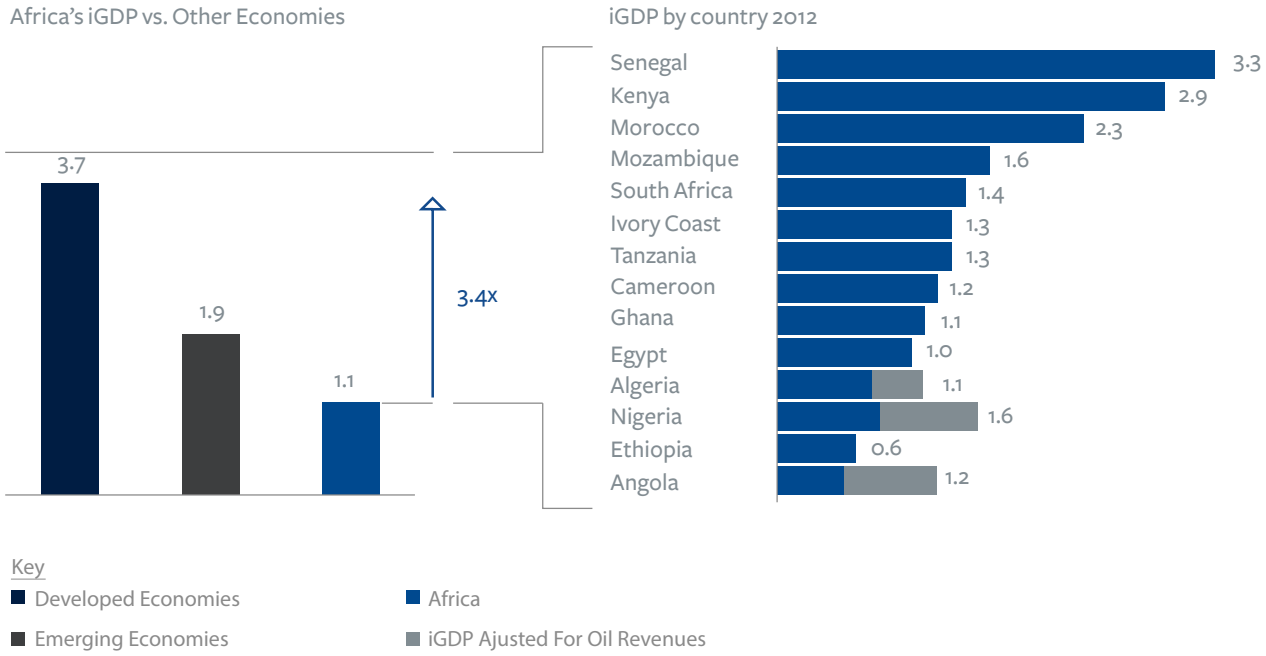


Source: UN (2018): Table 2.4 Value added by industries at current prices (ISIC Rev. 4), http://data.un.org

However, due to the aforementioned problems with using the Information and Communication sector as a proxy for the digital economy, the numbers might not accurately reflect the reality of Kenya's internationally renowned ICT sector. Indeed, **McKinsey's iGDP** [50] estimates suggest a very different picture than the ISIC-based estimates. The iGDP assessed the contribution of internet-enabled products and services by looking at expenditure data and estimates. The interesting aspect of this methodology is that the analysts took the challenge of (partially) including goods & services which are both used for internet, and non-internet purposes. The downside of the iGDP is the inclusion of e-commerce at full value which to some extent over-emphasises the relevance of the digital sector and ignores that e-commerce is only a distribution channel of goods, many of which would have been sold via conventional retail channels, probably. Another downside is

the focus on the internet which means an exclusion of digital, but non-internet related activities. Still, the iGDP provides a refreshingly different measurement and sheds a different light on the Kenyan digital economy. **Kenya's iGDP stood at 2.9% in 2012,** the second highest value in Africa, only topped by Senegal with 3.3 percent. This is higher than the African and emerging economies average, and close to the 3.7% average iGDP of developed countries.

FIGURE 10.
Afica iGDP vs Other Economies



[1]GDP assessed by expenditure method, with a share of each category attributed to the internet
[2]Emerging economies data is from 2012
Source: McKinsey(2014): https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/digital-divide-the-impact-of-closing-africas-internet-gap

The static view on the digital economy size in a certain year (as presented above) disregards the very dynamic nature of the sector. **The Kenyan ICT sector expanded by 11.0%** in 2017 compared to 9.7% in 2016, driven by improved performance in the telecommunications sub-sector, which rose by 12.7% in 2017. Between 2000 and 2009, the telecommunications sector in Kenya outperformed all other sectors and grew by around 20% per year, while the overall GDP growth was 'only' 3.7% [51].

5.2.2 SECTORAL ANALYSIS

Because GDP contributions of specific subsectors are rarely available while sales volume estimates are more common, the following sectoral analysis focuses on sales volumes. In order to put the numbers into relation, they are additionally reported as percentage of GDP. However, it must be noted that sales volumes are not the same as GDP contributions, so that the percentages cannot be compared to the overall GDP contributions reported in the previous section. They do, however, allow for a better comparison of the relative importance of certain subsectors in international comparison.

The internet access market in Kenya stood at $671 million (or roughly 1% of GDP), which is larger than in neighbouring Tanzania ($213m/0.5%), but much smaller than in the population rich Nigeria ($4,713m/1.2%) [52]. Most of this market is driven by mobile internet access revenues, reflecting Kenya's high mobile data penetration rate of 76.8% as opposed to its very low number of fixed internet connections (0.5% penetration) in 2018 [53]. While penetration rates that are based on number of subscriptions divided by population count

bear the risk of overstating the actual reality, there can be no doubt that a large and growing share of the country has now access to the internet (see Figure). More conservative estimates put the share of internet users in the Kenyan population at 26% in 2016 which compares to 13% in Tanzania, 22% in Uganda, 26% in Senegal and Nigeria, and 79% in the OECD [54].

Similarly important in size, the **mobile money** market amounted to an estimated $693 million or 0.8% of GDP [55] in 2017, driven by the furious rise of M-Pesa since 2007. The value of all mobile money transactions in Kenya amounted to roughly half the value of its GDP in 2017. Extrapolating GDP and mobile money growth rates, it may well be that mobile transaction volume has become larger than GDP in 2018. While the share of mobile money accounts among all formal financial sector accounts has climbed to 47.3%, other African countries have reached even higher shares (65% in Senegal, 82% in Uganda and 87% in Tanzania). This reflects partially their greater initially unbanked population, as well as the relative innovativeness and inclusivity of Kenyan banks, which in turn is partly a reaction to the success of M-Pesa and in other part a reflection of the determination and impact of Equity Bank, Kenya's other great financial inclusion success story.

The **internet advertising market** in Kenya was estimated to be $120 million (or roughly 0.2% of GDP), which is both absolutely and relatively much larger than in neighbouring Tanzania ($8.7m/0.02%) and Africa's media champion Nigeria ($65m/0.02%) [56].

There are few figures on the size of the **e-government** sector. One approach is to regard all public expenditure spend on ICT representing government efforts to deliver services digitally or digitally-assisted. Following this approach, the e-government sector amounted to $130 million (or 0.2% of GDP) in 2014/15. With this spending and the resulting e-government quality, Kenya has positioned itself on the lower-middle end of the UN's E-Government Development Index (rank 122) [57].

The Kenyan **e-commerce** sector is still in its infancy, but comparatively large in the Sub-Saharan context. According to official figures, e-commerce sales were as low as $36.5 million (0.06% of GDP) in 2014 [58]. International estimates put the sector slightly larger at $84.1 million (0.15% of GDP) in 2013, compared to $527.6 million in Nigeria, the epicentre of the African e-commerce revolution (0.1% of GDP) [59]. A recent statement by an UNCTAD official indicated that Kenya is leading the e-commerce development in Africa together with Nigeria and South Africa, with around 6% of all purchases placed through e-commerce in 2017 [60].In the OECD, e-commerce sales have reached 18.7% of total turnover, even though these high figures are driven by B2B ecommerce via electronic data interchange (EDI) rather than by B2C e-commerce like in Africa. [61] 5% of Kenyans were shopping online in 2014, compared to 4% in Nigeria, 3% in Tanzania, 1% in Uganda and 67% in the USA [62]. However, Kenya and the other African e-commerce markets are catching up with the world: Expected annual e-commerce growth for the period 2013-2017 was 39.4% in Kenya and 37.7% in Nigeria [63], while the expected global average growth rate was only between 11 and 17% for the period [64]. In line with that, Kenya scores relatively well (rank 82 of 144 countries) on UNCTAD's e-commerce index ranking, which analysed the opportunities for successful e-commerce rather than already existing market sizes [65].

TABLE 2.

Selected Sub-Sectors Of The Digital Economy

PURE DIGITAL ECONOMY	MARKET SIZE	GDP SHARE
DIGITAL GOODS		
AUDIO AND VIDEO CONTENT	$899m	1.27%
SOFTWARE		
PACKAGED SOFTWARE	$147m	0.21%
GAMES	$55m	0.08%
E-GOVERNMENT	$130m	0.2%
DIGITAL SERVICES		
IT SERVICES	$241m	0.4%
ONLINE ADVERTISEMENT	$120m	0.2%
HYBRID ECONOMY		
E- COMMERCE	$84m	0.14%
DIGITALLY-ENABLED SERVICES		
PLATFORM ENABLED		
BOOKING PLATFORMS		
TRANSPORT SERVICES (UBER TAXIFY)	$6m	0.01%
HOUSING (AIRBNB)	$3.9m	0.006%
MOBILE MONEY	$693m	0.8%
DIGITAL - ENABLING INFRASTRUCTURE		
COMPUTER HARDWARE	$1,208m	1.7%
INTERNET ACCESS PROVISION	$671m	1%

Sources: Pwc (2017) for online advertisement, games, audio and video content and internet access provision in 2016; Julisha (2013) for packaged software [66], ICT services and computer hardware in 2016; KNBS and CAK (2016) for e-government (total public ICT spending) in 2014 [67]; Deloitte (2017) for e-commerce value in 2013, Rookie Manager (2017) and Techweez (2017) for rough estimates of Uber and AirBnB-related revenues; for Mobile Money the total market size has been inferred from M-Pesa revenues taken from Safaricom's (2017) annual report and Safaricom's share in mobile money transaction volume as per CAK (2018). The size estimates are for different years between 2014 and 2017, so that resulting GDP shares can appear inconsistent, but are related to the respective year.

5.3 THE EXISTING DIGITAL ECONOMY FRAMEWORK

According to the OECD [68], an enabling Digital Economy framework consists of the following building blocks:

- Digital infrastructure
- Digital enablers
- Market environment (i.e. openness)
- Regulation ensuring effective use of ICT
- Involvement of stakeholders in policy-making

A digital Economy framework is thus not only comprised of laws and regulations, but also of infrastructure and education projects as well as stakeholder-government interaction. The following sections will review the current state of affairs in Kenya with regards to these framework building blocks and thereby laying the foundations for the subsequent identification of gaps and challenges.

5.3.1 LEGAL FRAMEWORK

After the break-up of KP&TC and the liberalisation of the ICT sector, the Kenya Communications Act (KCA) of 1998 was the major regulatory document. It was substantially revised in 2009, 2011 and again in 2013. The most recent revision - the **Kenya Information & Communications Amendment Act (KICA)** of 2013 -

currently represents the primary legal basis for the ICT sector in Kenya. The core of this legislation is the strengthening of the **Communication Authority of Kenya** (successor of Communication Commission of Kenya) as an independent regulatory body that is free of control by government. Other laws that affect the digital economy are the **Kenya Broadcasting Corporation (KBC) ACT of 1998** and the **Science, Technology and Innovation Act 2013**. Additionally, any legal framework of today's Kenya must reflect the requirements brought about by the new **Constitution of 2010**, especially with regards to decentralisation and strengthening of human rights.

Driven by the boom of the digital sector and the government's growing commitment to support and facilitate this development, a number of ICT-related bills have been drafted in the last decade, of which only some have actually been enacted. One of the few enacted bills is the **Access to Information Act** 2016 [69], which cements the constitutional rights of Kenyans to access important public and private information. The law defines concrete processes and timelines for private and public bodies of how to provide certain information. The **Information Communication Technology Practitioners Bill** [70] was announced in 2016. It would require every ICT professional to acquire a license, be registered and to meet certain requirements such as a university degree. The bill was strongly debated and met hostility from the IT industry which found it counterproductive in the promotion of innovation in the digital sector [71]. Driven by fears about demolition of critical ICT infrastructure and a growing connectedness of non ICT-infrastructure, the government called for input for a **Critical Infrastructure Protection Bill**, which was never enacted. Civil society groups spoke against such a bill and opted for the use of regulations to better cope with the dynamic and fast-changing nature of the sector [72]. Attempting to improve the copyright protection and royalty collection of Kenyan artists, the **Copyright Amendment Bill** was drafted in 2017 and raises hope for artists, should it be passed by parliament - but would require tighter control on the distribution of digital content in Kenya to meet its purpose [73]. To give effect to Article 31 of the Kenyan constitution (right to privacy) with regards to the challenges posed by data protection in the digital age, the **Data Protection Bill** draft has been released in 2018. It was generally welcomed by the Kenyan internet community, with recommendations of protecting privacy even stronger than the bill proposes and not allowing for too many exceptions (e.g. national security) [74]. To address digital security issues that go beyond privacy protection, the government proposed the **Computer and Cybercrimes Bill** in 2017 that is partly conflicting with the data protection and privacy standards as laid out by the Data Protection Bill. Its focus is on criminalising a wide array of cybercrime (such as hacking, false news, cyber harassment) and defining heavy fines for those. Despite resistance from the public due to concerns of violating media freedom, the law was assented by President Uhuru Kenyatta in 2018 [75]. It follows the suppressive approach against media of earlier legislation such as the **Media Council Bill** (2013). Reviewing the recent legislation (and legislative attempts) as a whole, it seems the different bills do not add up to a homogenous and consistent political approach towards issues around information, data security, privacy and freedom of the press.

