

## Chapter 5

# **Digital transformation for youth employment and Agenda 2063 in East Africa**

The chapter examines the relationship between digitalisation and youth employment in 14 East African countries: Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Mauritius, Rwanda, Seychelles, Somalia, South Sudan, Sudan, Tanzania and Uganda. The first section presents the state of youth employment and digital development in East Africa. The second section analyses how East Africa can leverage digitalisation for job creation, looking at the strengths, weaknesses, opportunities and threats. The third section discusses how the region needs to invest in human resource capacity to meet future labour demand, develop appropriate mechanisms to facilitate the school-to-work transition, promote national digital literacy programmes and create a monitoring process to understand changes in technology. The fourth section addresses how to nurture entrepreneurship and innovation by building a supportive regulatory environment for home-grown start-ups and facilitating financing for the development of technology parks. The final section highlights strategies for mobilising resources for regional infrastructure and building a single digital market.

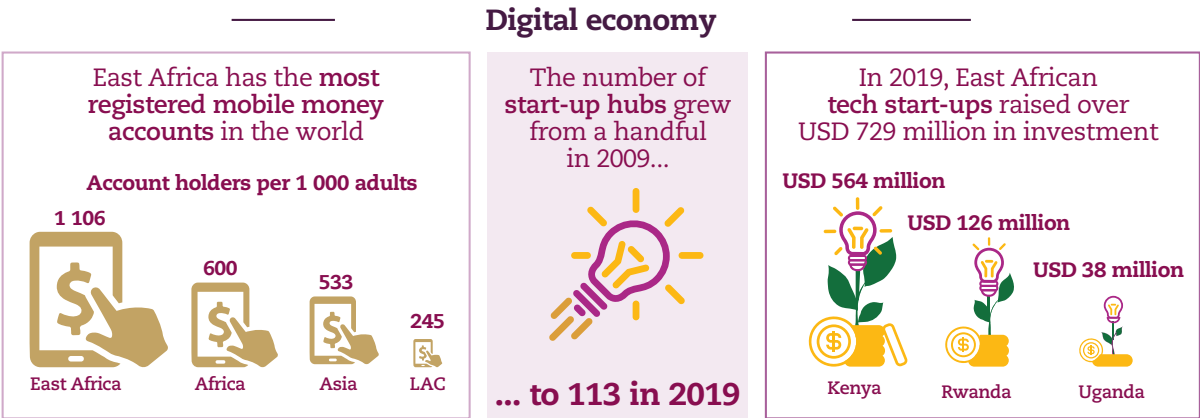
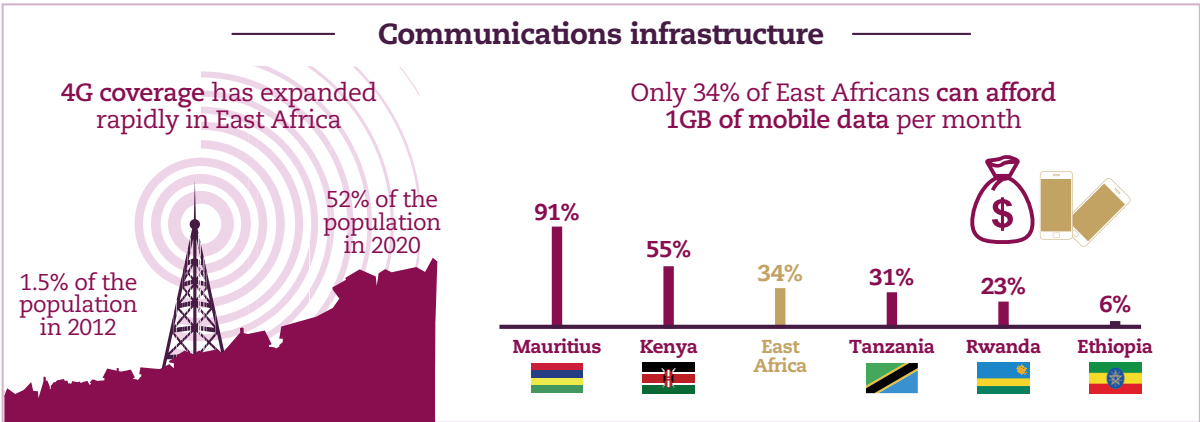
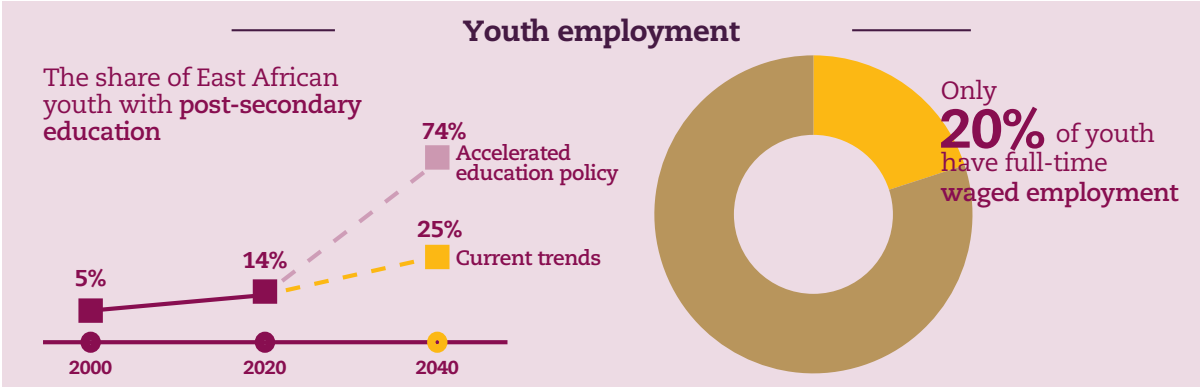
# EFFICIENT BRIEFING

The digital transformation can play a key role in youth employment in East Africa. Only 20% of the region's youth (aged 15-29) have full-time waged jobs, while most are in informal and agricultural work. Digital start-up companies in East Africa attract USD 1.2 billion a year in venture funds and create direct jobs in the digital economy. They also boost productivity growth, job creation and new business models in sectors such as financial technology (fintech), education, healthcare, consumer services and agriculture.

The conditions for leapfrogging to the digital age are ripe, but challenges remain. The region is home to a large pool of increasingly educated youth and relatively strong communications infrastructure, with the fourth-generation mobile network (4G) now available to almost three-quarters of the population. The region also boasts the highest mobile money use in the world. Yet turning higher education attainment into relevant skills for the future remains challenging. Digital adoption among youth is highly uneven across income, gender, geographical situation and education groups.

The region needs to address these challenges to create jobs in the digital era by: (i) investing in human resource capacity for future demand for skills; (ii) nurturing entrepreneurship and innovation in the digital economy; and (iii) co-operating to develop regional infrastructure and establish a single digital market.

# East Africa



- ### What's next for policy makers?
- Build cross-border communications infrastructure
  - Regulate data protection and personal privacy
  - Facilitate and regulate international mobile money payments

## East Africa regional profile

Table 5.1. Selected indicators on digital transformation in East Africa

			East Africa (5 years ago)	East Africa (latest year)	Source	Latest year
<i>Digital sector</i>	Communications infrastructure	Percentage of the population with a cell phone	9.3	32.9	ITU	2018
		Percentage of the population with 4G coverage	21.3	72.2	GSMA	2020
		International Internet bandwidth per Internet user (kilobits/second)	13 634.1	47 878.0	ITU	2017
	Telecommunication sector	Total capital expenditure (as a percentage of total revenue)	20.1	15.5	GSMA	2018-20
		Earnings before interest, taxes, depreciation and amortisation (as a percentage of total revenue)	46.0	43.0	GSMA	2018-20
		Total employed headcount within the telecom companies (head account full-time equivalent)	31 488	44 065	GSMA	2016-17
<i>Digital economy</i>	Start-up development	Number of active start-ups that raised at least USD 100 000	39	163	Crunchbase	2011-20
	Digital services	E-Commerce sales (in USD million)	598.5	858.6	UNCTAD	2014-18
		Export of professional and IT services delivered electronically (in USD million)	1 667.8	3 719.8	UNCTAD	2014-18
<i>Digitalised economy</i>	Internet use among people	Percentage of the population that use mobile phones regularly	56.7	63.5	Gallup	2018
		Percentage of women with Internet access	19.9	21.2	Gallup	2018
		Percentage of the poorest 40% with Internet access	14.3	14.1	Gallup	2018
		Percentage of rural inhabitants with Internet access	19.8	21.9	Gallup	2018
	Digital-enabled businesses	Percentage of firms having their own website	17.8	35.4	World Bank	2018*
		Percentage of firms using e-mail to interact with clients/suppliers	46.7	59.0	World Bank	2018*
		Percentage of goods vulnerable to automation that are exported to OECD countries	n.a.	17.1	World Bank	2020
	Access to finance	Percentage of the population with a mobile money account	23.0	60.0	Demirgüç-Kunt et al.	2017

Note: \* Data for 2018 or the latest year available. Chapter 1 provides the definitions of a digital and a digitalised economy. n.a. – not available, ITU – Information Technology Union, GSMA – Global system for Mobile communication Association, UNCTAD – United Nations Conference on Trade and Development.

Sources: Authors' calculations based on data from Crunchbase (2020), *Crunchbase Pro* (database); Demirgüç-Kunt et al. (2018), *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*; Gallup (2019), *Gallup World Poll*; GSMA (2020), *GSMA Intelligence* (database); ITU (2020), *World Telecommunication/ICT Indicators Database*; UNCTAD (2020), *UNCTADSTAT* (database); World Bank (2020a), *Enterprise Surveys* (database); World Bank (2020b), *World Development Report 2020*.

