



# Silicon Savannah: The Kenya ICT Services Cluster

*Clare Akamanzi | Peter Deutscher | Bernhard Guerich |  
Amandine Lobelle | Amandla Ooko-Ombaka*

---

Microeconomics of Competitiveness – Spring 2016

Photo credit: ICTVille.com

## Table of Contents

Executive Summary .....	1
Part I: East Africa and Kenya Context.....	2
Country Profile .....	2
Economic Performance .....	3
Part II: Competitiveness Analysis .....	5
The Central Framework .....	5
Endowments.....	5
Monetary & Fiscal Policies.....	5
Human Development and Political Institutions .....	6
Quality of Business Environment.....	8
Part III. ICT Services Cluster Profile .....	10
Profile Overview and Definition .....	10
Historical Background.....	11
Importance of ICT Services to Kenya’s Economic Growth .....	11
Regional and International Competitiveness of the ICT Services Cluster.....	14
Part IV. Key Competitiveness Issues in the ICT Cluster.....	16
Competitive Strengths .....	17
Competitive Weaknesses.....	19
Part V. Recommendations.....	23
Part VI. Conclusion.....	30
Appendix.....	31
Bibliography.....	31

## Executive Summary

Kenya is the largest and most diversified economy in East Africa with a \$55B GDP, (the 8<sup>th</sup> highest in Africa), with a population of ~44M and GDP per capita of ~\$1,200 (2013), and an economy dominated by agriculture, comprising ~25% of GDP and ~50% of export revenue. The services sector is relatively small, but growing as an important area of diversification as Kenya aspires to become an upper middle-income economy. In particular, the ICT services cluster - characterized by offerings like digital payments and access to real time market prices - is ripe for development. From 2008-2012, ICT services grew at 8% per annum, the fastest growing sector across the economy. Further, the mobile technology and digital payments revolution at the center of the spectacular growth story has earned Kenya the moniker of Africa's *Silicon Savannah*.

Given its strategic location, and natural endowments, Kenya is the commercial and logistics center of the region. In addition, the country has several competitive advantages that well position it to become a regional, or even global ICT services hub including: an entrepreneurial spirit fueling the start-up boon in the sector, rapidly increasing internet connectivity where over 95% of urban Kenyans have access to mobile internet, and customers with a demonstrated willingness to pay for services that fill institutional voids left by traditional industries (e.g., M-PESA C2C money transfer in lieu of brick-and-mortar banks). But, the sector faces four key competitive challenges: lack of high-skilled talent, limited access to finance for the highly fragmented SME-led industry, regulatory deficiencies evident in overlapping rules and gaps in key areas like data protection, and finally weak linkages between government, local universities, and large companies.

We propose that the Kenya ICT services cluster broaden its value proposition from a mobile technology innovation center towards a regional ICT services hub, which uses mobile technology innovations to 'leapfrog' conventional ICT services trajectories for all segments from retail to government. Accordingly, our priority recommendations emphasize three key themes: i) *collaboration between private and public sector players for early stage ventures that show promise* to help them convert into businesses (e.g., IFCs providing ICT extension services); ii) *building a local ICT services talent pipeline in both management and technical roles* to serve more mature companies (e.g., partner with MNCs to source diaspora talent from global offices); iii) *regionally streamlined regulations and locally housed infrastructure* like data centers that leverage the individual strengths of countries like Rwanda to provide a 160 million strong market for large companies serving B2B and B2G clients.

## Part I: East Africa and Kenya Context<sup>1</sup>

“ I am happy to say we as a country have recognized the place of ICT in our development agenda. **ICT is an integral component of our National Vision 2030.** Our ICT Masterplan projects that the sector can comfortably generate more than 180,000 jobs between now and 2017. It is also expected to contribute at least 8% of our Gross Domestic Product in the same period. By all accounts, therefore, **ICT is a big deal in Kenya.**”

- President Uhuru Kenyatta, *Speech at Opening of the ICT Innovation Forum, KICC, 3 March 2015*

### Country Profile

Kenya is located in East Africa, and is home to over 44 million people, 60% of whom are younger than 24. It is ethnically diverse, with over 42 ethnic tribes, the three largest of which account for almost half of the population (Kikuyu 21%; Luhya 14% and Luo 11%). After gaining independence from the British in 1963, Kenya became a secular republic, establishing English and Kiswahili as its official languages. Each of the four Heads of State since have assumed office through peaceful transitions, making Kenya one of the more stable democracies in the region. However, it has not been smooth sailing: Kenya suffers from intense tribal politics, which have precipitated waves of corruption and violent crime, and allows security problems to run rampant, such as the 2008 post-election violence, which claimed over 1,400 lives. Partly in response to tribal tension, the country embarked on one of the world’s most ambitious devolution plans in 2013, the results of which are yet to be seen.

Kenya has 580,367 sq. km of land, 48.1% of which is arable, and enjoys a largely equatorial, and tropical savannah climate. Its 536-kilometer coastline on the Indian Ocean has historically been a trading hub for the region, hosting traders from all over the world since 1<sup>st</sup> Century AD. Today, Mombasa port is the busiest in the region serving landlocked countries of Uganda, Rwanda, Burundi and DRC. Kenya has also evolved to be a trade and business hub for Eastern Africa, with many regional Headquarters established in its capital, Nairobi. Kenya is also endowed with numerous natural resources such as limestone, soda ash, wildlife, geothermal, hydropower and oil and gas.

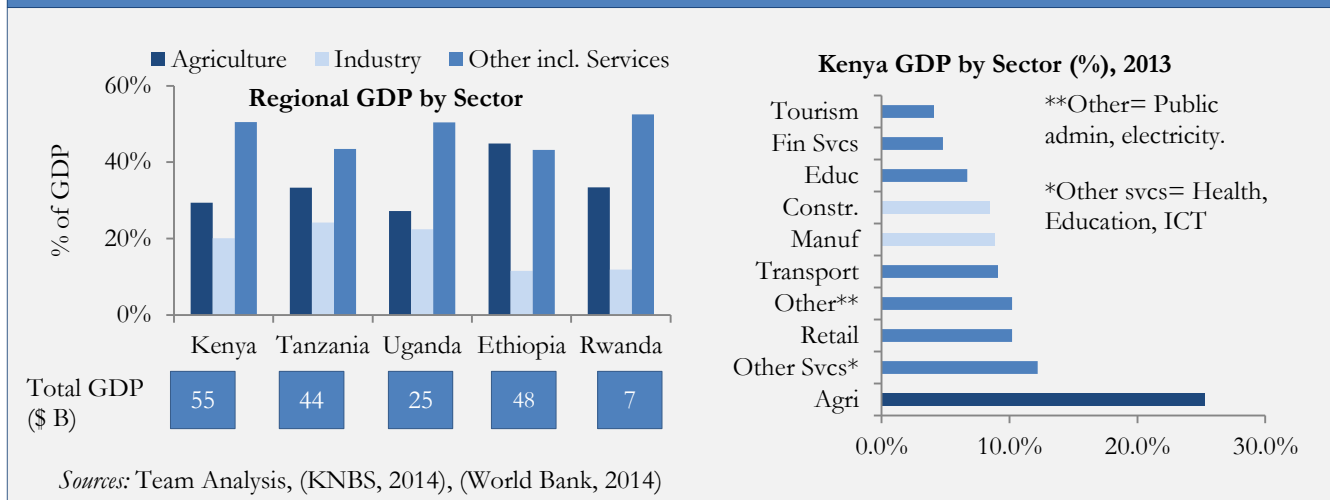
---

<sup>1</sup> Unless otherwise stated, information from this section was mainly derived from the CIA Factbook

## Economic Performance

As Fig. 1 shows, Kenya is the largest economy in East Africa, with a GDP of US\$ 55 billion and GNI per capita of US\$ 1190 (World Bank, 2014). It is also the most diversified when comparing the ratio of agriculture to other sectors. However, national income and export revenue is dominated by agriculture. Services only form a small<sup>2</sup> but fast growing sector of the economy.

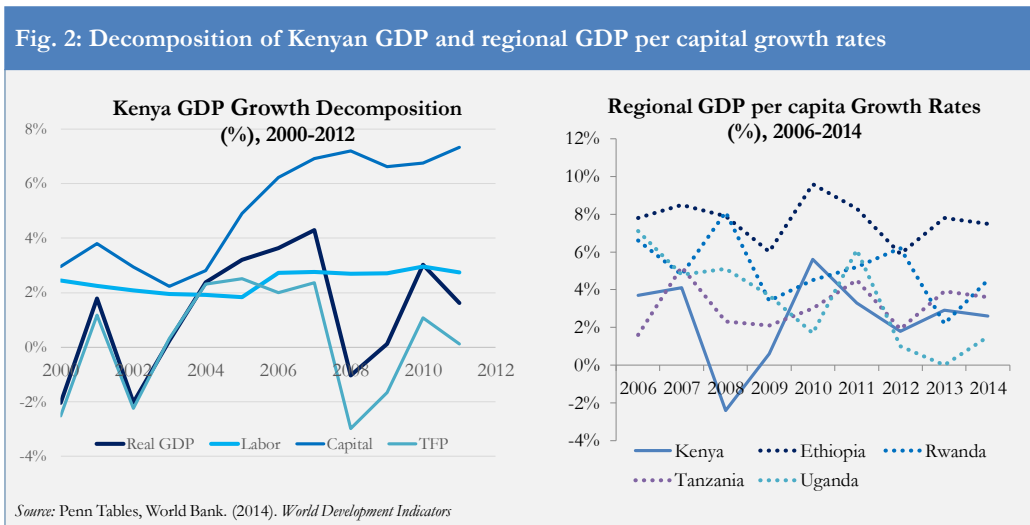
**Fig. 1: East African regional GDP by sector (2013) and detailed breakdown of Kenya's GDP**



