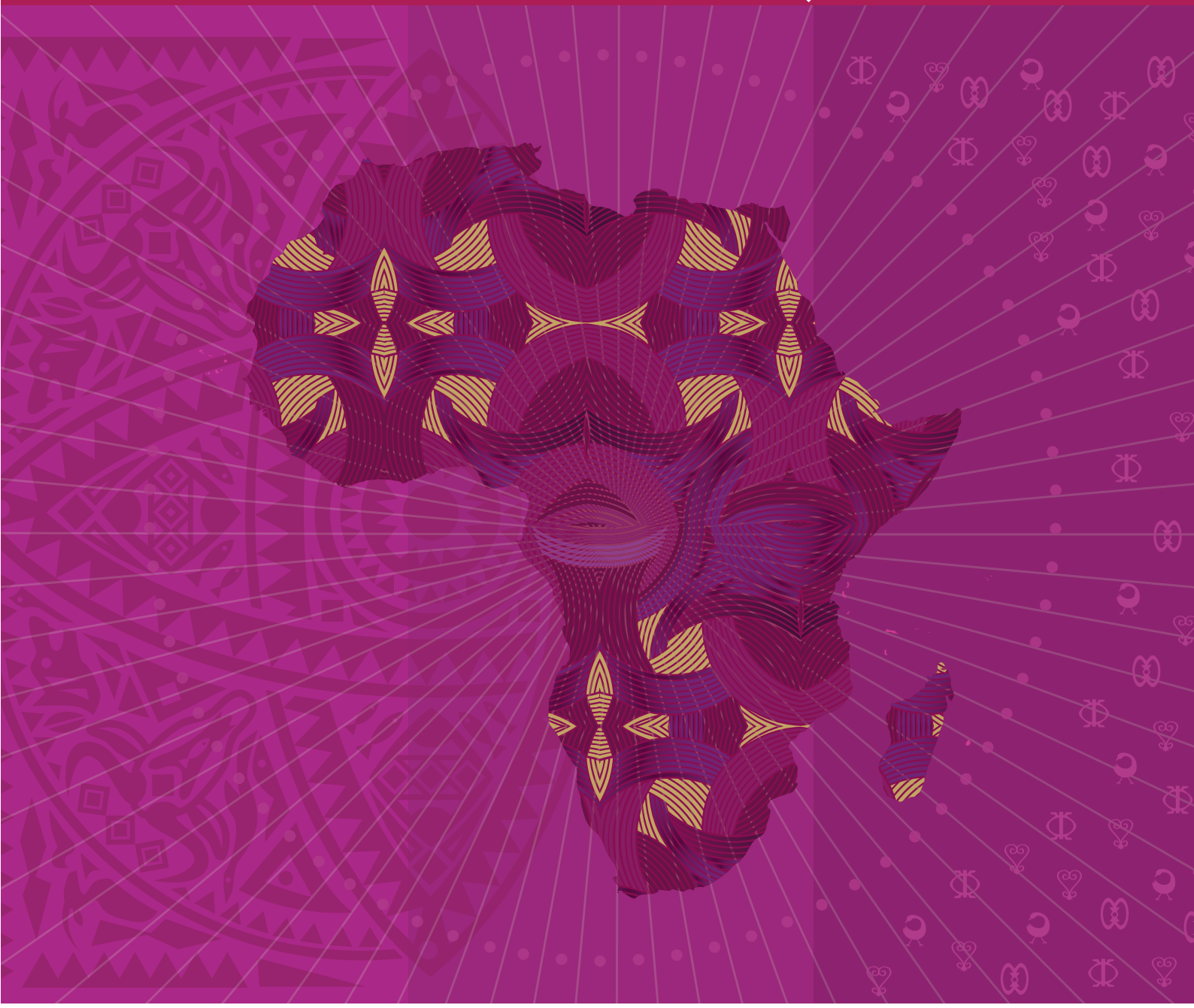
AFRICA'S DEVELOPMENT DYNAMICS

DIGITAL TRANSFORMATION FOR QUALITY JOBS



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Africa's Development Dynamics 2021

DIGITAL TRANSFORMATION FOR QUALITY JOBS

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Foreword

This fact-filled annual reference book brings readers the latest information on development policies on the African continent and its five regions. It presents a new narrative assessing Africa's economic, social and institutional performance in light of the targets set by the African Union's Agenda 2063. This third edition of *Africa's Development Dynamics* explores how digital transformation creates quality jobs and contributes to achieving Agenda 2063, thereby making African economies more resilient to the global recession triggered by the COVID-19 pandemic.

Africa's Development Dynamics is the product of a collaborative approach. It results from a solid and broad partnership between the African Union's Commission for Economic Affairs and the OECD Development Centre. A team of academic researchers, economists, statisticians, and other experts from Africa and diverse world regions contributed to the 2021 edition of the report.

This edition contains eight chapters. The first two explore Africa's digital transformation and priority actions, offering lessons for mutual learning across the continent and beyond. The next five chapters focus respectively on the five regions as defined by the Abuja Treaty: Southern, Central, East, North and West Africa. These chapters tailor policy recommendations to each region. The eighth chapter discusses the state of Africa's development financing in the context of the 2020 global economic crisis, and highlights key policy areas to ensure its sustainability.

A statistical annex is available on line, which allows for updates throughout the year. It contains the latest economic, social and institutional indicators across African countries for which data are comparable. The list of summary tables appears in the last pages of the report. The data are presented by country, region, Regional Economic Communities and other relevant groups of African countries; they compare Africa with other world regions and country groups. This compilation of policy-relevant data can inform decision makers, advisors, business analysts, private sector actors, journalists, non-governmental organisations and engaged citizens around the globe who are interested in assessing African countries' development trajectories.

The full report is published in English, French and Portuguese. An electronic version is also available on line, together with accompanying figures and tables. These, along with the statistical annex, appear on the websites of both the African Union Commission (https://au.int/afdd2021) and the OECD Development Centre (https://oe.cd/AFDD-2021).

Editorial

Struck by the COVID-19 pandemic, the global economy will contract by at least 4.5% this year. The African continent, which is highly exposed to external shocks, will experience its first recession in 25 years, with a decline in gross domestic product (GDP) of between 2.1% and 4.9% according to scenarios mapped out by the African Union in July 2020 in collaboration with the OECD Development Centre. African governments have responded to this massive shock with lockdowns, social protection, economic support and recovery measures. The African Union is supporting these efforts, in particular by setting up a COVID-19 fund to bolster the continent's response to the economic, social and health ramifications of the pandemic. It is also co-ordinating a call for creditors, including financial institutions, to cancel member countries' debt.

Maintaining fiscal space is imperative if Africa is to play a key role in the global economic recovery, create more jobs and achieve the goals set out under Agenda 2063. Safeguarding the progress made in terms of continental integration will also be essential. Flagship African Union initiatives in this regard include medium and long-term solutions to the economic crisis triggered by the pandemic, including the African Continental Free Trade Agreement (AfCFTA), which seeks to facilitate cross-border supply chains for food, pharmaceutical and other essential products.

The digital transformation could, in this context, drive more innovative, inclusive and sustainable growth, and in so doing contribute to the achievement of Agenda 2063. This third edition of our annual economic report examines how this transformation could support the creation of jobs and new opportunities for young people. It sets out several examples of the continent's digital inventiveness, galvanised, it seems, by the COVID-19 crisis. The digital transformation could help African societies to open up, encourage productive entrepreneurship, promote transparent governance, diversify economies – making them more resilient to macroeconomic shocks – and foster regional integration.

The report identifies four priorities for implementing this ambitious action plan:

1. Ensuring universal *access* to the digital solutions best suited to local contexts. In addition to communication and energy infrastructure, a full range of public policies are needed to achieve positive digitalisation for all. This will involve reducing inequalities, especially between women and men, and between megacities and rural areas, as well as the cost of accessing data, which is often higher than in other regions of the world.
2. Making digital technology a *lever for productivity*, especially for small and medium-sized enterprises (SMEs). A number of African countries are leading the way in protecting intellectual property rights and digital security, and in facilitating financing solutions, within a legal framework conducive to innovation.
3. Developing *skills* tailored to the fourth industrial revolution so that the expertise of the African workforce is aligned with 21st century markets, while facilitating the adoption of digital innovations by the informal sector.
4. Co-ordinating the multiplicity of digital *strategies* at the continental, regional, national and local levels to better prioritise, implement, monitor and evaluate progress. When the AfCFTA is implemented in 2021, it will include a component on establishing a single digital market in Africa that will complement multisectoral approaches.

For Africa's economic recovery to be sustainable, the digital transformation must be felt in all of the continent's priority sectors. This will require the commitment of all stakeholders, both private and public, and of the continent's partners. As a partner, the OECD is making a significant contribution to this effort by developing a deeper policy dialogue on digitalisation between private stakeholders, civil society, and decision-makers in Africa and other regions of the world. The African Union Commission and the OECD, through its Development Centre, are committed to supporting their members' efforts to make this digital transformation a vector for sustainable human, economic and social progress on the continent.

Moussa Faki Mahamat

Chairperson
African Union Commission

Angel Gurría

Secretary-General
Organisation for Economic Co-operation and Development

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The **drafting team** of the AUC was led by Dossina Yeo, Head of Economic Policy and Research Division (Department for Economic Affairs) and Moctar Yedaly, Head of the Information Society Division (Department of Infrastructure and Energy), with Moses Bayingana, Senior Policy Officer for ICT, Ndinaye Sekwi Charumbira, Policy Officer, and Djeinaba Kane, Policy Officer, and with contributions from Rumbidzai Treddah Manhando, Mary Menta and Edwin Kofi Owusu-Ansah. The members of the team included Désiré Avom (University of Yaoundé II-Soa), Aram Belhadj (University of Carthage), Jude Eggoh (University of Abomey-Calavi), Kouadio Clément Kouakou (Université Félix Houphouët-Boigny), Winford H. Masanjala (University of Malawi) and Elijah Bitange Ndemo (University of Nairobi). The team at the OECD Development Centre, led by Arthur Minsat, Head of Africa Unit, with Bakary Traoré, Economist, included Devank Agarwal, Keiko Alvarez, Adrien Corneille, Ana Grozdev, Mariana Lopes, Sébastien Markley, Francesco Napolitano, Thắng Nguyễn-Quốc and Elisa Saint-Martin. Chapter 8 benefited from contributions from Joseph Stead, OECD Centre for Tax Policy and Administration.

The report drew from the kick-off meeting the AUC organised in Addis Ababa in February 2020 and from two peer review meetings the OECD Development Centre organised in April and May 2020 on the initial draft chapters. These peer review meetings took place digitally following measures related to the COVID-19 pandemic. The report also relied on the results of a joint AUC/OECD 2020 Expert Survey on Digitalisation in Africa. Respondents included African policy makers, recognised experts on digitalisation, and representatives of private companies working in Africa's telecom and digital sectors.

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Abbreviations and acronyms

4IR	Fourth Industrial Revolution
ACBF	African Capacity Building Foundation
AfCFTA	African Continental Free Trade Area
AI	Artificial intelligence
AU	African Union
AUC	African Union Commission
AUDA-NEPAD	African Union Development Agency
CEMAC	Economic and Monetary Community of Central Africa
COMESA	Common Market for Eastern and Southern Africa
DAC	Development Assistance Committee
DAT	Disruptive agricultural technology
DE4A	Digital Economy for Africa
EAC	East African Community
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EU	European Union
FDI	Foreign direct investment
Fintech	Financial technology
GDP	Gross domestic product
GDPR	General data protection regulation
GIZ	Gesellschaft für Internationale Zusammenarbeit (German Corporation for International Cooperation)
GNI	Gross national income
GSMA	Global System for Mobile Communications Association
GVC	Global value chain
H2M	Human-to-machine
HIPC	Heavily indebted poor countries
IBRD	International Bank for Reconstruction and Development
ICT	Information and communications technology
IFC	International Finance Corporation
ILO	International Labour Organization
IMF	International Monetary Fund
IoT	Internet of things
IP	Intellectual property
ISP	Internet service provider
IT	Information technology
IXP	Internet exchange point
LAC	Latin America and the Caribbean
LDC	Least developed country
M2M	Machine-to-machine
MSME	Micro, small and medium-sized enterprise
ODA	Official development assistance
OECD	Organisation for Economic Co-operation and Development
P2P	Person-to-person
PIDA	Programme for Infrastructure Development in Africa
PPP	Public-private partnership

PRIDA	Policy and Regulatory Initiative for Digital Africa
REC	Regional Economic Community
SACU	Southern African Customs Union
SADC	Southern African Development Community
SEZ	Special economic zone
SME	Small and medium-sized enterprise
STEM	Science, technology, engineering and mathematics
STI	Science, technology and innovation
SWAC	Sahel and West Africa Club
Telco	Telecommunication company
TVET	Technical and vocational education and training
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Educational, Scientific and Cultural Organization
VAT	Value-added tax
VC	Venture capital
WAEMU	West African Economic and Monetary Union
WEF	World Economic Forum
WTO	World Trade Organization

Executive summary

COVID-19 poses an unprecedented threat to financing Africa's development by creating new risks and exacerbating pre-existing vulnerabilities. The amount of financing per capita decreased over 2010-18 for both domestic revenues and external financial flows, by 18% and 5%, respectively. Between 2019 and 2020, the ratio of tax to gross domestic product (GDP) is expected to decrease by about 10% in at least 22 African countries; total national savings could drop by 18%, remittances by a fourth and foreign direct investment by 40%. Donors have pledged to maintain official development assistance at their pre-crisis levels, although their capacity may depend on economic trends. This negative shock is increasing fiscal expenditure to support health and economic activities, which will probably double fiscal deficits. As a result, Africa's debt will soar to about 70% of GDP in current US dollars, with debt exceeding 100% of GDP in at least seven countries. The G20 debt moratorium that began in April 2020 provides a necessary respite for African countries, but it remains insufficient. Suspending and, in some cases, restructuring the debt may prove necessary to free up resources that are critical to achieving the African Union's Agenda 2063: The Africa We Want. Where possible, debt negotiations should include the growing group of private sector lenders.

The COVID-19 crisis strengthens the role of digitalisation in contributing to Africa's productive transformation and in fulfilling Agenda 2063, the African Union's vision for the continent's development. The digital transformation is expanding to almost all economic sectors, most rapidly to healthcare due to COVID-19. The continent boasts headline digital successes. The mobile money revolution is a well-known example: with the world's highest number of accounts – 300 million – it is altering local job markets, starting in East Africa. More than 500 African companies provide technology-enabled innovation in financial services (fintech). Some African start-ups' valuations now exceed a billion dollars. Over 640 tech hubs are active across the continent. However, digital innovations must expand far beyond these islands of success to achieve Agenda 2063 objectives and create a mass number of jobs for the youth.

Moving forward, governments can drive Africa's digital transformation and trigger large-scale job creation, including outside the digital sector, through four complementary actions:

- **Promote the dissemination of digital innovations beyond large cities through place-based policies.** Ensuring universal access to digital technologies calls for enhancing coverage, affordability and the availability of suitable content. Internet access has expanded thanks to the growing prevalence of mobile phones: 72% of Africans now use them regularly, with the highest number in North Africa (82%) and the lowest in Central Africa (63%). However, digital adoption remains unequal across genders, income groups and other groupings. Only 26% of the continent's rural dwellers use the Internet regularly, compared to 47% of its urban inhabitants.
- **Prepare Africa's workforce to embrace digital transformation and guarantee social protection.** By 2040, own-account and family workers will represent 65% of employment under current trends. The share of own-account and family workers will be the highest in West Africa, accounting for 74% of employment in 2040, and the lowest in North Africa at 25%. Presently, 45% of youth feel their skills are inappropriate for their jobs. The apparition of new livelihoods on the web requires setting solid regulatory schemes and providing social protection for informal iWorkers.

- **Remove barriers to innovation that prevent smaller firms from competing in the digital age.** Dynamic small and medium-sized enterprises (SMEs) need support to adopt the most appropriate digital tools for innovation and trade. For example, having a website is positively associated with a 5.5% increase in the share of direct exports in firms' sales. Only 31% of firms in Africa's formal sector have a website, compared to 39% in Asia and 48% in Latin America and the Caribbean. Today, only 17% of Africa's early-stage entrepreneurs expect to create at least six jobs, the lowest percentage globally. Enticing these firms to scale up is critical for job creation.
- **Deepen regional and continental co-operation for digital transformation.** Digital technologies pose new challenges to national regulators. Supranational co-operation can provide solutions in areas such as digital taxation, digital security, privacy, personal data protection and cross-border data flows. Harmonising continental and regional regulations is an important complement to national laws. As of today, only 28 countries in Africa have personal data protection legislation in place, while 11 have adopted substantive laws on digital security incidents.

Region	Main policy areas for digital transformation
Central Africa	• Co-ordinate investment in digital infrastructure regionally to expand coverage and ensure inclusive and reliable access. • Equip the workforce with the adequate skills to facilitate the school-to-work transition and reduce the skills mismatch. • Leverage digital technologies to promote entrepreneurship and foster the digital transformation of regional value chains. • Implement, monitor and evaluate digital strategies at the regional and national levels.
East Africa	• Facilitate the school-to-work transition, notably through digital literacy and technical and vocational education and training (TVET) programmes, and monitor technological developments to anticipate future skills requirements. • Nurture digital entrepreneurship and innovation by adapting the regulatory environment, and promote technology parks, notably through easier financing. • Strengthen regional co-operation on digitalisation, and mobilise public and private resources for regional infrastructure. • Set up a single digital market by promoting seamless connectivity, harmonising regulations and facilitating the interoperability of cross-border payments.
North Africa	• Support the development of financial technology by loosening regulatory constraints and experimenting with new regulations (e.g. sandboxes). • Modernise education and training systems by monitoring and evaluating digital literacy and programmes for science, technology, engineering and mathematics, and promote lifelong learning and reskilling of the workforce. • Encourage digital entrepreneurship by fostering innovation through public-private partnerships and improving governance in the region.
Southern Africa	• Reduce the digital divide by developing reliable and affordable digital infrastructure beyond urban centres. • Improve the quality of education and promote lifelong learning to meet future skills demand. • Harmonise existing digital initiatives at the national and regional levels, and accelerate their implementation, targeting the digital transformation of strategic value chains.
West Africa	• Strengthen government support to technology parks and start-up incubators, and monitor progress. • Implement supportive regulatory frameworks to develop fintech, foster financial inclusion and diversify sources of financing for private sector development. • Support entrepreneurs and SMEs in using digital technologies, especially in agricultural sectors, to strengthen their integration into regional and global value chains. • Invest in human capital to align skills with future market needs, and promote TVET through strategic partnerships with the private sector.