**Context:**

- About 7.2 million youth in East Africa will reach working age each year between now and 2030. However, currently only 20% of youth have full-time waged employment.
- The region has 1 106 registered mobile money accounts for every 1 000 adults, the highest penetration rate of mobile money in the world. The spread of mobile money services in Kenya helped raise at least 194 000 households out of extreme poverty.
- 4G coverage reached the majority of East Africans for the first time in 2019. However, only a third (34%) of the population can afford one gigabyte of prepaid mobile data.
- In 2019, East African tech start-ups raised over USD 729 million in investment, mostly in Kenya (USD 564 million), compared to USD 367 million in 2016.

**Proposed actions:**

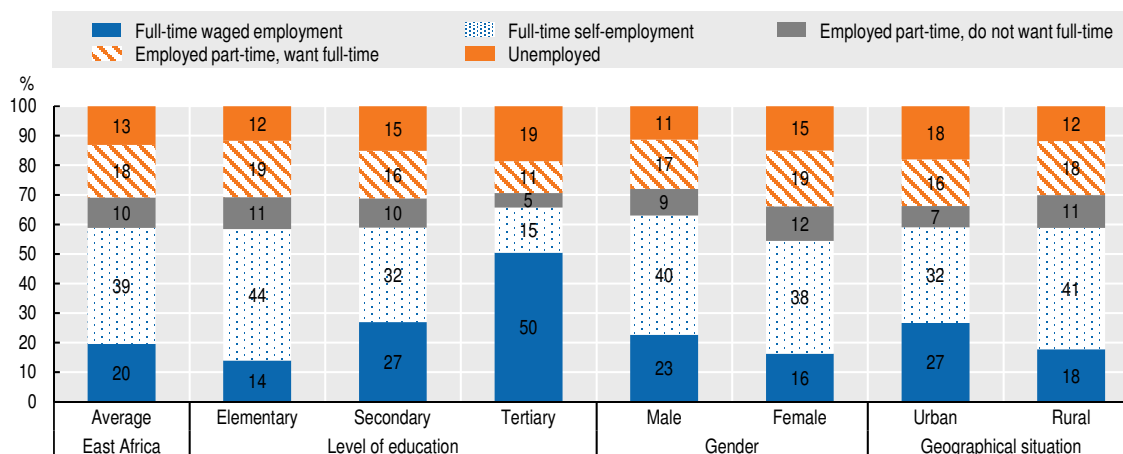
- **Invest in human resource capacity to meet future labour demand:**
  - facilitate the school-to-work transition
  - promote national digital literacy programmes that include disadvantaged groups
  - monitor technological development in East Africa.
- **Nurture entrepreneurship and innovation in the digital economy:**
  - adapt the regulatory environment to support local entrepreneurship
  - encourage the development of technology parks and facilitate their financing.
- **Strengthen regional co-operation to accelerate digitalisation:**
  - mobilise public and private resources to develop regional infrastructure
  - realise a single digital market by promoting seamless connectivity, harmonising regulations and facilitating the interoperability (the capacity to exchange and use information in electronic form) of cross-border payments.

## The region's formal sector does not provide enough jobs for its youth

**Most of the youth in East Africa have low-quality jobs, especially the less educated, females and those in rural areas**

In East Africa, about 7.2 million youth are expected to reach working age each year between now and 2030, and there is a limited number of formal sector jobs – those with normal hours and regular wages that are recognised as income sources on which income taxes are paid. According to the Gallup World Poll (2019), only 20% of youth have full-time waged employment (Figure 5.1). National surveys show that approximately 250 000 youth turn 18 every year in Rwanda, while only 500 000 formal jobs were available in 2017. Similarly, Kenya had about 2.8 million formal sector jobs in 2017 (out of 16.9 million jobs in total); with almost 1 million youth turning 18 each year, the ratio is about 3 to 1 (Mastercard Foundation, 2019).

Figure 5.1. Employment status among youth in East Africa's labour force according to level of education, gender and geographical situation, 2010-18 averages



Note: The data includes ten East African countries: Djibouti, Ethiopia, Kenya, Madagascar, Rwanda, Sudan, Somalia, South Sudan, Tanzania and Uganda. Elementary: have completed primary education or less (up to eight years of basic education). Secondary: have completed part of secondary education up to three years of higher education (9 to 15 years of education). Tertiary: have completed four years of study beyond high school and/or have obtained a university degree after four years of study.

Source: Authors' calculations based on data from Gallup (2019), Gallup World Poll, [www.gallup.com/analytics/232838/world-poll.aspx](http://www.gallup.com/analytics/232838/world-poll.aspx).

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**Self-employment and household enterprises, often associated with the informal sector, continue to account for most of the employment in the region due to a lack of better livelihood options.** Own-account and contributing family workers currently represent 75% of full-time employment in East Africa, down from 80% in 2000. More than 50% of the youth who participated in the ILO School-to-Work Transition Survey (ILO, 2015) across three East African countries, namely Madagascar, Tanzania and Uganda, found themselves in vulnerable forms of employment out of necessity, either due to the lack of wage-paying jobs or because their families required it.

**The labour force seems to be moving slowly from the agricultural to the services sector.** The agricultural sector still employs the largest proportion of the labour force though its share has been slowly decreasing, going from 72.2% of jobs in the first decade of the 21st century to 68.6% for the 2010-18 period. The services sector is absorbing most of the workers who leave agriculture. In Rwanda, for instance, the share of employment in the services sector grew from 9% in the early 2000s to 28% for the 2010-18 period. Nonetheless, new jobs in the services sector tend to be in low-productivity activities such as retail trade and hospitality, limiting the gains of labour reallocation (AUC/OECD, 2018).

**Young women's participation in the labour market has been increasing in recent years, but they still face significant constraints.** Although the gender gap (measured as the male-to-female labour market participation rate) decreased from 1.41 in 1991 to 1.39 in 2017, it remains significant in the region. Among 15-30 year-olds, 37% of females still find themselves outside of the labour force, compared to 23% of males. In addition, unemployment and vulnerable forms of employment are more prevalent among young women, who tend to be engaged in the trade, domestic work and service sectors, including restaurants and hotels.

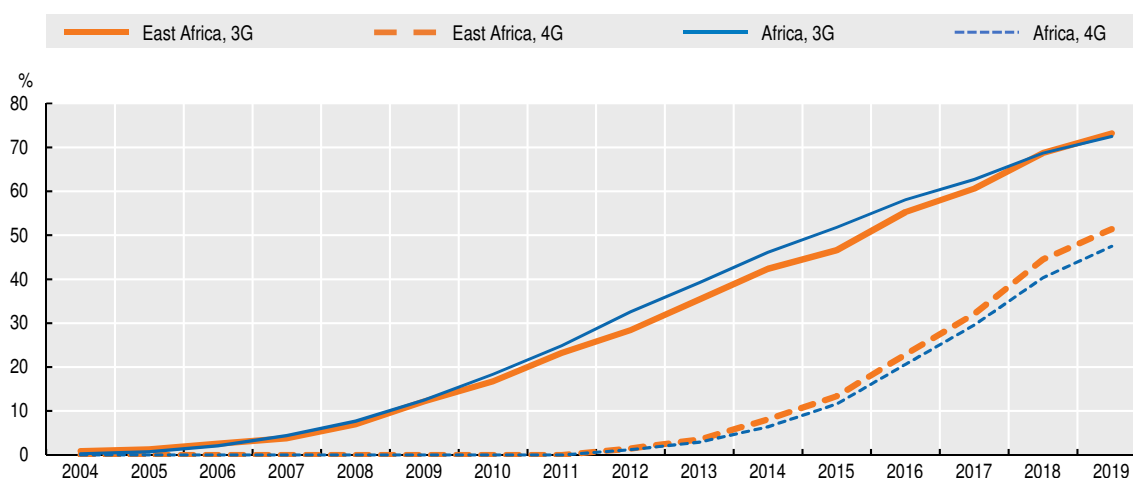
### The coverage and quality of communications infrastructure has improved, but digital affordability remains a barrier to access


East Africa has improved its connection to the global Internet network. The four high-capacity undersea fibre optic cables (TEAMS, SEACOM, EASSy and LION) increased the region's Internet connectivity to more than 36 terabits per second. Until the arrival of cables in 2009, East African countries, except for Mauritius, relied on satellite connection for just under one gigabyte per second that served the entire continent.

The challenge of developing a backbone broadband network remains in certain countries. Immediately after the cables landed on the eastern seaboard of Africa, six East African countries (Kenya, Mauritius, Rwanda, Somalia, Tanzania and Uganda) started laying terrestrial fibre optic cables to expand broadband access to citizens across the region. The Comoros, Djibouti, Ethiopia, Madagascar, South Sudan and Sudan have yet to build a robust internal communications infrastructure. Our analysis, based on the map of terrestrial fibre from AfTerFibre's Network Startup Resource Center and a map of urban agglomeration from Africapolis (see Chapter 1), shows that their coverage also favours larger cities over other areas. Coverage is stronger in cities where the population lives within ten kilometres of the backbone network; this is the case of 81% of residents in big cities and 51% of residents in intermediary cities.

4G mobile network coverage has increased rapidly in East Africa (Figure 5.2). 4G is an advanced network to replace 2G and 3G systems with higher download speeds, sometimes as fast as high-speed fixed broadband. Its introduction is particularly important in East Africa because it greatly improves the user experience for people who access the Internet on their mobile phones. Since its introduction to the region in 2012, 4G coverage expanded to reach 51.4% of the population in 2019, which is higher than Africa's average of 47.5%. Older technology such as the 3G network is also expanding, especially in remote areas. In East Africa, 73.2% of the population now live in areas with 3G mobile coverage, roughly the same level as for the whole continent (72.5%).