5.3.2 INSTITUTIONAL AND REGULATORY FRAMEWORK

There are two major public institutions in the ICT sector that shape the sector, complemented by a number of smaller players. As noted above, the **Communication Authority of Kenya (CAK)** is the main **regulator** of the ICT sector. It has set regulations for Registration of SIM-Cards, Distribution of Communications Equipment, Tariffs, Universal Access and Services, Radio Communications and Frequency Spectrum, Numbering, Postal and Courier Services, Licensing and Quality of Service, Interconnection and Provision of Fixed Links, Access and Facilities, Electronic Certification and Domain Name Administration, Fair Competition

and Equality of Treatment, Dispute Resolution, Consumer Protection, Broadcasting, Compliance Monitoring, Inspections and Enforcement [76]. One of the key regulatory improvements that spurred innovation and prevented unnecessary regulation was the adoption of a **Unified Licensing Framework (ULF)** by the CAK's predecessor CCK in 2008. Since then, ICT operators and service providers are licensed according to three broad types of provision instead of detailed license-schemes that require separate licenses for different technologies and services. Network facilities providers who must bid for network spectrum are differentiated from non-infrastructure based service providers, and the hardware-based terminal equipment providers. Most of the digital economy, to the extent that they require a formal license at all, fall into the middle category. The technology and service-neutral ULF was able to accomodate the convergence trends of the industry (radio, tv, print, internet, telecommunications) as well as the dynamic, fast-paced technological changes that require a flexible regulatory framework. Licenses are awarded for 15 years, so as to provide sufficient planning certainty and time to recoup investments, and typically imply an annual license fee of 0.4% of annual gross turnover [77].

Among the various types of licenses, the market structure of Kenya's (formal) digital economy presents a typical picture with few players in the asset-heavy, infrastructure-type of business models and a much more fragmented market in content provision marked by many smaller and medium-sized companies in addition to big enterprises.

TABLE 3.

Type Of Licenses

TYPE OF LICENSE	NUMBER OF LICENSES	COMMENTS
INTERNATIONAL GATEWAY OPERATORS	12	All major Kenyan mobile & fixed line telco companies
SUBMARINE CABLE LANDING RIGHTS	3	
NETWORK FACILITIES PROVIDER TIER 1	3	country wide spectrum
NETWORK FACILITIES PROVIDER TIER 2	24	Regional spectrum usage
NETWORK FACILITIES PROVIDER TIER 3	30	Limited to county boundaries, > 80% Nairobi-based
APPLICATIONS SERVICE PROVIDERS	234	All major Kenyan mobile & fixed line telco companies
CONTENT SERVICE PROVIDERS	358	Includes banks, technology companies, education, entertainment, etc
SUB-DOMAIN NAME REGISTRAR PROVIDERS	65	
BUSINESS PROCESS OUTSOURCING PROVIDERS	26	
TELECOMMUNICATIONS CONTRACTORS	582	

The other key institution of the sector is the **Information, Communication and Technology Authority (ICTA)** which in turn is more involved in enabling and promotion of the digital economy than in its regulation. The ICTA arose out of a merger of the Kenya Information and Communications Technology (ICT) Board, the Directorate of e-Government, and the Government Information Technology Services (GITS) [78], thereby reacting to criticisms of an ineffective regulatory landscape with too many actors. The ICTA's main tasks lie standard setting, promotion and management of ICT in government services (e-government), promotion of ICT literacy, promotion of ICT infrastructure, and the management of critical public ICT projects.

The other public institutions of the ICT sector are presented in the table below. It is evident that the heritage and focus of many of these institutions lies in the communications space of ICT. This is understandable from a history of regulatory activity (in Kenya and around the world) in this critical infrastructure with network effects and monopoly tendencies and often state-ownership background even in pre-digital days, on the one hand, and that until very few years ago telecommunications and broadcast media constituted the vast majority of businesses and economic activity in this space.

This is in-line with the experience in developed markets where until the advent of digital business that dominate entire sub-sectors and collect, store, analyse and pass on vast amounts of sensitive data, regulation attention was also on physical and mobile network providers.

TABLE 4.

State Corporations under Ministry of ICT

COMMUNICATION AUTHORITY OF KENYA (CAK)	Independent regulatory body for the ICT sector that is responsible for licensing, frequency spectrum alloacation, monopoly prevention, ICT tariff regulation and the management of the Universal Access Fund
KENYA BROADCASTING CORPORATION	Independent regulatory body for the ICT sector that is responsible for licensing, frequency spectrum alloacation, monopoly prevention, ICT tariff regulation and the management of the Universal Access Fund
KENYA BROADCASTING CORPORATION KENYA	Commercial public enterprise providing postal services.22
KONZA TECHNOPOLIS DEVELOPMENT AUTHORITY	Regulating the development, management and maintenance of the Konza Technology City, a massive public infrastructure projects that aims to create a technology hub city from the scratch.
KENYA ICT AUTHORITY (ICTA)	Enabling and promoting ICT for government and business. Promoting ICT literacy, capacity, innovation, e-governance and enterprice in line with National ICT Masterplan(s).
KENYA YEARBOOK EDITORIAL BOARD (KYEB)	Enhancing Government communications as well as producing publications (such as the Kenya Yearbook) that highlight development.
MEDICAL COUNCIL OF KENYA	Safeguarding media freedom, enhancing professionalism by setting standards and accreditation of journalists, and arbitration of media disputes.

Agency under the State Department of Education, Science and Technology

THE KENYA NATIONAL INNOVATION AGENCY (KENIA)	Agency created by the Science Technology and Innovation Act of 2013, managing the national innovation system including innovations in ICT.

Semi-Autonomous Government Agencies

KENYA INSTITUTE OF MASS COMMUNICATION	Training tecnical and mass media personnel to serve both in media and communication industry.
NATIONAL COMMUNICATIONS SECRETARIAT	Advising on policies, carrying out specialized research and conducting continous review of the communication sector.
COMMUNICATIONS APPEAL TRIBUNAL	Hearing complaints and arbitrating in disputes between parties in the communications sector (media, regulatory agencies, telco companies).

5.3.3 STRATEGIC PLANS

The key strategic document that is guiding (or at least: supposed to guide) Kenya's politics in all domains is the **Vision 2030,** published in 2008 by then president Kibaki. In the Vision 2030, and even more so in the three five-year Medium-Term Plans (MTP) that have been developed since, ICT figures prominently. It is depicted one of the seven core sectors ('BPO and Information Technology-Enabled Services') as well as a key enabler for all economic, social and political goals of the Vision 2030. Most public institutions derive its own strategic plans from the Vision 2030 and the MTPs. The key strategic plans for the ICT sector are currently the **Kenya National ICT Masterplan (2014-2017)** published by the Ministry of Information and Communication, as well as the plans of its two key authorities: the **ICT Authority Strategic Plan (2013-2018)** and the Communications Authority of Kenya (CAK) Strategic

Plan (2013–2018), which was still published under the Communication Commision (CCK), but left untouched after the rebranding and reorganisation as CAK. The major recurring themes of these strategy documents are: increasing **ICT access**, decreasing the **ICT skills gap**, promoting **e-governance**, strengthening **competition** and **innovation**, and developing the business process outsourcing **(BPO)** and Information Technology-Enabled Service **(ITES)** sectors for income-generation and employment.

In addition to these high-level plans, there are a number of more specific strategy documents. **The National Cyber Security Strategy (2014)** lays out Kenya's approach to protecting critical information infrastructure and data. The government's **National Broadband Strategy (2013–2017)** has the objective to provide all Kenyan citizens with affordable broadband services and maps the necessary steps towards this goal. It does not only focus on infrastructure development but also covers education, capacity building, regulation and financing. Finally, the **Media Council of Kenya's Strategic Plan (2018-2023)** describes how the council seeks to improve media freedom and to develop the media sector, primarily by means of campaigns, trainings, meetings, reports and mediation activity.

5.3.4 KEY PROJECTS

Out of the various legislative acts, regulatory bodies and strategic plans, a number of important public projects have evolved. The following overview presents the key projects, their objective, status and financials.

TABLE 5.

Key Projects and Objectives

PROJECT	OBJECTIVE	START	STATUS	FINANCIALS
NATIONAL OPTIC FIBRE INFRASTRUCTURE	Ensuring connectivity in all the 47 counties throught 6.400km of fibre cable	Phase 1: 2007 Phase 2: 2014	Phase 1: Completed in 2009 Phase 2: Officially, all 47 counties connected	Phase 1: KSh 6 billion Phase 2: KSh 7.2 billion [79]
KENYA OPEN DATA	Making government datasets accessible for free to the public		Online since 2011. 44 million page views (until 2015) [80]. 565 data sets online (2018).	Funded by World Bank. Cost n/a.
KENYA ECITIZEN	Main e-government system allowing to submit many applications and reports. However this requires a smartphone or computer, no USSD functionality or similar for wider accessibility. Also, "digital identity" as pre-requisite: e.g. no online set-up of business included as major initial step for formal sector entrepreneurship.	2014	Piloted since 2014, live since 2015. 4 million registered users with more than 300,000 transactions per month (2018).	Seed-funded from World Bank / IFC. Scandal about private appropriation of revenue collection. [81]
KONZA TECHNOLOGY CITY / KONZA TECHNOPOLIS	Grand-scale technology hub aiming to create thousands of BPO and ITES jobs and promote innovation	Idea announced 2006	Construction started in 2013. Electrification and first building in 2016/17. Planned completion in 2030.	Projected public funding: KSh 100 billion Projected private investments: KSh 500 billion [82]
UNIVERSAL SERVICE FUND	Promote ICT Access through network infrastructure financing, content development and capacity building	2009	Collected until 2018: KSh 7.1 billion. Plan until 2022: KSh 10.4 billion. [83] Unclear how much has been spent already.	Financed mostly through 0.5% levies on licensees annual turnover (proposed to increase to 1%).

PRESIDENTIAL DIGITAL TALENT PROGRAMME	equipping young ICT graduates with hands-on ICT skills through sponsored internships	2015	First batch of 100 graduates recruited as interns and absorbed by industry by now.	In 2018: KSh 100 million
CONSTITUENCY DIGITAL INNOVATON HUBS	support entrepreneurs and access to free Wi-Fi in all the 290 constituencies countrywide	2017	Only 11 hubs established by 2018 [84]	~KSh 5 million / constituency → KHs 1.5 billion [85]
DIGITAL LITERACY PROGRAMME / DIGISCHOOL	Equipping public primary schools with appropriate ICT infrastructure and teacher capacity building	2013	1.2 Million devices procured and distributed to 21,150 public primary schools. The remaining 3,183 public schools targeted for 2018/19.	Total Estimated Cost: KSh 17 billion 2018 budget: KSh 11.9 billion
AJIRA KENYA INITIATIVE	Train youth for online jobs / gig economy	2016	Did not take off, currently under review	unknown
DIGITAL MIGRATION IN BROADCASTING	Analogue to digital television migration to deliver improved quality and to free up spectrum for broadband.	2006	Completed in 2015	Estimated Cost: KSh 5.1 billion
PASHA CENTERS / DIGITAL VILLAGES	Aim to set up digital centres in each constituency to provide ICT access in rural areas	2011	Closed. Only 63 centres set up.	Budget: ~KSh 1 billion

5.3.5 STAKEHOLDER INVOLVEMENT IN POLICY-MAKING

According to a recent review [86], Kenya has developed an effective multi-stakeholder approach to ICT policy making since the National Rainbow Coalition (NARC) government had first invited stakeholder comments on the draft ICT policy in 2003. Here, the formation of Kenya's main tech representative network KICTAnet played a major role. By using the very inclusive and transparent means of debating important ICT topics over its mailing list, KICTAnet could gather opinions and insights from the country's digital professionals. It managed to adopt a very fruitful approach to lobbying through engagement with government rather than through confrontation and thereby gained respect and influence. The Kenyan government supported stakeholder involvement by recruiting members for its ICT board from the civil society. While the stakeholder participation on a national level is well developed in Kenya, it has been noted that Kenya's government, ICT institutions and CSOs do not yet fully participate as a stakeholder in international ICT policy making contexts, mainly due to a lack of economic and human resources [87].