Overview: Priorities to make digitalisation work for all in Africa

The COVID-19 pandemic has been the biggest shock to Africa's economy since the turn of the century

The economic recession triggered by the COVID-19 pandemic is hitting African countries hard. Most of them are facing their first recession in 25 years: gross domestic product (GDP) growth will likely decrease in 41 of the 54 countries in 2020, according to an International Monetary Fund forecast (October 2020). By contrast, when the global financial crisis hit the continent in 2009, only 11 countries went into recession. The crisis has affected Africa's growth through various external and domestic channels (Table 1). For example, the plunge in oil prices in the first quarter of 2020 has severely struck commodity-based economies. The shutdown of the global tourism industry, which employs 24.3 million people on the continent, has harshly affected tourism-dependent countries. Domestic demand and regional trade have suffered from confinement measures. At least 42 countries have imposed partial or full lockdowns on economic activities and the movements of people (UNECA, 2020). The crisis has also led to the postponement of the implementation phase of the African Continental Free Trade Area until 2021.

The global crisis is likely to derail Africa from its pre-COVID-19 development trajectory. The crisis could push some 23 million sub-Saharan Africans into extreme poverty in the course of 2020. Africa's capital accumulation and productivity could remain below their pre-COVID 19 trajectories until 2030 (Djiofack, Dudu and Zeufack, 2020). The most consequential disruptions in national economies could be productivity decline, reduced capital utilisation and increased trade costs. Added to these are losses in educational achievement and health, which could hinder the ability of the current generation to earn higher incomes and improve its well-being. These disturbances will slow down Africa's productive transformation and, consequently, the achievement of the African Union's *Agenda 2063: The Africa We Want*.

Africa's governments are facing the COVID-19 pandemic with lower financial resources per capita than during the 2008 global financial crisis. The amount of financing per capita decreased during the 2010-18 period for both domestic revenues and external financial flows, by 18% and 5% respectively (Figure 1). On average, African countries had public revenues of USD 384 per capita in 2018, compared with USD 2 226 for countries in Latin America and the Caribbean, USD 1 314 for developing countries in Asia, and over USD 15 000 for European and other high-income countries. Tax-to-GDP ratios had already been stagnating at 17.2% since 2015 in 26 African countries, despite important tax reforms (OECD/ATAF/AUC, 2019).

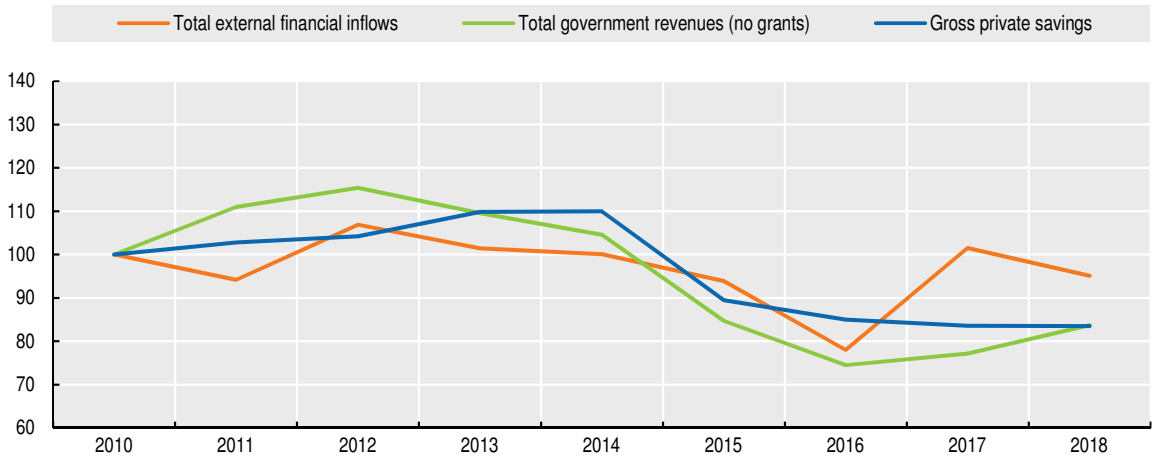
Public revenue will contract even further. The ratio of tax to GDP should contract by about 10% in at least 22 African countries between 2019 and 2020; total national savings could drop by 18%, remittances by 25% and foreign direct investment (FDI) by 40%. Donors have pledged to maintain official development assistance (ODA) at their pre-crisis levels. However, fiscal deficits will probably double in 2020. As a result, Africa's debt will likely soar to about 70% of GDP in current US dollars, up from 56.3% in 2019. While this average remains sustainable, the debt-to-GDP ratio is likely to exceed 100% of GDP in at least seven countries. The G20 debt moratorium that began in April 2020 provides necessary respite for African countries, but it remains insufficient. Suspending and, in some cases, restructuring the debt may prove necessary to free up critical resources to achieve the African Union's Agenda 2063. Where possible, debt negotiations should include the growing group of private sector lenders (see Chapter 8). Finally, the COVID-19 crisis makes accelerating Africa's productive transformation and continental integration processes all the more imperative.

Table 1. **African economies' dependence on global markets during the COVID-19 crisis: Stylised facts**

Main external channels	Observed shocks	Africa's vulnerabilities	Most dependent countries
Trade in goods and services	Weakened demand for exports	China, European Union (EU) countries and the United States accounted for 56% of Africa's export in 2017.	In **11 countries**, exports to China, EU countries and the United States exceeded 70% of total exports in 2017: Algeria, Angola, Cabo Verde, Chad, Congo, Libya, Morocco, São Tomé and Príncipe, Sierra Leone, South Sudan and Tunisia.
	Collapse of oil prices	Oil and oil products accounted for 38% of Africa's export in 2017.	In **6 countries**, exports of crude oil and oil products represented over 70% of total exports in 2017: Algeria, Angola, Chad, Equatorial Guinea, Libya and Nigeria.
	Disruptions on imports of food and pharmaceuticals	African countries import around 90% of their pharmaceutical products from outside the continent (mostly from China, the EU and India). Nearly two-thirds of African countries are net importers of basic foods.	In **12 countries**, more than 60% of the population is considered food insecure: Angola, Botswana, Cameroon, Guinea, Lesotho, Liberia, Malawi, Namibia, Niger, Sierra Leone, Tanzania and Togo.
	Halt on tourism activities	The tourism industry accounts for 8.5% of Africa's GDP and employs 24.3 million people on the continent.	In **14 countries**, tourism revenues were over 10% of GDP in 2019: Botswana, Cabo Verde, Comoros, Egypt, Gambia, Lesotho, Madagascar, Mauritius, Namibia, Rwanda, Senegal, Seychelles, Tanzania and Tunisia.
External financial flows	Drop in remittance flows	Remittance flows accounted for 3.2% of Africa's GDP in 2018.	In **7 countries**, remittance flows were more than 10% of GDP in 2019: Cabo Verde, Comoros, Gambia, Lesotho, Senegal, South Sudan and Zimbabwe.
	Drop in FDI flows	FDI flows accounted for 2% of Africa's GDP in 2018.	**In 15 countries**, FDI flows exceeded 5% of GDP in 2016-18: Cabo Verde, Congo, Djibouti, Gabon, Ghana, Guinea, Lesotho, Liberia, Niger, Mauritania, Mozambique, São Tomé and Príncipe, Seychelles, Sierra Leone and Somalia.
	Uncertainty on ODA flows	ODA flows accounted for 2.4% of Africa's GDP in 2018.	In **12 countries**, ODA flows accounted for over 10% of gross national income in 2018: Burundi, Central African Republic, Gambia, Guinea-Bissau, Liberia, Malawi, Mozambique, Niger, Rwanda, São Tomé and Príncipe, Sierra Leone and Somalia.

Source: Authors' elaboration.

Figure 1. **Financial flows to Africa: Real change in per capita levels (2010 = 100)**



Sources: Authors' calculations based on data from IMF (2020), *World Economic Outlook* (database), www.imf.org/external/pubs/ft/weo/2020/01/weodata/index.aspx; OECD-DAC (2020a), *International Development Statistics* (database), www.oecd.org/dac/stats/idsonline.htm; OECD-DAC (2020b), *Country Programmable Aid* (database), www.oecd.org/dac/financing-sustainabledevelopment/development-finance-standards/cpa.htm; UNCTAD (2020), *World Investment Report 2020* and World Bank (2020a), *KNOMAD Remittances Data* (database), www.knomad.org/data/remittances.

StatLink *https://doi.org/10.1787/888934203092*

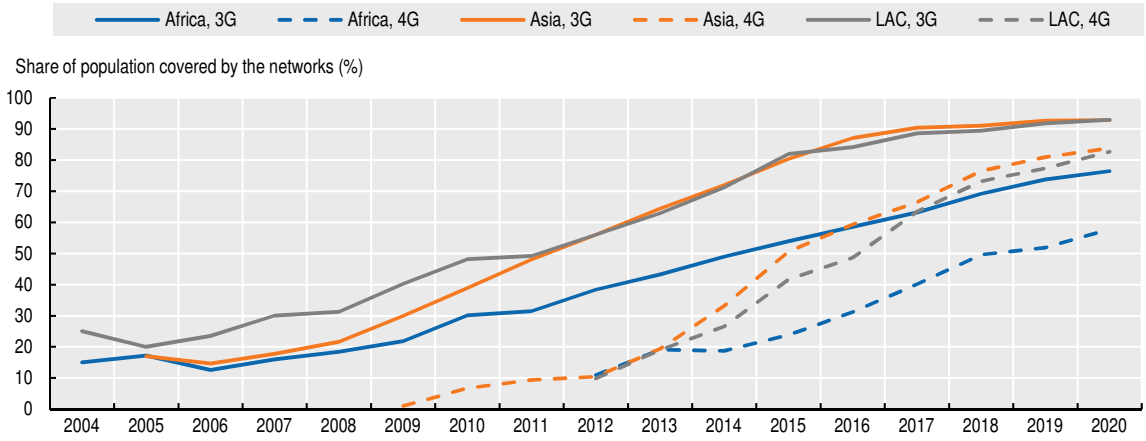
Digitalisation is a powerful tool for productive transformation and resilience to the crisis

African economies are undergoing a steady process of digitalisation

Digitalisation – the use of digital technologies, data and interconnection to change existing activities or create new ones – is well underway in all five African regions. The continent boasts several headline successes and dynamic ecosystems. The mobile money revolution is a well-known example: with 300 million accounts – the highest number in the world – mobile money has begun transforming Africa's job markets, expanding financial services to the underserved and unlocking innovative business models for local small and medium-sized enterprises (SMEs). Africa's telecom industry, which forms the core of the digital transformation, has shown a robust growth in subscribers, revenues and capital expenditures. To date, more than 500 African companies provide technology-enabled innovation in financial services (fintech). Johannesburg and Cape Town in South Africa, Nairobi in Kenya and Lagos in Nigeria rank among the top 100 cities for fintech ecosystems worldwide. Entrepreneurial and digitally savvy Africans are turning digital technologies and Africa's specific needs to their advantage to deploy fast-growing business models. Some African start-ups' valuations now exceed USD 1 billion (Chapter 1). Over 640 tech hubs and incubators are active across the continent, up from 314 in 2016. However, in order to achieve the objectives of Agenda 2063 and create a massive number of jobs for the youth, digital transformations must expand beyond those islands of success.

Information and communications technology (ICT) infrastructures have developed steadily, and prospects for new projects remain robust. In 2018, financing for digital infrastructure was USD 7 billion, 80% of which came from private investors (ICA, 2018). Africa's total inbound international Internet bandwidth capacity increased by more than 50 times in just ten years to reach 15.1 terabytes per second (Tbps) in December 2019, up from only 0.3 Tbps in 2009 (Hamilton Research, 2020). The operational fibre-optic network extended from 278 056 kilometres (km) in 2009 to 1.02 million km in June 2019. Mobile cellular subscriptions more than doubled in a decade to reach 88 per 100 people in 2018. About 58% of the population now live in an area covered by 4G networks (Figure 2). Through its Agenda 2063 flagship programmes, the African Union has 114 ICT infrastructure projects which aim to upgrade key Internet exchange points, build new broadband fibre infrastructure and upgrade existing terrestrial fibre backbones (AUDA-NEPAD, 2020).

Figure 2. **Percentage of the population covered by the 3G and 4G networks in Africa, Asia, and Latin America and the Caribbean (LAC), 2004-20**



Source: Authors' calculations based on GSMA (2020a), *GSMA Intelligence* (database).

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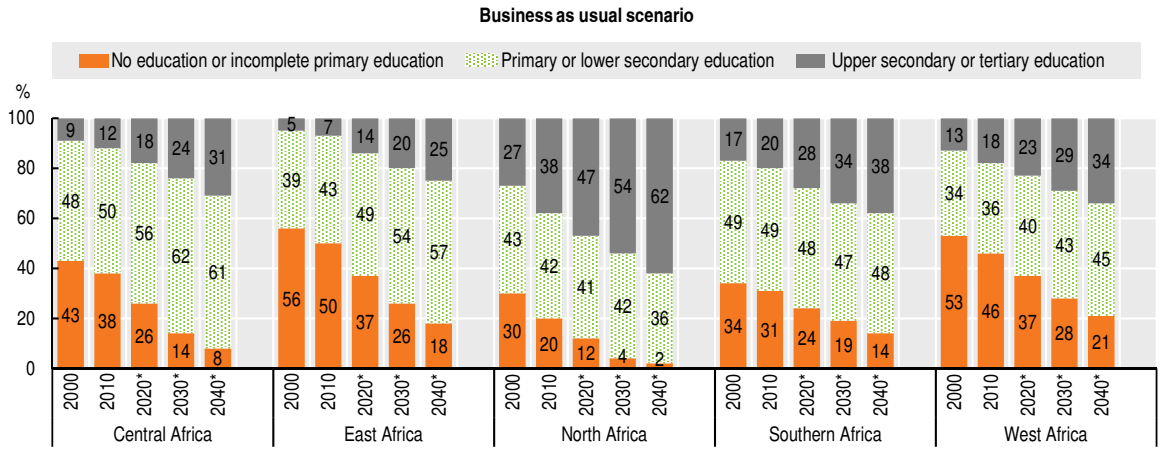
Africa's young and increasingly educated population is another asset for accelerating the continent's digital transformation. The number of Africans aged 15-29 with an upper secondary or tertiary education has risen from 47 million in 2010 to 77 million in 2020. Progress is most notable in North Africa, where 47% of the youth have at least an upper secondary education (Figure 3). Under business-as-usual scenarios, this number will increase to 165 million by 2040. In relative terms, the proportion of African youth completing an upper secondary or tertiary education could reach 34% by 2040, close to the proportion in Asia and up from 23% today. If African countries follow the same trajectory as projected for Korea in a fast-track scenario, this proportion could even reach 73% (233 million) by 2040.

Figure 3. **Profile of Africa's youth (aged 15-29) by educational attainment and region, 2000-40**



Note: * = Projections.

Source: Authors' calculations based on Wittgenstein Centre for Demography and Global Human Capital (2018), *Wittgenstein Centre Data Explorer Version 2.0 (Beta)* (database).

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Few benefit from the job opportunities of digital transformation

Despite the progress mentioned above, those who benefit from job opportunities created by Africa's digital transformation are too few. Telecom companies and the 20 fastest-growing African start-ups employ about 300 000 staff. Taken on its own, the digital sector is glaringly insufficient to provide education and jobs for the 29 million youth who will turn 16 years old every year between now and 2030.

Strong inequalities in labour markets limit the potential of the digital transformation to create quality jobs. The gap in digital access and capability manifests itself across three inter-related dimensions: spatial, social and competitiveness:

- The concentration of the digital economy in the continent's larger cities increases the spatial mismatch between jobs and people. Although about 70% of Africa's young people (i.e. 1.4 billion people) reside in rural areas, only 25.6% of African rural dwellers have Internet access compared to 35.2% in Asia and 40.1% in Latin-America (Gallup, 2019).
- The informal sector remains the main gateway to job markets for the vast majority of Africa's working-age population. This is the case for 75% of graduates aged 15-29 and for 88% of women. Informal workers have low digital adoption: only 16% of

self-employed workers use the Internet regularly, compared to 58% of people in waged jobs.

- Despite a great number of early-stage entrepreneurs across the continent, the funding ecosystem remains fragile. High-potential entrepreneurs face a weak regulatory environment to scale up their activities and innovate. This hinders private sector competitiveness, especially among micro, small and medium-sized enterprises.