Figure 5.2. 3G and 4G mobile network coverage in East Africa, 2004-19

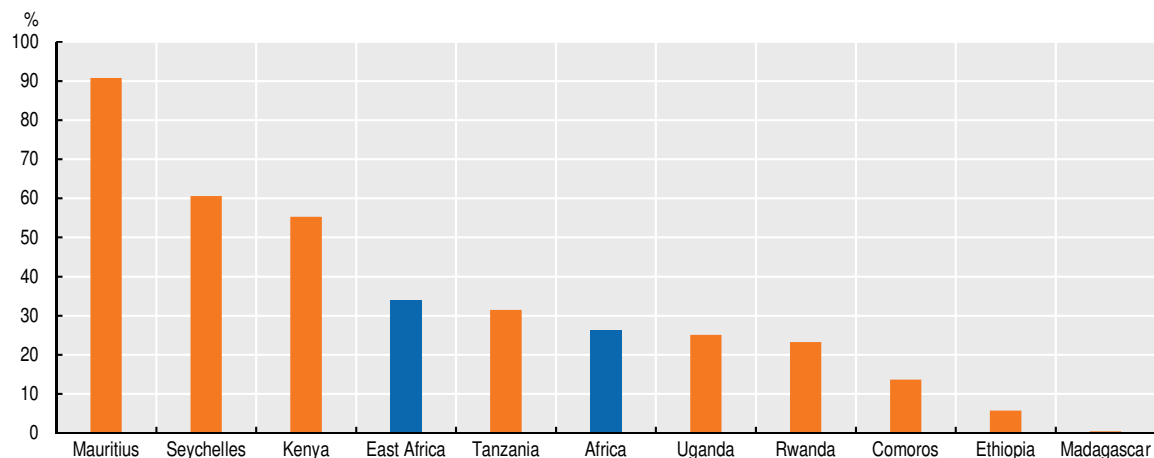


Source: Authors' calculations based on data from GSMA (2020), GSMA Intelligence (database), [www.gsmainelligence.com/](http://www.gsmainelligence.com/). StatLink  <https://doi.org/10.1787/888934203833>

**Innovations are helping expand Internet access to remote locations.** Rwanda has achieved near-universal 4G coverage. This results from a strategic public-private partnership begun in 2013 that builds 4G infrastructure and provides wholesale high-speed mobile traffic to Internet service providers. Rwanda’s government owns 49% of the partnership, and the rest belongs to Korea Telecom. Another example is the Mawingu project in Kenya, supported by Microsoft. It connects over 100 000 users in the town of Nanyuki to low-cost, high-speed Internet using solar power and under-used broadcast spectra, or “TV white spaces”.


**Affordability of digital services and devices remains a barrier to Internet use for a large share of the region’s population.** Only a third (34%) of the population in East Africa can afford one gigabyte of prepaid mobile data, the bandwidth needed for one to two hours of video conferencing (Figure 5.3). While this figure is higher than the average for Africa (26%), it highlights the need to make mobile Internet more affordable. A survey of information and communications technology (ICT) use among youth in Rwanda, Tanzania, Uganda and three other African countries reveals that costs of digital devices and services are a real issue (Research ICT Africa, 2018). Only 11% of youth in Rwanda own Internet-enabled phones, compared to 60% in South Africa.

Figure 5.3. Share of the population who can afford one gigabyte of mobile data monthly in Africa and selected East African countries, 2018



Note: Affordability is defined as the price of the cheapest prepaid one gigabyte of mobile Internet being below 5% of the monthly income of the household.

Source: Authors’ calculations based on price data from Research ICT Africa (2020), *Mobile Pricing* (database), [https://researchictafrica.net/ramp\\_indices\\_portal/](https://researchictafrica.net/ramp_indices_portal/) and on income distribution data from World Bank (2020c), *PovCalNet* (database), <http://iresearch.worldbank.org/PovcalNet/home.aspx>.

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### Most conditions for digitalisation are ripe; however East Africa must further improve its human capital and disseminate technology

This section discusses East African countries’ various strengths, weaknesses, opportunities and threats (SWOT) using digitalisation – the transition from analogue to digital – to create jobs. Table 5.2 summarises these ideas. The analysis highlights the region’s dynamic digital economy, an economy based on digital computing, and great potential to surpass several stages of development in moving into the digital era.



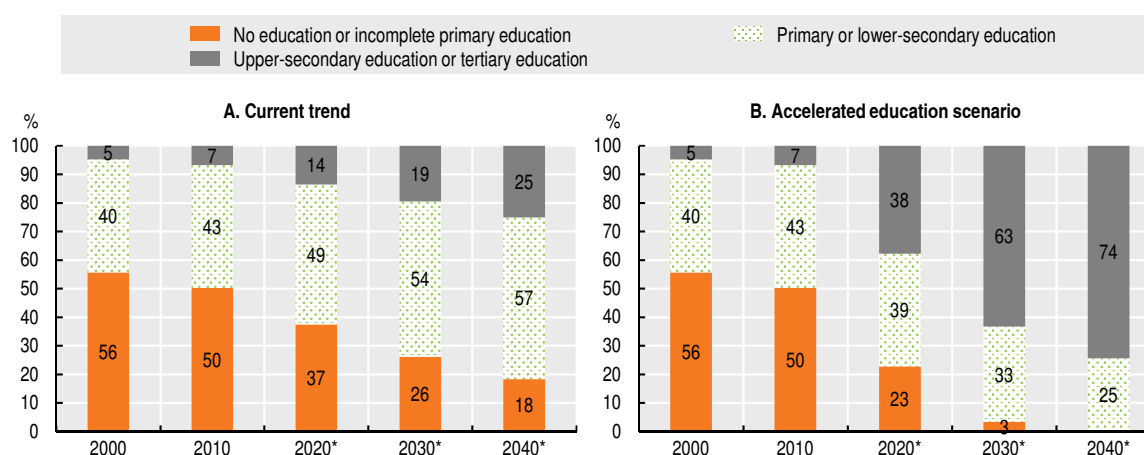
**Table 5.2. East Africa's strengths, weaknesses, opportunities and threats for using digitalisation to create jobs**

Strengths	Opportunities
<ol style="list-style-type: none"> <li>1. A large pool of increasingly educated youth</li> <li>2. A dynamic digital economy (especially in fintech)</li> <li>3. Private sector interests in ICT investment to meet the rising local demands</li> <li>4. A collective commitment to progress in digitalisation.</li> </ol>	<ol style="list-style-type: none"> <li>1. Direct job creation through entrepreneurship</li> <li>2. Indirect job creation through productivity improvement and innovation in key sectors (e.g. agriculture, finance and public services)</li> <li>3. Enhanced access to new markets through digital-delivery and electronic platforms</li> <li>4. Online education and training opportunities.</li> </ol>
Weaknesses	Threats
<ol style="list-style-type: none"> <li>1. Weak physical infrastructure (especially electricity)</li> <li>2. Low quality of education and digital skills</li> <li>3. Limited digital adoption, especially among disadvantaged populations and firms</li> <li>4. Scarce public financial resources for financing digitalisation.</li> </ol>	<ol style="list-style-type: none"> <li>1. A loss of jobs for semi-skilled workers and poor quality of jobs created by the digital economy</li> <li>2. Global platforms that bypass regulatory and tax requirements</li> <li>3. A mismatch of skills due to slow re-skilling of workers</li> <li>4. Political risks of Internet shutdowns.</li> </ol>

### A large pool of educated youth, a dynamic digital economy and a collective commitment to digitalisation are the region's main strengths

East Africa's youth are increasingly attaining higher educational levels. The proportion of African youth completing upper secondary or tertiary education grew from 5% in 2000 to 14% today (see Figure 5.4, Panel A). Following this trend, this proportion could reach 25% by 2040. If the region could accelerate progress in education at a rate like that of Korea, the share of youth with upper secondary or tertiary education could reach 74% (Figure 5.4, Panel B). In East Africa, education largely determines whether workers join the formal or informal sector. Among working youth who have no education or only basic education, 44% are self-employed. This proportion falls to 15% for those with tertiary education.

**Figure 5.4. Projected education profile of East Africa's youth (aged 15-29), 2000-40**



Note: \* = projections

Source: Authors' calculations based on data from Wittgenstein Centre (2018), Wittgenstein Centre Human Capital Explorer (database), <http://dataexplorer.wittgensteincentre.org/wcde-v2/>.

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**The region is also among the world leaders in certain segments of the digital economy.** East Africa has the highest penetration rate of mobile money in the world. According to data from the Financial Access Survey (IMF, 2020), the region has 1 106 registered mobile money accounts for every 1 000 adults, compared to 600 for the whole of Africa, 533 for Asia and 245 for Latin America and the Caribbean. East African countries of Kenya, Rwanda, Tanzania and Uganda lead the world in mobile money transactions, mostly because policy makers and regulators took the risk of investing in this innovation which has made the financial sector more inclusive (Groothuizen, 2019). Other countries in the region, including the Comoros, Ethiopia, Mauritius, Seychelles, Somalia and South Sudan, have also launched or are in the process of launching mobile money services.

**Digital adoption and empowerment by governments, people and businesses in East Africa are showing solid signs of improving productivity and creating jobs.** For example, through communication technologies, a strong business process offshoring (BPO) sector has emerged and created numerous jobs in several countries in the region. In Madagascar, 233 BPO companies are employing between 10 000 and 15 000 people (Filou, 2019). In Mauritius, about 800 ICT/BPO enterprises employed about 24 000 workers and contributed about 5.7% to the country's gross domestic product (GDP) in 2018 (Mauritius Economic Development Board, 2019).