5.3.6 RESULTING FRAMEWORK QUALITY

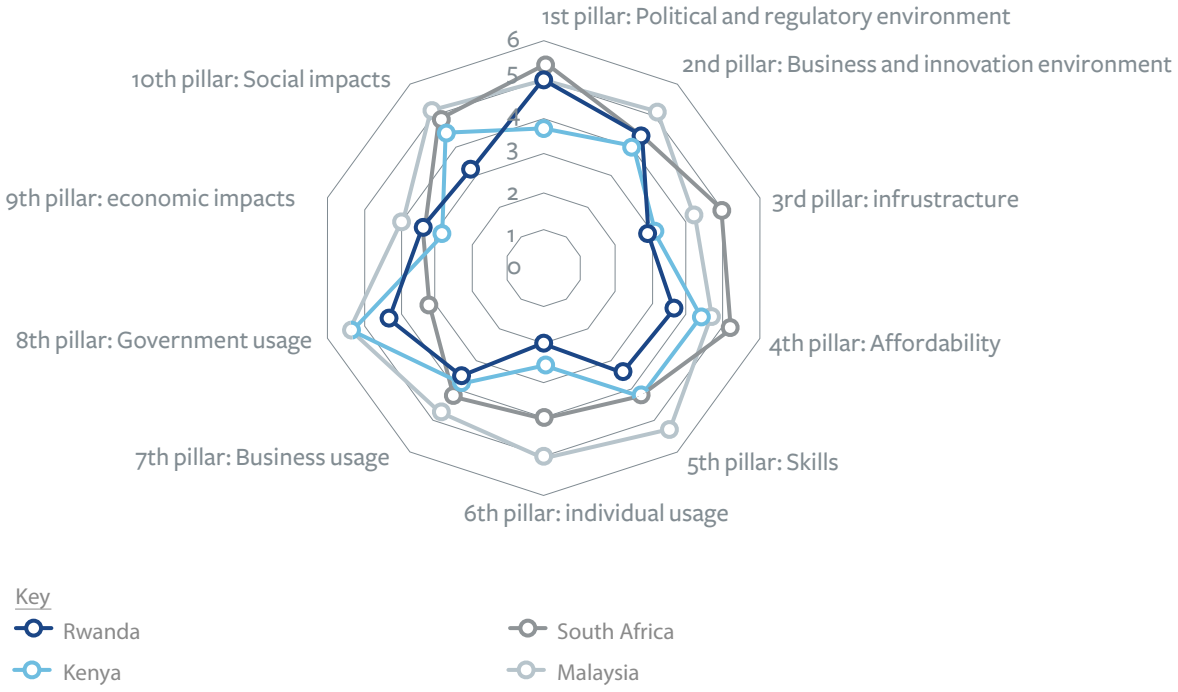
Taking stock, the **quality of Kenya's ICT framework is comparatively high**, especially in the Sub-Saharan context. Kenya ranks second in Africa on the ITU's Regulatory Tracker, and 45th in the world, far above its ranking in other development indicators. Kenya's regulatory framework is classified in the highest of four generations of frameworks, regarded to be led by economic and social policy goals that enable innovation and competition. While Kenya scores well and close to the maximum value on the aspects of "regulatory authority" (existence and quality), the "regulatory mandate" and the "competition framework" in the ICT space, with regards to the overall "regulatory regime" (i.e. what regulation exists in 15 major areas), Kenya only scores 21 out of 30 even though it had improved from a score of 10 out of 30 since 2007 [88]. It is notable, though that while these scores indicate the pro-competitive, -inclusive and affordable nature of Kenya's telecommunications infrastructure it has less direct bearing on the conduciveness of Kenya's policy

environment for the growth of its overall digital economy. Other ICT indicators are generally positive about Kenya's ICT framework quality and its impact. In the **ITU ICT Development Index** [89] Kenya scores higher than most Sub-Saharan countries (incl. Uganda, Tanzania, Senegal and Nigeria), but still substantially lower than South-Africa and far-off developed nations such as the USA (see graph below). This is driven by Kenya's **high mobile subscription rate, wide 3G coverage, low cellular prices and high mobile bandwidth** (speed). Shortcomings are in the domains of computer access, fixed broadband penetration and LTE coverage. With quality mobile internet access and a fast increasing spread of smartphones, these lower scores compared to developed countries are unlikely to hold back the growth of the consumer-driven digital economy. However, for business-to-business applications and more complex and higher-value digital services, reliable broadband uplinks and access to digital productivity tools (desktop and laptop computers, tablets with data entry and design peripherals) will remain essential and represent areas where Kenya still needs to catch up. In **McKinsey's** slightly outdated analysis from 2013, Kenya scored second in Sub-Saharan Africa in terms of internet development (**i5F index**) after South-Africa, [90] with particular strengths in national ICT strategy, financial capital and business environment, some shortcomings in ICT infrastructure and substantial room for improvement in the ICT skills base. That Kenya is in the middle of a digital revolution that has only recently started can be seen by the progress that Kenya made according to the **Digitization Index** developed by the ICT researcher Raul Katz and colleagues. The index reflects a country's level of digitalisation in the domains of ubiquity, affordability, reliability, speed, usability and skill. First classified in the lowest performing cluster as 'restricted' in 2013 [91], digitalisation has progressed in Kenya so that it was placed in the 'emerging' cluster in a 2015 recalculation of the index [92].

Looking at a wider set of factors, including the degree of adoption of communications access and social media, of digital distribution models by enterprises, cost, infrastructure and regulation of digital communications, researchers of Spanish multinational bank Banco Bilbao Vizcaya Argentaria (BBVA) in 2017 put Kenya at rank 76 out of 100 countries but first among large Sub-Saharan African economies other than South Africa. Its overall score in this "**DiGiX - Digitization Index**" puts Kenya at a level with Bulgaria, Indonesia, Tunisia or Peru. [93] The World Economic Forum's **Networked Readiness Index** of 2016 puts Kenya in a better relative rank (86 out of 139 or at the 61st percentile) but a similar company of peers. Kenya is positioned slightly below Rwanda, and 21 ranks below South Africa. While these indices strongly correlate with per-capita income in a country (70% in the case of the DiGiX), their composite nature allows a more nuanced picture of various success factors that create a setting conducive to the growth of the digital economy. This breakdown indicates notable differences between countries at comparable levels of development, and thereby highlights the discretion and potential impact that policy-makers have to make the most out of their country's macroeconomic context. Rwanda for instance has a roughly 30% lower per-capita income than Kenya, and much richer Argentina (more than 6 times Kenya's GDP per capita in purchasing-power terms) still clocked in three ranks below Kenya. In other words: while Kenya punches well above its weight when measured by the yardstick of its overall wealth and development, there's no reason to not put its ambition higher still.

FIGURE 11.

Networked Readiness Index



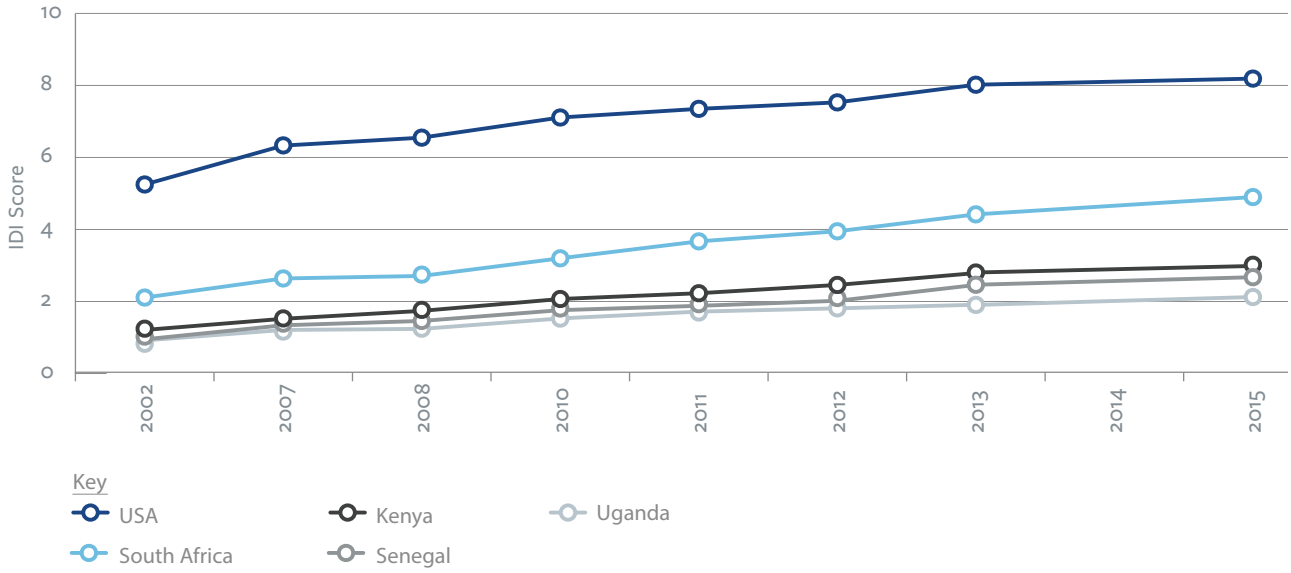
WEF Networked Readiness Index Scores, Source: Baller, S., Dutta, S., & Lanvin, B. (2016). Global Information Technology Report 2016. World Economic Forum

As innovation is one of the goals of every ICT framework, Kenya's good performance on the **Global Innovation Index** [94] indicates that the framework is not only factually up to modern standards as certified by the ITU Regulatory Tracker, but also effective in delivering its goals. Kenya's innovation framework ranked 3rd in innovation in Sub-Saharan Africa, before its neighbours Tanzania and Uganda and its tech-peers Senegal and Nigeria. Similarly, Kenya ranks 3rd in Sub-Saharan Africa in the **World Bank's Doing Business 2018**, [95] behind Mauritius and Rwanda but far better than Nigeria, Senegal, Tanzania and Uganda. Looking at the components of the index that are of particular importance for the digital economy, Kenya needs to improve its procedures around starting a business and trading across borders. When it comes to inclusiveness, Kenya's digital economy framework ranks decent in the internet.org's **Inclusive Internet Index** but less good than in other domains (51 out of 75 globally, 5th in Sub-Saharan Africa) [96]. It exhibits weaknesses in the availability and affordability, while the readiness of the population and relevance of content are ranked relatively high. Lastly, Kenya's generally good ICT policy framework is undermined by the high levels of corruption as indicated by Transparency International's Corruption Perception Index, where it ranks in the lowest (i.e. highest corruption) quantile and similarly poor to Nigeria and Uganda, but considerably worse than Tanzania, Senegal and Rwanda [97].

In general it can be summarised that Kenya's ICT framework is found to be among the leading in Africa, but that there is substantial room for improvement to catch up with more (digitally) developed countries, particularly with regards to the ICT skill base.

FIGURE 12.

Internet Development Index



5.4 THE INTERNATIONAL DIMENSION: KENYA AS A 'TAKER' AND 'SHAPER' OF REGIONAL AND GLOBAL ICT POLICIES

5.4.1 GLOBAL FRAMEWORK

As the major international regulatory agency in the telecommunications sector, the ITU is generally standard-setting for all countries' ICT sector. In 1994, Kenya signed the **International Telecommunications Regulations (ITR)** developed on the World Administrative Telegraph and Telephone Conference in Morocco in 1988 (WATTC-88), thereby adhering to a set of legally binding provisions. The ITR successor of the World Conference on International Telecommunications in Dubai in 2012 was not signed by Kenya due to an scandal about the Kenyan government ignoring civil society concerns in their position. [98] The influence of the ITU on Kenya's digital economy framework has generally been large, also beyond the provisions of the ITR. As a signatory to the ITU Geneva 2006 (GE06) Agreement, the Kenyan government agreed to an analogue switch-off (ASO) date of 17 June 2015 for its television broadcasting and worked towards this target. The CAK's Universal Service Fund was developed under ITU's framework for Universal Service Obligations. [99] The recently proposed Quality of Service guidelines by CAK for telecommunications operators was also inspired by a corresponding ITU recommendation. [100] In terms of Kenyan influence on the global ICT regulation, the CAK has retained a spot in ITU's Council for years.

While the ITU's mandate and scope is very bro ad, the **Internet Corporation for Assigned Names and Numbers (ICANN)** is the specialised international organisation for the regulation of core internet elements such as the management of the internet protocol systems IPv4 and IPv6 and domain registries. ICANN has recently announced the opening of its first African office in Nairobi. [101] As with the ITU, the CAK is represented in ICANN through its seat in the Government's advisory committee.