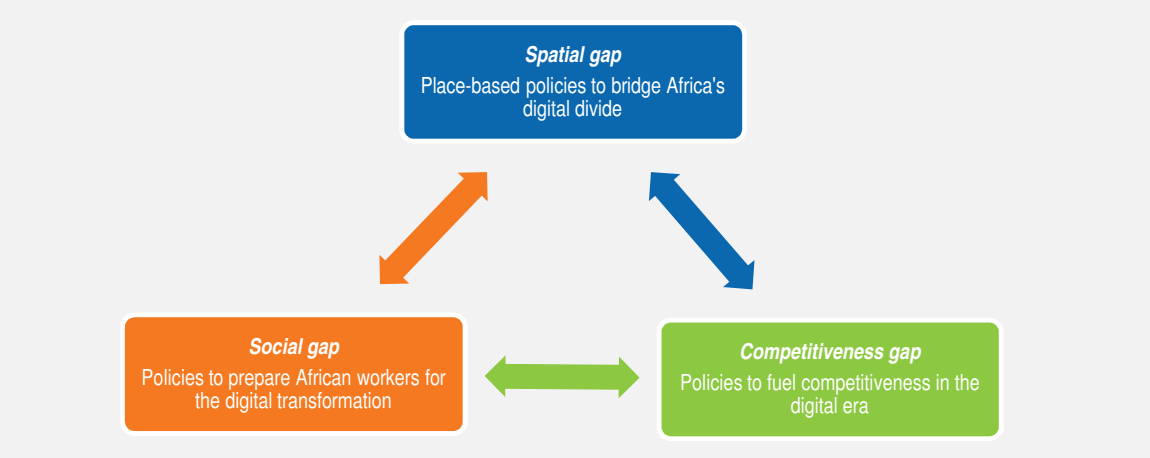
To trigger large-scale job creation, policies need to bring digital solutions to the non-digital economy

Most future employment opportunities will come through indirect channels, rather than through direct employment in the digital sectors. The real potential for large-scale job creation lies in spreading digital innovations from lead firms to the rest of the economy. The role of governments is to create an environment that enables the many private sector actors to benefit from digitalisation. Spreading digital innovations to the whole economy will empower the private sector to create more jobs.

While many African countries have digitalisation strategies, these generally focus on the digital sector only. Most strategies aim to expand the coverage of communication infrastructure networks, promote hubs and tech clusters, and implement regulatory reforms to attract leading companies. They target only specific sectors and tend to overlook the potential to use digitalisation to transform non-digital sectors.

New digitalisation strategies can address the spatial, social and competitiveness gaps in the labour market and bring digital solutions to the non-digital economy (Figure 4). To reduce those gaps, the report recommends that policy makers pay particular attention to three sets of policies: i) spreading digital innovations beyond large cities, ii) helping informal workers become more productive and iii) empowering enterprises for digital competition. Chapters 1 to 7 of the report examine a wide range of policies that can fill the gaps in current strategies in order to create quality jobs in the five African regions.

Figure 4. **Three gaps in Africa's labour market and corresponding sets of digital transformation policies to fill them and to trigger large-scale job creation**

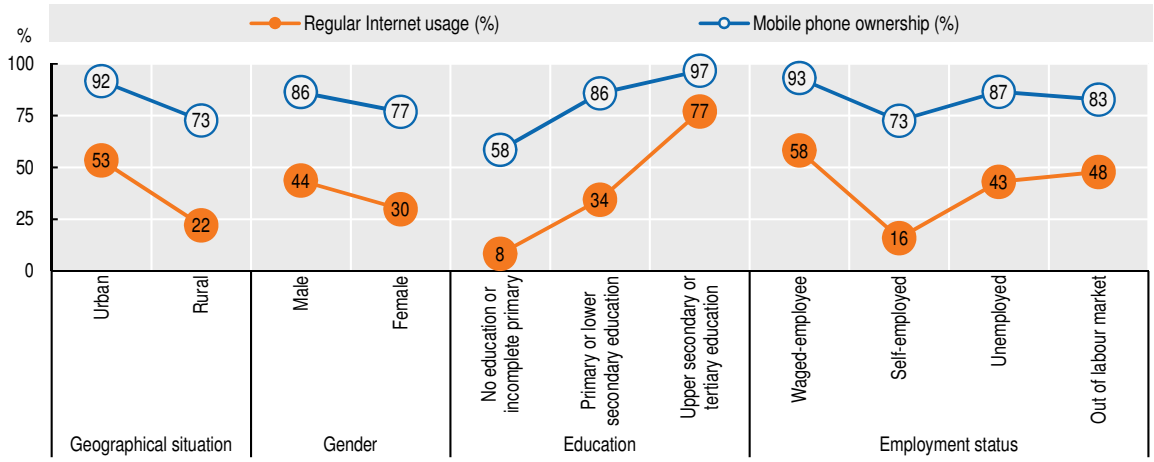


Source: Authors' elaboration.

Closing the spatial gap: Connecting intermediary cities and spreading digital innovations for rural development

Bridging spatial inequalities is a cost-efficient policy to respond to the interrelated dimensions of Africa's digital divide, including gender and socio-economic inequalities in accessing digital tools. Figure 5 compares inequalities in access to mobile phone and Internet usage. On the one hand, vulnerable groups in rural areas and small towns have much lower access to digital opportunities than in larger cities. For instance, only 17% of self-employed workers living in rural areas use the Internet, compared to 44% for those in urban areas (Afrobarometer, 2019). On the other hand, digital innovation concentrates in too few places: only five African cities host almost half of the most dynamic start-ups: Cape Town (12.5%), Lagos (10.3%), Johannesburg (10.1%), Nairobi (8.8%) and Cairo (6.9%) (AUC/OECD, 2019), and 85% of the venture capital funding for Africa's start-ups went only to four countries despite sevenfold growth between 2015 and 2019.

Figure 5. **Mobile phone and Internet usage among Africa's youth, aged 15-29, by geographical situation, gender, level of education and employment status, 2015-18**



Notes: The results are based on survey data from 34 African countries. Primary education: completed elementary education or less (up to 8 years of basic education); secondary: completed some secondary education and up to 3 years tertiary education (9 to 15 years of education); tertiary: completed 4 years of education beyond high school and/or received a 4-year college degree.

Source: Calculations based on Afrobarometer (2019), *Afrobarometer* (database).

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Extending digital technologies to remote areas can be cost-effective. Improving agricultural extension services and connecting the rural-urban supply chains can generate big wins in fighting pockets of poverty and informality in rural areas. A stock-taking exercise highlighted that the focus of the so-called Disruptive Agricultural Technologies (i.e. agritech) in Africa ranges from enhancing agricultural productivity (32%) to improving market linkages (26%) and, to a lesser extent, data analytics (23%) and financial inclusion (15%) (Kim et al., 2020). Over 83% of these innovative agricultural technology solutions do not require high connectivity and can operate with intermediate connectivity.

Developing broadband infrastructure in intermediary cities can yield high returns, as 73% of Africans will continue to live in intermediary cities and rural areas by 2040. In Central Africa, only 5% of the intermediary cities are within ten kilometres of the high-speed terrestrial fibre-optic network, and 20% in West Africa. Intermediary cities can act as transmission hubs that serve the rural hinterland, strengthen rural-urban linkages and drive rural transformation. Place-based policies are necessary to spread the costs of digital innovations effectively and to enhance regional competitiveness beyond large

cities. In all five regions of Africa, place-based policies can articulate sectoral policies locally to tap underutilised potential.

Universal access to communication technologies and Internet services partially depends on affordable prices. Only 17% of Africa's population can afford one gigabyte of data, compared to 37% in Latin America and the Caribbean and 47% in Asia. The costs are the lowest in North Africa and the highest in Central Africa.

Governments can make prices affordable through policies that i) create new public-private alliances for rural connectivity, ii) improve the use of Universal Service and Access Funds (USAFs) and iii) ensure fair competition among telecommunication providers. In Algeria, Ghana, Kenya and Nigeria, the public sector partnered with mobile telecom companies and with the telecommunications equipment providers to bring cost-effective mobile broadband services to their rural populations. To upgrade rural broadband networks, Malawi and four other Southern African countries have successfully tested reallocating vacant spectrum bands, previously used by television broadcasting, for Internet transmission over long distances (see Chapter 3). While 37 African countries have created USAFs, a recent review found that USD 408 million, or 46% of funds collected, were still unspent by end-2016 (Thakur and Potter, 2018). Benin, Ghana and Rwanda make good use of their USAFs by focusing them on skills acquisition programmes for women entrepreneurs.

Governments need to identify and support the most promising digital innovations for rural development. Agritech and data-related start-ups are on the rise across the continent (Table 2). Governments can collaborate with tech companies to spread the best farming practices. New technologies such as smart contracts, real-time payment solutions and distributed ledger technologies (also known as blockchain) can fundamentally transform the agricultural sector and help address the specific challenges of small-scale farmers. Other promising innovations for agricultural development include shared-economy models and digital tools for land rights.

Table 2. **Examples of start-ups in farming in the five African regions**

Start-up	Country	Region	Foundation	Notable features
WeFarm	Uganda, Kenya, Tanzania	East Africa	2018	WeFarm lets small-scale farmers connect with one another to solve problems, share ideas and spread innovation. It has reached over 1 million users across Kenya and Uganda.
Farmerline	Ghana	West Africa	2012	Farmerline provides small-scale farmers with mobile access to agricultural services. By 2017, it reached 200 000 farmers in ten African countries.
Aerobotics	South Africa	Southern Africa	2014	Aerobotics uses aerial imagery from drones and satellites to provide early problem detection services to tree and wine farmers and optimise crop performance. In 2020, it raised USD 5.5 million in funding from Naspers Foundry.
AgriEdge	Morocco	North Africa	2018	AgriEdge deploys weather data and satellite and drone imagery for precision farming. The start-up is helping more than 30 000 farmers in five African countries.
Promagric	Cameroon	Central Africa	2016	Promagric helps farmers combat crop diseases to reduce agricultural losses. The company's application uses artificial intelligence to diagnose crop diseases from an image.

Source: Authors' compilation.

Closing the social gap: E-skilling the workforce and preparing the labour markets for digital transformation

By 2040, own-account and family workers in Africa will represent 65% of employment under current trends. Their number could increase by 163%, to reach 529 million people in 2040, compared to an estimated 325 million people in 2020. Even in the best-case scenario where manufacturing and digital sectors expand substantially, own-account work will

likely remain the mainstay for the majority of Africa's youth. A significant proportion of the continent's young labour force is outside the education and training systems, is jobless or works in the informal sector. Policies need to help them embrace digital transformation and guarantee social protection.

Making digitalisation benefit informal and own-account workers requires increasing opportunities for lifelong learning and skill development. In Morocco, the Federation of Information Technology, Telecommunications and Offshoring is seeking to boost employability in the information technology sector by creating training courses and vocational qualification certificates in partnership with the National Agency for the Promotion of Employment and Skills. In May 2018, Facebook launched NG_HUB in Lagos in collaboration with the Co-creation Hub to provide 50 000 young Nigerians with skills for own-business development and to nurture a strong mutual learning community of entrepreneurs (Oludimu, 2018). Other interesting initiatives focus on technical and vocational education and training for women. This is the case for Women and Digital Skills (Ghana), W.TEC (Nigeria) and WeCode (Rwanda). The regional chapters in this report provide details on other initiatives. For example, in North Africa, triangular collaboration policies between governments, universities and the private sector are facilitating the establishment of technology hubs and incubation centres for skill development (see Chapter 6).

The emergence of new forms of own-account work via the use of e-platforms and digital applications calls for improving regulatory frameworks and social protection schemes to prevent precarious working conditions. In South Africa, for example, the number of gig workers is growing over 10% each year and could reach the millions within the next decades. Global evidence from 75 countries between 2015 and 2017 suggests that gig workers often face precarious working conditions, including low and unpredictable revenues and poor social protection. Policies should support collective action to help better regulate platform work. An example of such action exists in Kenya, where a group of online workers came together to set up an association in 2019. Setting international standards and promoting certification for responsible business conduct for lead platform companies could also help eliminate unfair practices and hold these platforms accountable without putting at risk this livelihood option for local workers.

Closing the competitiveness gap: Empowering African start-ups and SMEs to compete and innovate in the digital era

African enterprises have difficulty scaling up and innovating in the digital era. Today, only 17% of Africa's early-stage entrepreneurs expect to create at least six jobs, the lowest percentage globally. This, although the African population boasts the world's highest rate of entrepreneurship at about 22% of the labour force (AfDB/OECD/UNDP, 2017). In spite of having promising business ideas, many early-stage entrepreneurs face obstacles in obtaining loans from local banking systems. Only 5.4% of the total funds raised go to start-ups younger than five years old. Women-led start-ups only receive 2% of funding, although more women in Africa are entrepreneurs than in other world regions.[1]

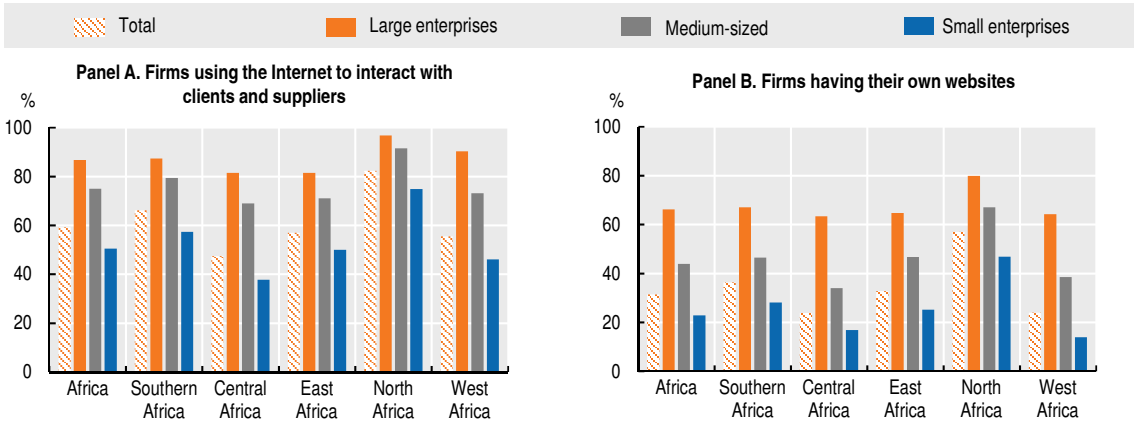
Governments can help dynamic enterprises tap digital-enabled trade, facilitate intellectual property registration and strengthen financing opportunities for start-ups. Key policy areas to support them include the following:

- Stronger digital adoption will increase company growth and resilience, especially if policies also encourage the spread of digital innovation among SMEs (Figure 6). For example, governments need to overcome bottlenecks in cross-border e-commerce by supporting international e-payments, cross-border deliveries, standards and certification. Firms can become more competitive by ramping up their online

presence and their after-sale services. Africa's entrepreneurs can use digital connectivity to enter new niches. One example is the rapid online growth of Nigeria's Nollywood, a film industry that employs about 1 million people.

- Governments can encourage entrepreneurs to register intellectual property by streamlining application procedures, reducing the cost of intellectual property registration and adapting enforcement mechanisms. For instance, Kenya's patent registration fees are 13.3 times its GDP per capita (the ratio is 10.2 in Senegal and 7.9 in Ethiopia), compared to 0.4 for Malaysia.
- Improving risk assessment methods, acceleration programmes for entrepreneurs, public procurements and public guarantees mechanisms can increase the financing available for local start-ups in all countries. Countries with a sovereign wealth fund should consider setting up small venture capital funds within their investment structures to support the development of start-up and SME ecosystems. Examples include the FSDEA (Fundo Soberano de Angola) in Angola, the Okoumé Capital fund in Gabon and the Teranga Capital fund in Senegal.

Figure 6. **Formal manufacturing and service firms in Africa that use the Internet**



Source: Authors' calculations based on World Bank (2020b), *World Bank Enterprise Surveys* (database), www.enterprisesurveys.org/en/data, using the latest data available for each country.
StatLink *https://doi.org/10.1787/888934203168*

Table 3. **Selected digital policy initiatives to support start-ups and SMEs in Africa**

Location	Year of launch	Area of intervention	Initiative	Notable features
Egypt	2010	Start-up development	Technology Innovation and Entrepreneurship Centre (TIEC)	In 2017, the TIEC launched the Fekratek Sherkatek (Your Idea, Your Project) initiative which funded 42 local start-ups for amounts ranging between USD 5 620 and USD 28 100 each.
Kenya	2015	Intellectual property rights	IP Hub	Kenya Copyright Board collaborated with Microsoft 4Afrika to develop more user-friendly interfaces for intellectual property registration. The system resulted in a 100% increase in applications in the first four months and recently expanded to serve the Common Market for Eastern and Southern Africa region.
Nigeria	2012	Financial inclusion in rural areas	Growth Enhancement Support Scheme (GESS)	In partnership with Cellulant, a local fintech start-up, the programme provides e-wallet solutions connecting farmers with suppliers and financial institutions. To date, farmers have received a total of USD 1 billion in government subsidies through the scheme.
Southern Africa	2011	Start-up development	Southern Africa Innovation Support Programme (SAIS)	Since its pilot in 2018, Connected Hubs, one of the programme's components, has built bridges between 20 business support organisations across 7 countries, supported over 500 early-stage entrepreneurs and strengthened 24 early-stage, impact-driven start-ups.

Source: Authors' compilation.

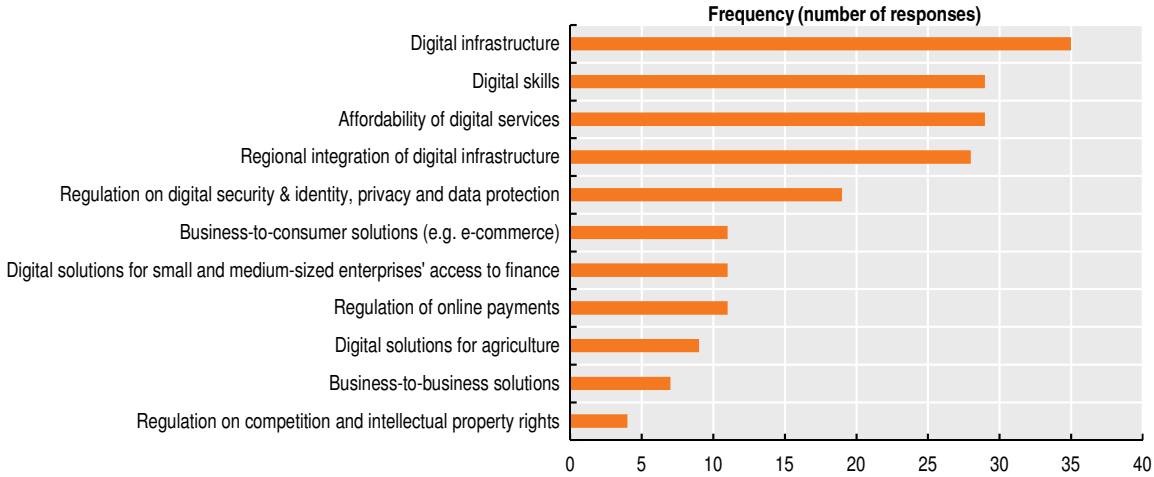
Regional and continental co-ordination in digital infrastructures and related services, data regulation and digital security is key for creating jobs

Without greater regional and continental co-ordination, national strategies will not achieve digital transformation. The rise of digital technologies poses new and complex challenges to country-level regulators, including taxation in the digital age, digital security, privacy, personal data protection and cross-border flows of data. The fast development of technologies, their global reach and their cross-border nature – to which governments need to respond with "fit-for-purpose" regulatory frameworks and enforcement mechanisms – magnify these challenges (OECD, 2019). Most national strategies aim at turning a country into a "regional digital hub" but do not prioritise regional and continental co-operation. National regulatory agencies cannot deal with technology-related challenges in isolation. If governments do not fix the issues at the regional and continental levels, they may not be able to realise the full potential of digital transformation for African firms and job creation. As of today, only 28 countries in Africa have personal data protection legislation in place, while 11 have adopted substantive laws on cybercrime. Serianu (2017) estimates that the cost of cybercrime in Africa was about USD 3.5 billion in 2017.