**Strong local demand for ICT services has also prompted the private sector to sustain investment in ICT infrastructure.** Total revenue from cellular activities by telecommunication companies (Telcos) in the region has steadily increased, from USD 7.8 billion a year in 2008-10 to USD 17.4 billion a year in 2017-19. The Telcos have also invested USD 2.6 billion a year in infrastructure between 2017 and 2019 to keep up with the demand of the expanding middle-class consumer base. Consequently, the average international Internet bandwidth per user in the region is 48 kilobits per second (kbit/s), compared to 31 kbit/s for Africa as a whole.

**The region's digitalisation agenda has also attracted broad support and commitment from both public and private actors.** East African governments have identified ICT as a key strategic sector for development and sought out various strategies. These include Digital Uganda Vision, Digital Mauritius 2030, Kenya's National Broadband Strategy and National ICT Masterplan, and Ethiopia's National Digital Transformation Strategy.

### **Weaknesses in physical infrastructure, digital adoption, skills and financing pose challenges to digitalisation in the region**

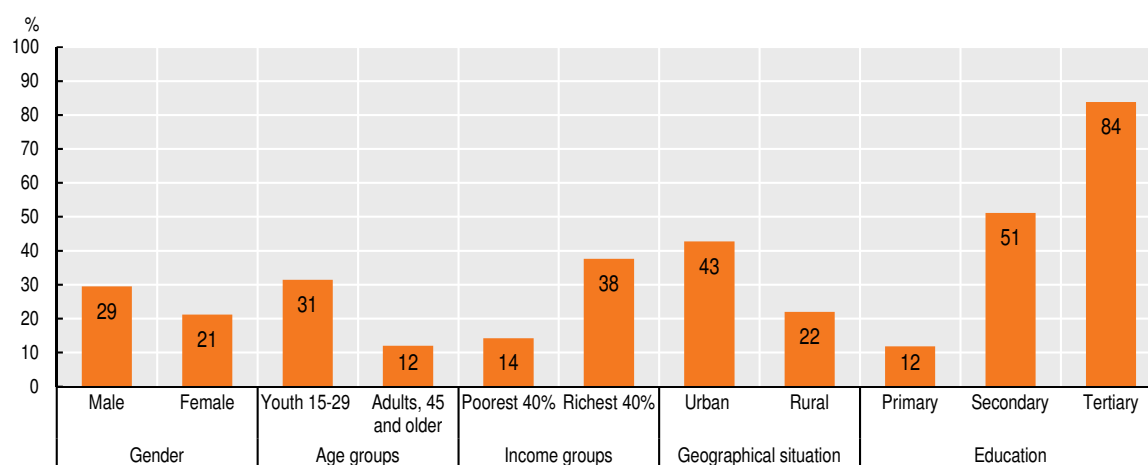
**Physical infrastructure, especially electricity, remains a principal hindrance to digitalisation in East Africa.** Eleven percent of the region's manufacturing firms cite electricity as their biggest obstacle to doing business, according to the World Bank's *Enterprise Surveys* (World Bank, 2020a). The high cost and unreliability of electricity supply are particularly challenging, especially in using data and computing. Weak logistic services, costly transport and underdeveloped postal systems also prevent e-commerce platforms from expanding beyond their core customer areas. Other barriers to transnational e-commerce include limited interoperability for cross-border payments and cumbersome custom and tax procedures for enterprises operating in multiple countries.

**The low quality of the education and training system also creates major challenges to the digitalisation process.** Only three East African countries rank in the top 100 globally for education attainment, when adjusting for education quality: Seychelles (43rd), Mauritius (51st) and Kenya (80th). At the other end, countries such as Madagascar, Rwanda and South Sudan rank in the bottom 10 among the 157 countries included in the World

Bank Human Capital Index (World Bank, 2018). High repetition rates, teacher shortages and underperformance in test scores all contribute to the poor quality of education in the region. In addition, the shortage of technical skills across the continent, with less than 10% of tertiary students currently studying science, technology, engineering and mathematics, represents a major constraint to taking advantage of digitisation happening globally.

The adoption of digital technologies remains limited, especially among the disadvantaged populations. Figure 5.5 reveals considerable gaps in Internet use across gender, age, income, geographical and education profiles. Beyond the problem of access and affordability, this usage gap is also due to the unavailability of content in local languages, its inappropriateness to local contexts, illiteracy and a lack of access to electricity (Henry, 2019).

Figure 5.5. Internet use by gender, age, income level, geographical situation and education in East Africa, 2018



Source: Authors' calculations based on data from Gallup (2019), Gallup World Poll, [www.gallup.com/analytics/232838/world-poll.aspx](http://www.gallup.com/analytics/232838/world-poll.aspx).

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In some cases, digital platforms and applications do not meet the needs of certain marginal groups (Van Dijk, 2005). Digital adoption, especially by women farmers, has emerged as a critical strategy to close the gender productivity gap and promote the empowerment of women; however, the risk of digital security always remains the weakest link in digital adoption in a region with only a few experts to mitigate any attacks (IDRC, 2019).

Digital adoption is also limited among East African firms. Our analysis using the World Bank's *Enterprise Surveys* (World Bank, 2020a) shows that only 33% of formal manufacturing and service firms have a website and 57% of firms use e-mail to communicate with suppliers and buyers. Smaller firms are much less likely to adopt digital technologies than large ones. Disparities exist due to several factors, including a lack of financial resources to digitise, a shortage of qualified personnel and the high cost of engaging online (Jung, Qiu and Kim, 2001).

Public financial resources for financing digitalisation are largely unavailable. In the short term, many countries in the region face difficulty in financing digitalisation due to both spending on health needs related to the Covid-19 pandemic, and the drop in revenue due to the expected collapse of tourism, trade and remittances (see Chapter 8).

Structurally, East African countries also lag behind in mobilising their domestic resources. In 2018, their tax-to-GDP ratios averaged 13.2%, compared to 21.8% in Southern Africa and 18.1% around the world (AUC/OECD, 2019).

### Digitalisation offers opportunities for job creation through entrepreneurship, productivity growth, and enhanced access to markets and online learning

Entrepreneurship and innovation in the digital space can play an important role in direct job creation. The region has achieved notable success with some of the start-ups that have grown enough to create significant employment (see Table 5.3). In 2014, East African start-ups created roughly 160 000 jobs with digital capacities (Chagani, de la Chau, Moraa and Mui, 2014). Nairobi serves as the hub for the most successful start-ups, especially those in the fintech space, such as Cellulant, Sendy, Lori, Africa's Talking, Lynx, Sokowatch, Flare, Fuzu and Apollo. In the last ten years, digital innovations have brought new occupations. New jobs – like data analyst, coder, digital security expert, digital marketer, user experience designer, social media marketer, virtual reality developer, data entry clerk and many more – have emerged to absorb the ever-increasing number of youth graduating from universities.

Table 5.3. Examples of digital start-ups in East Africa and their estimated size in 2020

Company	Sector of activity	Year founded	Country	Revenue (USD millions)	Number of employees	Total funding (USD millions)
Cellulant	Fintech	2004	Kenya	10 to 50	440	54.5
M-KOPA	Energy	2011	Kenya	10 to 50	694	161.8
Twiga Foods	B2B e-commerce and logistics	2013	Kenya	10 to 50	275	67.1
Mara Phones	Hardware manufacturing	2018	Rwanda	n/a	39	n/a
4G Capital	Fintech	2013	Mauritius	n/a	208	2.0

Note: n/a = not available.

Source: Authors' compilation based on Crunchbase (2020), *Crunchbase Pro* (database), [www.crunchbase.com](http://www.crunchbase.com). The numbers of employees were retrieved from LinkedIn (n.d.), *Profiles*, [www.linkedin.com](http://www.linkedin.com).

Digital innovation and adoption are necessary to boost productivity in key sectors and create jobs in the digital economy. Start-ups in the region are operating in a wide range of domains such as fintech, education, healthcare, consumer services and agriculture. For example, Disrupt Africa's list of 12 start-ups to watch in 2020 includes Rwanda's Axus (fintech), Kenya's MPost (virtual addressing) and Ridesafe (micro-insurance for motorbikes). Many other start-ups are innovating in the agricultural sector, which employs more than half of the total workforce (Table 5.4). They have developed applications that help address broken rural-urban supply chains and market linkages, as was the case during the pandemic. In rural areas, they offer extension and advisory services to farmers.

Three critical changes are developing from the ongoing fintech revolution in the region. First, electronic retail payment systems reduce fraud and enable e-commerce. Second, predictive analytics and artificial intelligence applications help create credit scores for individuals at low cost and allow them to access financial products without collateral requirements. Third, fintech permits the use of sustainable business models that reduce structural bottlenecks such as supply chain management (Ndung'u, 2018).

The development of the fintech sector opens additional opportunities. For example, the spread of mobile money services in Kenya has helped raise at least 194 000 households out of extreme poverty. It has also enabled 185 000 women to switch from subsistence agriculture to small businesses or retail as their main occupations (Suri and Jack, 2016).

Table 5.4. Dominant sectors of specialised apps in East Africa

Country	Agricultural extension	Advisory	Financial access	Supply chain	Market linkages	Weather
Djibouti	-	-	-	D4Ag	-	Gro-Intel
Eritrea	-	-	-	D4Ag	-	-
Ethiopia	Awesome Africa	VetAfrica GreenPath	Kifiya, CBE Birr	Ethiopian Commodities Exchange	Yerras Gebeya	Gro-Intel
Kenya	M-Farm, iCow, Farmers Pride, Wefarm	Wefarm Digifarm, M-Farm, Sunculture	FarmDrive, Apollo, Tulaa, Connected Farmer Alliance	Twiga	Farmshine, iProcure	Gro-Intel
Madagascar	-	-	-	-	-	-
Mauritius	-	-	LAFco	-	Mokaro	-
Rwanda	Weather and Crop Calendar	e-Nutrifood, Cure and Feed your Livestock	Menyesha, Exuus	SMAgri, Agrigo, KisaAgriLab	AgriMarketplace	-
Seychelles	-	-	-	D4Ag	-	-
Somalia	-	-	Ari.farm	-	SAMS	Gro-Intel
South Sudan	-	-	-	-	-	Gro-Intel
Sudan	-	-	-	-	Trabalkm	Gro-Intel
Tanzania	Wefarm	e-Kilimo, Agritechs	Connected Farmer Alliance	Tigo Kilimo	Ninayo	-
Uganda	Wefarm, Agro Supply	Jaguza	Harvesting	Grainpulse	Agro Supply	Gro-Intel

Source: Authors' compilation based on a review of the literature.