In relation with the **World Trade Organisation** (WTO) and its General Agreement on Trade in Services of 1994, Kenya had made several ICT-related commitments to achieve certain levels of liberalisation of the

sector. They were, however, not far reaching and mostly reflected the level of liberalisation in Kenya at the time. [102] Even though Kenya has hosted an important breakthrough meeting that saw the expansion of the **Information Technology Agreement** (ITA) of the WTO on tariff reductions in ICT trade, it has not joined the list of participants of this agreement yet. [103]

As an alternative approach to the USA- and technocracy dominated ITU , the **Internet Governance Forum (IGF)** has emerged to allow for the inclusion of multiple stakeholders in discussing ICT policy topics and setting the agenda for governments. While the IGF has evolved to an important means of bottom-up and multi-stakeholder-based participation in internet governance, it does not operate in standard setting or regulatory activities. Because Kenya's bottom-up tech szene is quite active, it has a notable influence on the local subsidiary (the East African Internet Governance Forum) and also the global IGF, which it has hosted in 2011. [104]

In addition to regulations and standards that affect Kenya directly, there are also indirect influences of international developments in ICT policy making. A key example of this is the new **EU's General Data Protection Regulation (GDPR)** of 2018 which has been deemed the gold standard of privacy and data protection. As it is directed towards protecting data and privacy of EU-citizens, it has implications for Kenya wherever Kenyan businesses deal with EU user data. With an increasing gig economy and digital outsourcing industry, the scale of the consequences might be larger than expected. As a recent report by Dalberg consultants on the implications of the GDPR for Africa put it: "With no African country currently deemed to be compliant with the GDPR, its introduction risks disrupting the USD 14 billion in annual exports from Africa's digital economy to the EU". [105] However, Kenya is on the way in aligning its policies to the GDPR, as its recently published Data Protection Bill draft borrows heavily from the EU's blueprint. It will make Kenya the second country in East Africa after Rwanda to have legislation dedicated to data protection. [106] However, limited recognition of sensitive data and a number of exceptions to privacy protection mean that Kenya is likely not GDPR compliant yet.

5.4.2 REGIONAL FRAMEWORK

On the regional level, a number of organisations that deal with the governance of the digital economy exist. However, most of them serve as intermediary organisations between national authorities and the big, policy-influencing and standard setting players. The following organisations are of relevance in the regional ICT framework: [107]

- Division of Information Society (ISD) African Union Commission
- East African Communications Organisation (EACO) authorities
- African Telecommunications Union (ATU)
- Africa Network Information Centre (AFRINIC)
- Africa Top Level Domain Organization (AfTLD)
- African Information Society Initiative
- Africa Union Convention on Cyber Security
- African Union Convention on Cyber Security and Personal Data Protection
- The East African Community Electronic Transaction Bill 2014

5.5 AN INSIDER VIEW - PRIMARY RESEARCH

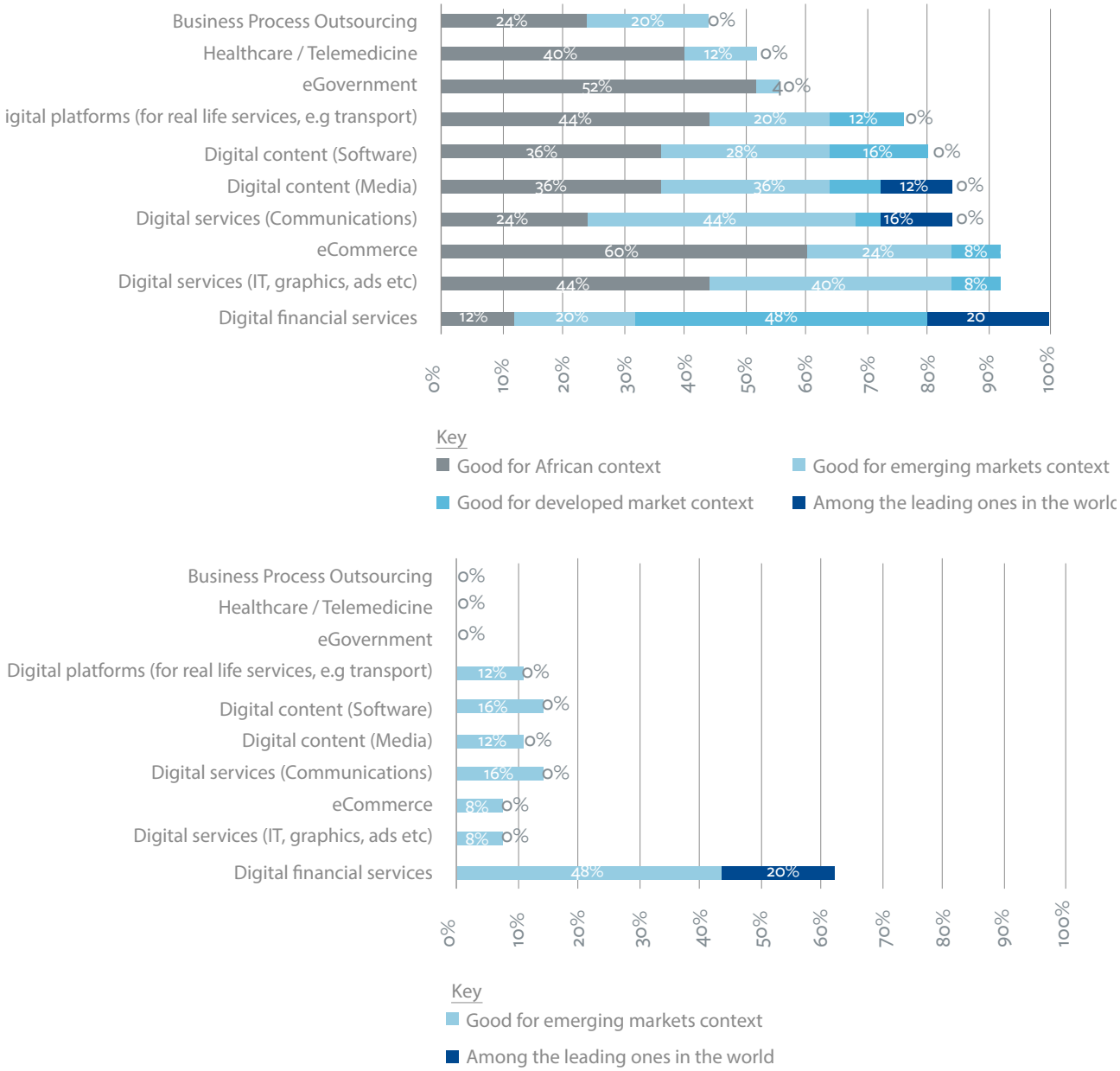
In order to provide further inputs for the research focused on assembling this report, primary quantitative research was conducted among Kenyan stakeholders, entrepreneurs and experts, supported by a mixture of international experts familiar with the digital economy and developing markets.

5.5.1 INTERNATIONAL EXPERTS

The **digital economy sectors of Kenya were overall rated positively** with digital finance, digital services and eCommerce standing out as the strongest areas. Of those who indicated awareness of the country, digital services, eCommerce, digital content and the digital financial services were all rated overall very good within Kenya, with the **financial services standing out by far** with almost 50% rating it good even for developed market context and 20% rates it among the best ones in the world. It is followed by digital communication services (44% and 16%) and digital IT services (40% and 8%).

FIGURE 13.

Rating of Kenyas Digital Economy Categories

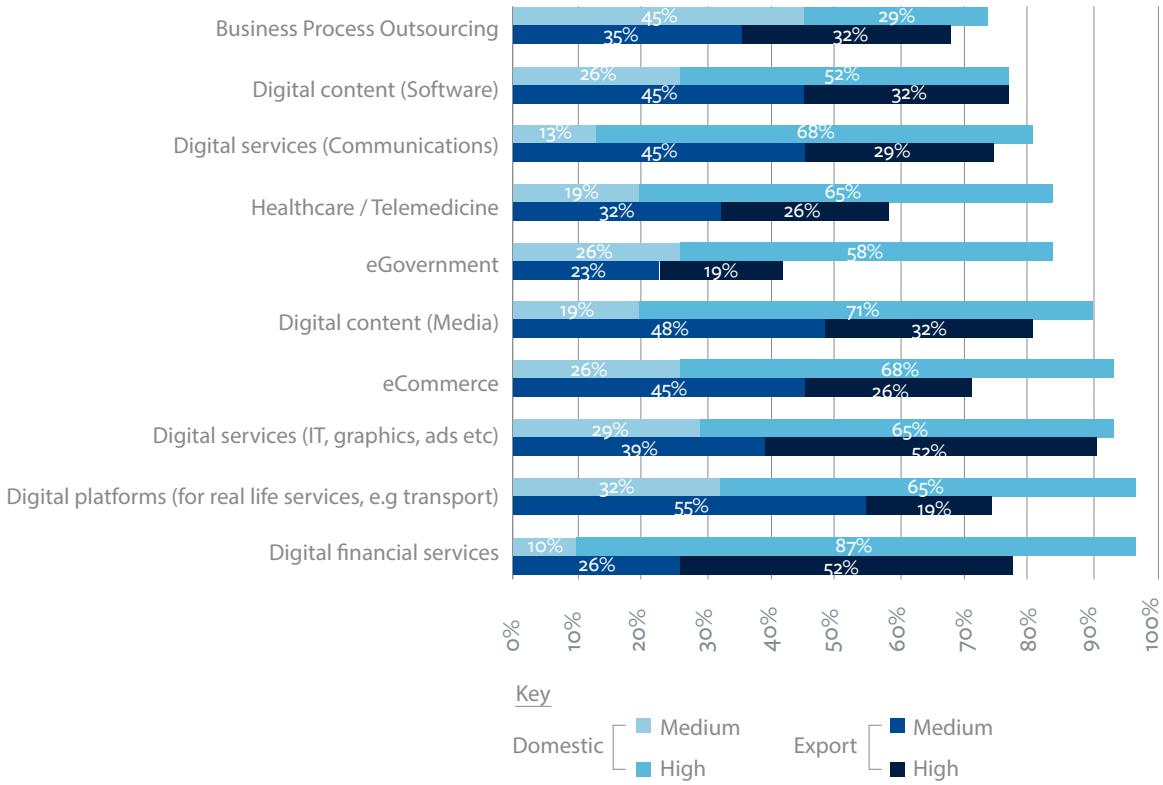


Graph, Rating of Kenyas digital economy categories

Even more optimistic were the experts regarding the **domestic potential of the digital sectors**, estimating relatively high export potential for them, mainly because of the cheap and experienced workforce. In the evaluation of the domestic potential of a developing country such as Kenya by the experts who are familiar with emerging markets, digital finance took first place (97% indicating medium / high domestic potential), followed by real-life services' digital platforms, digital IT services and eCommerce. It was noted that in a population with high mobile penetration the digital channels become more important and the challenges and solutions focus on the marginalized communities, having the potential to „leapfrog" the traditional developed solutions and become successful. Overall in a developing country like Kenya is, the digital services (e.g. IT, ads), digital content (both media and software) and financial services was thought to have the highest export potential. This is likely due to relatively cheap specialized workforce for digital services and content, and successful use cases for financial services.

FIGURE 14.

Kenya's Market Potential Per Category

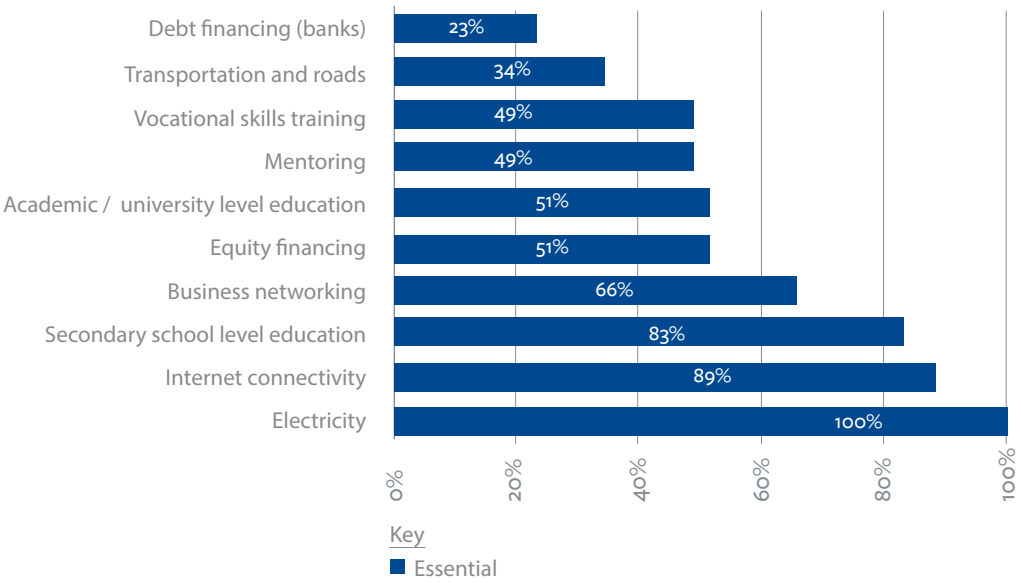


Graph, Kenyas market potential per category

Internet connectivity (89%) and **secondary school level education** (83%) ranked among the most important dimension of the infrastructure to enable the digital economy in a country, besides electricity, which was all around agreed to be essential. While other areas were also thought to be important, there is a significant drop after the top 3 in thinking if the field is essential for growth.

FIGURE 15.