The joint AUC/OECD 2020 Expert Survey carried out for this report identified three policy areas for regional and continental co-operation to help create more and better jobs (Figure 7):

- ensuring affordable intra-Africa roaming services
- harmonising data regulatory frameworks
- improving continental co-operation on digital security.

Figure 7. **Priority areas for regional and continental co-operation: Results from the AUC/OECD 2020 Expert Survey on Digitalisation in Africa**



Notes: This figure shows answers to the survey question, "Which of the following areas of digitalisation do you think should be the priorities for regional and continental co-operation to help create more and better jobs in your region?". It is based on responses from six (out of Africa's eight) Regional Economic Communities and on individual assessment on 23 African countries. Respondent to the survey included policy makers, experts on digitalisation and representatives of private companies working in Africa's telecom and digital activities. For this question, each respondent was asked to select five top priority areas out of an open-ended list of 15 areas, with an option to add any additional areas of their choice.

Source: AUC/OECD 2020 Expert Survey on Digitalisation in Africa.

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Tackling these issues at the regional and continental levels will enable Africa's governments to reap the broader benefits of their digitalisation strategies. For example,

the expansion of physical infrastructure should go hand-in-hand with regulatory policies promoting affordable access to bandwidth. Accelerating co-operation on roaming services, data regulation and digital security will increase intra-African trade and productive integration. Progress in these three areas will pave the way for achieving a pan-African digital single market by 2030 and for implementing the African Union Commission's Digital Transformation Strategy for Africa (DST) 2020-2030. The DST envisions an "integrated and inclusive digital society and economy in Africa that improves the quality of life of Africa's citizens, strengthen[s] the existing economic sector, enable[s] its diversification and development, and ensure[s] continental ownership with Africa as a producer and not only a consumer in the global economy".

Note

1. Globally, the highest total entrepreneurial activity rates for women are found in sub-Saharan Africa (21.8% to 25.0%), followed by Latin America and the Caribbean (17.3%), while the global average rate is 10.2%. In Nigeria, nearly four in every ten working-age women are engaged in early-stage entrepreneurial activity (40.7%).

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Chapter 1

Digitalisation and jobs in Africa under COVID-19 and beyond

This chapter analyses the dynamics of digitalisation in Africa and how it can create jobs for youth and fulfill Agenda 2063 in the context of the COVID-19 crisis. The first section examines the importance of digitalisation – the use of digital technologies and data and the interconnection that results in new activities or changes to existing activities – for Africa's productive transformation and resilience to future crises. The second section documents the progress of digitalisation in Africa since the start of the mobile money revolution in 2007. Then it highlights the main channels through which digitalisation can create jobs. The third section identifies critical mismatches that require policy makers to act now, to accomodate the changes in Africa's youth profiles by educational attainment. The final section of the chapter documents ongoing continental initiatives to promote Africa's digital transformation and identifies key policy areas for enhancing co-operation.

IN BRIEF

The COVID-19 crisis strengthens the importance of digitalisation in accelerating Africa's productive transformation and fulfilling the African Union's Agenda 2063. Prior to the pandemic, the continent had several headline successes in changing its economy and had a growing number of dynamic start-up ecosystems. Together with the mobile money revolution, which now reaches 300 million accounts in Africa – the highest in the world –, these digital ecosystems had already begun transforming job markets (by creating direct and indirect jobs), modernising banking, expanding financial services to the underserved and unlocking innovative business models.

Today, governments can use the digital transformation to trigger mass job creation, especially through indirect channels, by focusing on four key actions:

- Ensuring universal access to digital infrastructure to avoid widening inequalities across regions, genders, education levels and employment status. Only 26% of the continent's rural dwellers regularly use the Internet, compared to 47% of its urban inhabitants. Promoting the spread of digital innovations to intermediary cities can have an important multiplier effect.
- Preparing African youth, especially those working in the informal sector, to embrace digitalisation. By 2040, own-account and family workers will represent 65% of employment under current trends and at least 51%, even in more optimistic scenarios.
- Tackling barriers to digital adoption and innovation in order to allow smaller firms to grow and compete in the digital age. Only 17% of early-stage entrepreneurs in Africa expect to create six or more jobs, the lowest percentage globally.
- Accelerating continental and regional co-ordination is essential to complement national strategies. In particular, adapting the African Continental Free Trade Area (AfCFTA) to the digital age requires greater co-operation to improve communications infrastructures, roaming services, data regulation and digital security. As of today, only 28 countries in Africa have comprehensive personal data protection legislation in place, while just 11 countries have adopted substantive laws on cybercrime (digital security incidents).

Digitalisation and jobs in Africa during COVID-19 and beyond

With COVID-19, Africa needs decisive policies to combat growing economic vulnerabilities

Adverse effects on productive investment

Without pro-active policies:

- **Capital accumulation below pre-COVID trends until 2030**
- **Disrupted FDI**

Accelerating automation and shifting global supply chains

14.1% of Africa's exports at risk of substitution

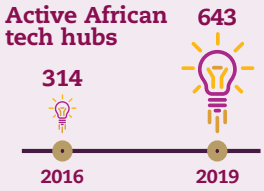
4 times more industrial robots worldwide in 2018 than 2008

Rising global trade costs

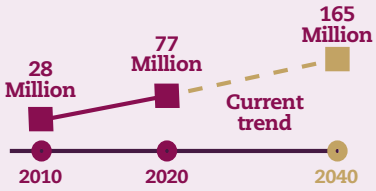
Costs could rise by **6-9%**

Africa's growing digital economy can improve resilience and drive job creation

A dynamic innovation scene



A growing number of youth (aged 15-29) is receiving post-secondary education



Data on firms shows that a **10% increase in email use raises:**

- annual sales by **37-38%**
- sales per worker by **22-23%**
- number of full-time workers by **12-14%**

To accelerate productive transformation, public policies need to tackle the obstacles to digital innovation across three dimensions

Spatial divide

Share of population using Internet regularly **by geographic location**

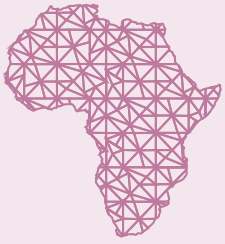
Formality divide

Share of **workers** who use the Internet regularly

Firm size divide

Share of **firms** that use the Internet to interact with clients

Continental co-ordination is key to achieving Africa's digital transformation



The African Union is leading **15 initiatives** harnessing digital technologies and innovation to:

- Support the **AfCFTA** implementation
- Achieve a **digital single market** by 2030
- Strengthen **Africa's role** in the global digital economy

To enable digital content creation in Africa, countries need to **accelerate co-ordination** on digital security and data regulation

- **Only 1 out of 5 African countries** have a legal framework for digital security
- **11 countries** have adopted substantive laws on cybercrime

Selected indicators on digital transformation in Africa

Table 1.1. **Core indicators of digitalisation for job creation in Africa, Asia, and Latin America and the Caribbean, 2020 or latest year**

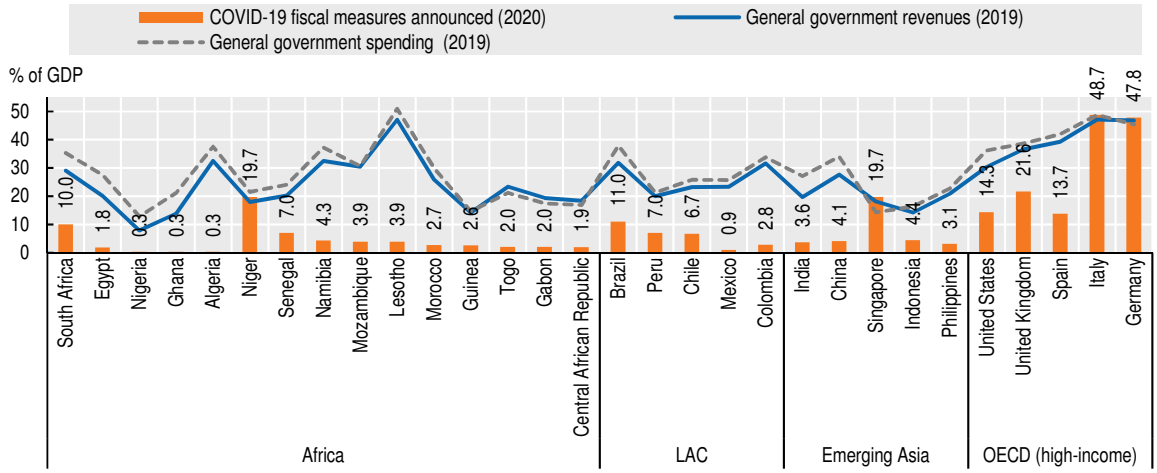
			Africa (5 years ago)	Africa (latest year)	Asia (latest year)	LAC (latest year)	Source	Latest year
Digital sector	Communications infrastructures	Percentage of the population with a cell phone	15.1	40.8	62.5	60.6	ITU	2018
		Percentage of the population with 4G coverage	23.8	57.9	84.0	82.7	GSMA	2020
		International Internet bandwidth per Internet user (kilobits/second)	8 244.8	28 405.0	71 424.0	54 207.0	ITU	2018
	Telecommunication industries	Total capital expenditure (as a percentage of total revenue)	21.7	18.6	22.6	20.2	GSMA	2017-19
		Earnings before interest, taxes, depreciation and amortisation (as a percentage of total revenue)	45.2	42.6	44.3	38.7	GSMA	2018-20
		Total employed headcount within the telecom companies (head account full-time equivalent)	n.a.	6 652	96 012	21 573	GSMA	2016-17
Digital economy	Start-up development	Number of active start-ups that raised at least USD 100 000	160	570	13 713	1 382	Crunch-base	2011-20
	Digital services	E-commerce sales (in USD million)	3 748.0	3 959.2	97 292.7	4 865.2	UNCTAD	2014-18
		Export of professional and IT services delivered electronically (in USD million)	16 7825.0	21 038.0	292 616.0	36 869.0	UNCTAD	2014-18
Digitalised economy	Internet use among people	Percentage of the population that uses mobile phones regularly	n.a.	72.0	87.8	77.8	Gallup	2018
		Percentage of women with Internet access	15.8	30.0	46.0	56.6	Gallup	2018
		Percentage of the poorest 40% with Internet access	10.3	22.7	33.6	45.4	Gallup	2018
		Percentage of rural inhabitants with Internet access	15.7	25.6	35.2	40.1	Gallup	2018
	Digital-enabled businesses	Percentage of firms having their own website	18.2	31.4	38.7	48.2	World Bank	2018*
		Percentage of firms using e-mail to interact with clients/suppliers	46.1	59.1	59.3	80.9	World Bank	2018*
		Percentage of goods vulnerable to automation that are exported to OECD countries	n.a.	14.1	18.9	19.0	World Bank	2020
	Access to finance	Percentage of the population with a mobile money account	n.a.	66.3	23.1	18.1	Demirgüç-Kunt et al.	2017

Note: *Data for 2018 or the latest available. Asia and Latin America and the Caribbean (LAC) include lower- and middle-income countries only. n.a. – not available, ITU = Information Technology Union, GSMA = Global System for Mobile Communications 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 (2020a), *GSMA Intelligence* (database); ITU (2020), *World Telecommunication/ICT Indicators Database*; UNCTAD (2020a), *UNCTADSTAT* (database); World Bank (2020a), *Enterprise Surveys* (database); World Bank (2020b), *World Development Report 2020*.

In a global economy upset by the COVID-19 crisis, digital transformation policies are critical to maintaining the progress towards fulfilling Agenda 2063

The COVID-19 pandemic and ensuing global crisis have bolstered the urgency for African economies to build stronger and more resilient productive structures. Whereas at the time of writing this report in the second and third quarters of 2020, the spread of the virus has been relatively limited in Africa compared with other world regions, the shock induced by the sudden stop of global economic activity has been far-reaching (see Chapter 8 on financing African countries' development). Most African countries have taken temporary fiscal measures to respond, despite relatively limited fiscal space (Figure 1.1). In addition, several central banks implemented monetary stimulus packages (IMF, 2020a). However, 41 African economies will undergo a recession in 2020 according to the International Monetary Fund forecast (realised in October 2020). This compares with 11 countries in recession in 2009 when the global financial crisis hit Africa.

Figure 1.1. **Fiscal measures undertaken by 15 African countries and 15 non-African countries in response to the COVID-19 pandemic in 2020 compared to government revenues and spending in 2019, as a percentage of gross domestic product (GDP)**



Note: Countries with the highest number of confirmed COVID-19 cases by region as of 15 June 2020. LAC: Latin America and the Caribbean.

Sources: Authors' compilation based on OECD (2020a), *Country Policy Tracker* (web portal); IMF (2020b), *Policy Responses to COVID-19: Policy Tracker* (web portal); Bruegel (2020), *The Fiscal Response to the Economic Fallout from the Coronavirus* (dataset); IMF (2020c), *World Economic Outlook, April 2020* (database).

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African policy makers have implemented many digital solutions to fight the COVID-19 pandemic at local, national, regional and continental levels. Ministries of education in 27 African countries were able to provide well-functioning e-learning platforms for students by May 2020 (UNESCO, 2020). Most African central banks have strongly encouraged the population to use digital payments (GSMA, 2020b).[1] The Africa Centres for Disease Control and Prevention – in collaboration with 20 international partners and foundations – has launched a not-for-profit continental e-platform to help African governments procure diagnostic tests and medical equipment from certified suppliers on the global market. Janngo, a start-up based in Côte d'Ivoire, designed and built the web portal. Moreover, several start-ups and talented entrepreneurs have developed new and affordable solutions to reduce the pandemic's burden on the continent's fragile health systems. From Solar Wash, a sun-powered, touch-free water dispenser in Ghana, to more advanced technologies such as DiagnoseMe, a remote mobile app in Burkina

Faso, and COVID-19 triage tools in Nigeria (Ochieng and Fokuo, 2020; Sadibe, 2020). In Senegal, the Institut Pasteur de Dakar developed a prototype for a ten-minute COVID-19 diagnostic test.

However, the adverse effects of COVID-19 on Africa's productive capacities could last more than a decade and reverse Africa's progress towards fulfilling Agenda 2063. Simulations by Djiofack, Dudu and Zeufack (2020) found that Africa's capital accumulation and productivity could remain below their pre-COVID 19 trajectories until 2030. The most consequential disruptions in national economies could be productivity decline, reduced capital utilisation and increased trade costs. These disruptions will slow down Africa's productive transformation and, thereby, the achievement of Agenda 2063 (AU/OECD, 2019). Furthermore, the pandemic risks disrupting Africa's recent progress in health and education, which could reduce the ability of the current generation to earn higher incomes.

COVID-19 is likely to accelerate ongoing trends in global trade. This makes digitalisation and regional and continental co-operation necessary conditions for transforming African economies.

- **COVID-19 may intensify the ongoing shift in international supply chains.** Since 2010, international firms have been gradually using more local and regional inputs in their products (Miroudot and Nordström, 2019; Baldwin and Tomiura, 2020; OECD, 2020b). The increased need for more resilient supply chains in the post-COVID-19 period, combined with the imperative of reducing the carbon footprint of production, will amplify this transformation (UNCTAD, 2020b). This could result in the "regionalisation" of complex global value chains and disrupt global FDI flows.
- **Uncertainty could lead to higher trade costs.** The volume of world merchandise trade has been steadily declining since the 2008-09 global financial crisis (WTO, 2020). The OECD estimates that trade costs could rise between 6% and 9% across transport modes in the post-COVID-19 era (Benz, Gonzales and Mourougane, 2020). Trade restrictions could further increase global trade costs. During the first semester of 2020, 89 jurisdictions implemented 154 export controls on medical supplies, and 28 jurisdictions executed 40 export curbs on agricultural and food products (Global Trade Alert, 2020).
- **The COVID-19 crisis may accelerate automation**. In just one decade, installations of industrial robots worldwide increased almost fourfold, from 112 000 units in 2008 to 422 000 units in 2018 (IFR, 2020). This demand for robot installations is primarily driven by the automotive industry (30%), followed by electronics (25%), and metal and machinery (10%). The servicification of manufacturing (i.e. the increasing importance of services for value addition in manufacturing) and consumer preferences for more sustainable and low-carbon production processes may lead firms to favour local over off-shored production. Top European firms anticipate adopting more robotic systems in their post-COVID-19 investment plans (Ahmed, 2020).
- **Increasing automation in advanced countries is likely to affect African labour markets.** Our estimates, based on World Bank (2020b), show that 14.1% of Africa's export flows to OECD countries could be at risk of being substituted. The risk is even higher for North Africa (23% of the region's total exports go to OECD countries). In comparison, the risk is 18.9% for developing Asia and 19.0% for LAC.
- **Effective implementation of the African Continental Free Trade Area (AfCFTA) agreement can strengthen regional value chains and build economic resilience against future crises.** Prior to COVID-19, Africa's regional markets were growing fast, with demand for processed goods expanding 1.5 times faster than the global average (AUC/OECD, 2018).