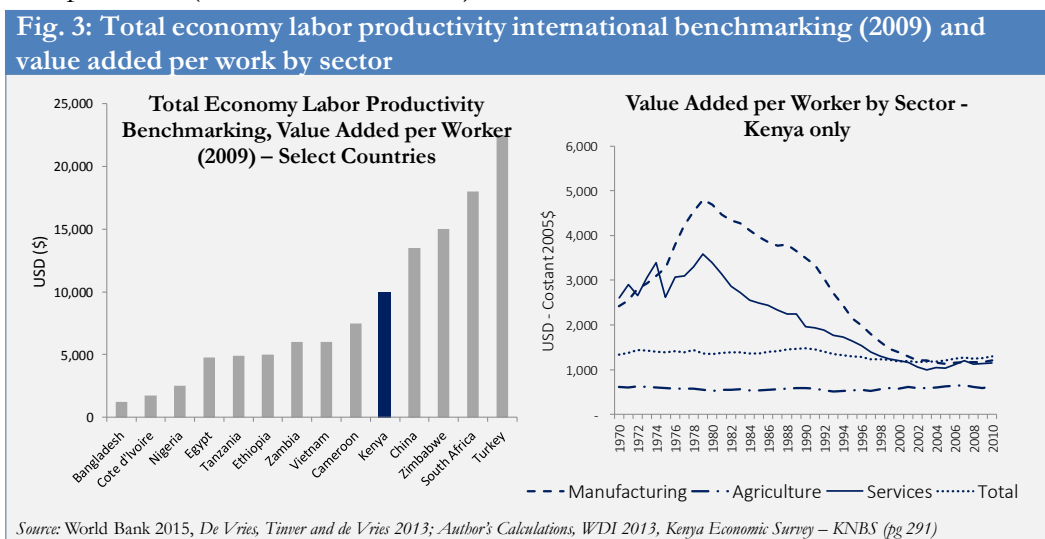
Agriculture accounts for about 25% of GDP, and over 51.4% of export revenues, while several services sectors are growing faster than the overall economy, with ICT taking the lead at an 8-10% growth rate (KNBS, 2014). As noted in the national development plan for the country, Vision 2030, ICT offers a promising source of future growth. With the exception of tourism, Kenya hardly exports services abroad, which helps to explain its limited competitiveness in external markets for the sector.

As seen in Fig. 2, Kenya's growth has been driven by capital and labor accumulation, and peaking at ~4.2% in 2007 before plummeting during the 2008 post-election violence. Meanwhile, GDP per capita is sluggish and more volatile than its East African peers. Poverty remains high at 43.4%. As we see in Fig. 3, in relative terms Kenya's value-add ranks higher than not only its East African peers, but also many other African countries like Egypt, Ethiopia, and Vietnam.

<sup>2</sup> E.g. Financial services accounts for 4.8%; Education 3.5% and Health 1.9%

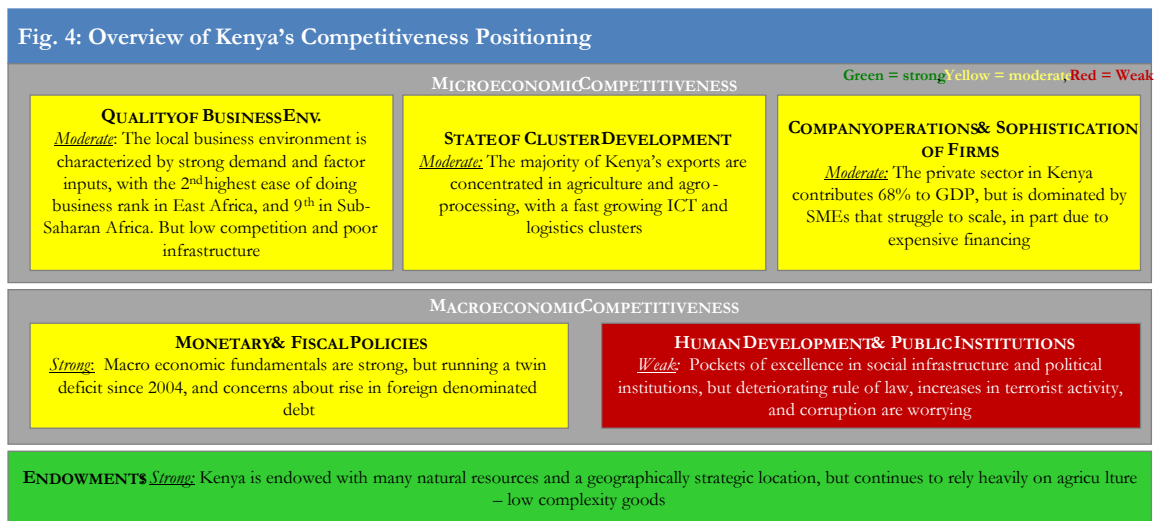


A policy concern though, lies in the declining levels of productivity in absolute terms, which is particularly acute for services, and manufacturing. The decline began when Kenya switched from import-substitution from export led growth in the 1980's (Ronge, 2000). Its persistence can be attributed to three main issues: Firstly, Kenya's growth in the past decade has been driven by labor accumulation, rather than increases in capital or efficiency gains; Secondly, the national agenda has focused on job creation rather than increasing labor productivity. This seems to have led to an inflated wage bill, and a comparatively inefficient labor force; finally, coordination failures exist and will soon become binding constraints to growth, particularly in sectors like manufacturing that are dependent on demand spill-overs (Ooko-Ombaka, 2016).



## Part II: Competitiveness Analysis

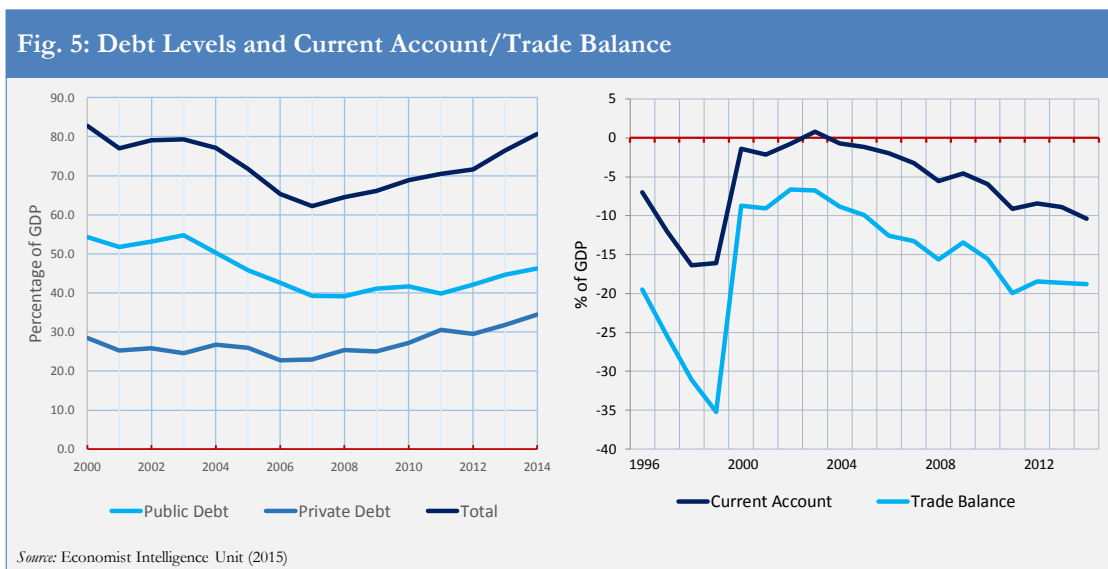
### The Central Framework



**Endowments:** Kenya has three key natural endowments, which have been and remain as key drivers of its growth: 1) Kenya's strategic location between the Arabian Peninsula and Central Africa has made it a natural trading and commerce hub for nearly two thousand years (Hallett, 1970), with the primary port being Mombasa; 2) Kenya is agriculturally rich, with fertile soil, plentiful water resources, and a climate that favors a wide variety of crops. The Kenyan highlands comprise one of the most successful agricultural production regions in Africa, and are home to Kenya's principal cash crops of tea, coffee and cut flowers. To this day, agriculture employs roughly 75% of the Kenyan labor force, though most (80%) landholdings belong to low-productivity and subsistence farmers. 3) Kenya's spectacular ecosystem has long attracted tourists. Its natural beauty and abundant wildlife, including the 'big five' game and *Great Migration* attracted over 1.2 million tourists in 2015 (World Bank, 2016), and remains the county's largest source of foreign currency.

**Monetary & Fiscal Policies:** Kenya's monetary and fiscal policies are strongly mixed. Of primary concern is the twin deficit (current account and fiscal) that Kenya has been running since 2004. This appears to be the result of a perilously low domestic savings rate (3.9% of GDP), despite a relatively high deposit rate (~8.4% in 2012) (World Bank, 2016). Kenya's budget, with an average

deficit of 5.2% and a debt-to-GDP ratio of ~50%, is strongly geared toward consumption over investment. Given the nearly non-existent savings rate (World Bank, 2016), Kenya finances its investments with a burgeoning current account deficit. Indeed, three quarters of all investments in the economy were financed via borrowing from abroad.



This is problematic for the incentives it places on macroeconomic policymakers. Years of lack of investment in the tradeable sector has also led to an over-reliance on imports. Because nearly 80% of Kenyan government debt is foreign currency denominated, a devaluation would increase foreign debt servicing requirements. Given already high consumption levels and precious little domestic savings, a corresponding increase in aggregate demand would likely mean that the government would be unable to balance its budget. This macro-economic position causes politicians to be fearful of devaluation and, consequently, a macro-economic policy that does not favour exports, making international markets harder for ICT services to penetrate.

**Human Development and Political Institutions:** Kenya’s Human Development outcomes and political institutions are rapidly improving, but it is starting from a low base, and still plagued by problems of corruption and rule of law. Corruption is regrettably widespread, with no prosecutions



of senior officials despite multiple high-profile cases (of over \$1Bn, sometimes more than 10% of GDP). Furthermore, roughly 70% of Kenyan businesses reported that they expected to pay bribes

*“The incentives for the big guys to innovate are low given crony capitalism. Academic institutions, think tanks, **SMEs are where innovation is coming from. We need to better support them to grow...**” – Leading Macroeconomist*

to merely get business done. Transparency International ranks Kenya 139 out of 168 on its Corruption Index. Security and Rule of Law are also problematic. Al Shabaab, a Somali terrorist group, conducted two high-profile attacks in Nairobi in recent years, but the threat of terrorism is minute compared to non-terror activity, with over 90% of all reported attacks being due to armed civilian activities, such as muggings, armed robbery, kidnappings, and murder. Indeed, it is such a problem that security is the largest single line item in the budget (\$2.2Bn), and the private security industry is one of the fastest growing in Kenya. But more optimistically, these institutional voids could be potential opportunities for ICT services entrepreneurs. M-PESA, an electronic funds transfer service launched by Safaricom, has become nearly ubiquitous in recent years primarily because of the huge security and corruption problems involved in transferring cash, and the only shallow penetration of the formal banking system.