Importance Of Infrastructure In a Country's Digital Business

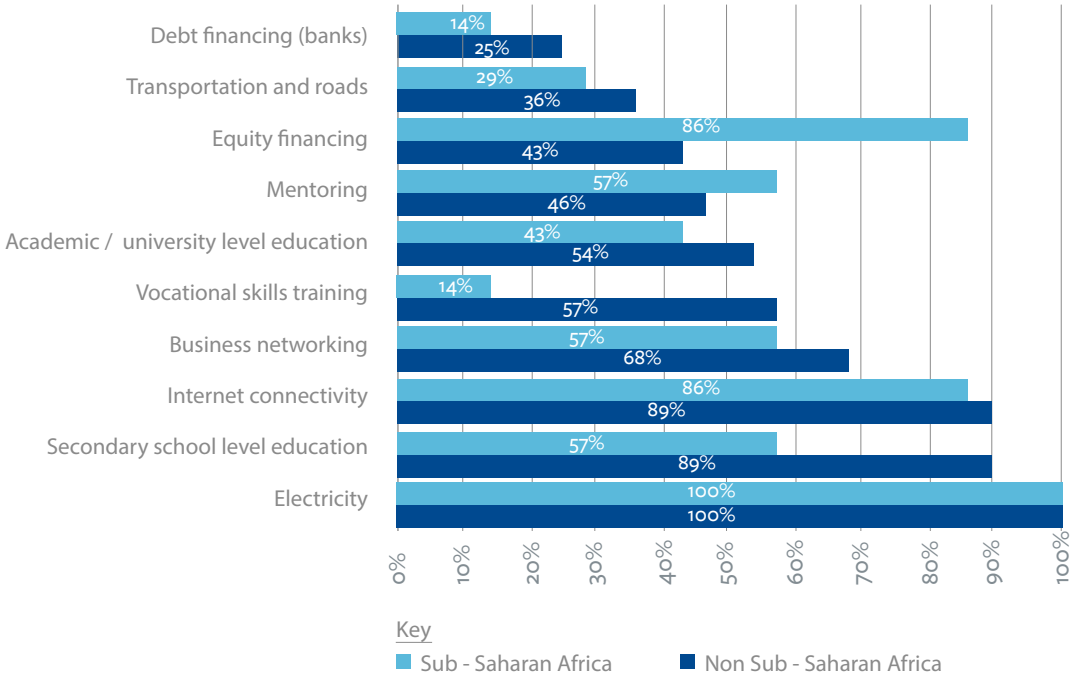


Graph, Importance of infrastructure in a countrys digital business

For the African experts, education overall did not seem to be the core issue, much more the equity financing aspect. For the African respondents, **equity financing** stands in the second place tied with internet connectivity in order of importance (86% marked as 'Essential' vs 43% for the other experts), while debt financing is only 14% indicated as essential (vs 25%). Another dimension that stands out is the question of training: in all levels – especially in vocational skills training (14% vs 57%) and secondary school level (57% vs 89%) – deeming it much less important than their colleagues from outside of Africa, instead putting a greater emphasis on **mentoring** (57% vs 46%).

FIGURE 15.1.

Essential Infrastructure Among African / Non-african Experts



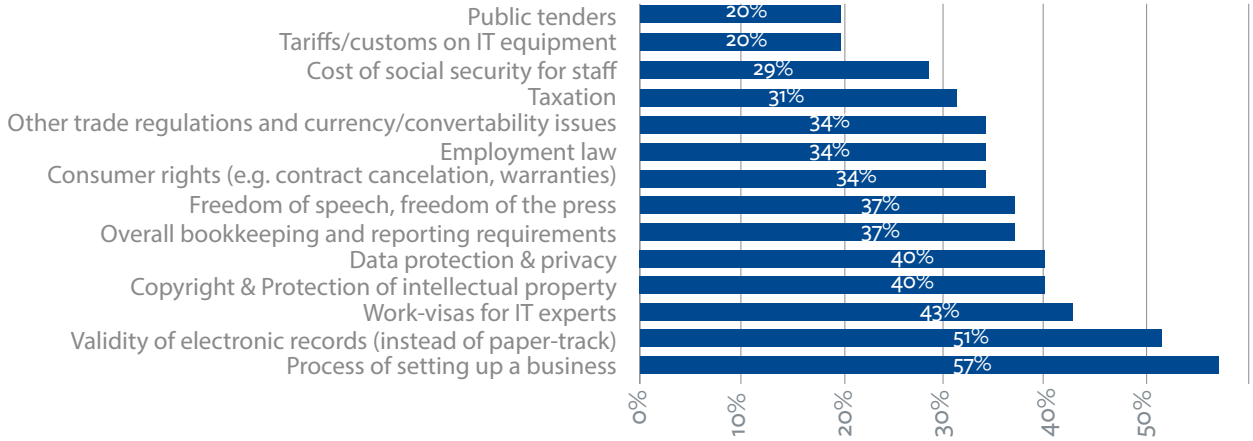
Essential infrastructure among african/non-African experts

The most important policies and regulations in order to attract foreign investment were the **process of setting up a business** (57%) and the validity of electronic records (51%), followed by intellectual property laws, data protection (40%-40%), bookkeeping and reporting regulations and freedom of speech (37%-37%). Whereas African respondents focussed on the reliability of the overall framework (rule of law, freedom of speech, business set-up) – possibly confident to navigate other aspects within available profit margins – non-African experts emphasized the quality of detailed legislation. Hinting at having a more open framework of the country – such as setting up a business (86% vs 50%) or freedom of speech (57% vs 32%) – is more important than the detailed / narrower regulations – copyright (29% vs 43%) and employment laws (14% vs 39%) – or the ease of importing experts from abroad (work-visas of IT experts (50% vs 14%)).

The South-East Asian and African region was indicated as key sources for best practices to be inspired of for the Kenyan policy dialogue. **Rwanda and Malaysia** were mentioned multiple times for their positive political framework supporting companies in the tech sector and a digital-first policy framework, besides the European Union's approach in supporting entrepreneurs and innovation. Some other concrete international examples mentioned include e-Estonia movement, Rwanda's eGov online platform, Ghana's Mobile Money Interoperability System, India Stack and Speed Lebanon.

FIGURE 16.

Essential Policy / Regulations Support



Essential policy/regulations support

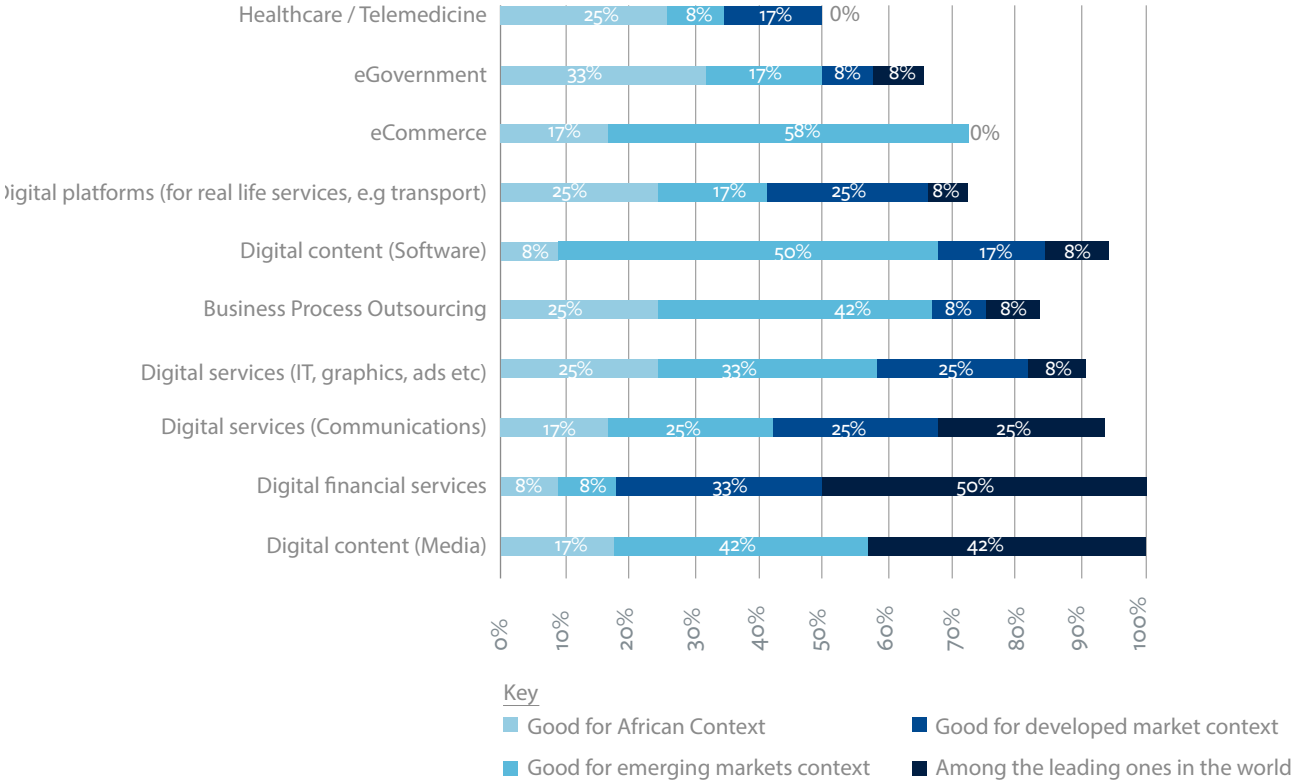
Key infrastructural project examples to boost the digital economy in Kenya were mainly focused around three aspects that scored high previously in the infrastructure importance question: the promotion of building out broadband internet network, to support primary and secondary education to broaden the literate base to involve in the digital economy and the support of start-ups through easing the set-up process and introducing **accelerator programmes**. Compared to this, the experts' expectations towards their own countries' policy-makers were focused around transparency, simplification of regulations and processes, and a more structured framework for venture capital access.

Change is seen by most of the experts as something that must be sparked from outside of the country and from top-down. The most recommended tools / channels to reach policy-makers were **lobbying** & dedicated think-tanks (both 71% - the latter more emphasized by African experts), media exposition (57%) and influential international companies (54%) and organizations (43%), while having very little faith in interaction with political parties (11%) or parliamentary reports (14%) as well as grassroot activism (17%).

5.5.2 KENYAN EXPERTS

Both the overall level of development of the digital economy and both the highest ratings are more prominent among Kenyan experts than the international respondents. Digital financial services stand out by far, half of the interviewees believing it to be among leading ones in the world and 33% rating it good for even developed market's context, while half of the experts put digital services (ranked second) comparable to the developed markets' and world's best.

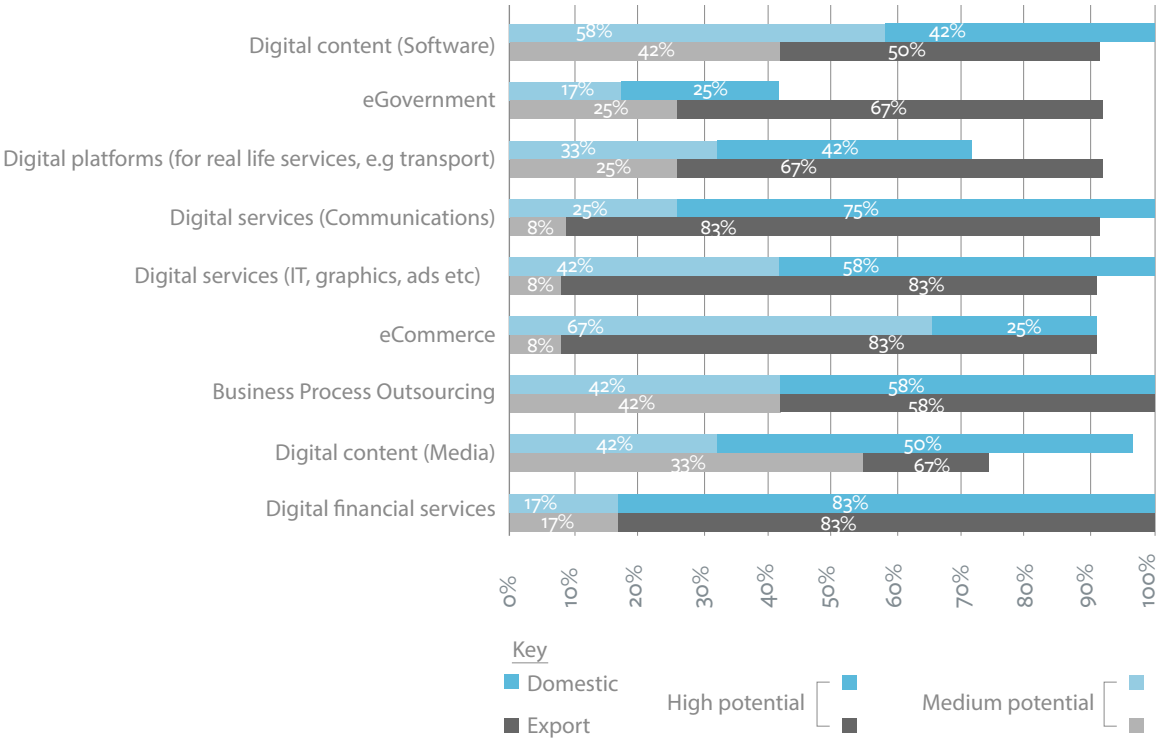
FIGURE 17.
Kenyas Current Level Of Sophistication



The **opportunities** for the Kenyan digital economy were evaluated very **high / favorable for both the domestic and the export market**; key areas: Digital financial services, Digital services (Communications) and Digital content (Media). The country's domestic market was rated extremely favourable with a 93% average seeing at least medium potential in the different areas, with the majority indicating high potential rather than medium. Three outstandingly highly rated sectors were Digital content (Media), Digital financial services and Business Process Outsourcing, followed very closely with all remaining categories, but Healthcare which was rated a bit lower. The export outlook was also quite favourable, however a bit more conservative with 88% of the sectors marked at least with medium potential, however only a 49% marked any as high. Digital services (Communications) and Digital financial services were rated highest but were followed by other type of digital content and services as well as BPO.