The COVID-19 crisis has ripened the context for digitalisation to accelerate Africa's productive transformation and make the continent more resilient to future crises. Africa's rapid development dynamics can fuel local firms' technological leapfrogging, if governments adapt their development strategies to the new opportunities. Throughout the last decade, Africa's fast-growing regional markets allowed many local firms to increase in size and productivity. Still, the power of the digital transformations remains largely to be harnessed in many African countries. While the global response to COVID-19 has heavily relied on digital technologies, persistent digital divides constrain Africa's capacity to respond to shocks from the pandemic. An economy-wide digital transformation – as defined in Box 1.1 – can only be achieved if i) digital technologies are widespread and help companies in other economic sectors become more productive; ii) people find better employment opportunities; and iii) governments improve supportive public services.

Box 1.1. **Definitions of digitalisation and digital transformation**

Digitalisation refers to the use of digital technologies and data as well as to the interconnection that results in new activities or changes to existing activities (OECD, 2019a). Today, digital technologies include:

- mobile data networks (4G and 5G, for example),
- mobile payment and financial products,
- the Internet of things (IoT),
- blockchain,
- artificial intelligence (AI),
- big data analytics and cloud computing.

Digitalisation differs from the Fourth Industrial Revolution (4IR). Whereas the digitalisation of production plays a key role in advancing 4IR, certain technological changes – such as bioproduction and the bioeconomy, nanotechnology, and materials innovation – may be less relevant in the African context (OECD, 2017a; AfDB/OECD/UNDP, 2017).

Digital transformation refers to the changes that digitalisation is making to the economy and society. These changes affect virtually all sectors of the economy (OECD, 2019a). They also have impacts on the inputs, functions and economic models of less digital-intensive sectors such as agriculture, construction and trade (for these sectors, the use of digital technologies contributes to lowering transaction costs and addressing information asymmetries associated with certain activities like access to finance) (Dahlman, Mealy and Wermelinger, 2016). At the same time, the digital transformation reshapes the distribution of production, value addition and economic rents across workers, firms and spaces according to the ability of workers and firms to control, own and access these new modes of production (Foster and Graham, 2016). For example, digitally intermediated data services and algorithms are increasingly underpinning decision-making and production processes and have become an important source of value. A countrywide digital transformation strategy aimed at creating jobs, therefore, needs to extend beyond the information and communications technology (ICT) activities to embrace all economic sectors in order to benefit from jobs indirectly created by digitalisation (OECD, 2020c).

Bukht and Heeks (2017) distinguish three scopes of the digital transformation ;

- The **core scope** focuses on the ICT sector. This measure includes economic activities from producers of digital content, ICT goods and services.
- The **narrow scope** includes all emerging economic activities that exist solely thanks to digital technologies. This scope expands beyond the ICT sector. It includes other elements such as business-offshoring processing, information technology outsourcing, as well as emerging activities that did not exist before digital technologies, e.g. the gig economy (click-work, Upworks) and the platform economy (such as Airbnb, Uber, eBay and Alibaba).

Box 1.1. **Definitions of digitalisation and digital transformation (*continued*)**

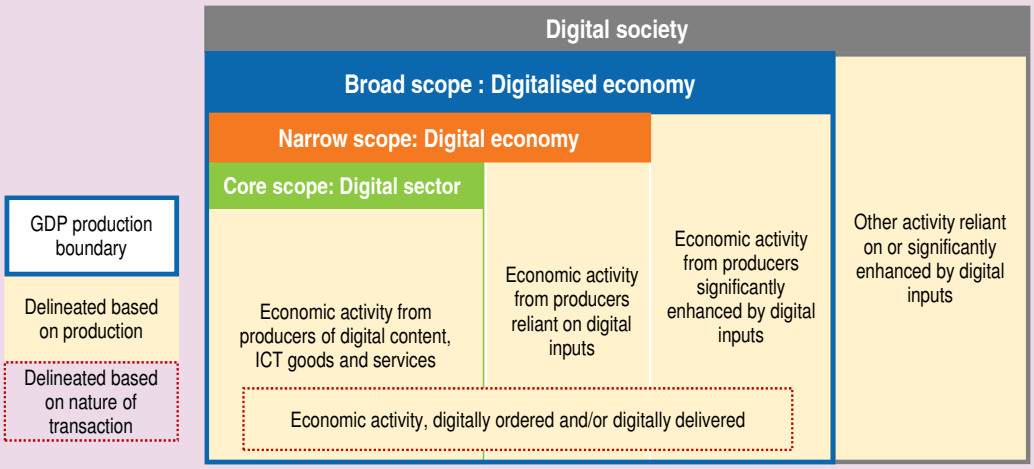
- The **broad scope** covers all economic activities significantly enhanced by digital technologies: e-business (ICT-enabled business transactions, such as mobile money and other financial technologies) and its sub-sets, e-commerce, e-delivery services, use of digitally automated technologies in manufacturing and agriculture.

OECD (2020c) complements this approach by adding a fourth scope, and by proposing an alternative perspective on how to measure digital transformation comprehensively (Figure 1.2):

- **The fourth scope of the digital transformation process, the digital society,** extends beyond the three previous scopes to incorporate digitalised interactions and activities excluded from the GDP production boundary, i.e. zero priced digital services (such as the use of public digital platforms).
- **In order to combine flexibility and precision for measurement purposes, an alternative perspective is to cover all economic activity digitally ordered and/or digitally delivered.** Rather than considering the firms' output or production methods, this measure would focus on ordering or delivery methods.

Due to this report's focus on job creation, and data constraints, the scope of our analysis will be limited to the core, the narrow and the broad scope of digital transformation.

Figure 1.2. **Defining the digital economy through the four-scope model**



Source: OECD (2020c), *A Roadmap Toward a Common Framework for Measuring the Digital Economy.*

By 2040, digitalisation can transform Africa's job markets, if public policies work for all

Prior to 2020, digitalisation was already well underway in Africa, with several headline successes and dynamic ecosystems

2007 was a landmark year for Africa's digitalisation. Safaricom introduced the M-PESA[2] mobile money service, the very first in Africa. At its inception, the major innovation was to make financial services available via mobile phones in order to supplement Kenya's lack of banking infrastructure (e.g. automatic teller machines), thus addressing the unmet financing needs in underserved areas. The business model also significantly reduced transaction fees.

Since 2007, the mobile money revolution has rapidly expanded. In 2018, Africans had more than 300 million mobile money accounts, more than any other continent in the world. There are now more than 500 companies providing technology-enabled innovation in financial services (referred to as *fintech*) such as mobile money in Africa. Countries now offer a wide number of digital financial products (e.g. deposits, savings accounts and payment systems). New big players have grown (Table 1.2). For example, in November 2019, Interswitch became Africa's first start-up company valued at more than a billion dollars. That year, Interswitch had more than 1 000 employees and an estimated annual revenue of over USD 76 million. In February 2020, South African start-up JUMO raised USD 55 million to expand to Bangladesh, Côte d'Ivoire, India and Nigeria (Kazeem, 2020). Johannesburg and Cape Town in South Africa, Nairobi in Kenya, and Lagos in Nigeria rank among the top 100 cities for fintech ecosystems worldwide (Findexable, 2019).

Africa's digital development is rapidly expanding in other sectors. Entrepreneurial and digitally savvy Africans are building innovative solutions to meet the booming demand for health, education and agriculture, among others. They are turning digital technologies and Africa's specific needs to their advantage to deploy fast-growing business models. For example, Kobo360, a Nigerian start-up founded in 2017, is looking to revolutionise the country's domestic transport and logistics sector, as well as to link Nigeria's farmers with buyers all over the world. In August 2019, the company raised USD 30 million (Bright, 2019a). Several other tech-enabled start-ups are improving the transport of goods in Africa. These include Kenya's Lori Systems, an all-in-one logistics platform, and Ghana's AgroCenta, which provides a supply chain platform facilitating small-scale farmers' access to large markets and a financial inclusion platform.

Innovation hubs and incubators are also flourishing. In 2019, 643 tech hubs were active across Africa, up from 314 in 2016, and only a handful in 2010 (AFRILABS and Briter Bridges, 2019). The four African countries with the most tech hubs are Nigeria (with 90 tech hubs), followed by South Africa (78), Egypt (56) and Kenya (50). In tech hubs such as Yabacon Valley (in Lagos), the diaspora is playing an important role in providing ideas, networking and venture capitals. Annex 1.A1 of this chapter highlights successful business models and policies for each of these four tech clusters in Africa. The regional chapters offer examples from other countries.

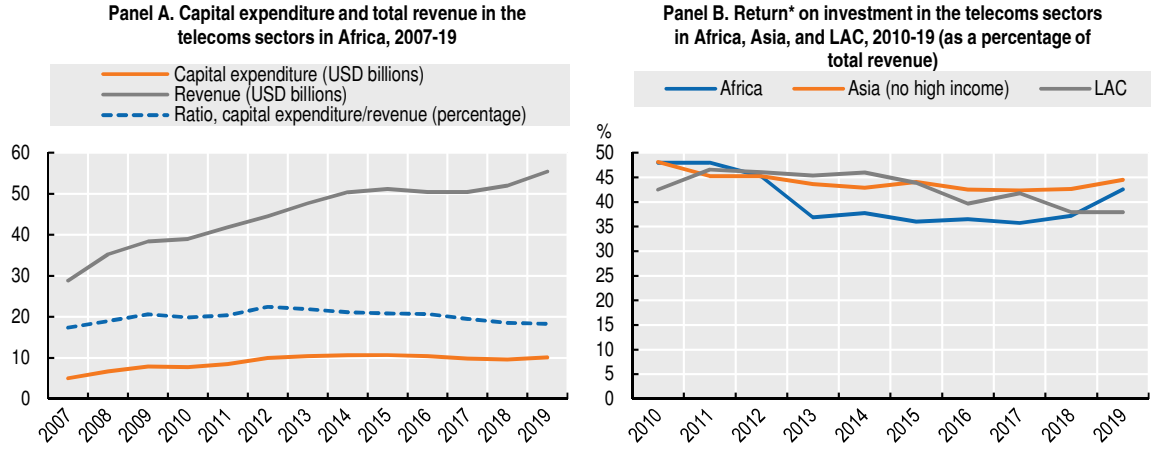
Africa's telecom sectors, which are critical for digital transformation, have shown robust growth throughout the last two decades. The introduction of competition in the mobile telecom services and other major regulatory reforms during the 2000s have made this sub-sector attractive to new opreators and improved the quality of service supply. Despite the global financial crisis in the late 2000s, telecom sectors have grown significantly in almost all African countries. Annual revenues of Africa's telecom companies have steadily increased, from USD 29 billion in 2007 to USD 55 billion in 2019 (Figure 1.3, Panel A), and capital expenditure has doubled. Key indicators on the returns on investment are strong in all five African regions (Figure 1.3, Panel B).

Table 1.2. **Twenty examples of start-ups, accelerators and large telecom companies within different layers of Africa's digital ecosystem, 2020**

	Company name	Year of foundation	Estimated revenue range (USD million)	Number of employees	Total funds raised (USD million)	Main activity	Location (city)	Country
Digital economy	**OPay**	2018	100 to 500	1 053	170.0	Fintech	Lagos	Nigeria
	Interswitch	2002	50 to 100	1 003	34.7	Fintech	Lagos	Nigeria
	Cellulant	2004	10 to 50	440	54.5	Fintech	Nairobi	Kenya
	Fawry	2008	10 to 50	133	122.0	Fintech	Cairo	Egypt
	JUMO	2014	1 to 10	299	146.7	Fintech	Cape Town	South Africa
Digitalised economy	**M-KOPA**	2011	10 to 50	694	161.8	Energy	Nairobi	Kenya
	Twiga Foods	2013	10 to 50	275	67.1	Business-to-business e-commerce	Nairobi	Kenya
	Jumia Group	2012	500 to 1 000	7 564	823.7	E-commerce	Lagos	Nigeria
	Kobo360	2018	< 1	149	37.3	Logistics	Lagos	Nigeria
	takealot.com	2011	100 to 500	1 574	231.1	E-commerce	Cape Town	South Africa
	Raye7	2016	1 to 10	25	n/a	Ride sharing	Cairo	Egypt
Start-up/ accelerator	**Naspers**	1915	2 800 to 3 000 (headline earnings)	2 734	n/a	ICT investment	Cape Town	South Africa
	Co-Creation Hub	2010	n/a	92	5 (funds raised)	Start-up incubation	Lagos	Nigeria
	Flat6Labs	2011	n/a	10	15 (raised for start-ups)	Early stage venture, seed funds	Cairo	Egypt
Core IT and digital sector	**Sensor Networks**	2015	n/a	17	1.0	Software and IT consulting	Cape Town	South Africa
	Mara Phones	2018	n/a	39	n/a	Hardware manufacturing	Kigali	Rwanda
	Aerobotics	2014	1 to 10	84	10.3	Software and IT consulting	Cape Town	South Africa
	Orange	1988	> 10 000	122 444	774.4	Telecoms	Casablanca (regional headquarters)	Morocco
	MTN Group	1994	1 000 to 10 000	34 656	121.1	Telecoms	Johannesburg	South Africa
	Safaricom	1997	1 000 to 10 000	7 610	2 590.0	Telecoms	Nairobi	Kenya

Note: * The numbers of employees were retrieved from the LinkedIn profiles. n/a = not applicable.
Source: Authors' compilation based on Crunchbase (2020), *Crunchbase Pro* (database), and LinkedIn (n.d.).

Figure 1.3. **Capital expenditure and revenue by telecom companies in Africa and return on investment in Africa, Asia, and Latin America and the Caribbean (LAC), 2007-19**

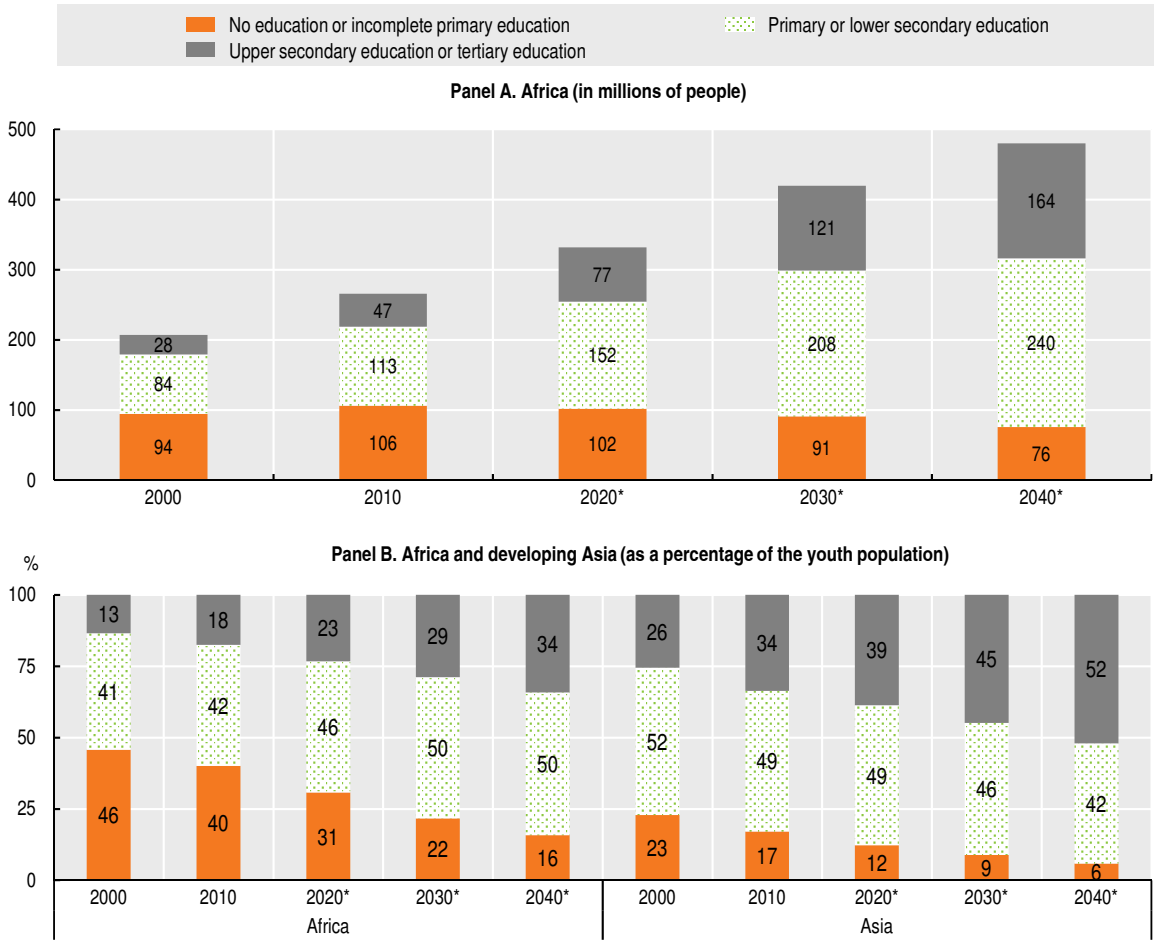


Note: Return on investment: earnings before interest, taxes, depreciation and amortisation.
Source: Authors' calculations based on GSMA (2020a), *GSMA Intelligence* (database), www.gsmaintelligence.com/data/.
StatLink https://doi.org/10.1787/888934203225

Policies can use digitalisation to transform Africa's job markets, especially through indirect job creation

Africa's biggest asset for digitalisation will be its growing population of increasingly better-educated youth. The number of Africans aged 15-29 with an upper secondary or tertiary education has already risen from 47 million in 2010, to 77 million in 2020 (Figure 1.4, Panel A).[3] Under business-as-usual education scenario, this number will increase to 165 million by 2040. In relative terms, the proportion of African youth completing an upper secondary or tertiary education could reach 34% by 2040 (closer to Asia's proportion), up from 23% today (see Figure 1.4, Panel B). This figure could even reach 73% (233 million) by 2040 if African countries can replicate Korea's fast-track education scenario with more ambitious investments in education and health.