However, Kenya is making leaps and strides in other areas. Kenya’s adult literacy rates is the highest in the region (87%) (World Bank, 2016), and education is a priority issue of the government, with programs such as free primary education. The quality is relatively highly ranked (36 of 140), but there are concerns about the secondary and tertiary education levels, despite being a regional leader. This concerns ICT services companies, who will need a reliable pipeline of skilled labor in order to grow and strengthen the cluster. Another noteworthy change is the 2010 Constitutional Reforms, which precipitated one of the most ambitious decentralizations of power in the world, creating a new county level of government, increased checks and balances, and independent judiciary, and a relatively progressive Bill of Rights. The changes came into effect in 2013, and whilst the impact is hard to measure, international observers remain optimistic about its prospects.

**Quality of Business Environment:** Kenya’s business environment is characterized by several promising indicators, hampered by several poor fundamentals, leaving it somewhere in the middle by global comparisons, with an overall global competitiveness ranking increased to 99 out of 140 in 2016 (World Economic Forum, 2015).

*Factor (Input) Conditions:* Kenya has taken advantage of many of its natural resources (namely wildlife, location, and agricultural fertility), and access to credit, whilst poor by OECD standards, are superior to its regional peers. Kenya education system is regarded regionally for being good quality (World Economic Forum, 2015), but struggles to meet higher level demands at the secondary and tertiary levels, constraining more sophisticated businesses (World Bank, 2016). Similarly, poor transportation and electrical infrastructure imposes substantial costs on businesses, with higher export transportation and shipping costs than its peers (despite the Mombasa port), and losses due to blackouts of around 6% per year, the second highest in the region (World Bank, 2016). Fortunately, Kenya’s telecommunications infrastructure fares better, particularly in urban areas, with relatively high internet and mobile penetration rates (World Bank, 2016). This stands to increase with a roll-out of new fiber-optic cables planned for the next few years.

*Context for Firm Strategy & Rivalry:* The Kenyan firm context is particularly challenging. Competition among firms is intense due to the relative homogeneity of Kenya’s primary

*Investors come with a Wall Street approach – but most of these businesses don’t keep books, let alone proper financial statements. **We need investors that can work with local companies with a lower level of sophistication**” – Former microfinance CEO*

produce (agricultural crops, textiles, flowers, tea, and coffee). Kenyan businesses suffer from extremely high costs of doing business due to crime and violence, the highest in the world (World Bank, 2016). International firms face high corporate taxes (30%), and troublesome FDI regulations, weak IP and investor protection, and historically strained relations with labor (World Economic Forum, 2015).

However, the government has shown strong support for the ICT sector, building on Kenya’s reputation as the “Silicon Savannah”.

*Related & Supporting Industries:* Kenya fares well in the degree of integration around its business environment. Whilst Kenya is heavily dependent on imports for product inputs, it benefits from large numbers of moderate quality suppliers, meaning that Kenyan businesses can largely get what inputs they desire (World Economic Forum, 2015). Kenya’s main export clusters of flowers, tea, coffee, textiles, and petroleum products are relatively developed for their current needs.

*Demand Conditions:* Kenya enjoys relatively sturdy domestic demand and a solid value-chain for its key produce, and Kenyan businesses are at least somewhat customer oriented, particularly in the cities. Kenya’s cities, lining the corridor between Nairobi and Mombasa are easily its demand centers. Here, the middle class is emerging, with increasing buying power, particularly for digital services. Kenyans are widely regarded as being highly entrepreneurial, with strong firm adoption of technology, and a government that has demonstrated far higher digital sophistication than its African neighbors (Safaricom, 2016). However, nearly three quarters of Kenya’s citizens live outside of the cities, typically in hard to reach areas of the country, hamstringing demand for difficult to move products.

Fig. 6 Overall Kenya Diamond



## Part III. ICT Services Cluster Profile

### Profile Overview and Definition

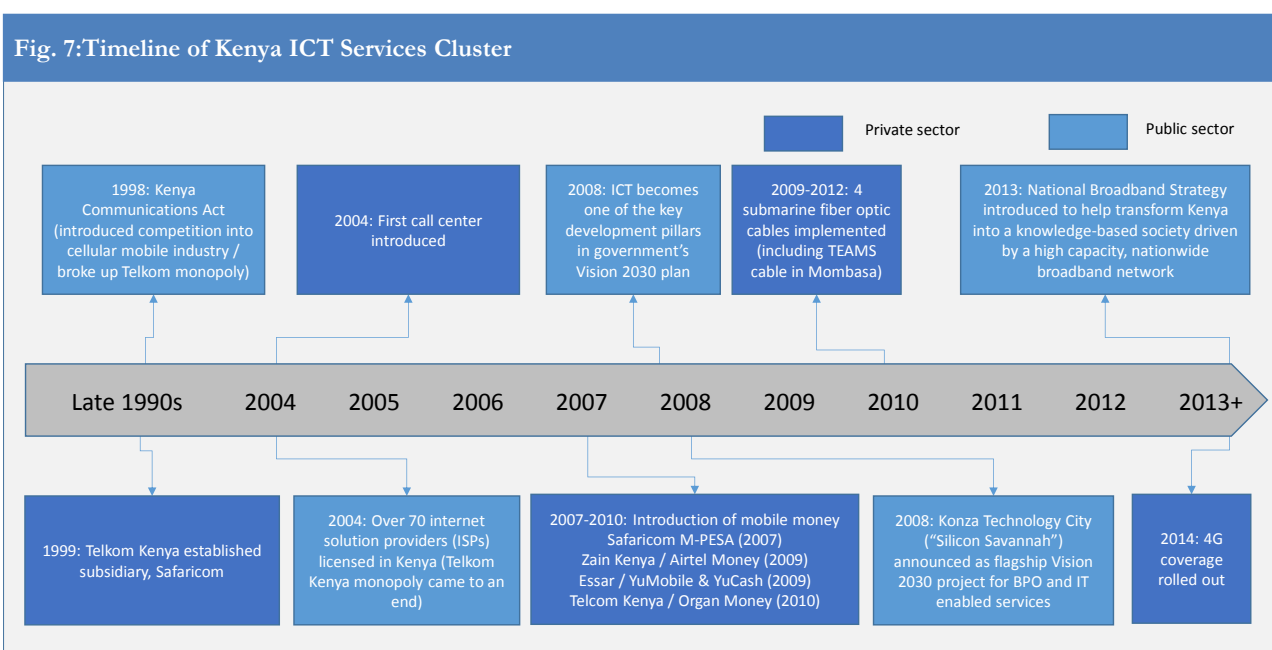
The Kenyan government has set the aspiration for Kenya to become a knowledge-based economy by 2030, built on the basis of high quality human capital. This vision would be greatly supported by a strong ICT services sector that can attract and nurture this human capital. The focus of our analysis is therefore on building a strong ICT cluster focused on services and not hardware. Specifically, we define the cluster as having three segments as outlined below:

- Business to Business (B2B): services that facilitate transactions between businesses (e.g. manufacturer to wholesaler or wholesaler to retailer). There has already been impact from ICT in the healthcare with regards to telemedicine or the centralization of health supply chains.
- Business to Consumer (B2C): services that facilitate transactions directly between businesses and consumers. While retail is the obvious player in this space (e.g. KenCall call centers), financial services (e.g. M-PESA) and agriculture (e.g. M-FARM) have also greatly benefited from ICT developments.
- Business to Government (B2G): services that improve transparency and facilitates transactions between government agencies and citizens. Kenya's eCitizen services or the Kenya Open Data Initiative strive to achieve this.

It is also worth pointing out that Kenya leads on a number of cross-cutting ICT services that serve all of the above components. For example, the IBM research lab helps to drive innovation and create commercially-viable ICT driven solutions in areas such as agriculture, financial inclusion, education, transportation and e-government (IBM Research, 2015). In addition, a number of entrepreneurial hubs, such as iHub, NaiLab and Nairobi Garage, have a strong technology services focus, which have cultivated Kenya's reputation as the "Silicon Savannah".

## Historical Background

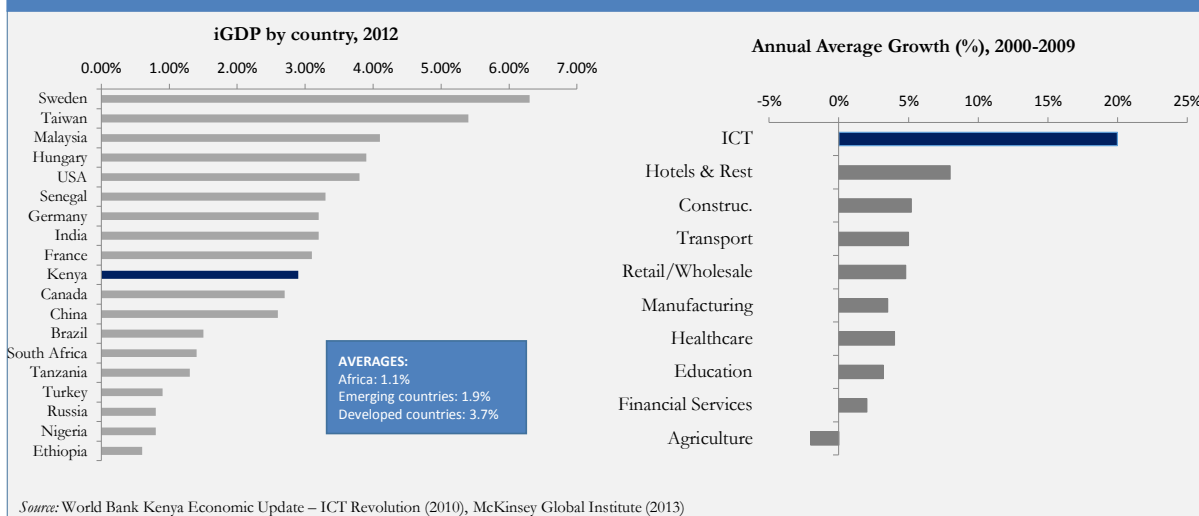
The Kenyan ICT services cluster can be traced back to the late 1990s but has only really developed over the past 8 years. One of the catalysts was the implementation of 4 submarine fiber optic cables in Mombasa between 2009 and 2012 (Rubadiri, 2012), which brought high-speed internet to the country. Both private sector investment and regulatory innovations were needed to propel the sector to where it is today (Bhattacharya, 2016). ICT has been a core development pillar in the government’s growth plan and in 2013, Kenya released the National Broadband Strategy to help transform Kenya into a “knowledge-based society driven by a high capacity, nationwide broadband network” (ICT Authority of Kenya, 2013).