FIGURE 18.

Assesment of Kenya's Potential in Domestic and Export Markets of the digital economy.



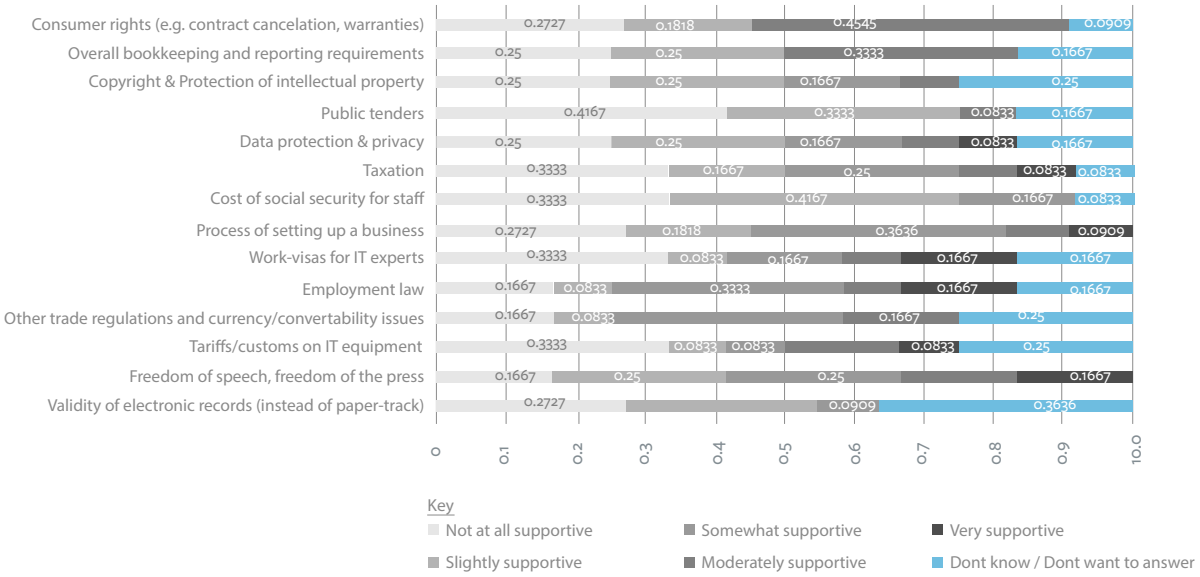
When asked if the quality of certain infrastructure areas affect businesses in a positive or negative way, Business networking (67%), Internet connectivity (67%) and Equity financing (58%) were listed having the most positive effect on the infrastructure, while by far secondary education indicated as the most negative effect (-50%) among the infrastructure together with debt financing (-42%), marking the areas most in need of change.

Validity of electronic records (36%) and **freedom of speech** (33%) are deemed the **most supportive** policies in the country, bookkeeping and reporting requirements and customer rights lagging very far behind, **but taxation, copyright and intellectual property laws and data protection / privacy** also got predominantly marked for **not** or only slightly **supportive**. This is further emphasized by having the two latter policy topics among the 5 most important (alongside tariffs on IT equipment, employment law and freedom of speech), while reporting an unfavourable current condition.

The respondents' recommendations towards policy makers were formulated around three key topics: stakeholder involvement and human-centric design, supporting innovation and making it easier to start a business and to export in Kenya.

FIGURE 19.

Kenyan Policies and rate of support.



Regarding the institutions supporting and affecting the businesses everyday life, a more startup-specific supportive environment is reported with the most relevant and helpful institutions being Incubator programs (83%), international and Kenyan NGOs (75% and 67%) and coworking spaces (67%). Among the examples brought up were both venture capitalists (KCB Lion's Den, Novastar Ventures), NGOs (Kictanet) and hubs (iHub, Strathmore University) that can act as and represent best practices in Kenya.

The experts' opinion aligned on that the stakeholders and policy makers are not as well-informed as they should / could be, highlighting that this area should still be focused upon to support successful negotiations. While industry associations and relevant ministries / agencies were thought to be relatively well-informed (about two-third at least well-informed in the topics), regular party and parliament members were not so much, showing that an informational campaign should also touch on the key stakeholders' education to better represent their people. Informedness of Kenyan ICT policies, plans, laws and regulations were low, on average 3 out of four experts choosing to not answer the question or select don't know option, possibly either because they were not directly relevant to the respondents' day to day work, while also possibly further hinting on communication issues.

The majority of the Kenyan respondents agreed that the Kenyan digital business world and the policy-makers do not engage sufficiently with each other, key reasons identified to be worry of corruption and the slow, bureaucratic processes, but often even that is not transparent who the stakeholder party should be from the policy-makers side. On the other hand, policy-makers seem to lack understanding of the digital businesses, hand in hand with lack of interest and overview of the market. As a potential solution that could address some topics for both sides could be organization of mitigated roundtable discussions and overall restructuring and communicating the responsibilities and opportunities (first as a revamp for policy-makers and then to the businesspeople)

5.6 GAPS, CHALLENGES AND RECOMMENDATIONS

EDUCATION & SKILL SHORTAGE

In the much cited Economic Update for Kenya in 2010, the World Bank put ICT at the center in explaining the past economic success and predictions for the next decades. The key threat towards a prosperous future as a regional and international ICT hub was identified to be Kenya's lack of a qualified talent pool. [108] This weakness has been emphasised in many studies and reports since then. An iHub Research report summarises the core of the problem: *"The employability of youth in digital jobs is particularly hindered by a gap between theoretical skills, attained by youth through various programs, **and practical skills**, sought after by employers"*. [109] While the sheer number of tertiary institutions and students has grown substantially in recent years, it is likely that quality didn't follow suit, and may even have suffered. This is not an ICT-specific phenomenon, but has been observed for the whole tertiary education sector. A World Bank report warned of **"expansion without quality"** [110]. It is thus a lack of general quality in tertiary education combined with a disconnection from market needs that drags Kenya's ICT framework behind in terms of education and skills. Our own survey results among international experts and stakeholders highlights that tertiary education is not necessarily regarded as a key prerequisite, but that a strong secondary education, vocational skill training and business expertise rank higher in importance for a digital economy framework. This is in line with calls for more practice-orientation through **specialised ICT training** and **on-the-job training** in Kenya [111]. To build a solid ICT skill basis, Kenya has recently invested heavily in ICT equipment in schools (one tablet per child). However, such infrastructure can only be useful when the people who are supposed to use it have the appropriate skills. According to a 2018 report by the Kenya Institute of Curriculum Development (KICD), only 39 per cent of Kenyan teachers use ICT to teach despite having the facilities [112]. Finally, it has been highlighted that improving basic digital skills and especially spreading the use of ICT requires **general literacy and english skills** as a prerequisite [113]. However, Kenya's literacy rate of 78% (above age of 15) is higher than in Uganda (73.9%), Nigeria (59.6%), Senegal (55.7%), Rwanda (70.5%) and only slightly lower than Tanzania (80.3%) indicating that general schooling is already quite successful and that Kenya can build on these good foundations. Because building up a locally-sourced ICT talent pool is a difficult long-term project, Kenya should additionally seek to **recruit international talents** as much as possible. Here, three main sources appear fruitful to target: 1) Multinational organisations (MNOs), 2) Diaspora, 3) Digital nomads. Kenya should strengthen its role as an African ICT hub to attract more (digital) **MNOs** and other ICT-related organisations to open regional headquarters, which will lead to an inflow of more digital talent. Attractive tax frameworks, easy business registration, visa and permit processes as well as good ICT infrastructure could facilitate this process. **Sourcing ICT talents from Kenya's diaspora** can be an additional source of talent inflow that could be promoted by active government outreach and attractive relocation assistance. [114] **Digital Nomads** could in turn be attracted through marketing Kenya's high touristic value, relatively high security and good ICT infrastructure.

ICT ACCESS & USE

While ICT access has generally developed favourable in Kenya and is one of the strengths of its digital economy framework, there is room for further improvement especially with regard to **rural areas**. According to the **ICT Access Gap Study** from 2016, geographical coverage of 2G and 3G was only 45% and 17% of Kenya's

land area, respectively. Due to relatively high urbanisation rates and concentration in towns and villages, the population coverage was much higher at 94.4% for 2G and 78% for 3G. While coverage has likely improved and is supported by new 4G networks, the Access Gap study points towards underprovision of rural areas with ICT access. In order to further promote network coverage Kenya should learn from a recent Global System for Mobile Communications Association (GSMA) study that points to a **negative relation between spectrum fees/auction prices and subsequent network coverage** and quality. [115] While Kenya's spectrum fees have not been excessive in comparison to its African peers (see Table below), the GSMA study observes that developing countries overprice their licenses put into relation to population or expected revenue per user. The report strongly recommends to keep license fees low and only to cover the cost of spectrum management in order to pave the way for high coverage ratios. Kenya should bear this in mind when issuing new 4G licenses or when pricing future **5G spectrum licenses**. Another best practice in terms of closing inter access gaps is to **partner with the private sector**, such as Telkom is recently doing with Google's Project Loon, aiming to provide rural internet access via high-altitude balloons from 2019 onwards. [116] In terms of supportive infrastructure such as electricity provision, Kenya should continue its recent efforts to close the access gaps (through the "Last Mile Connectivity Program") which allowed for an increase of **rural electricity access** rates from 7.2% in 2010 to 48.4% in 2016 . While Kenya performs relatively well in most of ITU's Key ICT Access statistics, the greatest weakness lies in the low rates of computer access (14.8% vs. a global average of 46.5% in 2016). [117] A more favourable tax and duty framework could spur higher penetration rates of computers (see section on taxes below). It can be argued that better access to computers will also stimulate the most necessary growth in deepened ICT skills, whereas a focus on mobile phone internet access may restrict Kenyans to mere end users of digital technologies without the option to advance ICT skills much (in terms of programming or system administration skills). Another supportive infrastructure challenge that needs to be tackled is the **lack of a coherent national addressing system (NAS)** that makes e-commerce delivery complicated, if not impossible. While the government has announced the introduction of a proper NAS that will enable e-commerce to flourish, it yet has to deliver on this.

TABLE 6.

Spectrum Fees

COUNTRY	4G SPECTRUM FEE ($/MHZ) [118]
KENYA	$ 1.25 Million/MHz
NIGERIA	$ 0.8 Million/MHz (2.3 GHz band) $ 1.6 Million/MHz (2.6 GHz band)
TANZANIA	$ 0.5 Million/MHz
MOZAMBIQUE	$ 3.0 Million/MHz (withdrawn due to excessive price)
GHANA	$ 3.4 Million/MHz
SENEGAL	$ 2.7 Million/MHz

CYBERSECURITY, PRIVACY AND OPEN DATA

In terms of data, privacy and security, Kenya's digital economy framework will have to strike the right balance when dealing with questions around data, privacy and security protection. From an economic development point of view, Kenya need's to **strengthen its intellectual property (IP) rights** as envisaged with the draft Copyright Amendment Bill of 2017, in order to promote both local IP industries as well as the BPO sector, which relies on data security and intellectual property laws for sourcing **data processing jobs.** Promoting

the development and dispersion of **open-source software** can also be part of a revised intellectual policy framework. Open-source can be a chance for reduced software procurements costs for the state as well as lower access barriers to certain software types (e.g. office or graphic editing software) for users. In a similar vein, the government should continue to increase its **open data** service, to allow for transparency and monitoring on the one hand, and to stimulate research and data analysis on the other hand. **Big Data analytics and AI** projects will benefit from this. Additionally, Kenya should work on enacting its Data Protection Bill to **increase privacy protection**, equally for economic reasons as well as human rights protection. However, the government will have to make sure that the law is enforced enough and not rendered ineffective by too many exceptions to data protection and privacy, such as those granted by the recently enacted Computer and Cybercrimes Bill. At the same time, the legal efforts to establish more cybersecurity are necessary and overdue. Cybercrime is a key challenge for doing business and has cost Kenya $36 million in 2013 only. In 2016, this loss has increased to $171 million. [120] When it comes to **net neutrality**, Kenya should develop [119] its own, African-based stance that may differ from western interpretations or valuations. It might well be that slight deviations from the ideal of net neutrality such as letting Facebook or Wikipedia provide free, but limited internet to disadvantaged populations will benefit Kenya more than it harms. [121]