Figure 1.4. **Youth cohorts, aged 15-29, by educational attainment in Africa and Asia according to business-as-usual scenarios, 2000-40**



Note: (p) = projections. Due to data availability, the figures reported are for the population aged 15-29.

Source: Authors' calculations based on Wittgenstein Centre for Demography and Global Human Capital (2018), *Wittgenstein Centre Data Explorer Version 2.0 (Beta)* (database).

StatLink https://doi.org/10.1787/888934203244

Digital sectors create few direct jobs, which are not sufficient to meet the continent's employment needs on their own. *African Development Dynamics 2018* showed that African economies must create more and better jobs to absorb the 29 million youth who will reach working age every year between now and 2030 (AUC/OECD, 2018). For comparison, telecom

companies directly employ about 270 000 staff. Jobs related to the ICT services, such as the IT and business process outsourcing and software developpers, remain limited and mainly concentrated in few countries. The 20 fast-growing start-ups in Table 1.2 total less than 20 000 employees. More broadly, the digital ecosystem will not provide enough jobs for all young Africans in the near future.

The real potential for large-scale job creation lies in the diffusion of digital innovations from the lead firms to the rest of the economy. The channels for indirect jobs creation include: i) the input-output linkages within the digital ecosystem; ii) the dynamic spillover effects, which depend on the rates at which local economies increase productivity; and iii) the society-wide effects beyond GDP (see Table 1.3). For example, the mobile money revolution in East Africa has led to significant job creation through several indirect channels such as spillover effects on households and businesses and enabling new business models (Box 1.2).

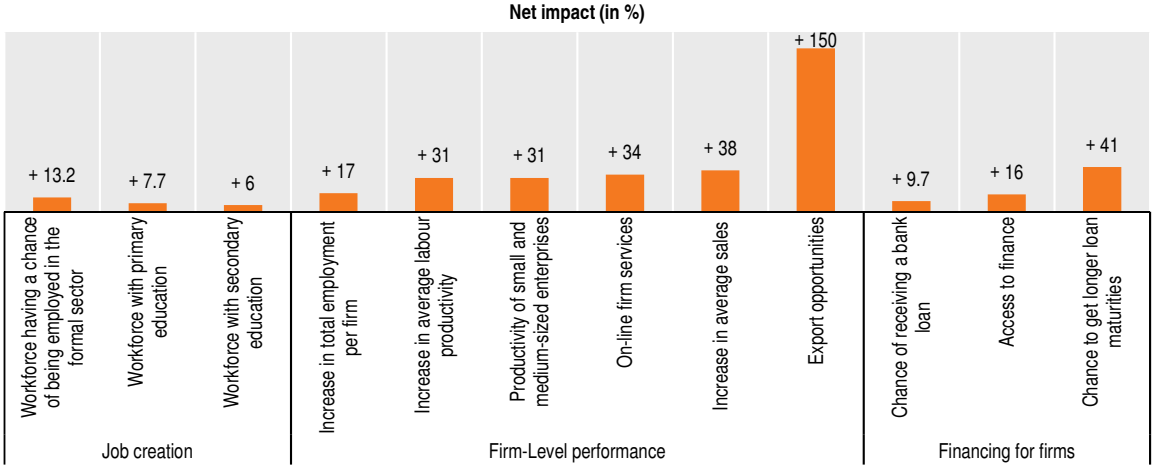
Table 1.3. **Impacts of digitalisation on job creation: A review of the main channels**

Type of impact	Main channels	Description
Input-output impacts on jobs and value-addition *(economic activities and linkages within a digital ecosystem)*	**Direct jobs and outputs**	Employment and economic production directly generated in the **core enterprises** in charge of developing network facilities or digital solutions
	Indirect jobs and outputs	Employment and economic production generated by **subcontractors** or others who supply inputs and services (e.g. metal products, electrical equipment, professional services)
	Induced jobs and outputs	Multiplier effects generated by **household spending** based on the income earned from the direct and indirect effects (e.g. retail trade, consumer goods and services)
Dynamic spillover effects on the local economy and society as a whole	**Productivity**	Improvement in productivity due to the adoption of more efficient business processes enabled by quality infrastructures, improved digital technologies and related tools and better digital services
	Innovation	Acceleration of innovation resulting from the introduction of new digital-enabled applications and services: new processes, products and services (e.g. telemedicine, search engines, online education, videos on demand)
	Value chain development	✓ Better linkages among different actors along the core economic clusters (in agriculture, manufacturing, services) in a given area ✓ Entirely new activities in the regions (e.g. tourism, outsourcing of services, virtual call centres)
	Society-wide effects (beyond GDP)	✓ For firms and citizens, greater access to information and participation in and oversight of policy-making processes ✓ Improved government transparency, accountability and effectiveness ✓ Better financial inclusion and resource mobilisation ✓ Greater consumer surplus and benefits from more diversified products and services, gains in terms of time-use, etc.

Source: Adapted from AUDA-NEPAD (2019), "The PIDA Job Creation Toolkit"; ITU (2012), *Impact of Broadband on the Economy: Research to Date and Policy Issues*; and OECD (2013), "Measuring the Internet economy: A contribution to the research agenda".

Figure 1.5 reports econometric findings from a review of empirical studies on Africa and other developing regions. A landmark study by Hjort and Poulsen (2019) shows that for 12 African countries, the arrival of high-speed Internet to a region, a proxy for the level of digital development, positively increases the employment rate for both workers with high and low education. Building on their approach, other papers have shown an even higher impact of digitalisation on the performance of firms (productivity, sales and new export opportunities) and on their access to longer-term financing. For example, data on more than 30 000 firms from 38 developing countries – including 9 countries in Africa – show that a 10% increase in e-mail use by firms in a given geographic area raises their total annual sales by 37-38%, sales per worker by 22-23% and the number of full-time workers by 12-14% (Cariolle, Goff and Santoni, 2019).[4]

Figure 1.5. **Impacts of digitalisation on job creation in Africa and other developing countries**



Note: This is a summary of econometric findings. The data presented here show the marginal impact of digitalisation (infrastructure development, speed of the Internet connection and Internet usage among the population) on job creation, firm-level performance, and financing for firms in Africa and other developing countries.

Source: Authors' illustration based on Hjort and Poulsen (2019), "The arrival of fast internet and employment in Africa"; Cariolle, Goff and Santoni (2019), "Digital vulnerability and performance of firms in developing countries"; and D'Andrea and Limodio (2019), "High-speed internet, financial technology and banking in Africa".

StatLink *https://doi.org/10.1787/888934203263*

Box 1.2. **The impact of mobile money on employment in East Africa**

The story of fintech in East Africa illustrates the dynamic links between digitalisation and jobs, through several spillover effects.

First, in Kenya, the number of mobile money agents – i.e. own-account workers sub-contracted to facilitate the service – grew from 307 in March 2007 to over 240 000 in March 2020 (Central Bank of Kenya, 2020).

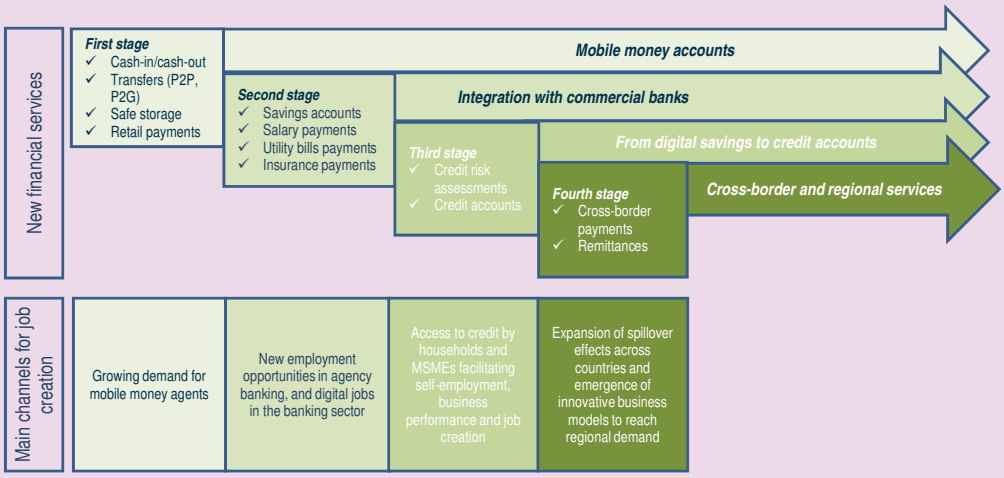
Second, competitive pressure from the mobile payment system forced traditional commercial banks to adopt digital financial services and introduced agency banking for the underserved population. The number of agents employed by agency banking reached 60 000 in 2017. In 2015, the volume of transactions using M-PESA, a mobile domestic money transfer and financing service, reached 45% of Kenya's GDP. The percentage of the population having a formal banking account in Kenya grew from 26% in 2006 to 75% in 2016 (Central Bank of Kenya, 2016).

Third, access to mobile money services has triggered very positive spillover effects on households and businesses. In Kenya, it helped raise at least 194 000 households out of extreme poverty between 2008 and 2014. It also enabled 185 000 women to switch their main occupations from subsistence agriculture to small businesses or retail over the same period (Suri and Jack, 2016).

Fourth, mobile financial services are now enabling new business models such as pay-as-you-go financing. Benefiting from the M-PESA services since 2011, M-KOPA provides affordable electricity from solar power, which has reached 750 000 homes and businesses across East Africa. Many studies have shown a positive impact of mobile money on the performance and growth of micro, small and medium-sized enterprises (MSMEs) in terms of productivity, sales and market shares.

Box 1.2. **The impact of mobile money on employment in East Africa (*continued*)**

Figure 1.6. **The evolution of mobile money products and channels for job creation in East Africa**



Note: P2P = person to person. P2G = person to government

Source: Authors' elaboration based on Ndung'u (2018), "Next steps for the digital revolution in Africa: Inclusive growth and job creation lessons from Kenya".

Scaling up the benefits of digitalisation requires diffusing digital innovations beyond large cities, helping informal workers become more productive and empowering enterprises for digital competition

Achieving universal coverage of communications infrastructures requires place-based policies to overcome spatial inequalities

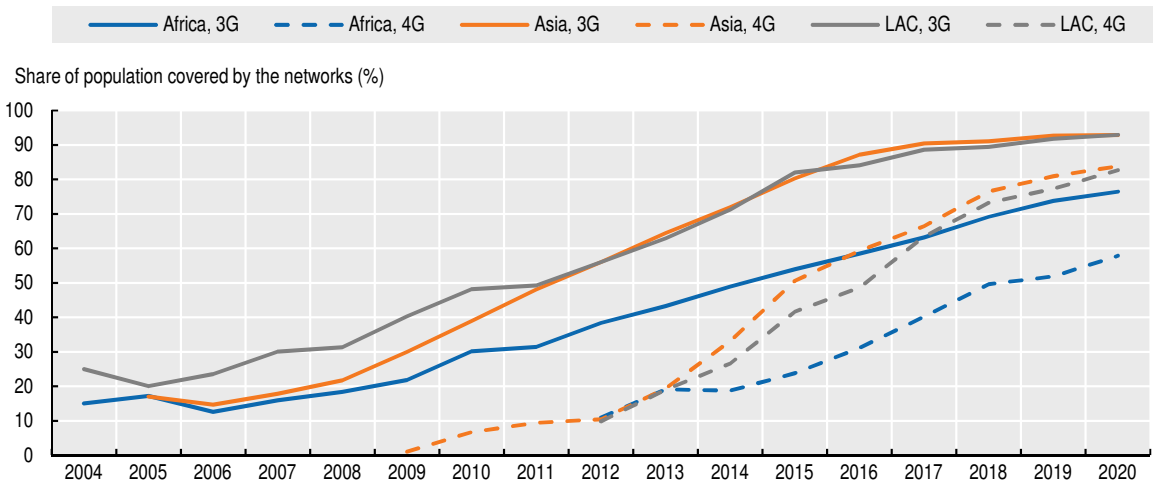
Over the last decade, most African countries have been actively developing their ICT infrastructure networks, with significant investment from the private sector. Forty-five (out of 54) African countries had an active digital broadband infrastructure development strategy in 2018, compared to 16 in 2011 (see ITU, 2018). In 2018, digital infrastructure financing was USD 7 billion, with 80% of this amount coming from private sector investments (ICA, 2018). As shown earlier in Figure 1.3, returns on investments are solid and similar to the levels in Asia. Progress in communications infrastructures can be sequenced between three main segments stretching from first mile, middle mile and last mile access. The first mile refers to the points where the Internet enter a country. The middle mile refers to national backbone network and the associated elements such as data centers and Internet exchanges. The last mile refers to local access networks that connect the end users.

Since 2009, telecom companies and global tech actors have spearheaded the development of submarine cables – i.e. the first-mile communication infrastructure that connects African countries to the global Internet. Investment in submarine cable systems and terrestrial landing stations have linked most African countries to the global Internet and increased the connection speed. The continent's total inbound international Internet bandwidth capacity has increased by more than 50 times in just ten years to reach 15.1 Terabytes per second (Tbps) in December 2019, up from only 0.3 Tbps in 2009 (Hamilton Research, 2020). Prospects for new projects remain robust. In May 2020, Facebook and a group of telecom companies – including China Mobile International, MTN

GlobalConnect, Orange and Vodafone – began collaborating to deploy 37 000 kilometres (km) of subsea cables by 2024 to connect Africa's Internet broadband network to Europe and the Middle East. This new broadband network, called 2Africa, should deliver more than the total combined Internet traffic capacity of all 26 subsea cables serving Africa today (2AfricaCable, 2020).

Africa has also more than tripled the middle-mile Internet infrastructure that expands the connection within and between countries. Exhaustive inventories show that Africa's operational fibre-optic network extended from 278 056 kilometres (km) in 2009 to 1.02 million km in June 2019. (Hamilton Research, 2020). About 58% of the population in Africa now live in an geographic area covered by the fourth generation (4G) mobile network (Figure 1.7). North Africa has the highest figure in Africa, with 85% of its population covered by the 4G network in 2020 (see Chapter 6). This is to compare with 86.5% in Latin America and the Caribbean and 88% in developing Asia in the same year.

Figure 1.7. **Percentage of the population covered by the 3G and 4G networks in Africa, Asia and Latin America and Caribbean (LAC), 2004-20**

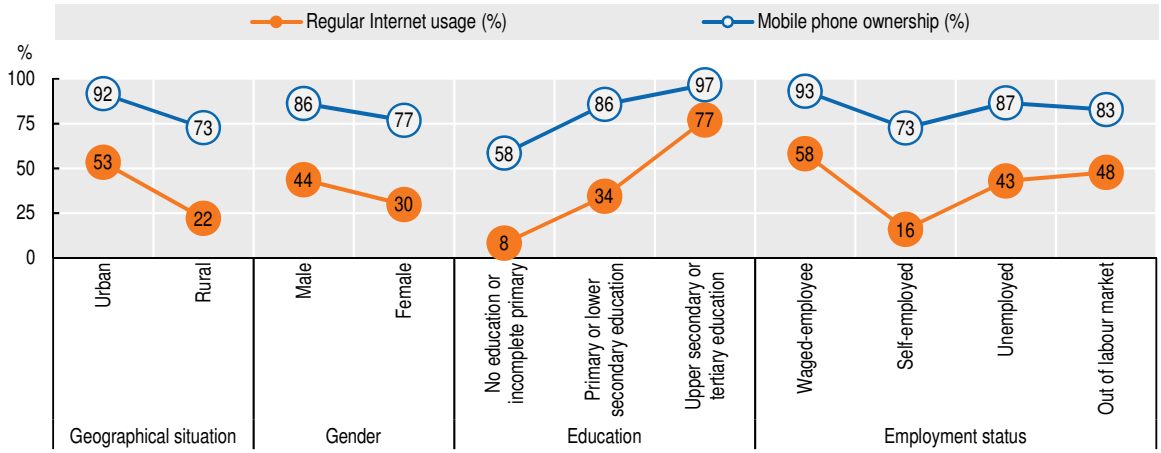


Source: Author's calculations based on GSMA (2020a), *GSMA Intelligence* (database).
StatLink https://doi.org/10.1787/888934203282

Despite this progress, access to the last mile broadband infrastructures remains a challenge across the continent. Currently, nearly 300 million Africans live more than 50 km from a fibre or cable broadband connection. Complementary solutions to expand and enhance the transmission network such as Internet exchange points (IXPs), data servers and satellite transmission systems remain underdeveloped. For example, 42% of African countries still do not have IXPs, and their domestic Internet traffic has to be routed abroad to reach its destination. Achieving universal access to broadband connectivity in Africa by 2030 would require approximately USD 100 billion or USD 9 billion a year, which would include laying out at least 250 000 kilometres of fibre across the region (ITU/UNESCO, 2019).

The use of communications infrastructures by the population is also highly unequal across space, gender, education levels and employment status. For example, more than 75% of Africa's youth has a mobile phone[5]. However, only 22% of rural youth regularly use the Internet, compared to 53% of urban inhabitants (Figure 1.8). Similarly, the share of young people regularly using the Internet varies across gender groups (30% of women and 44% of men), education levels (8% of those with less than a primary education and 77% of those with an upper secondary or higher education) and employment status (16% of those self-employed and 58% of those with waged jobs).

Figure 1.8. **Mobile phone and Internet usage among Africa's youth, aged 15-29, by geographical situation, gender, level of education and employment status, 2015-18**



Notes: The results are based on survey data from 34 African countries. Primary education: completed elementary education or less (up to 8 years of basic education); secondary: completed some secondary education and up to 3 years tertiary education (9 to 15 years of education); tertiary: completed 4 years of education beyond high school and/or received a 4-year college degree.

Source: Authors' calculations based on Afrobarometer (2019), *Afrobarometer* (database).