## Importance of ICT Services to Kenya’s Economic Growth

Given the competitive macro environment of Kenya, we believe that a thriving ICT services sector is one of the levers to help Kenya leapfrog traditional ‘industrial revolution’ paths to development and aspire to become an (upper) middle-income economy by 2030. There are three main reasons for this: (i) Kenya’s demonstrated potential to excel at ICT, (ii) ICT’s role as an enabler for other sectors, and (iii) ICT’s association with other diversified industries.

**Fig. 8: iGDP (2012) and Kenya average annual sector growth**



### 1. Kenya’s demonstrated potential to excel at ICT

Kenya has shown that it has the potential to become not just a regional player but also a global leader in ICT services. As shown in Fig 8, while Africa’s internet contribution to GDP (“iGDP”) is low at 1.1%, Kenya punches well above its GDP weight and leads the continent at 2.9%, ahead of Canada, China, Brazil and Russia, and just behind Africa’s top ranked nation (Senegal at 3.3%). Internet connectivity has been shown to be a catalyst for economic growth (McKinsey Global Institute, 2011), placing Kenya well to capitalize on this to transition to a higher income country.

In addition to the regional and global comparison, Kenya has been domestically experiencing a tri-factor technological revolution driven by mobile phone, mobile money and internet connectivity, which has seen exponential growth of mobile subscriptions penetration to 87.8% of the population (Communications Authority of Kenya, 2015). The ICT services sector has also grown faster than all other sectors of the Kenyan economy in the first decade of the 21<sup>st</sup> century, as shown in Fig 8 above.

### 2. ICT as an enabler of other sectors

In addition to contributing to GDP, ICT enables innovation, productivity and efficiency gains across several sectors that are core to Kenya’s economic growth. According to a recent McKinsey report (McKinsey Global Institute, 2013), the internet’s greatest impact is likely to be concentrated in

six sectors that are already amongst the fastest growing in Kenya: *financial services; education; health, retail; agriculture; and government*. In particular, SMS technology and telecommunications infrastructure has revolutionized how individuals act and has facilitated how SMEs operate. For example, ICT services-led innovations in financial services such as M-PESA, the pioneering mobile payments platform, has included millions into the Kenyan financial architecture that previously had no access (see Fig. 9). Similarly, innovations in agriculture such as M-Farm are increasing productivity by giving farmers access to production information and market prices (Bleiberg & West, 2015).

Fig. 9: M-PESA Case Study



#### Company Overview

- Mobile phone-based money transfer service that was launched in 2007 by Vodafone for Safaricom and Vodacom in Kenya and Tanzania, respectively
  - The service leverages SMS technology and mobile phone infrastructure to allow users to deposit, send and receive money into an account on their mobile phones
  - It is a branchless banking service, and customers can withdraw and make cash deposits through a large network of agents including retail outlets and “mom and pop stores”
- Has extended to further services which include M-Kesho in 2010 (links M-PESA to a formal Equity Bank account), M-Shwari in 2012 (a savings / loans product), Lipa Na M-PESA in 2013 (extended retail services for payment in grocery stores, gas pumps etc.), M-Akiba in 2015 (the world’s first mobile-phone traded bond; 5 year bond to raise \$1B for infrastructure investments)

#### Estimated impact

- Today, an estimated \$1.6 Bn per month moves through the M-PESA system in Kenya
  - Former CEO Michael Joseph estimates that 40% of Kenyan GDP goes through M-PESA
- 65% of Kenyan adults have registered with M-PESA, which has greatly led to tremendous growth in financial inclusion for populations that were previously potentially unbanked

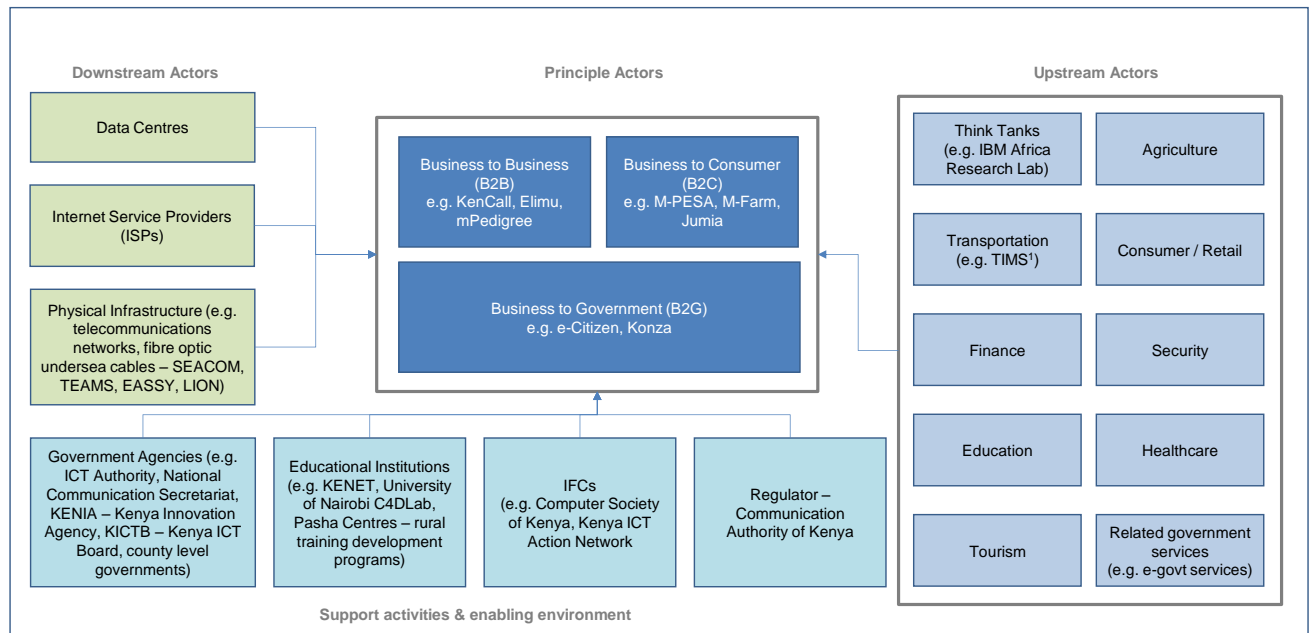
Sources: (Joseph, 2016) (Safaricom, 2016)

### 3. ICT is associated with production of more complex and diversified industries

As shown in Fig 10, the ICT services cluster is closely related to a number of more diversified and complex upstream sectors such as logistics and transportation which are the workhouse industries of more developed economies. For example, Kenya’s Transport Integrated Management Systems enhances road safety and accountability in Kenya (ICT Authority Kenya, 2016). A dynamic ICT services cluster will have positive knock-on effects on such upstream sectors which in turn will help

them scale and grow. The success of this model however, is predicated on support from downstream actors and the strength of supporting activities, which are discussed in Part IV.

Fig. 10 – Kenya ICT Services Cluster Map



## Regional and International Competitiveness of the ICT Services Cluster

In establishing itself as a viable ICT services hub in East Africa, Kenya’s biggest competition is Rwanda (Miller, 2016). Although coming from a much lower economic base than Kenya’s, Rwanda’s political leadership has invested considerable resources in developing the country’s ICT sector, which is beginning to take off (Tufail, 2016). This political will is supported by the country’s conducive business environment, strong macro-economic performance, zero-tolerance for corruption as well as a reputation for an effective government (World Economic Forum, 2015). However, despite strong Government efforts, private sector participation and entrepreneurship lags behind Kenya, with ICT accounting for only 3% of Rwanda’s GDP (Nyirishema, 2016). Fig. 11 below provides a competitive comparison between Kenya and Rwanda.



Fig. 11 – Regional Competition for Kenya’s ICT sector

Metric	Kenya	Rwanda
<b>Macro-Economic Indicators</b>		
GDP growth rate 2011-2015	GDP average growth of 5.4% and per capita at 2.6%	GDP average growth of 7.1%, and per capita growth of 4.5%
Ease of doing business & competitiveness	Ranks 2 <sup>nd</sup> in EAC both in the ease of doing business and competitiveness	Rwanda ranks 1 <sup>st</sup> both in the ease of doing business and competitiveness in EAC and 3 <sup>rd</sup> on the African continent
<b>Governance Indicators</b>		
Corruption	Ties with Uganda at 3 <sup>rd</sup> position in the EAC, on corruption perception	Rwanda ranks 1 <sup>st</sup> within the EAC in corruption perception (most positive)
Security (Law & Order)	Kenya is mostly stable and secure, but continues to be under threat from the Al Shabab terrorist group in Somalia and ranks 124 <sup>th</sup> globally in law and order	Rwanda is secure and stable, and is yet to completely eliminate the FDLR rebel group threat from the Democratic Republic of Congo.
<b>Other ICT Services-Related Indicators</b>		
ICT Plans and Policies	Kenya’s Vision 2030 places ICT in its priority sectors. The ICT Master Plan defines the direction of the sector	Rwanda’s Vision 2020 identifies ICT as a priority sector and has developed a National Information and Communications Infrastructure (NICI) Plan
Skills development/ entrepreneurship	<ul style="list-style-type: none"> <li>• Strong entrepreneurial spirit and general education track record in the region</li> <li>• 78% literacy rate</li> <li>• There are over 8 established tech hubs in Kenya. iHub, one of the most established in Africa has 150 companies established after incubation there, and has over 13,000 members.</li> <li>• Some significant innovations already have global recognition like M-PESA</li> </ul>	<ul style="list-style-type: none"> <li>• Low entrepreneurial spirit, with Government driving the sector.</li> <li>• 71% literacy rate</li> <li>• Rwanda has 2 small, high subsidized tech hubs, with no major innovation yet to be significantly commercialized.</li> <li>• Recent entry of Carnegie Mellon University in partnership with the Government aims to spur innovation and skills development.</li> <li>• Kigali University of Science and Technology and Vocational technical schools offer ICT disciplines.</li> </ul>
ICT Infrastructure	<ul style="list-style-type: none"> <li>• Kenya has the most advanced ICT infrastructure services with 4 under sea cables (EASSy, TEAMS, SEACOM, Lions 2), which reduce bandwidth costs compared to its land locked neighbor’s like Rwanda</li> <li>• Kenya also has 2 data centers, which it hopes to complement with 2 additional tier 4 data centers in the upcoming Konza city, a major ICT technology park that when completed, will set Kenya apart as an ICT eco-system hub.</li> </ul>	In partnership with Korea Telecom, the government has built a nation-wide fiber option backbone and currently upgrading to 4G; a national data center as well as cyber security network. As a landlocked country, Rwanda relies on Kenya to access undersea cables.
Tax structure & tax incentives for ICT	Kenya, under the EAC, considers ICT equipment as capital goods that are zero rated for import duties	Same EAC regime as Kenya for ICT imports. In 2015, Rwanda reduced Corporate Income Tax from 30% to 15% for investors in, inter alia, ICT
ICT prevalence	74% cellular subscription; 12% households with computers; 43% population using internet	64% cellular subscription; 3% households with computers; 11% population using internet