**Adopting digital solutions can boost efficiency for government services.** Chapter 8 reveals the potential for revenue authorities to improve tax collection using digitalisation. East African countries have digitised their tax services and other public services, except for the Comoros, Eritrea, Somalia, South Sudan and Sudan. Four of these five countries have been in protracted conflicts, which could be the reason they have fallen behind the others.

**Digital platforms can reduce costs for businesses and help local firms to grow, thanks to expanded access to markets.** Digital connectivity and data flow enable better tracking and co-ordinating along domestic and global value chains, while increasing their interconnectedness and demand for just-in-time deliveries. For example, Kenya's mobile-based platform Twiga Foods, launched in 2014, serves around 2 000 outlets a day through a network of 13 000 farmers and 6 000 vendors. By better matching demand and supply, the cashless platform offers higher prices and a stable market to farmers as well as a reliable supply to vendors. This efficient food value chain has helped reduce post-harvest losses for produce brought to the network from 30% to 4%.

**East Africa's export of professional services such as finance, insurance ICT and technical support has steadily increased.** It rose from USD 0.9 billion in 2005 to USD 4.4 billion in 2017. Electronic transmission (Mode 1) is the dominant mode of supply for such trade, accounting for USD 3.0 billion, or 67%, of export in professional services in 2017. The digital nature of such activities permits East African countries, especially landlocked ones, to access global markets while avoiding the structural bottlenecks in transport, logistic and customs procedures that hamper the trade of goods.

**Online learning offers a promising approach to providing education and training at scale.** Prior to the Covid-19 crisis, the use of education technology was growing, and edtech investment was expected to increase from USD 18.66 billion in 2019 to USD 350 billion in 2025 (WEF, 2020). The pandemic might substantially accelerate the adoption of online learning. Virtually every country in East Africa today is using online platforms for teaching.

**The region is well-equipped to exploit these educational opportunities.** Broadband is plentiful (Ndemo, 2016), and self-learning groups have started to venture into artificial intelligence and blockchain solutions. East Africa's first such start-up, M-shule (an adaptive learning solution), has already been launched.

### **Digitalisation creates threats of poor job quality, automation, skill mismatches and policy incoherence**

**While digital platforms can create new jobs, their quality is sometimes low.** A survey of seven African countries (including Kenya, Rwanda and Tanzania)<sup>1</sup> shows that about 30% of online platform workers had had jobs where they were never paid. Many workers can get only subcontracts from other users for lower pay or buy established platforms accounts to start their businesses at significant costs (Melia, 2018). In transport and logistics, numerous low-end jobs are sub-contracted to individuals who have their own motorbikes or cars, and they are paid only after performing their work as opposed to receiving salaries. Although many of the drivers in ride-sharing platforms enjoy the flexibility and independence of their jobs, they work for long hours and bear the tax burden since platforms avoid local taxes (Eisenmeier, 2018).

**The global features of digital platforms such as Uber, Facebook and Google pose difficulties for governments to regulate their activities and to require them to pay their fair share of taxes.** These platforms often have headquarters outside of Africa and do not fall under the jurisdiction of African governments. Unilateral tightening of regulations could put local workers at a disadvantage compared with workers elsewhere and potentially eliminate this livelihood option. There was a recent conflict in Kenya between platform owners and workers (Ndemo, 2016). Chapter 8 further addresses issues related to taxation of the digital economy, where the boundaries of firms can be ambiguous and cross-border transactions can occur digitally.

**Automation can decrease demand for semi-skilled workers in the manufacturing and service sectors, and even more so in the financial sector.** The spread of advanced technologies like robotics, 3D printing, sensors, artificial intelligence (AI) and machine learning has raised concerns that technologies could potentially displace human labour. The financial sector, where AI makes loan decisions, has been losing the low-end cadres of jobs to digitalisation, but this has been compensated by new jobs like data analytics. Initial estimates from the *World Development Report 2016* show that automatable occupations account for as much as 44% of employment in Ethiopia and 52% in Kenya (World Bank, 2016). However, recent literature suggests that the direct impact on jobs in Africa is likely to be lower, especially due to the relative cost of adopting automation (Banga and te Velde, 2018).

**Digitalisation in higher-income countries could also affect East Africa's labour market indirectly through international trade and investment.** Automation and higher demand for speed and customisation could shorten the value chains, leading to reshoring of production to high-income economies. In fact, 17.1% of East Africa's exports to OECD countries are prone to robotisation, which is above Africa's average of 14.1%.

**Technological change could cause a mismatch between training and skills demand.** McKinsey (2017) says that at least 14% of the world's workforce (380 million workers) are likely to switch jobs as a result of digitisation, automation and other emerging technologies. This will change the career paths for many and will require new skills. The challenge, however, is finding the resources to invest in retraining and "up-skilling" existing workers quickly to meet the demands of future jobs.

**Governments shutting down the Internet for political reasons is increasingly becoming a problem in East Africa.** Sudan shut down the Internet for three weeks to

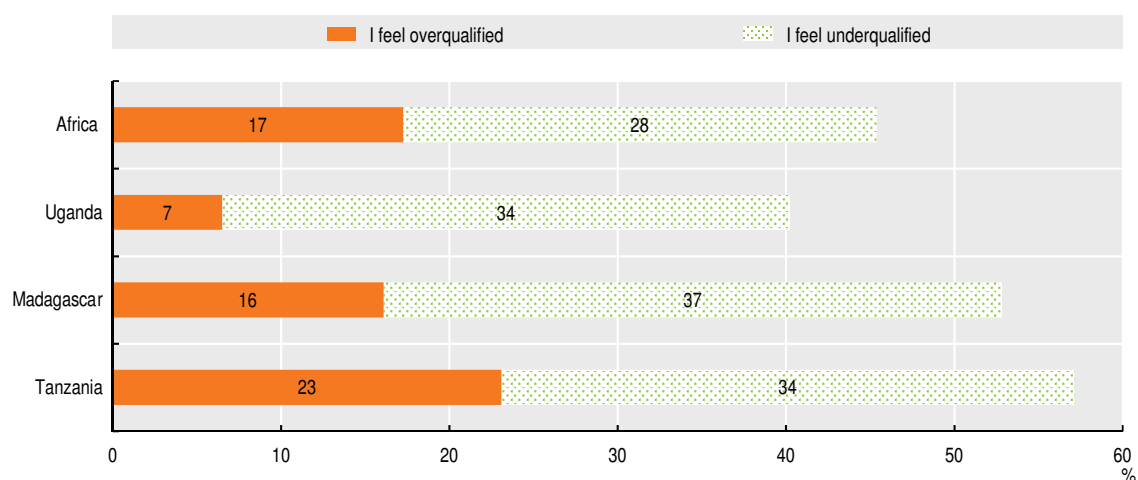
contain a revolt (Parker, 2019). In Ethiopia, Internet shutdowns have become common; the government shut it down in 2016, 2017 and 2019 to supposedly stop the leakage of exams amid anti-government protests (BBC, 2019). Other East African countries that have shut down the Internet for various reasons include Eritrea, Somalia, South Sudan and Uganda (APC, 2019).

## The region needs to invest in human resource capacity to meet future labour demand


East Africa can facilitate the school-to-work transition by developing technical and vocational education and training (TVET) institutions and comprehensive digital literacy programmes

The current market mechanism for placing students in fitting jobs is weak. Data from the Gallup World Poll shows that, in East Africa, the unemployment rate is higher for those with secondary and tertiary education or above (15% and 19%, respectively) than for those with no or basic education (12%). This implies a mismatch between the skills and aspirations of young people, on the one hand, and the demands of the labour market, on the other. In Madagascar, Tanzania and Uganda, more than 40% of surveyed youth considered themselves inadequately skilled for their current positions, with a large majority feeling underqualified to meet the requirements of their jobs (see Figure 5.6).

Figure 5.6. Young workers' perceptions of the relevance of their education to their current job requirements in Africa as a whole and Madagascar, Tanzania and Uganda



Source: Authors' calculations based on ILO (2015), *School-to-Work Transition Survey*, [www.ilo.org/employment/areas/youth-employment/work-for-youth/WCMS\\_191853/lang--en/index.htm](http://www.ilo.org/employment/areas/youth-employment/work-for-youth/WCMS_191853/lang--en/index.htm).

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TVET institutions need to be revamped in order to meet the demands for future jobs (see Chapter 1 on the Fourth Industrial Revolution [4IR] technologies that have begun to dominate new jobs). As digitisation continues to alter the world, the roles, requirements and potential of TVETs will fundamentally change. Their definition and scope will also need to integrate ICT to prepare students for the future of work, along with the methodologies, structures and arrangements necessary for the new digital era (Douse and Uys, 2019). For example, Generation Kenya, a public-private programme, works closely with the government of Kenya and TVET institutions to equip youth with technical and employability skills (Table 5.5). Since its inception in 2015, Generation Kenya has successfully placed 84% of the 18 000 graduates in employment in multiple sectors (e.g. financial services, distributed

sales, customer service manufacturing) through a network of more than 200 employer partners (AUC/OECD, 2019: 77).