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Finally, the high concentration of the existing digital ecosystems in the megacities raises the concern of growing spatial inequality due to digitalisation. The majority of Africa's digital hubs and start-ups concentrate in large cities. For example, five cities host 49% of the most dynamic African start-ups identified by Crunchbase in 2019 (AUC/OECD, 2019): Cape Town (12.5%), Lagos (10.3%), Johannesburg (10.1%), Nairobi (8.8%) and Cairo (6.9%). These five cities account for just 53 million inhabitants, less than 4% of the total African population. They offer strong digital ecosystems with critical masses of skills, supporting infrastructure, investors and communities for entrepreneurship.

Bridging these spatial divides is a critical first step to avoid widening the mismatch between the spatial distributions of jobs and people. Today, the majority of the African population lives outside the largest cities. About 70% of Africa's young people reside in rural areas. Rural populations make up 1.4 billion people. They will continue to grow in absolute terms, at least beyond 2050.

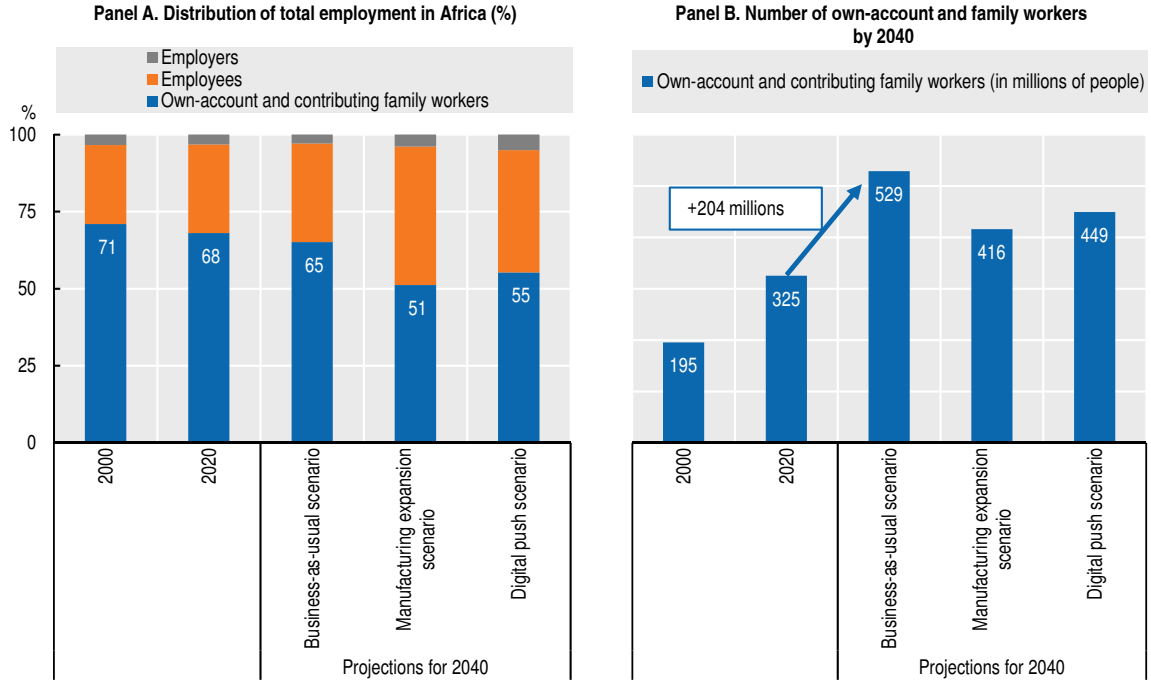
Place-based policy approaches can make a difference by articulating various sectoral policies to tap underutilised potential in all regions, enhancing regional competitiveness (AfDB/OECD/UNDP, 2015; OECD, 2016). The channels through which digital innovations diffuse into the local economy depend on several place-specific factors. In remote regions, non-digital factors such as limited skills, basic infrastructure (e.g. electricity) and access to finance can prevent a significant proportion of people from benefiting from digital technologies. Chapter 2 will further discuss the ways policies can adapt to these place-specific constraints.

Policy makers must prepare Africa's informal workforce to take advantage of the digital transformation

Self-employment, often in the informal economy, will likely continue to be the most dominant form of employment in Africa by 2040, even in two optimistic projection scenarios. Own-account and family workers currently account for 68% of all workers in Africa, down from 71% in 2000 (Figure 1.9, Panel A). If the trend over the past 20 years continues, this share will drop to 65% (business-as-usual scenario). In absolute numbers,

this means that the number of own-account workers in Africa could increase by 163% to reach 529 million people in 2040, compared to an estimated 325 million people in 2020 (Figure 1.9, Panel B). Even if Africa could replicate China's success in accelerating structural transformation in the manufacturing sector during the 1990-2010 period (projection scenario S2), the majority (51%) of workers would continue to work in household enterprises. Similarly, if Africa were to replicate India's progress in building a world-class ICT and business services sector (projection scenario S3), 55% of Africa's jobs would still fall in the category of own-account workers. Box 1.3 explains the methodology for spatial analysis and labour market projections.

Figure 1.9. **Size of self-employment in Africa's labour markets in 2000, 2020, and projections according to three scenarios by 2040**



Note: See Box 1.3 for a brief description of the projection methodology.
Source: Authors' projections based on ILO (2019) *ILOSTAT: Employment statistics* (database).
StatLink https://doi.org/10.1787/888934203320

The informal sector remains the main gateway to the job markets for the vast majority of Africa's working-age population, including young graduates. To date, only 20% of Africa's working-age population are on wage-paying employment and only 11% of women (AUC/OECD, 2018, ILO, 2020). About 85.8% of employment in Africa is informal, compared with 25.1% in Europe and Central Asia (ILO, 2018). School-to-work transition surveys confirm that more than 75% of young graduates aged 15-29 start working in informal activities (OECD, 2017b).

Currently, many informal workers are missing out on the benefits of digitalisation, due to low digital adoption. Only 16% of self-employed workers use the Internet regularly, compared to 58% of people working in waged jobs (Figure 1.8). The low uptake of digital tools is a missed opportunity for informal workers. The regional chapters of this report showcase various examples where digital tools and digital-enabled business models permit informal workers to increase their productivity, upgrade their production and formalise their businesses. In particular, fintech has shown tremendous results in extending financial services to the underserved in East Africa (see Box 1.2).

Box 1.3. **Methodology for projecting Africa's labour market outcomes by 2030 and 2040**

This projection exercise aims to show three scenarios for what Africa's labour markets could look like in 2030 and 2040. The first scenario – the business-as-usual scenario (S1) – extrapolates trends observed in Africa's labour market over the past 20 years. Two more optimistic scenarios – manufacturing expansion (S2) and digital push (S3) – reflect manufacturing-led development (e.g. Lin, 2011; Lin and Monga, 2010) and service-led growth (Ghani and O'Connell, 2014).

Scenarios S2 and S3 rely on the hypothesis that the continent will be able to achieve its ongoing plan to create a single continental market by 2030 and/or a digital single market by 2030. Two well-known cases serve to calibrate the two most optimistic scenarios: past trends observed in China (S2) and India (S3). Whereas the context and conditions for changes will be different in Africa (and across African countries) to the experience of China and India, these approximations serve to scale the potential outcomes against Africa's expected employment challenges.

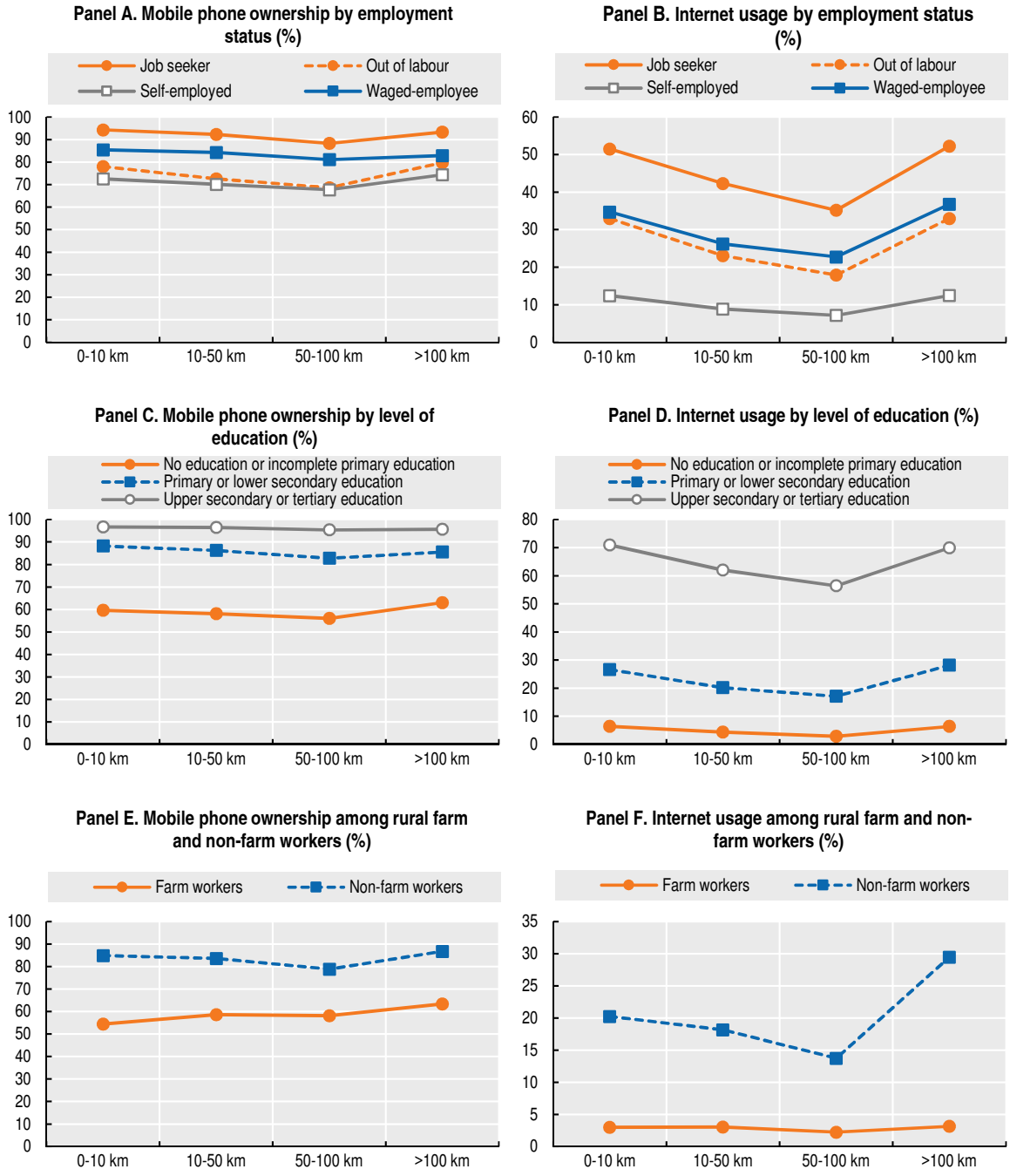
The exercise employs a simple three-step projection modelling based on past changes in labour market outcomes:

- First, we use the shares in the labour force for each category of employment sector, employment status and occupation at country-year level, as obtained from ILOSTAT. We then calculate the changes in the shares of each employment category in Africa between 2000 and 2020, in China between 1990 and 2010 and in India between 2000 and 2020. These changes are added to the corresponding share of that category for Africa in 2020 to obtain the share of the category in Africa's labour force by 2040.
- Second, to project the size of the labour force, we extrapolate Africa's labour force size (from the ILO growth rate) with the growth rate of the working-age population in Africa from 2020 to 2040 from the UN Department of Economics and Social Affair's World Population Prospects 2018. In this setting, we implicitly assume a constant labour-force participation rate. The main projections employ the medium fertility variant.
- Finally, the projected share of each employment category is multiplied by the projected labour force size to obtain the size of Africa's labour force for each category.

Policy makers will need to prepare African youth for future challenges from digitalisation while addressing traditional shortcomings in the labour market. In particular, Africa's youth will need to acquire critical skills to thrive in the digital era. Policy makers can play a critical role in expanding fintech adoption and preventing precarious working conditions for workers on e-platforms. At the same time, school-to-work transition programmes need rethinking, both in terms of focus and implementation, to better match youth with job opportunities.

Beyond accessibility, other factors (such as skills, the affordability of services and the availability of suitable content) also limit the use of the Internet. The regular use of Internet services remains low among own-account workers even when they live in a connected geographic area. Only 16% of these workers regularly use the Internet, despite the fact that 80% of them own a mobile phone (Figure 1.10, Panels A and B). Similarly, the rate of regular Internet usage stands at 10% among people with less than a secondary education, while more than 60% of them own a mobile phone (Figure 1.10, Panels C and D). The rate of Internet usage is even lower than 10% among farmers (Figure 1.10, Panels E and F). Chapter 2 will further discuss priority areas for policy actions.

Figure 1.10. **Mobile phone ownership and Internet usage in Africa by socio-economic group and proximity to a broadband backbone network, 2014-15**



Note: The Afrobarometer survey from Round 6 includes 34 African countries in 2014-15. Panel A indicates the percentage of Afrobarometer's respondents "using Internet at least once a day". Using the module plug-in Nearest Nodes GIS (NN-GIS) in the Geographic Information System (GIS) software, we considered that a high-speed Internet connection is available for any Afrobarometer respondent "living within 10 kilometers of an operational fiber network node".

Source: Authors' calculations based on two datasets: Afrobarometer (2019), *Afrobarometer Round 6* (database), and Many Possibilities (2020), *The African Terrestrial Fibre Optic Cable Mapping Project* (database).

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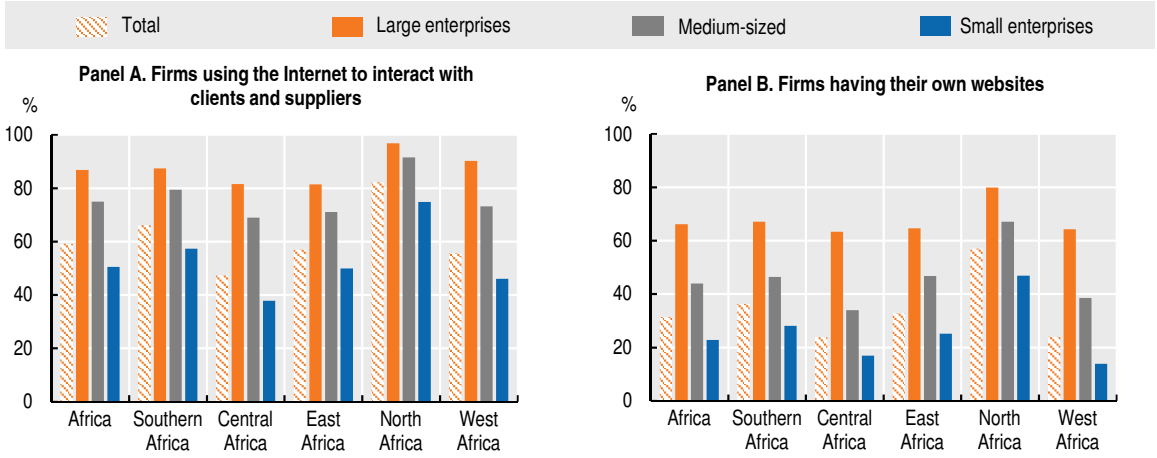
High-growth start-ups and dynamic small and medium-sized enterprises need enabling regulations, financing and business services to compete in the digital era

Africa's strong entrepreneurial spirit is an asset for job creation. Data from the Global Entrepreneurship Monitor surveys conducted between 2013 and 2019 (GEM, 2020) show that Africa scores higher than Asian and LAC countries in both entrepreneurial intention and total early-stage entrepreneurial activity (TEA).

African enterprises have difficulty scaling up and innovating. In Africa, only 17% of early-stage entrepreneurs expect to create six or more jobs, the lowest proportion globally; for Asia, the proportion is 21%. About 19% of African early-stage entrepreneurs indicate that either they are conducting an innovative business or have high job creation expectations, compared to about 27% in Asia. Lockdowns and the potential of long-term economic fallout due to the COVID-19 pandemic further challenge the growth of these enterprises.

Increasing their growth and resilience requires stronger digital adoption, especially among MSMEs. Among firms from the World Bank Enterprise Surveys, only 59% of all African firms use the Internet to interact with clients and suppliers, and only 50% of small African firms do so (Figure 1.11, Panel A). The share of firms having their own website is even lower, at 31% among all African firms and 23% among small ones (Figure 1.11, Panel B). Estimated at USD 5.7 billion in 2017, the continent's consumer e-commerce market is less than 0.5% of its combined GDP, compared to a global average of 4%. Barriers to digital adoption for MSMEs range from structural factors such as infrastructure to firm-specific factors such as financial and organisation capability.

Figure 1.11. **Formal manufacturing and service firms in Africa that use the Internet and have websites**



Source: Authors' calculations based on World Bank (2020a), *World Bank Enterprise Surveys* (database), www.enterprisesurveys.org/en/data, using the latest data available for each country.

StatLink https://doi.org/10.1787/888934203358

Government regulations, financing and business services can help innovative start-ups and dynamic SMEs to grow and compete in the digital age. In particular, AUC/OECD (2019) identified two promising groups of entrepreneurs that can benefit the most from using digitalisation to scale up and create new jobs:

- **High growth start-ups** are small companies with great potential for growth based on their use of innovative technologies to disrupt or create new markets. While generally accounting for less than 10% of small businesses in developing countries,

these ventures can contribute significantly to the economy through their high growth and innovation (CFF, 2018). In the case of Africa, this first group is mostly dominated by early-stage start-ups. Table 1.4 describes five examples of promising start-ups' business models that tackle traditional constraints to development in Africa. With the right policy support, these types of innovative models can quickly spread across the continent.

- **Dynamic SMEs** deploy existing products or proven business models as they seek to grow through specialisation in niche markets, market extension or step-by-step innovations. Their growth and scale potential are moderate and depend on their access to regional and global markets. Policy makers can help these enterprises expand by tapping the potential of digital-enabled trade which remains nascent in Africa. Estimated at USD 5.7 billion in 2017, the continent's consumer e-commerce market is less than 0.5% of its combined GDP, compared to a global average of 4%.