Sources: (World Bank, 2014) (World Bank, 2016) (World Economic Forum, 2015) (East African Community, 2004) (UN International Telecommunication Union, 2015) (Transparency International, 2015) (Gallup, 2015) (Kabbatende, 2016) (Kelly, 2014) (Nsengimana, 2016) (Sebera, 2016) (Tufail, 2016) (Rubadiri, 2012) (Kayihura, 2016)

Beyond the East African region, Kenya faces tougher competition from South African and Nigeria. South African enjoys technical superiority over all other Africa countries by some margin, being far ahead in deployed infrastructure and innovation. (WIPO, 2015). This has resulted in the country's most widespread culture of using ICT in everyday life and transactions (Tufail, 2016). South Africa also leads in talent development and is home to 5 of the top 10 universities in Africa. (World University Rankings, 2016). Kenya's main advantage over South Africa is its proximity to large markets. Kenya is at the heart of the East African Community (EAC) and Ethiopia, with a combined population of nearly a quarter of a billion people. Given the idiosyncrasy of services, this is not an inconsequential issue, but Kenya will have to develop more than this if it is to compete.

Nigeria recently overtook South Africa to become Africa's largest economy. It has a rapidly growing ICT sector, and offers a large market of almost 180 million people, which provides a compelling case for business scale. But despite its potential, Nigeria is yet to optimize its strength for ICT competitiveness, with poorer mobile phone penetration and internet access (65% and 43% respectively) (UN International Telecommunication Union, 2015).

#### **Part IV. Key Competitiveness Issues in the ICT Cluster**

Our analysis of Kenya's ICT Services Cluster shows that it is successfully filling some of the institutional voids that were identified on the country level, but lacks in some of the areas that drive competitiveness. Two of the four dimensions exhibit a particularly strong divergence between positive and negative aspects: Within factor input conditions, strong physical infrastructure stand against shortages in high-skill labor and access to finance, while context for firm strategy and rivalry shows strong entrepreneurial spirit that faces impediments created by deficiencies in the surrounding regulatory framework for ICT services. The figure below illustrates this "shadow and light" character of the ICT cluster's competitiveness.

Fig. 12 – ICT Cluster Diamond for Kenya



We identified three competitive strengths and four major competitive issues towards the aspiration for Kenya to become a strong ICT services cluster.

### Competitive Strengths

Some of the cluster’s strengths at first stand at odds with weaknesses identified on the national competitiveness areas identified in section 2. While we noted weaknesses in logistical infrastructure on the country level, we find strengths in **fiber optic cable development** and the associated **abundance of broadband capacity** (Waema & N'dungu, 2012) as well as decreasing internet connectivity costs. Similarly, the difficulty to reach large parts of the population in rural areas has turned into a **pull factor for innovative business models** that can fill some of the institutional gaps (The Economist, 2013). Finally, an **entrepreneurial spirit** has been on the rise in Kenya ever since the launch of M-PESA (Bright & Hrubry, 2015), while strong government backing has established the internationally recognized trademark of “Silicon Savannah” (Bloomberg, 2012).

**1. Increasing connectivity:** Kenya’s fixed line internet penetration rate has surged from 14% in 2010 to 43% in 2014 (World Bank, 2016). Including mobile data networks, 74% of the Kenyan population had access to the internet as of 2015, figures above the regional and even the global

averages (Wainaina, 2015). 95% of Kenyans have internet enabled phones, 31% own a smartphone (McKinsey Global Institute, 2013). The government push to roll out fiber optic cables and making the necessary regulatory changes (Government of Kenya, 2013) have greatly increased network capacities and reduced prices (Waema & N'dungu, 2012).

This has two effects: (1) as connectivity increases, more and more Kenyans even in hard-to-reach places gain access to the ICT services market. From Nairobi, where tech has been developing fast within only a few years, those services can increasingly reach other parts of the country. (2) Benefits from increased connectivity are being emulated in East Africa, thus further expanding market reach and needs to be addressed. Kenya is one of the few African countries with an “internet-related trade surplus” (McKinsey Global Institute, 2013).

**2. Strong demand for innovative solutions:** Kenyan customers have rapidly adopted new internet based services that were specifically tailored to address some of the competitive deficiencies and local problems. For example, M-PESA’s success was due to its ability to provide fast and secure cash transfers even for remote villages (Runde, 2015). Building on that success, more start-ups have spawned to address payment related issues, such as school fees transactions or public transportation payments (The Economist, 2012). M-Farm, a Kenyan smartphone app that provides real time price information on crops, is transforming agriculture by increasing transparency and efficiency for local farmers (Bleiberg & West, 2015), while BRCK, the backup-generator, makes connectivity more reliable during power outages (Steadman, 2013).

These are examples of how ICT services seizing opportunities and the willingness of customers to use innovative services make a real economic impact, accelerating growth for Kenya’s services sector through ICT services adoption. Kenya’s challenges in areas such as security or property rights provide room for more business opportunities. Given similar challenges in surrounding countries, increasing internet access in the region is likely to increase demand for such services.

**3. Entrepreneurial Spirit:** Known as Silicon Savannah, Kenya has become a leading entrepreneurial power in Africa (USAID, 2015). Kenya scores high in the 2016 Entrepreneurship Index in high-tech transfer and networking, ahead of any other African country (Global Entrepreneurship and Development Institute, 2015). Companies are generally quite willing to adopt new technologies into their practice, and “opportunity-driven entrepreneurship” has gained traction “as more people embrace it for self-development” (Oigara, 2015).

Entrepreneurship has further been pushed by strong and visible government support on infrastructure, support of incubators, and policy reform. Government activities involve targeted small enterprise development and provision of small credit facilities (University of Pennsylvania), and the Global Entrepreneurship Summit in 2015, featuring U.S. President Obama, has highlighted Kenya’s strong position in the region. Finally, the emergence of privately driven tech hubs and networks, such as *m:lab*, *iHub* or the *Savannah Fund*, have fostered a culture of innovation and exchange of ideas that is unique to Africa (The Economist, 2012). Agglomeration gains from talent can be expected from the “Konza Technology City” currently under development in the proximity of Nairobi (BBC News, 2013). Kenya’s strong entrepreneurial development can further drive demand for capital investment, talent, and coordination among public and private stakeholders.

### Competitive Weaknesses

Four major weaknesses inhibit the ICT services cluster from further development not just in the regional, but in the global context. Non-physical factor inputs are largely determined by a **shortage of high-skill talent**, and further negatively impacted by a **limited access** for small and medium enterprises (SME) **to finance**. On the context of strategy and rivalry side, the regulatory framework exhibits weaknesses that inhibit foreign direct investment and service development. Finally, research and development (R&D) is comparatively low due to **coordination failures** between **research institutions and firms**.

**1. Shortage of high skill talent:** For Kenyan technology oriented firms, accessing highly skilled talent is a major reason for concern: the skills gap encompasses both the supply of adequately trained personnel for ICT firms and the demand for ICT services of a citizenry educated for basic use (“digital literacy”) (Government of Kenya, 2013). Of the 27,000 ICT professionals in Kenya, 27% work in support functions and 26% as systems analysts and engineers, leaving a gap in problem solving and creative skills required to develop innovative solutions (Kenya ICT Board, 2011). The ICT industry complains that graduates are not well prepared for large ICT projects (Kashorda, 2013), partly because ICT related university programs are not regulated by a specialized regulatory body (Kashorda, 2013), and partly because a general shortage of modern equipment prevents students from gaining relevant subject experience (ICT Authority of Kenya, 2013).

A particular challenge found by a study is that master-level graduates often do not have industry-specific degrees, and companies thus shy away from the extra expenditures required for additional training (Ochieng, 2015). This means that skillsets within the workforce highly depend on the individual quality of privately operated training programs. Industry officials highlighted a lack of hands-on experience. Firms’ on-the-job training is thus generally underdeveloped and lacks a common structure. The challenges are exacerbated by a lack of experienced teaching faculty and outdated lab equipment, which lead to a lack of PhD and advanced degree holders in ICT related structured training programs. A study by Ernst & Young, a consulting firm, found that learning and development opportunities are the highest concern for the retention of talents among human resource officers in Eastern Africa (Ernst & Young, 2014). The following quote sums up the situation rather well: “The Kenyan ICT industry view of fresh ICT graduates is that of low quality (...) in terms of technical content (...) communications, analytical and critical thinking skills” (ICT Authority of Kenya, 2013).

The scarcity of high skill labor has grave implications: Firms are increasingly forced to import professionals from other countries at high cost: For example, Kenyan banks were forced to import ICT talent from overseas at very high cost (Haruta, Horvath, Pint, & Zhang, 2011) to fill workforce

gaps for the implementation of new IT systems. In addition, the pathway to private businesses is often blocked due to inadequate training of graduates in essential business and managerial skills (Ncube & Ondiege, 2012).

**2. Limited access to finance for SME:** Limited access to finance for small and medium enterprises (SME) in the ICT sector stems from the usually high perception of risk due to the small scale of the sector (Government of Kenya, 2013) and poses a key constraint to growth in the entire region of Sub-Saharan Africa (International Finance Corporation, 2013). “SME in Kenya have difficulties of accessing both credit finance and equity” (Memba, Gakure, & Karanja, 2012) is a common complaint among insiders. Limited access to deposits, credit facilities and other financial services by formal financial institutions as well as high collateral requirements make it difficult for SME to find the financing they need. Venture Capital (VC) in particular seems to be in short supply: even though VC has been shown to be able to boost development of SME, entrepreneurship stakeholders are largely ignorant of the role that VC can play (Ambrose, 2012). The African Development Bank states that the “lack of seed capital is a constant problem” (Ncube & Ondiege, 2012), even though the authors note some improvements lately. In addition, larger companies tend to shy away from providing capital due to high volatility, the inability of small firms to meet minimum requirements, and their inexperience in financial management (Ambrose, 2012).