**Table 5.5. Examples of initiatives to revamp technical and vocational education and training to the digital era in East Africa**

Programme	Description	Country
Generation Kenya	Generation Kenya has partnered with over 200 employers and over 40 TVET institutions to provide technical training to more than 32 000 youth.	Kenya
Digital for innovation hubs: Enabel and MTN	Public-private partnerships between Enabel and MTN set up digital services (computers, servers, Internet connections and maintenance) for innovation hubs in 9 vocational training institutions. They have permitted youth to gain access to open educational resources for skills development.	Uganda
African Development Bank's Coding for Employment Program	Supports the establishment of 130 innovation centres and aims to create 9 million direct and indirect jobs by 2025.	Kenya, Rwanda
WeCode	WeCode offers advanced IT-training to working-age Rwandan women with and without a prior ICT degree. By the end of 2019, WeCode had trained 900 women to become information technology (IT) specialists.	Rwanda
UNESCO and Korea's Better Education for Africa's Rise (BEAR II)	This project aims to make TVET more relevant to labour market demand, enhance its quality and improve the perception of TVET among young people, enterprises and society.	Ethiopia, Kenya, Madagascar, Tanzania and Uganda

TVET institutions will need to improve their image to become useful. Issues that have created a poor perception of TVETs include inefficiency, limited capacity to provide quality training, obsolete equipment and the barriers of access for women (IDRC, 2018). Students also shunned TVET institutions because they do not secure admission to university. To bring these institutions up to expectations, governments will have to invest heavily and use other development models such as public-private partnerships between governments, industry and TVET institutions. The African Leadership University is one example of such an ambition (Box 5.1).

#### Box 5.1. African Leadership University

The African Leadership University (ALU) is a unique tertiary institution with campuses in Mauritius and Rwanda. Its mission is to build 25 campuses across the continent and produce 3 million young African leaders over the next 50 years. The Ghanaian social investor Fred Swaniker started the university with the unique approach of using individualised teaching to provide learners with the skills that young entrepreneurs will need for the future. The institution also seeks to develop in students the essential characteristics for creating a mission-based life of impact and purpose.

The ALU programme combines learning and work experience. Before graduating, students work a full year in a variety of organisations both locally and internationally. This enables them to build strong connections with potential employers and provides practice in solving real-world problems. Learners are exposed to the work situation, which gives them an advantage over traditional university graduates in gaining employment or starting their own enterprises.

Source: Authors' compilation based on a review of the literature.

The private sector in industry can provide internships to graduating students. This helps smooth the transition to work. Donor organisations sponsor many of the emerging collaborations of this kind (see, for example, the partnership between the Kenya Association of Manufacturers and GIZ in 2018, with funding from the United Kingdom's Department for International Development, the North American Aerospace Defense Command and Shell). A study in Uganda emphasises that collaboration between TVET



institutions and the private sector, especially in skills development, will result in the efficient delivery of services, due to the private sector's technical know-how and on-the-job training (Oviawe, 2018). Unfortunately, there are few collaborations between the private sector and TVETs in East Africa even though governments have been pushing the agenda (Mutetha, 2018). In addition, the African Development Bank (AfDB, 2020) identifies weak industry linkages as one of the reasons why skills mismatches exist. Other factors include poor implementation of policies and resource constraints that make it difficult to respond to current and future industry needs.

**Investment in TVET to enhance guidance and counselling is necessary for the school-to-work transition.** Helping youth understand career choices and investing in counselling services would greatly assist students as they transition from school to work. Strong career guidance and counselling systems can inform youth of the training opportunities available to them. A recent UNESCO review highlights that the current career guidance services in Ethiopia, Kenya, Madagascar, Uganda and Tanzania are ineffective and lack a national policy framework (UNESCO, 2018). If the policy is developed and implemented, it could make TVET more attractive than it is now. Such a policy could also address the existing mismatch between the demand for and supply of labour.

**The private sector can also get more directly involved by providing on-the-job training rather than limiting teaching to training centres.** Considerable differences exist across East African countries in firms' providing formal training, ranging from 35.9% of firms in Rwanda to only 12.7% in Madagascar (World Bank, 2020a). The probability of providing training increases by 10 percentage points for firms involved in product innovation, by 9 percentage points for firms involved in process innovation and by 3 percentage points for firms that use foreign-licensed technologies.

### **The region should promote national digital literacy programmes that include disadvantaged groups**

**East African countries need to invest more in digital literacy (World Bank, 2019a).** National digital literacy programmes should provide a complementary set of skills: foundational skills or core skills (literacy and numeracy), technical skills (for a specific job) and transferable skills (cross-cutting soft skills such as socio-emotional skills or other non-cognitive skills). The rapid changes in technology are such that lifelong learning will become the norm. For any nation to succeed, it must integrate digital learning technologies and skills into all curricula and develop appropriate teaching methods. Digital skills should be part of basic education, such as reading, writing and arithmetic (Ceemet, 2018).

**Digital literacy for youth helps to enhance digital skills for more specialised careers (World Bank, 2019a).** From the authors' experience in East Africa, only Kenya has a national digital literacy programme, while Rwanda and Sudan propose a partial one. The rest of the countries in the region have yet to launch such a programme. Public-private partnership arrangements targeting education can offer specialised training for workers. For instance, since 2017, the Good Thing Foundation has partnered with the Kenya National Library Service to teach digital skills based on individual needs (e.g. Internet searches, online banking and online job hunting).

**Policies should promote gender equality in the digital economy, and more can be done to increase women's participation in East Africa's start-up scene.** While the number of women in higher education is increasing, they are still underrepresented in science, technology, engineering and mathematics (Castillo, Grazzi and Tacsir, 2014). As a result, women are technically discriminated against in technology. Despite high rates of female entrepreneurship in Africa, women face significant barriers to access and use financial

services – including formal and regulatory exclusion (IDRC and Mastercard Foundation, 2018).

However, initiatives have been launched in the region to provide adequate digital skills to women and facilitate their school-to-work transition. In Rwanda, for instance, WeCode provides IT-training to working-age Rwandan women with or without a prior ICT degree; the teaching is based on both competence and soft skills in order to prepare the students as best as possible for their career and job opportunities. A similar initiative called iamtheCODE operates across East Africa. It creates digital hubs, in collaboration with schools, libraries and community centres, to teach young women in science, technology, engineering, arts, mathematics, entrepreneurship and design, as well as code, creative learning and problem-solving. In addition, since 2013, Intel has been working on reducing the digital gender gap through its programme She Will Connect. This initiative teaches women basic digital skills and demonstrates the benefits of connectivity and technology by providing financial, health and educational information during and after training, for free.

### Monitoring technological development can help East Africa prepare for future skills requirements

Countries need to remain proactive in assessing future technological progress and anticipating future skill needs. Socio-economic disruptions to emerging business models will be felt in the way of changes to the employment landscape and skills requirements, leading to substantial challenges for recruiting, training and managing talent. Several industries could find themselves with workers who do not have the specialist skills needed (WEF, 2017). Taking a proactive approach requires understanding the disruptive changes ahead, investing in training and aligning the workforce with innovations to come. New training programmes such as the African Masters of Machine Intelligence are a step towards building the workforce needed for the future of digitalisation (Box 5.2).

#### Box 5.2. African Masters of Machine Intelligence in Rwanda

Artificial intelligence is among the 4IR disruptive technologies with the most impact, yet not many African universities have specific programmes in this area. The research community is also missing out on talented individuals because they have not received the right training.

The African Masters in Machine Intelligence (AMMI) started in 2018 to train African researchers and engineers to use AI to improve the lives of Africans. One of AMMI's missions is to educate a generation of globally connected African machine learning developers, researchers and practitioners. The first AMMI cohort comprises 31 students (42% women) from 11 countries. The AMMI programme is supported by Facebook and Google, without whom it would not have been possible. The institution, which ensures that women are represented in its programme, has a completion rate of 91%, with all students taking up jobs within the continent.

AMMI's long-term goal is to bring the best of AI education to Africa and contribute to building a healthy ecosystem of AI practitioners committed to making a positive impact on African societies. In the 2019/20 academic year, the AMMI programme hosted students from 18 African countries to develop relationships, increase their technical abilities through group projects and interact with world-class lecturers. They are mentored by both their former institutions and senior researchers in the field. On completing the programme, they will become mentors for the students after them.

Source: Authors' compilation based on a review of the literature.

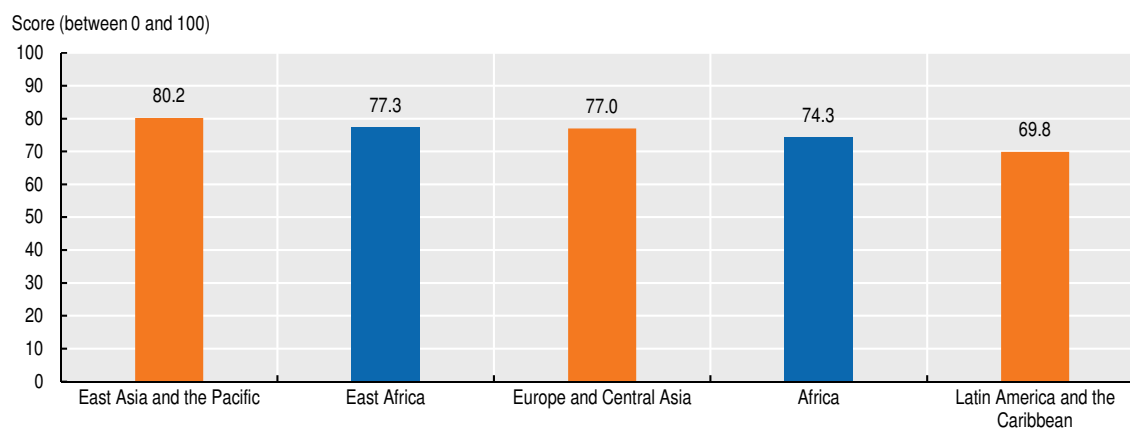
Governments need mechanisms for foreseeing and assessing technological advances in order to keep pace with changes, understand the impact of frontier technologies and identify potential responses. Close collaboration with platforms such as the Commission on Science and Technology for Development (CSTD) and the Science, technology and innovation (STI) Forum can help governments understand emerging technologies and inform the broader public debate on how to ensure a safe and inclusive digital future for all. The CSTD can provide good examples of national, regional and international technology foresight exercises and assessments.