TAX&TARIFF FRAMEWORK

The taxation and tariff framework is related to the digital economy primarily in two ways. First, a conducive and reasonable tax and tariff environment is a prerequisite for the growth of the ICT sector (enabling). Secondly, the existing tax&tariff framework is challenged by some technological developments and needs to be adjusted to ensure fair competition and little friction (adaption). On the enabling side of things, Kenya need's to make sure that short-term considerations about tax or tariff incomes don't cause long-term damage in terms of decreased technology adoption and use due to unattractive or unaffordable prices. While Kenya's **VAT exemption** of ICT goods in 2009 was certainly a sign that the government was aware of this, the re-introduction of the VAT on ICT products with the **VAT Act in 2013 was a great step backwards**. There is evidence that the tax exemptions have helped to boost penetration after 2009, and that the re-introduction will thus slow down the growth of the sector. In Kenya's 2018 budget speech it was announced that at least computer parts could be exempted from VAT to **encourage local assembly and production of ICT goods**. While this government decision goes in the right direction, final ICT goods will continue to be charged with VAT. The VAT charge of 16% is still relatively small compared to 20 to 30% percent duties to be paid on ICT components [123] or used computers. While Kenya's environmental and cost concern about dumping of old computers inside the country is understandable, the 25% duty on used computers has been criticised for blocking **access to affordable ICT equipment**. [124] The overall tax and tariff framework has been criticised as inconsistent [125] and the CAK holds high import duties partly responsible for slow take-off of e-commerce [126]. In the 2014 Information Technology and Innovation Foundation (ITIF) Ranking of 125 countries, Kenya ranked 36th in terms of specific ICT taxes and tariffs (1st=highest cost). [127] The ITIF also predicts that a reduction of ICT tariffs as part of joining the WTO's second ITA agreement would **spur economic growth** in Kenya and outweigh foregone tariff income over time. It would additionally increase use and dispersion of ICT goods in the whole economy. [128]

COMPETITION & INNOVATION

Ensuring competition and innovation in a digital economy framework faces to challenges: 1) digital

economies tend to build monopolies due to network effects and quasi-zero-marginal cost; 2) the digital sector undergoes fast changes and a high pace of technological innovations that can render all-too inflexible regulatory regimes ineffective quickly. In terms of **monopolies**, Kenya has seen the rise of Safaricom to become a very dominant player in mobile communication and mobile money markets [129]. In 2018, Safaricom had a market share of 68.4% in mobile data, 66.5% in voice traffic, 77.2% in mobile money, 94.9% in SMS. [130] In order to keep up innovation and drive down prices, Kenya's regulating authority CAK needs to **break up Safaricom's monopoly power**. The CAK had ordered a competition market study which was finalised in 2017, and should consider the implementation of the key recommendations: Prohibition of on-net discounts, prohibition on individually tailored loyalty schemes and promotions, enabling of cross-platform money transfers at no surcharge (interoperability), sharing of Safaricom net/towers with other operators on cost-basis, replicability of retail tariffs, reduction of license fees for small-scale operators to enter competition [131]. When it comes to dealing with the fast-changing nature of the digital sector, Kenya can learn from its own experience with the regulatory environment that enabled the phenomenal growth of ICTs since 1998. Other than ensuring for competition, Kenya has generally had a passive but open ('wait and see') approach to regulation of new developments in the ICT market, which allowed innovation to happen in the first place. [132]

While wait&see is good start as a regulatory approach, the digital economy framework needs to become more flexible and adaptable on the one hand and activating and acting as a catalyst on the other hand. The many recent government initiatives illustrate a seriousness of purpose among Kenyan policy-makers for actively creating a "Silicon Savannah". They also illustrate, though, the risk of large scale policy and infrastructure action in the context of the digital economy to be outpaced by technological advances, changes in consumer preferences and industry dynamics. Given the long-lead times involved in generating an idea, building consensus and shepherding it through political decision-making or even legislation, fundraising, planning and permission-granting, a project's relevance may well have faded until it is brought to realisation. The ICT sector itself has in recent years undergone an evolution to cope with the speed of such change and the complexity of the environment that solutions need to serve: large-scale, costly and long-running IT development processes with rather fixed objectives or specifications and structures have been increasingly abandoned in favour of a more agile development process [133]. Outside of investments in basic infrastructure itself, policy-makers may want to take note of these concepts that like others from lean management have widely shaped leading digital economy players from startups to multinationals.Kenya should have a closer look at how Denmark (ranked 1st in EU's Digital Economy and Society Index 2018) has recently gone about implementing **agile regulation**: Denmark has made this digitally-informed regulatory approach a key pillar in its Digital growth strategy and now requires authorities to assess all commercial regulations for their agility. Another role model could be Malaysia's **sandbox-approach** to technology regulation that provides live testing grounds for new businesses and business models that are safe-guarded on the one side but at the same time enjoy regulatory flexibilities. However, any regulation can only be as agile in its effects as the players that are regulated. Kenya should work towards a 'failure culture' that makes repeated trial-and-error not only a laboratory method, but is also applied to business models and technologies. To support the development of such a culture, Kenya needs to reform its insolvency framework: It takes terrifying 4.5 years in Kenya to resolve an insolvency, compared to 2.9 in South Africa and 1.7 in OECD countries [135]. Another obstacle to agile regulation is the existence of **too many public actors**. While the concentration and streamlining of tasks in the ICT Authority was a great achievement, it is still questionable whether all the existing authorities and boards [136] are necessary and provide additional value, or whether they create inconsistencies and inefficiencies. The same must be said about the plethora of strategic plans of the different agencies or published by the government.

PROMOTION OF INCLUSIVE DIGITAL ECONOMY

In addition to providing a conducive infrastructure, tax and regulatory framework, the Kenyan government should also actively promote the digital sector for inclusive growth. While the Kenyan government shares this vision and has declared the **promotion of business process outsourcing (BPO) and Information Technology-enabled Services (ITES)** as core pillars of its policy towards achieving the Vision 2030, it has yet only had very moderate success in these sectors. The **key problems** identified in the failure of kickstarting the BPO / ITES industry are: lack of scale (both a cost and capacity problem), too many small players, to few big ones, lack of international trust, lack of experience. [137] While openly acknowledging these problems, the government's current plan to stimulate the ICT outsourcing industry mainly focuses on the domestic market, by encouraging public authorities as well as the private sector to outsource to Kenyan-owned outsourcing providers. [138] This well in line with the actual development outsourcing sector, which has more and more turned inwards serving local businesses despite its initial goal towards international clients. [139] However, a **focus on domestic markets has severe disadvantages**, namely substantially reduced profit margins, a limited demand and the risk of an inward-directed development that is not linked to international markets and therefore does not allow for a convergence in terms of quality, know-how and business practice. The only strategy of the government towards an internationalisation of the industry is given by including local outsourcing businesses in international delegations to connect them with potential clients. While this is certainly not a bad idea, it seems the government is not actively addressing the key challenges identified above. It needs to **work towards larger, more professional and more experienced outsourcing players** that are trustworthy, competitive and have the capacity to actually handle large outsourcing projects. There are primarily two avenues to achieve this: either through **strengthening and consolidating the locally-owned outsourcing industry**, or through attracting **more international BPO / ITES companies**. The former has the advantage of keeping all revenues in the country, but might suffer from a lack of professionals skills and experience. The latter has the disadvantage of sharing outsourcing revenues with foreign shareholders, but would bring in international expertise. Strengthening local players could involve stronger financial support through **tax exemptions or subsidies**. As lack of scale seems to be a key obstacle to the current growth of the industry, such 'infant industry' protection can be regarded as an acceptable and useful form of state intervention, as long as the protection strategy is clearly export-oriented and is aimed to end as soon as reasonable scale and competitiveness is reached. Another, less protectionist measure would be to actively connect Kenyan outsourcing businesses to potential buyers and to engage in international marketing. This could be done via a state agency (such as the ICTA), as done successfully in Malaysia through Outsourcing Malaysia [140] and the Malaysia Digital Economy Corporation (MDEC). [141] The MDEC is also very active in skill enhancement through trainings and mentoring programs. Alternatively, private sector initiatives such as the Global Impact Sourcing Coalition (GISC) could be supported. Another promising option is the already mentioned attraction of **digital nomads**, which in addition to bringing skills and money with them are likely to engage in **contracting Kenya's higher-value and creative outsourcing industry** for their own freelance projects and thereby connecting them to the international market. Simplified visa requirements, attractive co-working spaces that combine touristic value with good digital infrastructure, and provision or facilitation of housing are all it needs to **become an attractive digital nomad location**. [142] Given that Kenya provides all these and can even add economic and political stability, reasonable levels of security and affordable living costs, it could really become a hub for digital nomads. Some private-sector initiatives such as the impact sourcing agency **Digital Lions** in Northern Kenya have already made good experience with the skill transfer and connection to international clients through digital nomads, but also with professional volunteers who came to support the project. **Voluntourism** could thus be a second, very related avenue for connecting the

local outsourcing industry to international markets, although this could only work for non-profit or social businesses that are attractive for volunteers. ICTA should become more active in the marketing of Kenya for Digital Nomads and ICT Volunteers, e.g. through a dedicated program (code-and-travel?) inspired by the success of work-and-travel in Australia. The advantage of a digital nomad and volunteer sourcing strategy is that the Kenyan government does not need to become too involved in (or knowledgeable about) the ICT outsourcing sector itself, but all it needs to do is to brand and marketise its already existing strengths. However, the BPO and ITES sector always bears the risk of not translating into inclusive growth, but rather into an **exploitative gig economy** where old, unfair trade patterns between developed and developing countries are revived. [143] While the options for unilateral government intervention in the international gig economy are limited and might damage Kenya's outsourcing industry, there are a few policy options Kenya should explore. To counter information and power asymmetry between platforms and single gig workers, union and co-op development among gig workers could be stimulated [144]. Additionally, transparency about the earning possibilities and contractual details of different platforms could be increased by an informative platform overview website, including platform ratings. To provide health insurance and other social security benefits also to those not working in fixed employment schemes, the existing voluntary contribution options in Kenya should be promoted among gig workers. In the long-run, Kenya should lobby for making platforms automatically deduct social security contributions and forward to the respective national funds. Ultimately, and in light of all the above, it remains questionable whether the government's enormous financial efforts to build the **Konza Technology City** are a good investment. As mentioned above, the failure of the BPO / ITES sector was mainly due to a lack of scale, skills and experience, but not necessarily of infrastructure. While Konza would certainly be able to accomodate large scale IT businesses from an infrastructural point of view, Kenya first needs to develop these players themselves and work on a strategy how to attract more international businesses. Kenya should thus review its short-term priorities and potentially descale the Konza Project as well as make it more agile, in the sense of a modular, stepwise development based on actual (technological) developments and needs. Additionally, it could free some funds from the Konza project for investments in a few smaller-scale digital nomad centers located near tourist attractions.

GENERAL BUSINESS ENVIRONMENT

Lastly, Kenya should further improve its general business environment for the digital economy to flourish. Here, three areas provide a particularly high beneficial potential: 1) Fight against corruption, 2) ease of doing business, and 3) access to finance, particularly for women. As a corrupt environment has evidently held back Kenya's digital economy in the 1990s and 2000s, [145] further improving integrity will be crucial for all other ICT policies to be carried out effectively. Technology can help to **fight corruption** through increased transparency, but in the end it will need a combined and honest effort of the government as well as the population to get Kenya out of this massive hindrance to any kind of development. Its importance cannot be stressed enough. Secondly, Kenya needs to improve the **ease of doing business**, particularly in the areas which are most important for the digital economy and where substantial shortcomings have been identified, that is in procedures around starting a business and trading across borders [146]. Lastly, improving **access to finance** for SME tech businesses and micro-entrepreneurs will be essential for the digital economy to develop. State-run or supported micro-credit institutions that target the tech sector could be a potential avenue for improving the situation. A special focus should be put on women, as it has been found that small businesses founded by women are among the most technically advanced, innovative and successful. [147]

TABLE 7.

Challenges And Policy Recommendation

CHALLENGE	POLICY RECOMMENDATION
REDUCING ICT SKILL SHORTAGE	Strengthen specialised ICT training (digital vocational skill training) and on-the-job training, e.g. force MNOs to accept internsincrease teachers ICT skills Source international digital talents through MNOs, diaspora & digital nomadism
INCREASING ICT ACCESS AND USE	Link tertiary education to business needs, e.g. through adjusting curricula and making internships mandatory in study programs Reduce future spectrum fees to curb network coverage. Improve rural electricity access Continue implementation of national addressing system to enable ecommerce to flourish
ENHANCING CYBERSECURITY, PRIVACY AND OPEN DATA	Strengthen intellectual property rights Take privacy protection as well as media freedom seriously and overhaul Computer and Cybercrimes Bill Promote open-data and open-source to increase access and curb innovation (such as advances in African AI)
REFORM TAX & TARIFF FRAMEWORK	Consider reintroducing VAT exemptions for ICT products, also but not exclusively ICT parts that could encourage local assembly Remove 25% import duties on used computers to improve availability of affordable ICT equipment
ENSURING COMPETITION AND INNOVATION	Break-up Safaricom's monopoly power to ensure affordability and innovation Reform regulatory agencies and procedures to become more agile, i.e. to be able to adapt quickly to the fast-paced technological change Further streamline the regulatory sector and reduce number of authorities and boards Provide for test-grounds for innovative business models (regulatory sandboxes)
PROMOTING AN INCLUSIVE DIGITAL ECONOMY	Encourage consolidation of local BPO / ITES industry towards larger, more professional and more experienced outsourcing players Attract more international technology companies Recruit digital nomads and professional voluntourists for skill-transfer but also connection of Kenya's outsourcing industry to international markets Reconsider Konza Technology City and potentially descale Avoid exploitative gig economy
IMPROVING GENERAL BUSINESS ENVIRONMENT	Improve procedures around starting a business and trading across borders Increase access to finance, especially for women Intensify fight against corruption

6 STAKEHOLDERS IN FOCUS

6.1 STAKEHOLDER OVERVIEW

For the purpose of this study, a broad mapping of Kenya's digital economy stakeholders has been done, with a special focus on the players operating in the area of creation and support of new businesses. Six different types of stakeholders emerged from this approach:

1 Government: public players influencing and operating in the digital economy.

2 Private Business: most important private actors that are shaping kenyan digital economy.

3 Business Association: relevant association promoting and supporting business environment.

4 NGO: local and international operating in digital economy.

5 Investors: angels, private equity and venture capital shaping digital economy growth.

6 Accelerators & Incubators: players involved in accelerating and supporting ICT start ups.

The stakeholder mapping has resulted in the following numbers of international and Kenyan stakeholders and types:

TABLE 8.