The ubiquitous micro-credit institutions are often focused on agriculture and lack ICT specific expertise and resources. Shareholding through capital markets is a rare concept. As a consequence, SME often have to rely on retained earnings and informal savings and costly short-term financing options (Kung'u, 2011). For startups in the ICT sector, this means that scaling up of services becomes difficult. By nature, most ICT related SME start with a regional focus and thus initially have little scope for risk sharing. This makes their funds unpredictable, and their main sources of capital provide little cushioning during expansion and against external shocks. Providers of micro-finance in many

instances do not have sufficient resources to follow the expansion of SME's services portfolios, meaning that they “hardly grow beyond start-up stage” (Memba, Gakure, & Karanja, 2012).

**3. Regulatory deficiencies:** Regulation for the ICT services sector is spread out between the central government and state entities in Kenyan counties, resulting in unclear responsibilities and role overlap (Waema & N'dungu, 2012), and consequently in higher transaction (compliance) costs for private players. To the extent that fragmentation makes it more difficult for regulatory institutions to prosecute software piracy and other types of cybercrime, investment is deterred. In addition, fragmentation has made it more difficult to fully align regulations with international standards, which is an important pillar for foreign investment as well as cross-border cutting service delivery. An additional barrier for this is being posed by the absence of cross-border recognition and enforcement. Reflecting the issue of corruption on the country diamond level, government officials as well as large industry players frequently interfere with regulation, and industry bodies exert influence (Kariuki, 2009). This was supported by statements from industry experts, who pointed toward the “undue influence” of large players, such as Safaricom.

A telecom regulatory environment assessment conducted by Research ICT Africa, a think tank, found that 40% of ICT value-added service providers rated the anti-competitive policies highly ineffective or ineffective in 2009, with another 30% rating them neutral/average – the worst result among all categories (Waema, Adeya, & N'dungu, 2010). On top of that, Quality of Service (QoS) is yet largely unregulated (Waema & N'dungu, 2012). Given the international best practice consensus and clear findings that QoS is an important pillar of ICT market development and a tool for strengthening often uninformed and price-led consumers (International Telecommunication Union, 2006), Kenya's regulatory framework provides insufficient incentives for the industry to focus on improving service quality and achieving transparent competition.

**4. University-firm coordination failures:** University-firm coordination failures are rooted in the weak linkages between government agencies, such as KENET, the Commission of Higher



Education, and Kenya Innovation Agency, local (public) universities, and private firms. A study indicates that multinational firms in particular tend to rely more on imported technologies than on domestic research (Munyoki, Kibera, & Ogutu, 2011). Due to the absence of a coordinating institution as well as a proper industry association, university research is largely disconnected from firms providing ICT services, with “limited industry-university linkages in terms of attachments and joint projects” (ICT Authority of Kenya, 2013). This disconnect is exacerbated by a lack of geographical clustering around technology campuses. As a result, private firms experience high barriers to access public and private research facilities. Coupled with high costs for private firms to conduct basic research, this meant that research and development (R&D) activities were below 1% of GDP in 2010, using U.N. data (The Global Economy, 2010). In conclusion, weak transmission of university research into market relevant developments, i.e. commercialization (ICT Authority of Kenya, 2013), and the resulting barriers to access international knowledge bases – particularly for SME – constrain the ICT services cluster and call for better collaboration between universities and the industry (McKinsey Global Institute, 2013).

## Part V. Recommendations

*Box 1 - Value Proposition:* Kenya should broaden its value proposition from a mobile technology innovations center, to a **regional ICT services hub using mobile technology innovations to ‘leapfrog’ conventional ICT services trajectories for all customers – retail to government**

Before 2000, knowledge-based and technology-led clusters like the mature Silicon Valley cluster in the USA and the early-stage cluster in Helsinki in Finland developed around the close integration of networked intellectual capital, labor and raw material residing within and exchanged among spatially proximate agents (e.g., individuals, firms, and other knowledge-creating institutions like universities) (Huggins, 2008). However since the dot.com bust, non-spatially proximate actors are better able to transfer complex knowledge, and less complex clusters can source knowledge

internationally; it flows more freely. Therefore successful ICT cluster models are shifting from spatially bound networks, to wider connectivity and non-spatial consolidation (Huggins, 2008).

Despite the absence of an established cluster built in old proximate model, Kenya has already demonstrated pockets of excellence in this new connectivity model of ICT cluster development through mobile technology innovations. The current value proposition of the cluster and promise of the Silicon Savannah is centered on mobile technology enabled solutions for the masses. For example, M-PESA grew from a C2C mobile transfer service launched in 2007, into a ubiquitous platform used by close to 60% of the population. M-PESA has inspired to a plethora of B2C and B2G offerings like the Bill-Pay service *Lipa na M-PESA*.

However we believe that that the cluster is ripe for a re-framing of its value proposition in light of the competitiveness challenges it faces including the shortages of high-skill talent, limited access to finance for SMEs, low R&D coordination and regulatory deficiencies. At present, innovative ideas struggle to convert to businesses. Mumble but fragmented SMEs providing B2C services struggle to scale and diversify. Overlapping and complex regulations, coupled with the lack of competition in the larger B2B and B2G service providers constrain the growth of these firms.

Reframing the value proposition as outlined in *Box 1* is timely for three main reasons: first, the substantial investments into backbone infrastructure to develop the sector (e.g., the implementation of 4 sub-marine fiber optic cables between 2009-2014). Second, the priority accorded to the sector by the Vision 2030 Development Plan (e.g., flagship projects like Konza City). And finally, some regulatory reforms are in place to anchor Kenya's ICT transformation in high capacity nationwide broadband network (e.g., 2013 National Broadband Strategy).

The proposed value proposition leverages existing competitive advantages in an entrepreneurial spirit, mobile connectivity, and customer willingness to pay for services that fill institutional voids to leapfrog traditional ICT cluster development paths and develop regional footprints for all customer segments. Accordingly the recommendations that follow deliver on this

value proposition by emphasizing three key themes: first – collaboration between private and public sector players for early stage ventures that show promise to help them convert into businesses. Second – a strong focus on a local ICT services pipeline in both management and technical expertise like engineering to serve more mature companies. And finally, the aspiration for regionally streamlined regulations and locally housed infrastructure for large companies serving B2B and B2G clients. An overview of the priority recommendations to be implemented through 2018 follows with proposed sequencing in *Fig. 10*, but a more detailed treatment of these recommendations is described below.

**I. Factor Input Conditions:** To address the lack of top local technical and managerial talent and access to finance for SMEs, we propose:

- A. Ministry of ICT partner with locally based MNCs (e.g., Microsoft, Intel) to:
  - i. *Source diaspora talent from global offices.* Companies like BCG are currently experimenting with programs that recruit diaspora talent in developed markets, train them abroad for 2-3 years, and then transfer them to African offices. To complement this, Government can further provide *market based incentives for the diaspora to return* (e.g., helping Kenyan business owners register new companies at consulates abroad).
  - ii. *Provide structured on job training* for local firm employees as well as host broader industry skill building opportunities, akin to ICT ‘extension’ services.
  - iii. *Increase scholarships for PhDs and advanced ICT degrees* (e.g., 7-UP Nigeria Scholarship for Business School). If MNCs sponsor scholarships with the aspiration of a future talent pipeline, there are opportunities for government to ease current talent pressures (e.g., work permits)
  - iv. *Co-invest in research facilities that require scale* that no single MNC nor smaller SMEs can invest in alone (e.g., local data centers). Building this infrastructure requires coordination between several players, and the government has a role to play in bringing them together, and catalyzing the process (e.g., regulation for shared hardware)

- B.** IFCs (e.g., Computer Society of Kenya - CSK) use their networks and resources of its bigger and more established firms to facilitate introductions of smaller firms to venture capital sources regionally and abroad (e.g., host VC/PE roadshows in Kenya).

Fig. 13. Overview of Priority ICT Cluster Recommendations and Proposed Sequencing

		Level of action and accountability	
		National	Cluster
		<b>OVERVIEW OF PRIORITY ICT CLUSTER RECOMMENDATIONS</b>	
		<i>[Primary actor]</i> <b>Recommendation</b>	<b>Implemntn. Seq</b>
2016-2018	Factor input conditions	<b>A</b> <i>[Gov]</i> Partner with locally based MNCs (e.g., Microsoft, Intel) to: <b>i) source diaspora talent</b> from global offices, <b>ii) provide structured on job training</b> for local firm employees as well as broader industry (e.g., ICT extension services), <b>iii) Increase scholarships for PhD</b> and advanced ICT degrees exchanges; <b>iv) co-invest in research facilities that require scale</b> (e.g., local data centers)	• 1
		<b>B</b> <i>[IFCs]</i> Use networks and resources of bigger firms to facilitate <b>introduction of smaller firms to venture capital sources in regional and abroad (e.g., VC/PE roadshows to Kenya)</b>	• 2
	Demand conditions	<b>C</b> <i>[Gov]</i> <b>Create Regulation Taskforce to use National Broadband Strategy as anchor to streamline and remove competing regulation</b> in sector, and clarify roles of overlapping policy and regulator institutions	• 3
	Context for firm rivalry	<b>D</b> <b>Change competitive frame for Kenya's ICT sector from East African Community to broader Sub-Saharan Africa</b> to include Mauritius and South Africa (e.g., set sector targets relative to these economies)	• 6
	State of Cluster Development & Related Industries	<b>E</b> <i>[Gov]</i> <b>Lay ground work to create "East Africa ICT cluster" with Kenya at the center;</b> rather than waiting to build capabilities within Kenya, leverage government support and research facilities from Rwanda (e.g, Carnegie Mellon Research Facility), capital market sophistication from Mauritius to attract investment to the region as a whole	• 7
		<b>F</b> <i>[IFCs]</i> <b>Increase linkages between universities and firms through IFC led events</b> to bridge gaps in company spending on R&D (e.g., hackathons as above, talent pipelines)	• 5
	Company Ops & Strategy	<b>G</b> <i>[IFCs, Gov]</i> <b>Work with start-up accelerators</b> like Endeavor, 88Mph, Savannah Fund, NailLab <b>to codify and distribute the 'how-to' business knowledge from resident entrepreneurs</b>	• 4
		<b>H</b> <i>[IFCs, Private Sector]</i> Seek <b>profitable opportunities to merge</b> and reduce fragmentation	• 8

Source: Team Analysis, (Delgado & Christian Ketels, 2012)

**II. Demand Conditions:** To address issues of overlapping regulation, we recommend that:

- C. Ministry of ICT *create an ICT Regulation Taskforce*, using the National Broadband Strategy as an anchor to streamline and remove competing regulations in the sector (e.g., redundancy in terrestrial to digital migration), address missing gaps (e.g., data protection) and clarify the roles of overlapping policy and regulatory institutions (e.g., Kenya ICT Board overlap with the National Communications Secretariat).