## Governments can play important roles in nurturing entrepreneurship and innovation in the digital economy


Adapting the regulatory environment to the digital economy would help home-grown start-ups to innovate and scale up

An enabling regulatory environment could support firms in the digital economy. In the area of fintech, for example, 34% of African fintech firms consider that specific regulations are necessary for their countries (Cambridge Centre for Alternative Finance, 2018). So far, East Africa has made considerable progress in regulating the mobile money space. The region scored 77.3 out of 100 on the GSMA Mobile Money Regulatory Index, higher than Africa's average of 74.3 (Figure 5.7). Policy makers will need to find the right balance between meeting various policy goals (such as promoting innovation, protecting consumers and ensuring macro-prudential policy) and avoiding regulatory overload for smaller companies.

Figure 5.7. Mobile Money Regulatory Index for East Africa and selected regions, 2018



Source: Authors' elaboration based on GSMA (2019), *The Mobile Money Regulatory Index* (database), [www.gsma.com/mobilemoneymetrics/#regulatory-index](http://www.gsma.com/mobilemoneymetrics/#regulatory-index).

StatLink  <https://doi.org/10.1787/888934203928>

A test-and-learn approach is key to adapting regulations to rapidly changing and highly uncertain contexts. Many start-ups have emerged successfully in the absence of regulation. Several African countries have experimented with regulating novel innovations tailored to local contexts, especially in fintech (Table 5.6). A recent sandbox pilot of this sort in Rwanda reveals that the test-and-learn approach may be underutilised due to a lack of awareness of the process and a lack of clarity on expectations. In addition, the pilot found stringent limits on growth opportunities (a maximum of 1 000 customers for participating start-ups) and noted a cumbersome application process (UNCDF, 2019).

Table 5.6. Operational regulatory sandboxes in East Africa

Country	Creation	Examples of products tested/Progress
Kenya	2019	<ul style="list-style-type: none"> <li>• Crowdfunding platform (Pezesha Africa Limited)</li> <li>• Cloud-based data analytics platform (Innova Limited)</li> <li>• Blockchain and cryptocurrency (Be Mobile, FusionX, PIRL, SALT Technology Ltd, XenTechnologies Ltd)</li> </ul>
Mauritius	2016	<ul style="list-style-type: none"> <li>• Credit and capital solutions for individuals and for small and medium-sized enterprises (Finclub)</li> <li>• Crowdfunding platform (Olive Crowd, FundKiss)</li> <li>• Identity management system (Selfkey)</li> </ul>
Rwanda	2017	<ul style="list-style-type: none"> <li>• Mobile wallet system (Riha Payment System)</li> </ul>
Uganda	-	<ul style="list-style-type: none"> <li>• The National Payment Systems Bill 2019 mandated the Central Bank to develop a regulatory sandbox framework for innovative fintech firms.</li> </ul>
Tanzania	-	<ul style="list-style-type: none"> <li>• The Capital Markets and Securities Authority agreed to implement a regulatory sandbox.</li> </ul>

Source: Authors' compilation from Columbia Business School (n.d.), "Regulatory sandboxes", <https://dfsobservatory.com/content/regulatory-sandboxes>.

In addition to sandboxing, a comprehensive approach to regulation is necessary to unlock the potentials of start-ups. For example, the recent data localisation measures in Rwanda impose data storage and hosting cost for start-ups and prevent them from accessing the latest technological advances (UNCDF, 2019). Stronger discussions between regulators and stakeholders in the digital economy are needed to identify gaps and strengthen the ecosystems. In addition, regulation of the digital economy sometimes falls under the oversight of different government bodies, calling for interdepartmental co-ordination. For example, the National Bank of Rwanda and the Rwanda Utilities Regulatory Authority signed a memorandum of understanding to delineate responsibilities for oversight of the financial market.

Technologies also offer new ways of collecting regulatory data and monitoring and enforcing regulations. For example, the National Bank of Rwanda uses an automatic reporting process via electronic transmission to supervise more than 600 financial institutions, including banks, microfinance institutions, and savings and credit co-operative organisations (see Chapter 2).

Regulatory interventions can help ensure interoperability of payment systems. In 2012, the Tanzania Communications Regulatory Authority (TCRA) sought to regulate mobile financial services by introducing interoperability in order to create effective competition and further financial inclusion (IFC, 2015). TCRA launched interoperability in 2014, becoming one of the first globally. As a result, interoperable wallet services have significantly increased the integration of digital payments in customers' daily lives, as customers tend to transact more frequently, send smaller amounts of money and keep higher balances in their wallets (CGAP, 2018). In Kenya, mobile money interoperability became mandatory in April 2018 (Mburu, 2018).

### Supporting the development of technology parks and facilitating their financing boosts the growth of start-ups

The number of start-up hubs in East Africa quickly increased within a decade, from only a handful in 2009 to 59 in 2016 and 113 in 2019, according to the GSMA. These hubs include incubators, accelerators, university-based innovation hubs, technology parks and co-working spaces (see Table 5.7). They offer a range of services to local areas, e.g. co-working infrastructure, networking and other tech-focused supports. They also facilitate the discussion between policy makers and the start-up community through fora such as fintech Fridays in Kigali. So far, Nairobi and other capital cities in the region have accounted for the bulk of tech hubs, but new hubs are also starting in smaller cities, such as Mombasa.

Table 5.7. Examples of start-up hubs in East Africa

Start-up	Date of establishment	Country	Notable feature
iHub	2010	Nairobi, Kenya	iHub start-ups raised over USD 40 million in early-stage financing, and their businesses have contributed over 40 000 jobs to the region's economy. In 2019, it was acquired by CcHUB from Nigeria.
Hive Colab	2010	Kampala, Uganda	The first tech hub in Uganda, Hive Colab collaborates with academia and the private sector.
IceAddis	2011	Addis Ababa, Ethiopia	IceAddis, the first tech start-up incubator in Addis Ababa, has 25 start-ups, 3 tech ventures and a network of 6 000 highly talented individuals.
KLab	2012	Kigali, Rwanda	This was Rwanda's first tech hub. It welcomed more than 50 000 people until 2016.
Mauritius Startup Incubator	2016	Port Louis, Mauritius	More than a conventional incubator, it helps French-speaking companies to set up on the island or to outsource, acting as a bridge and participating in the transfer of know-how by recruiting and training Mauritians.
Id8 Space	2018	Dar es Salaam, Tanzania	Id8 is a virtual workspace providing marketing assistance, mentorship through more than 20 dedicated advisors and 120 associated start-ups.

Source: Authors' compilation.

**Financing for East African tech start-ups and ventures continues to grow.** In 2019, East African tech start-ups raised over USD 729 million in investments, compared to USD 367 million in 2016 (Partech Africa Research, 2020). Most of these investments go to Kenya (USD 564 million), followed by Rwanda (USD 126 million) and Uganda (USD 38 million). Private ventures and investors account for the bulk of these investments.

**In addition, several East African governments are investing in larger-scale technology clusters.** These tech parks act as development catalysts that can attract foreign investment and augment infrastructure networks and fibre optic connections (Huet, 2016). This strategy takes inspiration from cluster policies that were instrumental in developing modern industry in China, India, Korea and Malaysia, among others (Owusu, 2016). For example, Kenya is investing USD 10 billion to build Konza Silicon Savannah City, 60 kilometres south of Nairobi (see Box 5.3). In Rwanda, the government is developing the Kigali Innovation City to host world-class universities, technology companies, biotech firms, and commercial and retail real estate (Emewu, 2019). The construction project will create 50 000 jobs annually while building a critical mass of talent, research and innovative ideas. Other countries, such as Ethiopia and Mauritius, are also pursuing ambitious technology cluster projects (Table 5.8).

Table 5.8. High profile technology cluster projects in East Africa

Project	Country	Financing model
Konza Silicon Savannah City	Kenya	USD 10 billion in public-private partnerships, with the national government providing 10% of the total funding (mainly in infrastructure)
Kigali Innovation City	Rwanda	USD 2 billion project funded by the Rwandese government and Africa50
Ebène Cybercity	Mauritius	Loans guaranteed by the Indian government
True Wakanda	Ethiopia	USD 3 billion project in partnership with a private developer

Source: Authors' compilation.

**Non-traditional financing models can help fund technology clusters.** The region's clusters are in their infancy, and only a few countries are active enough to raise the required resources. Governments can promote financing models such as public-private partnerships, smart bonds and spread shareholding, where investors buy a share in an infrastructure project, instead of a bond (Siba and Sow, 2017). The USD 2 billion Kigali Innovation City will be funded by the Rwandese Government and Africa50, a pan-African

infrastructure investment firm that was started by the African Development Bank (Mwai, 2019). Emerging technologies such as blockchain-enabled smart contracts can play a much larger role in real estate operations, including financing, purchasing, selling, managing and leasing to transform property development (Deloitte, 2017).