Types of Stakeholders

TYPE	KENYAN	INTERNATIONAL	TOTAL
ACCELERATOR	28	0	28
BUSINESS ASSOCIATION	15	0	15
GOVERNMENT	13	1	14
INCUBATOR	5	0	5
INVESTOR (ANGEL, VC , PE)	28	6	34
NGO	0	17	17
PRIVATE BUSINESS	23	4	27
GRAND TOTAL	112	28	140

FIGURE 20.

Stakeholder Types

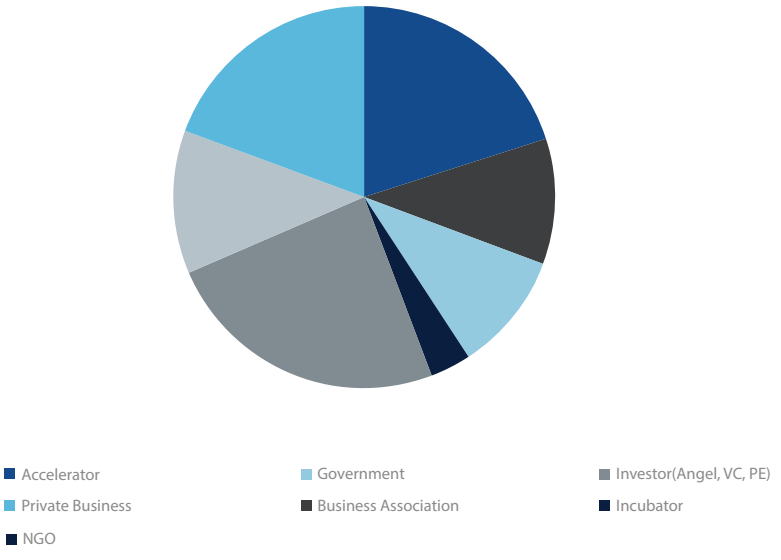


TABLE 9.

Stakeholder Breakdown

TYPE OF INSTITUTION	KENYAN OR INTERNATIONAL	NAME OF INSTUTION	SHORT PROFILE OF ACTIVITIES
ACCELERATOR	Kenyan	@iLabAfrica/@iBizAfrica	Business platform and accelerator
ACCELERATOR	Kenyan	500 Startups	Business platform and accelerator
ACCELERATOR	Kenyan	88 mph	Business platform and accelerator
ACCELERATOR	Kenyan	88 mph/startup garage	Business platform and accelerator
ACCELERATOR	Kenyan	Afrilab	Business platform and accelerator
ACCELERATOR	Kenyan	Afrilabs	Business platform and accelerator
ACCELERATOR	Kenyan	Akirachix	Business platform and accelerator
ACCELERATOR	Kenyan	C4d lab kenya	Business platform and accelerator
ACCELERATOR	Kenyan	Chandaria Business Innovation and Incubation center	Business platform and accelerator
ACCELERATOR	Kenyan	Fab lab nairobi	Business platform and accelerator
ACCELERATOR	Kenyan	Growth africa	Business platform and accelerator
ACCELERATOR	Kenyan	GrowthHub Africa	Business platform and accelerator
ACCELERATOR	Kenyan	Ibiz africa	Business platform and accelerator
ACCELERATOR	Kenyan	IFC SME Solution Centre	Business platform and accelerator
ACCELERATOR	Kenyan	iHub	Business platform and accelerator
ACCELERATOR	Kenyan	Kenya Markets Trust	Business platform and accelerator
ACCELERATOR	Kenyan	M: lab east africa	Business platform and accelerator
ACCELERATOR	Kenyan	m:lab East Africa	Business platform and accelerator
ACCELERATOR	Kenyan	Mara launchpad kenya	Business platform and accelerator
ACCELERATOR	Kenyan	Nailab	Business platform and accelerator
ACCELERATOR	Kenyan	Open Capital Advisors	Business platform and accelerator
ACCELERATOR	Kenyan	Savannah Fund	Business platform and accelerator
ACCELERATOR	Kenyan	Sinapis Group	Business platform and accelerator
ACCELERATOR	Kenyan	Spotone Global Solutions	Business platform and accelerator
ACCELERATOR	Kenyan	Unreasonable Institute	Business platform and accelerator
ACCELERATOR	Kenyan	Upstart Africa	Business platform and accelerator
ACCELERATOR	Kenyan	Village Capital	Business platform and accelerator
BUSINESS ASSOCIATION	Kenyan	Domain Registrars Association of Kenya	Internet integration
BUSINESS ASSOCIATION	Kenyan	East African Internet Association	Introduce the Internet in the country
BUSINESS ASSOCIATION	Kenyan	IEEE Kenya chapter	Professional association advancing technology
BUSINESS ASSOCIATION	Kenyan	Information Communication Technology Association of Kenya	Consulting and business services
BUSINESS ASSOCIATION	Kenyan	Information Technology Standards Association	Foster IT standards
BUSINESS ASSOCIATION	Kenyan	Kenya Information Society	Catalyze the growth of an information society
BUSINESS ASSOCIATION	Kenyan	Kenya IT & Outsourcing Services (KITOS)	Trade Association
BUSINESS ASSOCIATION	Kenyan	Kenya National ICT forum	Contribute to formulation of ICT policy
BUSINESS ASSOCIATION	Kenyan	Linux Chix	Promote women in computing and the use of open source
BUSINESS ASSOCIATION	Kenyan	National E-Commerce Task Force	Lobby the government on the implementation of e-commerce
BUSINESS ASSOCIATION	Kenyan	Technology Service Providers of Kenya (TESPOK)	Technology service providers association in Kenya

BUSINESS ASSOCIATION	Kenyan	Telecommunications Dealers Association of Kenya	Bring down the cost of telecom accessories
BUSINESS ASSOCIATION	Kenyan	Telecommunications User Association	Lobby for service-level agreements with providers
BUSINESS ASSOCIATION	Kenyan	The African Private Equity and Venture Capital Association	
BUSINESS ASSOCIATION	Kenyan	The Kenya Private Sector Alliance (KEPSA)	Private business organization
BUSINESS ASSOCIATION	Kenyan	Broadcast Content Advisory Council	Broadcasting, telecommunication, cyber security
GOVERNMENT	Kenyan	Communications and Multimedia Appeals Tribunal	Authority on Press, Communication and Internet,
GOVERNMENT	Kenyan	Communications Authority of Kenya	License and regulation on information and communication services
GOVERNMENT	Kenyan	Government Advertising Agency	NA
GOVERNMENT	Kenyan	ICT Authority	Management of all Government of Kenya ICT functions
GOVERNMENT	International	International Telecommunications Union (ITU)	nformation and communication technologies – ICTs
GOVERNMENT	Kenyan	Kenya Broadcasting Corporation	State-run media organisation
GOVERNMENT	Kenyan	Kenya Computer Incident Response Team	National cyber security agency
GOVERNMENT	Kenyan	Kenya Education Network	National Research and Education Network (NREN) of Kenya.
GOVERNMENT	Kenyan	Kenya Institute of Mass Communications (KIMC)	Training electronic engineering
GOVERNMENT	Kenyan	Media Council of Kenya	Media standards and complianc
GOVERNMENT	Kenyan	Ministry of ICT	State Department of ICT and Innovation
GOVERNMENT	Kenyan	National Communications Secretariat	Policy advisory services
GOVERNMENT	Kenyan	Taskforce on Distributed Ledgers and Artificial Intelligence	Frontier digital technologies
INCUBATOR	Kenyan	BRCK	Fee public WiFi network provider - Moja
INCUBATOR	Kenyan	GrowthAfrica	Business platform and accelerator
INCUBATOR	Kenyan	Impacthub	Part innovation lab and business incubator
INCUBATOR	Kenyan	Kick	Gearing rural economies to run at vastly higher RPMs
INCUBATOR	Kenyan	Ushahidi	Business and communication platform
INVESTOR (ANGEL,VC,PE)	International	NEST	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	88mph	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Accion	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Acumen Fund	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Africa Media Venture Fund	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Amadeus Capital Partners	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Bamboo Finance	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Business Partners International	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Catalyst	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	D.O.B. Equity	Angel Investors and Private equity

INVESTOR (ANGEL,VC,PE)	Kenyan	East Africa Capital Partners	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	EC Private Equity	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	eVA Fund	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Fanisi	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	International	Fanisi Capital	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Grassroots business fund	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	GroFin	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Growth Hub Africa	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	International	Haltons Pharmacy	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Innovation 4 Africa	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Invested Development	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Jacana Partners	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Khosla Impact	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Kitendo Capital	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Kukua Fund	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Leapfrog	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Mbada Ventures	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	International	Novastar	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	International	Pearl Capital	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	SPARK Ventures	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	TBL Mirror	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	Tech Equity	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	Kenyan	TLcom	Angel Investors and Private equity
INVESTOR (ANGEL,VC,PE)	International	Viktoria Venture	Angel Investors and Private equity
NGO	International	Africa Network Information Centre (AFRINIC	Regional Internet registry (RIR) for Africa
NGO	International	Africa Top Level Domain Organization (AfTLD)	Forum for African TLD managers
NGO	International	African Internet Governance Forum (EAIGF)	Internet and internet governance in Africa.
NGO	International	Computer Industry and Services Association of Kenya (CISAK)	Investments,Training and Representation.
NGO	International	Computer Society of Kenya	International ICT summits and policy making

NGO	International	Consumers Federation of Kenya (COFEK)	Consumer protection, education, research, etc
NGO	International	Freedom House	Research and advocacy
NGO	International	Internet Corporation for Assigned Names and Numbers (ICANN)	Database maintenance and coordination
NGO	International	Internet Governance Forum (IGF)	Public policy forum
NGO	International	Internet Society Kenya Chapter	No Profit Internet Technical Community
NGO	International	ISACA	Knowledge and practices for information systems
NGO	International	Kenya Human Rights Commission (KHRC)	Human rights and democratic culture in Kenya
NGO	International	KICTanet	ICT policy and regulation
NGO	International	The Africa Centre for Open Governance (AfriCOG)	Research and monitoring on governance
NGO	International	The International Association of Women in Radio & Television	Network of media women
NGO	International	Transparency International-Kenya	Transparency and corruption issues
NGO	International	Tunapanda	Business training services
PRIVATE BUSINESS	Kenyan	Access Kenya	Internet service provision
PRIVATE BUSINESS	International	Airtel	Mobile services provider
PRIVATE BUSINESS	Kenyan	Andela	Software developers trainer
PRIVATE BUSINESS	Kenyan	Betin	Bookrunner
PRIVATE BUSINESS	Kenyan	Betway	Bookrunner
PRIVATE BUSINESS	Kenyan	Bitsimba	ICT solutions provider
PRIVATE BUSINESS	Kenyan	Brighter Monday	East Africa's #1 job website
PRIVATE BUSINESS	Kenyan	Daproim	Data Services, IT, Support services
PRIVATE BUSINESS	Kenyan	Digital Divide Data	Business process outsourcing (BPO)
PRIVATE BUSINESS	Kenyan	Duma Works	Job Portal
PRIVATE BUSINESS	International	Essar	Mobile cellular services under the brand yuMobile
PRIVATE BUSINESS	International	Global Impact Sourcing Coalition (GISC)	Business network
PRIVATE BUSINESS	Kenyan	Jambopay ipay	Online payment gateway
PRIVATE BUSINESS	Kenyan	Jumia.co.ke	Kenya's no. 1 online retailer
PRIVATE BUSINESS	Kenyan	Kenya Data Networks	Data Communications Carrier
PRIVATE BUSINESS	Kenyan	Kilimall.co.ke	Online Shopping portal
PRIVATE BUSINESS	Kenyan	New Kenyan Jobs	Job Portal
PRIVATE BUSINESS	Kenyan	Olx.co.ke	Online Buy and Sell
PRIVATE BUSINESS	Kenyan	Pesapal Mula	Online payment service
PRIVATE BUSINESS	International	SA/ZA Central Registry (ZACR)	Non-profit organisation (NPO)
PRIVATE BUSINESS	Kenyan	Safaricom	Mobile, voice, messaging, data
PRIVATE BUSINESS	Kenyan	Sasa Host	Website and email hosting
PRIVATE BUSINESS	Kenyan	Sportpesa	Bookrunner
PRIVATE BUSINESS	Kenyan	Taxify	Mobility taxi app
PRIVATE BUSINESS	Kenyan	Telkom	Mobile operator
PRIVATE BUSINESS	Kenyan	Truehost kenya	Domain name registration and hosting
PRIVATE BUSINESS	Kenyan	Zuku	Internet provider

7 APPENDIX

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