**III. Context for Firm Strategy & Rivalry:** To address issues of Kenya’s ‘spikey’ competitiveness profile i.e. global leader in pockets of ICT services (e.g., digital payments), but significant gaps in core infrastructure (e.g., 3G penetration <15%):

D. *Expand the competitive frame for Kenya’s ICT services sector* from the East African Community to broader Sub-Saharan Africa to include Mauritius and South Africa. If Kenya aspires to have a continental or even global services cluster, it is important to set ICT service sector targets relative to these aspirational economies, rather than compare the state of the sector to EAC peers that it already outperforms in many of the competitiveness metrics in Part III.

**IV. State of Cluster Development & Related Industries:** To address issues of a rapidly evolving and highly fragmented cluster with poor linkages between private sector – government – academia:

E. *Lay the groundwork to create an “East Africa ICT cluster”* with Kenya at the center. Rather than waiting to build all the capabilities required for a thriving cluster within Kenya, leverage strengths from other countries in the region, and the scale of a 160 million strong regional market to create a regional cluster and attract investment. For example, regulatory efficiency and research facilities in Rwanda (e.g., Carnegie Mellon in Rwanda), capital market sophistication and ease of registering businesses in Mauritius. This recommendation is in line with existing work of the EAC to streamline the existing barriers to regional integration and competing trade regulations (e.g., no visas to travel with the region). Kenya is a good fit for the heart of the cluster given its relative strength of the private sector that drives 68% of GDP, relatively higher human capital, ease of access for investors (e.g., a number of direct flights from Europe and Asia, not landlocked)

F. *Increase linkages between universities and firms through IFC led events.* These should target specific gaps identified in Part III – for example more university spending on R&D and creating a talent pipeline could be catalyzed by using research facilities available at IFC member locations for

ICT classes for university students – a stop gap approach until universities can build their own capabilities.

**V. Company Operations and Strategy:** To address issues of a flat industry value proposition (i.e. M-PESA everything) and high fragmentation of the sector coupled with the lack of business knowledge to convert innovations into sustainable and larger businesses:

G. *Ministry of ICT and IFCs to work with start-up accelerators to codify and distribute 'how-to' business knowledge from resident entrepreneurs (e.g., Endeavor, 88Mph, NaiLab).* These incubators have succeeded in quickly converting some ideas into viable products (e.g., M-Farm) and the successes as well as failures of their entrepreneurs are valuable lessons for aspiring entrepreneurs. Codifying this knowledge in videos and how-to-manuals made available to aspiring entrepreneurs can help address the knowledge gap.

H. *IFCs and individual firms to seek profitable opportunities to merge:* The high level of fragmentation in the industry is in some ways asymptomatic of the lack of knowledge to scale; small businesses that struggle to scale often perish. There are increasing incentives and resources to merge with the increasing entry of large and well capitalized corporations like Google, IBM and Oracle entering the local market and seeking local expertise and knowledge present in smaller more fragmented firms. Furthermore, the membership of corporations like this in IFCs (e.g., CSK) strengthens the ability of the IFC members to act on issues like mergers.

Once the priority recommendations described above are underway, the following areas may be further considered to address some of the more complex issues identified:

- **Factor Input Conditions:** i) Ministry of ICT to provide local universities and tertiary college ICT programs with “Common Development Policy” aligned with aspirations of cluster, particularly for technical scientists and engineers. ii) Ministry of Industry and Trade to dedicate specific ICT Services resource (e.g., add work stream) to the existing Business Environment Delivery Unit team at Ministry of Investment and Trade (MOIT) that is targeting Top 50 rank in WB Ease of Doing Business. Will identify specific recommendations that affect ICT disproportionately (e.g., IP Protection, dominance of large business groups)
- **Demand Conditions:** Ministry of Industry and Trade to extend existing national “Buy Kenya, build Kenya” campaign to ICT services sector to reduce the perception tax of made-in-Africa technology services.
- **Context for Firm Strategy & Rivalry:** Ministry of ICT can use the Regulatory Taskforce outlined above to align data & IP protection policy with international best practices.
- **Company Operations and Strategy:** i) IFCs working with Ministry of ICT can encourage industry to move from over-reliance on mobile and digital payments infrastructure (e.g., Government to host hackathons for B2G services like eGov, IFCs to host hackathons for B2B innovations) ii) Individual firms can invest in building local data storage capabilities that leverage Kenya’s strong fiber optics network, and reduce reliance on foreign infrastructure that limits local company access; government to offer incentives for this investment (e.g., reduced rent for land to build data centers).

## Part VI. Conclusion

Kenya has a unique opportunity to capitalize on its global reputation as the *Silicon Savannah* and a pioneer in the global mobile technology economy to become a global ICT services hub with products available for a full spectrum of customer segmentation - B2C, B2B, B2G. Given Kenya's status as a leading commercial and logistics hub in East Africa, coupled with the competitive strengths of smaller regional peers like Rwanda (i.e. regulatory environment, research facilities), there is a unique opportunity for Kenya to lead the creation of a Regional ICT cluster boasting a domestic market of 160 million consumers that can compete with not only other regional clusters on the continent like South Africa, but other emerging global ICT services clusters like the Philippines.

This transition will require a concerted effort from government and the private sector to remove the key competitiveness issues facing the sector like the lack of high skill talent and regulatory deficiencies. President Uhuru Kenyatta's remarks at the 2015 ICT Innovation Forum reaffirmed the governments' commitment to enabling the ICT sector to deliver on its Vision 2030 goals. We hope that government together with MNC's and large local companies like Cellulant can enable Kenya's ICT services sector to ride the coat-tails of growth from the past 5 years and establish the *Silicon Savannah* as a cluster that is here to not just survive, but thrive.



## Appendix

### *List of Interviews*

Michael Joseph, Managing Director Mobile Money Vodafone, Former CEO Safaricom  
Kamal Bhattacharya, Director IBM Research Africa Lab  
Kwame Owino, CEO Institute of Economic Affairs, Kenya  
Catherine Nyaki Adeya, Former CEO of Konza Technopolis City  
Rizwan Tufail, Former Regional Director, Microsoft, Kenya  
Robin Miller, Assistant Partner & Global ICT Practice Lead, Dalberg  
Philbert Nsengimana, Minister of Youth and ICT, Rwanda  
Patrick Nyirishema, Director General, Rwanda Utilities Regulatory Authority  
Regis Gatarayiha, Head, ICT Department, Rwanda Development Board  
Eddy Kayihura, CEO, Broadband Systems Corporation, Rwanda  
Alline Kabbatende, COO, Rwandaonline  
Antoine Sebera, Chief Corporate Relations and H.R, Olleh Rwanda

## Bibliography

- Ambrose, J. (2012, November). Venture capital (VC): The all important MSMEs financing Strategy under neglect in Kenya. *International Journal of Business and Social Science*, 3(21), 234-240.
- BBC News. (2013, January 23). *Kenya begins construction of 'silicon' city Konza*. Retrieved April 9, 2016, from BBC News: <http://www.bbc.co.uk/news/world-africa-21158928>
- BDO. (2011, March 9). *MTN Nigeria Rakes In N749 Billion Revenues*. Retrieved December 2011, 2011, from Business Daily Nigeria: [www.businessdayonline.com/NG/index.php/news/76/hot-topic/18880-mtn-nigeria-rakes-in-n749-billion-revenues](http://www.businessdayonline.com/NG/index.php/news/76/hot-topic/18880-mtn-nigeria-rakes-in-n749-billion-revenues)
- Bhattacharya, K. (2016, April 6). Director - IBM Research Africa Lab. (A. Lobelle, Interviewer) Cambridge, MA.
- BIZNA. (2014, November 18th). *Top 5 Technologically advanced countries in Africa*. Retrieved from bizna.co.ke: <http://www.bizna.co.ke>
- Bleiberg, J., & West, D. M. (2015, April 23). *Three ways mobile is helping farmers in Kenya*. Retrieved April 16, 2016, from Brookings: <http://www.brookings.edu/blogs/techtank/posts/2015/04/23-farm-kenya-mobile-app>
- Bloomberg. (2012, April 18). *Silicon Savannah: Kenya's Billion-Dollar Tech Bet*. Retrieved April 09, 2016, from Bloomberg News: <http://www.bloomberg.com/news/videos/b/fa73fc02-c511-4824-806d-5656acdfae7c>
- Bright, J., & Hrubry, A. (2015, July 23). *The Rise Of Silicon Savannah And Africa's Tech Movement*. Retrieved April 10, 2016, from TechCrunch: <http://techcrunch.com/2015/07/23/the-rise-of-silicon-savannah-and-africas-tech-movement/>
- Communications Authority of Kenya. (2015). *Quarterly Sector Statistics Report; Second Quarter for the Financial Year 2015-2016*. Retrieved April 29, 2016, from <http://ca.go.ke/index.php/statistics>
- De Vries, G. M. (2013). Structural Transformation in Africa: Static Gains, Dynamic Losses. *GGDC Research Memorandum 136*.