### Box 5.3. Kenya technology cluster development: The Silicon Savannah

Nairobi's dynamic ICT scene has earned it the nickname Silicon Savannah. The Kenyan government has played a key role in Nairobi's digital success, championing many ICT projects after allowing mobile money on a trial basis without proper regulation, a risk which proved worth taking. Other projects included the laying of undersea cables and the rollout of the Kenya Open Data Initiative in response to requests by young developers to access data for use in creating new applications.

The government initiatives were complemented by industry stakeholders, notably the Kenya ICT Action Network (KICTANet), a multi-stakeholder think tank for people and institutions interested and involved in ICT policies and regulations. One of the first tech hubs, iHub, also became a centre of activity. Three of its founders developed a crisis response platform that was used in the aftermath of Kenya's 2007/08 contested elections. Ngong Road, where iHub was initially located, became a magnet for other start-ups. Hence, the term Silicon Savannah was coined.

In early 2010, the government embarked on a project to expand the technology cluster beyond Ngong Road to accommodate institutions that wanted to join Kenya's ICT landscape. Konza City was born: it is being established to accommodate tech universities, global tech companies, research and development organisations, ICT incubators and accelerators, as well as government institutions that will facilitate the city's growth. So far, the Huawei data centre, the Korean Advanced Institute for Science and Technology, and premises for 40 other companies are at various stages of detailed design and construction. Konza City is expected to create more than 60 000 jobs.

Source: Authors' compilation based on a review of the literature.

## Countries can work together to mobilise resources for regional infrastructure and build a single digital market in East Africa

### Governments can help organise public and private resources for regional infrastructure development

**The need for developing regional infrastructure is high in East Africa.** The Program for Infrastructure Development in Africa (PIDA) estimates that critical regional projects across the continent required USD 68 billion per year in 2012-20. The cost of ICT infrastructure is generally cheaper than other types of infrastructure, such as electricity and transport. Alper and Miktus (2019) estimate that East Africa would need to invest USD 4.1 billion to reach full 4G coverage by 2025.

**The private sector has played a key role in financing communications infrastructure, yet gaps remain.** For example, the telecommunication sector in East Africa invested on average USD 1.4 billion a year on capital expenditure between 2015 and 2019. However, private investments tend to overlook the weaker local purchasing power of poor and remote areas. These areas generate less revenue and are therefore unlikely to offset higher up-front investment costs. Similarly, cross-border projects that require dealing with different regulatory frameworks, local governments and various partners are

disproportionately costly for private investors due to high uncertainties and co-ordination costs.

**Regional and continental development banks can help mobilise private resources for strategic regional investment.** The TEAMS undersea cable was built using public-private partnerships (Ndemo, 2015). The EASSy cable too was installed using a mixture of funding under the convening power of the AfDB and the private sector to execute the strategy for the first regional infrastructure investment in East Africa (AfDB, 2007). According to data from PIDA, there are currently five infrastructure projects for expanding the fibre terrestrial networks and connecting countries in the region to the undersea cable. Notably, the East Africa Broadband Network is helping develop an integrated East African Broadband ICT Infrastructure Network (EAC-BIN) to provide cross-border connectivity between five East African Community (EAC) partner states (Burundi, Kenya, Rwanda, Tanzania and Uganda) to the global gateways.

**Long-term regional co-operation with common strategies, as well as regulatory arrangements like the EAC framework, is key to mobilising resources for regional infrastructure.** East Africa is home to a few continental and regional initiatives, both by public and private actors, to collaborate and accelerate digitalisation (Table 5.9). Such initiatives can provide the basis for creating a formal regional framework to mobilise resources for developing future infrastructure. Regional public goods, such as data centres, new undersea cables and Internet exchange points (IXPs), could make the Internet more accessible and affordable to the region (ISOC, 2016). For example, the Kenya IXPs generate savings of USD 40 million a year by exchanging Internet traffic locally rather than using expensive international rerouting (Kende, 2020). East Africa currently has ten projects on enhancing IXPs, according to data from PIDA.

Table 5.9. Examples of regional initiatives on digitalisation in East Africa

Initiative	Brief description	Country
Smart Africa Alliance	This pan-African initiative was endorsed by all African heads of state to accelerate socio-economic development in Africa through ICT.	Rwanda
Next Einstein Forum (NEF)	NEF works to make Africa a global tech hub, placing youth at the centre. It has four main projects: Global Gatherings, Policy Institute, NEF Community of Scientists and NEF Platform.	Rwanda (2018) and Kenya (2020)
African Network Information Center	This non-profit organisation serves as the Regional Internet Registry for Africa and is responsible for distributing and managing a number of Internet resources.	Mauritius
Microsoft's Africa Development Centre	In 2019, Microsoft launched its Africa Development Centre in Nairobi, expecting to invest USD 100 million in infrastructure and the employment of local engineers over the first five years of operation.	Kenya

Source: Authors' compilation based on a review of the literature.

### Realising a single digital market requires seamless connectivity, regulatory harmonisation and the interoperability of cross-border payments

**The development of a single digital market will support scalability of local innovations across the region and Africa at large.** Many countries in the region do not have sufficient market size to succeed in the digital economy by themselves. They need to join the larger regional market to avoid a digital divide within their own countries and relative to the global digital economy. A single digital market can build on existing efforts of the EAC and the Common Market for Eastern and Southern Africa (COMESA) to integrate countries in the region, invest in digitalisation and foster innovation. For example, COMESA

established a plan to develop a Digital Free Trade Area that provides trade facilitation for e-commerce in East and Southern Africa.

**Increasing the capacity, speed, reliability and affordability of cross-border communication services is vital to ensure the seamless flow of communication across East Africa.** Joint investment in regional infrastructure (see previous section) and harmonised spectrum licensing regimes can help lower wholesale costs in the long run. At the same time, initiatives such as the One Network Area by the EAC can contribute to reducing retail prices of cross-border telecom services (see Box 5.4). The highly uneven coverage and quality of ICT infrastructure across and within each country also call for establishing minimum standards of access quality.

#### Box 5.4. The One Network Area initiative: A success story by the East African Economic Community

In 2014, the EAC countries made a joint commitment to cut the roaming charges within the community. By 2015, they fast-tracked the introduction of the One Network Area (ONA) with four central pillars:

- eliminating charges for receiving voice calls while roaming, for calls originating in ONA countries
- waiving excise taxes and surcharges on incoming ONA voice traffic
- establishing caps on the wholesale price (USD 0.07 per minute) and retail price (USD 0.10 per minute) for outbound ONA traffic
- Requiring mobile network operators to re-negotiate with their roaming partners to reduce wholesale tariffs.

By 2016, the initiative had already achieved considerable success. Cross-border voice traffic more than doubled in the region. The financial impact on mobile network operators has been relatively minor, thanks to the resulting higher demand and the relatively small share of roaming as their source of revenue. Despite the success of this initiative, plans to extend it to other services (data, SMS and mobile money services) and to other countries (Burundi and Tanzania) have been slow to materialise.

*Source: Authors' elaboration based on World Bank (2019b), A Single Digital Market for East Africa: Presenting a Vision, Strategic Framework, Implementation Roadmap and Impact Assessment.*

**The safe and seamless flow of data in the region demands regulatory co-ordination in the areas of digital security, data protection, privacy and exchange.** The growing importance of data in terms of values, use and volume requires policy makers to find the right balance between data privacy, sovereignty and economic efficiency. Kenya, Rwanda and Uganda currently have a working group on harmonising regulations and establishing protocols for intergovernmental data sharing as part of the Northern Corridor Integration Project. Initiatives such as this can be used to address additional measures, including data localisation and content restrictions, which can pose significant burdens on firms operating across the region, especially small firms. Furthermore, the EAC Electronic Transactions Bill, that facilitates digital money, sets out regional standards for electronic signatures, e-government services, consumer protection and the limitation of liability of service providers. However, the national reaction to the bill since its passage in 2015 remains mixed (World Bank, 2019b).

**These issues also require collaboration across countries to effectively deal with the problem in order to adapt faster to digital technologies.** As digitalisation intensifies, concerns over digital security continue to mount in developed as well as developing



countries, according to der Spuy and Oolun (2018). They posit that digital security strategies are underdeveloped in an area where start-up innovations occupy critical areas of the economy. In addition, there are skill shortages and a general lack of awareness of digital security risks. This makes the regions of Africa more susceptible to digital security threats and harm. A collaborative strategy involving public-private partnerships can help. For example, facing common external threats, the Nordic countries have pooled technologies and competencies to counter hybrid threats within a single digital security defence (O'Dwyer, 2019). A strategy of this kind is critical to securing the shared infrastructure in East Africa and protecting innovations that are emerging in the region.

**East African governments can also facilitate and regulate cross-border payments, especially for mobile money accounts.** Even within the EAC, where integration is more advanced, no interoperable mobile payment system currently covers the whole region, and the cost of creating one remains high (World Bank, 2019b). Leaders can support new, innovative approaches to address this problem. As an example, in July 2018, the East African Securities Regulatory Authorities agreed to use regulatory sandboxes to encourage innovation for capital market practitioners who operate regionally (Wechsler, Perlman and Gurung, 2018). At the same time, regulators can play a strong role in establishing full interoperability. In the European Economic Area, for instance, a firm (such as a money transmitter) can apply for a “passport” in order to establish a presence or carry out its permitted activities in another European country (FCA, 2020). Such interoperability in East Africa would require substantial efforts to standardise and recognise regulatory frameworks across borders.

#### Note

1. The other four countries are Ghana, Mozambique, Nigeria and South Africa.

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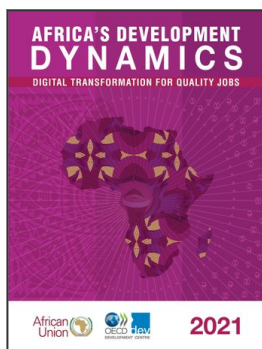


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