- Delgado, M., & Christian Ketels, M. E. (2012). Determinants of National Competitiveness. *NBER Working Paper Series, No. 18249*.
- East African Community. (2004). *East African Community Customs Management Act*.
- Ernst & Young. (2014). *Realising potential: EY 2014 Sub-Saharan Africa talent trends and practices survey*. Retrieved April 18, 2016, from [http://www.ey.com/Publication/vwLUAssets/EY-2014-SSA-Talent-Trends-Survey-Report/\\$FILE/EY-2014-SSA-Talent-Trends-Survey-Report.pdf](http://www.ey.com/Publication/vwLUAssets/EY-2014-SSA-Talent-Trends-Survey-Report/$FILE/EY-2014-SSA-Talent-Trends-Survey-Report.pdf)
- Feenstra, R. C. (2013). The Next Generation of the Penn World Table. *NBER Working Paper No. 19255*.
- Gallup. (2015). *Global Law and Order Report*.
- Gatarayiha, R. (2016, April 2nd ). Head, ICT Department, Rwanda Development Board.
- Global Entrepreneurship and Development Institute. (2015). *Kenya Country Data*. Retrieved April 12, 2016, from The GEDI: <https://thegedi.org/countries/kenya>
- Government of Kenya. (2013). *The National Broadband Strategy*.
- Hallett, R. (1970). *Africa to 1875: A Modern History*.
- Haruta, A., Horvath, R., Pint, B., & Zhang, J. (2011). *High-end Talent Development and Retention in the ICT industry in Kenya*. Nairobi: IBM Corporate Service Corps.
- Huggins, R. (2008). The Evolution of Knowledge Clusters. *Economic Development Quarterly* , 1-13.
- IBM Research. (2015). *Africa*. Retrieved April 24, 2016, from IBM Research: <http://www.research.ibm.com/labs/africa/>
- ICT Authority Kenya. (2016). *Transport Integrated Management Systems (TIMs)*. Retrieved April 24, 2016, from <http://www.icta.go.ke/transport-integrated-management-systems-tims/>
- ICT Authority of Kenya. (2013). *The National Broadband Strategy: A Vision 2030 Flagship Project*. Nairobi: Ministry of Information, Communications and Technology.
- International Finance Corporation. (2013). *Access to Finance - Sub-Saharan Africa*. IFC Advisory Services.
- International Telecommunication Union. (2006). *ICT Quality of Service Regulation: Practices and Proposals*. Geneva, Switzerland: ITU.
- Joseph, M. (2016, April 14). Managing Director - Mobile Money, Vodafone; Former CEO of Safaricom. (A. Lobelle, Interviewer) Cambridge, MA.
- Kabbatende, A. (2016, April 2nd ). Chief Operating Officer, Rwandaonline Platform. (C. Akamanzi, Interviewer)
- Kariuki, G. (2009). Growth and improvement of information communication technology in Kenya. *International Journal of Education and Development using Information and Communication Technology*, 5(2), 146-160.

- Kashorda, M. (2013). A Strategy for Developing High-end ICT talent for Emerging African NRENs – The case of KENET. *Proceedings and reports of the 6th UbuntuNet Alliance annual conference* (pp. 89-102). UbuntuNet.
- Kayihura, E. (2016, April 2nd). CEO, Broadband Systems Corporations. (C. Akamanzi, Interviewer)
- Kelly, T. (2014, May 2). *100 Tech Hubs Across Africa: Where Are the New Innovation Hot Spots*. Retrieved April 24, 2016, from VC4A: <https://vc4a.com/blog/2014/05/02/100-tech-hubs-across-africa-where-are-the-new-innovation-hotspots/>
- Kenya ICT Board. (2011, November 22). *Monitoring and Evaluation Survey Result*. Retrieved April 17, 2016, from <https://opendata.go.ke/download/3j44-wqzt/application/zip>
- KNBS. (2014). *Economic Survey*. Nairobi: Kenya National Bureau of Statistics.
- Kung'u, G. K. (2011). Factors influencing SMEs access to finance: A case study of Westland Division, Kenya. *Munich Personal RePEc Archive*.
- Law relating to investment promotion and facilitation, 06/2015 (Law March 28, 2015).
- McKinsey Global Institute. (2011). *Internet Matters: The Net's sweeping impact on growth, jobs and prosperity*. McKinsey & Company.
- McKinsey Global Institute. (2013). *Lions go digital - The Internet's transformative potential in Africa*. McKinsey & Company.
- Memba, S., Gakure, W., & Karanja, K. (2012, March). Venture Capital (VC): Its Impact on Growth of Small and Medium Enterprises in Kenya. *International Journal of Business and Social Science*, 3(6), 31-38.
- Miller, R. (2016, April 25th ). Assistant Partner & Global ICT Practice Leader, Dalberg . (C. Akamanzi, Interviewer)
- Munyoki, J., Kibera, F., & Ogutu, M. (2011, April 13). Extent to which university-industry linkage exists in Kenya: A study of medium and large manufacturing firms in selected industries in Kenya. *Business Administration and Management* , 1(4), 163-169.
- Ncube, M., & Ondiege, P. (2012). *Silicon Kenya: Harnessing ICT Innovations for Economic Development*. Tunis Belvédère, Tunisia: African Development Bank Group.
- Nsengimana, P. (2016, April 28th ). Minister, ICT and Youth, Rwanda. (C. Akamanzi, Interviewer)
- Nyirishema, P. (2016, April 3rd ). Director General, Rwanda Utilities Regulatory Agency (RURA). (C. Akamanzi, Interviewer)
- 'Ochieng, L. (2015, April 19). *Nice papers, but can you back it? The problem with Kenya's job market*. Retrieved April 17, 2016, from Daily Nation: <http://www.nation.co.ke/lifestyle/DN2/The-problem-with-Kenya-job-market/-/957860/2690760/-/gftxnv/-/index.html>
- Oigara, J. (2015, July 22). *Kenya will lead the future of African entrepreneurship*. Retrieved March 12, 2016, from Daily Nation: <http://www.nation.co.ke/oped/Opinion/KCB-Group-GES-Kenya-innovation/-/440808/2802860/-/10u4fhp/-/index.html>

- Ooko-Ombaka, A. (2016). Kenya's Big Push: Coordination Challenges in Kenya's Industrial Zone Approach to Manufacturing. *Second Year Policy Analysis - Harvard Kennedy School*.
- Ronge, E. a. (2000). A Review of Kenya's Current Industrialization Policy. *KIPPRA Discussion Paper No. 3*.
- Rubadiri, V. (2012, November 19). *Kenya Plans to Land 5th Undersea Cable*. Retrieved April 24, 2016, from Capital Business: [www.capitalfm.co.ke/business/2012/11/kenya-plans-to-land-5th-undersea-cable](http://www.capitalfm.co.ke/business/2012/11/kenya-plans-to-land-5th-undersea-cable)
- Runde, D. (2015, August 12). *M-Pesa And The Rise Of The Global Mobile Money Market*. Retrieved April 15, 2016, from Forbes: <http://www.forbes.com/sites/danielrunde/2015/08/12/m-pesa-and-the-rise-of-the-global-mobile-money-market/#34f3e67a23f5>
- Safaricom. (2016). *M-PESA*. Retrieved April 30, 2016, from <http://www.safaricom.co.ke/personal/m-pesa>
- Sebera, A. (2016, April 3rd). Chief Corporate Relations and H.R, Olleh Rwanda. (C. Akamanzi, Interviewer)
- Steadman, I. (2013, May 13). *Ushabidi's rugged BRCK, 'the backup generator for the internet'*. Retrieved April 19, 2016, from Wired: <http://www.wired.co.uk/news/archive/2013-05/13/brck>
- The Economist. (2012, August 25). *Upwardly Mobile*. Retrieved April 16, 2016, from The Economist: <http://www.economist.com/node/21560912>
- The Economist. (2013, May 27). *Why does Kenya lead the world in mobile money?* Retrieved April 12, 2016, from The Economist explains: <http://www.economist.com/blogs/economist-explains/2013/05/economist-explains-18>
- The Global Economy. (2010). *Compare Countries using data from official sources: Research and development expenditure, percent of GDP*. Retrieved April 19, 2016, from The Global Economy: <http://www.theglobaleconomy.com/compare-countries/>
- Transparency International. (2015). *Corruption Perception Index*. Retrieved April 29, 2016, from <http://www.transparency.org/cpi2015>
- Tufail, R. (2016, April 26th). Former Regional Director, Microsoft, Nairobi, Kenya. (C. Akamanzi, Interviewer)
- UN International Telecommunication Union. (2015). *ICT Development Index*. Retrieved April 29, 2016, from <http://www.itu.int/net4/ITU-D/idi/2015/>
- University of Pennsylvania. (n.d.). *SBC Network & Entrepreneurship Development in Kenya*. Retrieved March 29, 2016, from African Studies Center: [http://www.africa.upenn.edu/Comp\\_Articles/SBC\\_Network\\_12727.html](http://www.africa.upenn.edu/Comp_Articles/SBC_Network_12727.html)
- USAID. (2015, July). *Kenya Entrepreneurship Fact Sheet*. Retrieved April 15, 2016, from USAID.gov: <https://www.usaid.gov/sites/default/files/documents/1860/Entrepreneurship%20fact%20sheet.pdf>
- Waema, T. M., & N'dungu, M. N. (2012). *Evidence for ICT Policy Action - What is happening in ICT in Kenya?* Research ICT Africa.
- Waema, T., Adeya, C., & N'dungu, M. N. (2010). *Kenya ICT Sector Performance Review 2009/2010*. Research ICT Africa.

- Wainaina, E. (2015, December 23). *Kenya's Internet Penetration stands at 32 Million Users or 74.2% of Population*. Retrieved March 24, 2016, from TechWeez: <http://www.techweez.com/2015/12/23/kenyas-internet-penetration-stands-at-32-million-users-or-74-2-of-population/>
- WIPO. (2015). *Global Innovation Index*. Retrieved April 29, 2016, from <https://www.globalinnovationindex.org/userfiles/file/.../GII-2015-v5.pdf>
- World Bank. (2010). *Kenya Economic Update - Kenya at the Tipping Point? with a special focus on the ICT Revolution and Mobile Money*. Poverty Reduction and Economic Management Unit Africa Region.
- World Bank. (2014). *World Development Databases*. Retrieved April 29, 2016, from World Development Indicators: <http://data.worldbank.org/data-catalog/world-development-indicators>
- World Bank. (2016). *2016 Ease of Doing Business Report*. Database. Retrieved April 29, 2016, from <http://www.doingbusiness.org/~media/GIAWB/Doing%20Business/Documents/Annual-Reports/English/DB16-Chapters/DB16-Mini-Book.pdf>
- World Bank. (2016). *International tourism, number of arrivals*. Retrieved April 29, 2016, from <http://data.worldbank.org/indicator/ST.INT.ARVL>
- World Economic Forum. (2015). *Global Competitiveness Report 2015-2016*. Retrieved April 29, 2016, from <http://reports.weforum.org/global-competitiveness-report-2015-2016/>
- World University Rankings. (2016, April 21). *Best universities in Africa 2016*. Retrieved April 29, 2016, from World University Rankings: <https://www.timeshighereducation.com/world-university-rankings/best-universities-in-africa-2016>