Table 1.4. **Five examples of digital entrepreneurs in Africa and their business models**

Company name	Year of foundation	Description	Total funds raised (USD million)	Business model	Core market segment	Main value proposition
Mpost	2016	The company converts phone numbers into formal postal addresses and allows users to use mobile phones to receive goods. The service is active in Kenya and plans to expand to Botswana, Rwanda, Tanzania and Uganda.	2	Mobile postal services	Postal services for "communal addresses"	Helps eliminate the challenge of "communal addresses" in Africa
Pargo	2014	Pargo is a "click-and-collect" delivery platform that helps retailers sell and deliver goods to their customers using collection points of their choice. It currently operates in Botswana, Eswatini, Lesotho, Namibia and South Africa.	1	Logistics and delivery online platform	Logistics services for informal settlements and rural areas	Helps retailers solve the challenges of last-mile deliveries
SpacePointe	2014	SpacePointe is a global financial technology company offering digital payment services to MSMEs in the informal sector, even in the most rural areas. The platform is active in West Africa and North America, with planned launches in Asia and LAC.	1.2	Cloud-based payments platform	Electronic payments collection for the informal sectors and rural areas	Drives the adoption of electronic payments by the informal sector
Eteyelo	2015	Eteyelo develops applications allowing schools to automate pedagogical and school monitoring, management of school fees, and parent-school relationships. It was founded in the Democratic Republic of the Congo.	n/a	Mobile applications and web platform	Digital data services for education systems	Reduces the distance between all actors in the education system (students, teachers, parents, etc.)
Swvl	2017	Swvl offers an app that allows users to book fixed-rate affordable rides on its network of vans and buses. It now operates in Egypt and Kenya and plans to expand to Nigeria.	76.5	Mobile platform for bus sharing	Smart mobility services in urban areas	Facilitates mobility in urban areas and helps reduce traffic congestion

Note: n/a = not applicable.
Sources: Authors' compilation and Crunchbase (2020), *Crunchbase Pro* (database).

Continental co-ordination remains key to achieving Africa's digital transformation and Agenda 2063 flagship programmes

Co-ordination and prioritisation will help to deliver on the African Union's ongoing flagship programmes for digital transformation

Digitalisation is a priority for Africa's continental integration agenda. Through Agenda 2063 programmes, the African Union is leading over 15 initiatives to harness digital technologies and innovation for industry, trade, financial and payment services, education, agriculture, health and other sectors. In line with the Agenda 2063 aspirations, the intent is also to strengthen Africa's position as a digital producer in the global ecosystem. Annex 1.A2 describes some of these flagship continental initiatives, their main objectives and key digital deliverables.

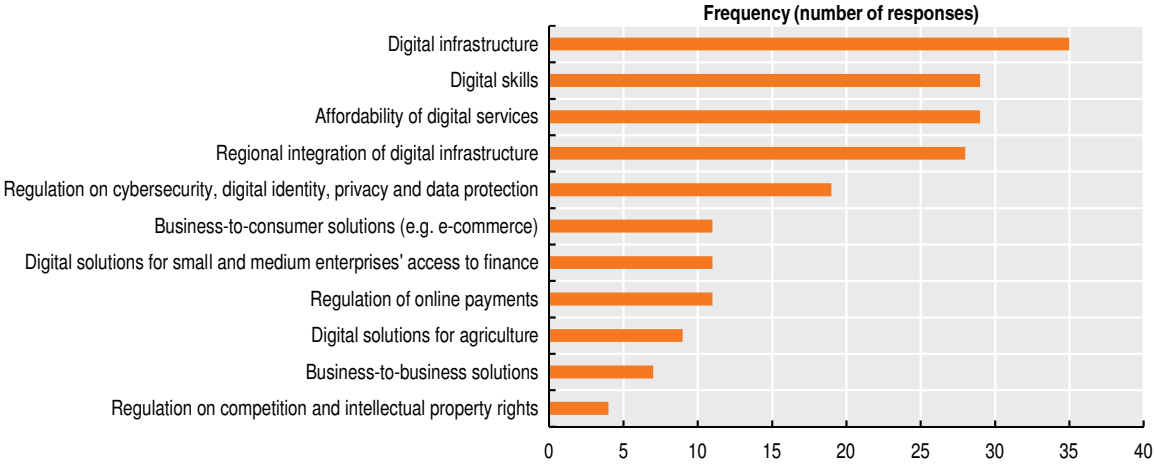
The African Union aims to achieve a digital single market by 2030 (AUC, 2020a). To that purpose, the African Union Commission (AUC) developed the Digital Transformation Strategy for Africa (DTS) 2020-2030, which was endorsed by the Thirty-Sixth Ordinary Session of the African Union Executive Council held in February 2020. The DTS envisions an "integrated and inclusive digital society and economy in Africa that improves the quality of life of Africa's citizens, strengthen[s] the existing economic sector, enable[s] its diversification and development, and ensure[s] continental ownership with Africa as a producer and not only a consumer in the global economy". The DTS builds on existing initiatives and frameworks, such as the Policy and Regulatory Initiative for Digital Africa (PRIDA), the Programme for Infrastructure Development in Africa (PIDA) and the African Continental Free Trade Area (AfCFTA). The AUC is mobilising international development partners to achieve this digital transformation agenda:

- Since April 2020, PRIDA, undertaken in collaboration with the Information Technology Union (ITU) and the European Union, has launched two working groups – one on "authorisation and licencing regimes" and another on "data protection and localisation" – with a view to assess regulations, identify best practices and harmonise them across the continent.
- The Digital Economy for Africa (DE4A) initiative 2020-2030, undertaken with the World Bank Group, supports governments to invest strategically in digital infrastructure development, affordable services, skills and entrepreneurship. Currently, 15 investment operations are being deployed across the continent, and 29 others are in the pipeline.
- The AUC is also running a programme to ensure Africa's access to satellite-based technologies and related data services. The 2016 AU's African Space Policy and Strategy aims to strengthen Africa's use of outer space in critical sectors such as agriculture, disaster management, climate forecast, defence and security. Satellite-based wireless systems are a cost-effective way to develop or upgrade telecom networks in areas where user density is lower than 200 subscribers per square kilometre (AUC, 2019). Such wireless systems can be installed five to ten times faster and at a 50% lower cost than landline networks. The space economy is expanding and becoming increasingly global (OECD, 2019b). Other emerging technologies have the potential to address the challenges of distance in rural remote areas cost-effectively (see Chapter2).

Confirming the orientations of the AUC's flagship projects, the AUC/OECD 2020 Expert Survey underlined several areas for creating more and better jobs. Figure 1.12 summarises these priority areas by descending order. For example, regional and continental co-ordination on telecom roaming services, data regulation and cyber security is key for creating jobs. Taken together, these priority areas can also create the

enabling environment for data value location and local content development in Africa. The remaining sub-sections highlight areas for which immediate actions are required.

Figure 1.12. **Priority areas for regional and continental co-operation: Results from the AUC/OECD 2020 Expert Survey on Digitalisation in Africa**



Notes: This figure shows answers to the survey question, "Which of the following areas of digitalisation do you think should be the priorities for regional and continental co-operation to help create more and better jobs in your region?". It is based on responses from six (out of Africa's eight) Regional Economic Communities and on individual assessment on 23 African countries. Respondents to the survey included policy makers, experts on digitalisation and representatives of private companies working in Africa's telecom and digital activities. For this question, each respondent was asked to select five top priority areas out of an open-ended list of 15 areas, with an option to add any additional areas of their choice.

Source: AUC/OECD 2020 Expert Survey on Digitalisation in Africa.

StatLink *https://doi.org/10.1787/888934203377*

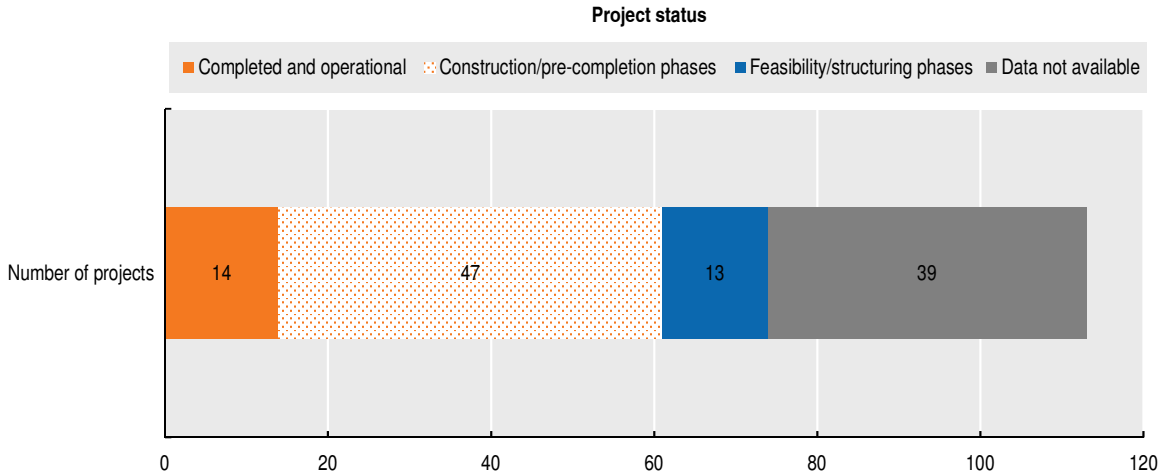
The continent must keep improving its access to international bandwidth infrastructure and services

Continental co-ordination is necessary to address bottlenecks in access to international bandwidth and to ensure affordability. The establishment of Internet exchange points – interconnecting terrestrial fibre backbones – is crucial to ensure Africa's access to international digital services at lower prices. To this end, PIDA provides an important framework and monitoring tool. Of PIDA's 114 ICT infrastructure projects, 42 aim to upgrade key Internet exchange points, 37 are dedicated to building new broadband fibre infrastructure across the continent and 34 intend to upgrade key existing terrestrial fibre backbones (AUDA-NEPAD, 2020). As of June 2020, 14 of PIDA's ICT projects were completed and operational and 47 were under construction or in pre-completion stage (Figure 1.13).

In the next phase of Priority Action Plan for 2021-2030 of the PIDA, the objective is to select fewer, but more viable projects. The challenges related to project preparation risk compromising the realisation of quality infrastructure (OECD/ACET, 2020). The following issues stand out:

- Projects serving the maximum number of unconnected intermediary cities need to be among the top priorities. Africa's intermediary cities hold great promise for unlocking new opportunities for productive transformation, rural-urban linkages and job creation (see OECD/ACET, 2020).
- Speeding up Internet exchange points programmes further. The volume of intra-regional traffic backhauled to subsea cable landing points increased by 37% in 2018 to reach 479 gigabytes per second (Gbps) thanks to the completion of new terrestrial cross-border links and to the expansion of capacity of others. This compares to 350 Gbps in 2017 and just 103 Gbps in 2014 (Hamilton Research, 2020).

Figure 1.13. **The Programme for Infrastructure Development in Africa flagship projects for the information and communications technology sector, by status**



Source: Authors' elaboration based on AUC/AUDA-NEPAD/AfDB (2020), PIDA Projects Dashboard (website), https://www.au-pida.org/pida-projects/.

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Accelerating continental co-operation on roaming services, data regulation and digital security will increase intra-African trade and productive integration

Achieving a single pan-African market for goods and services, as targeted by the AfCFTA, holds great promise for growth and job creation. According to UNECA (2018), with the sole removal of tariffs on goods, the AfCFTA has the potential to increase intra-African trade by nearly a 40-50% increase between 2020 and 2040. According to UNCTAD (2018), the full operationalisation of the AfCFTA can result in a 1.17% increase in employment.

To move forward with the AfCFTA implementation, the African Union (AU) member states have started to negotiate protocols on investment, intellectual property rights and competition policy. Prior to the COVID-19 outbreak, December 2020 was the target date for completion of these "phase two" negotiations. Negotiations towards a continental protocol on e-commerce and digital trade will start soon after the conclusion of the phase two negotiations (Muchanga, 2020). The establishment of a Pan-African Payment and Settlement System (PAPSS) is among the key digital deliverables. The PAPSS aims at allowing quick settlements of cross-border transactions through digitalised means. Ensuring quicker payments and settlements will enhance market liquidity and deepen national, regional, and continental capital and financial markets.

The AUC is also planning to launch a digital platform to help African SMEs scale up their operations. The AUC and the African eTRADE Group are collaborating to develop a continental e-commerce platform for SMEs. This platform will provide an online trading place and payment settlement for SMEs in order to facilitate cross-border trade and the delivery of products across the continent and reduce transaction costs (AUC/AeTrade Group, 2018).

A drastic reduction of roaming cost is required

Africa can learn from other regions about the use of roaming costs (Bourassa et al., 2016). High roaming costs and related barriers to the use of data can severely reduce the benefits of the digital economy and slow the implementation of a regional digital single market (Cullen International, 2016, Cullen international, 2019). On the other hand, advancing a digital single market in the European Union had immediate benefits

for consumers, businesses and online trade (see Box 1.4). Cross-border e-commerce in the EU has increased by more than 4%, and the volume of online trade by 5% (European Commission, 2019b). African countries should therefore quickly address the issue of intra-African roaming costs.

So far, progress for affordable or free intra-African roaming services remains limited. Only three of Africa's Regional Economic Communities – the Economic Community of West African States (ECOWAS), EAC and SADC – are on the way to reducing roaming costs. In 2017, ECOWAS member states approved a regulation to allow citizens travelling within the region to pay no additional roaming tariffs but roam at local rates. The initiative is currently in the implementation phase, and expected benefits for citizens' welfare and for regional integration are significant (World Bank, 2018). The EAC also agreed to establish a "One Network Area" roaming rule in 2014 (ITU, 2016). In the SADC region, roaming tariffs as of 2020 should now be at "cost + 5%" according to a scheme adopted in 2014 (ITU, 2017, pp25-32). This scheme was agreed by the Communications Regulators' Association of Southern Africa following the 2014 SADC Roaming Report.

Box 1.4. **Reaping the full benefits of a digital single market: Insights from the case of the European Union**

The European Union is among the most advanced examples in implementing a digital single regional market. In 2015, the European Commission presented the EU Digital Single Market Strategy, followed by a dedicated resolution by the European Parliament on 19 January 2016 (European Parliament, 2015). Since then, a number of landmark achievements have supported the construction of the European digital single market, including:

a) **The end of roaming charges** since 15 June 2017. The so-called roam-like-at-home approach enables all European citizens travelling in the Europe Union to use their mobile phones for calls, SMS and data for the same price as in their country of residence.

b) **The cross-border portability** of online content since April 2018. Europeans can access their online subscriptions to films, sports events, e-books, video games and music services while travelling to another member state.

c) **The modernisation of data protection** since 25 May 2018. The data protection reform is a legislative package that includes the General Data Protection Regulation.

d) **The removal of geo-blocking barriers to e-commerce** since March 2018. The new rules ensure consumers can access goods and services online without concern for geographically based restrictions to e-commerce, or cross-border transactions.

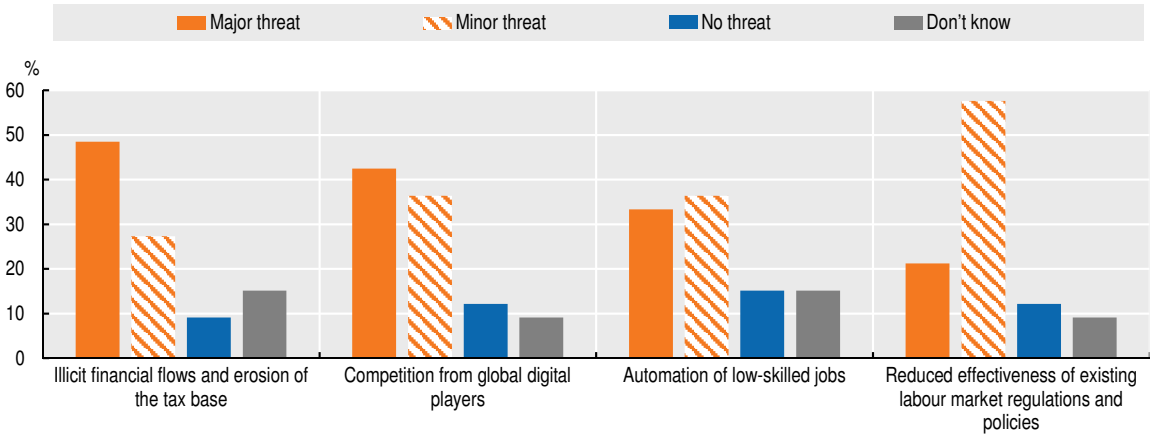
Sources: Authors' compilation based on European Commission (2019a), "Commission report on the review of the roaming market", and European Commission (2019b), *A Digital Single Market for the Benefit of All Europeans*.

Accelerating the continental harmonisation of data regulatory frameworks is essential

Given the international scope of digital data value chains, African countries should not cling to isolated national frameworks for data regulation. First, greater regulatory coherence across countries is required to navigate global digital data. Despite some regional and continental efforts, the national data regulatory framework in most African countries is far below the required level for the digital era. Second, evidence from a sample of 64 countries between 2006 and 2016, shows that isolated attempts to restrict the cross-border movements of data or require local storage of data inhibit trade in services and reduce the productivity of local firms (Ferracane and Marel, 2018). Third,

a single continental framework would be more powerful and simpler to understand. In Europe, for example, since the EU's General Data Protection Regulations (GDPR) came into effect in May 2018, any company wishing to conduct business within the EU must comply with a number of similar principles and guidelines to ensure privacy and protection of personal data. As of today, only 28 countries in Africa have comprehensive personal data protection legislation in place (UNCTAD, 2020c). Experts already see this weakness as a major risk to Africa's digital development (Figure 1.14).

Figure 1.14. **Risks associated with digitalisation for creating jobs in Africa: Results from the AUC/OECD 2020 Expert Survey on Digitalisation in Africa**



Notes: This figure shows answers to the survey question "How do you rate the following possible risks associated with digitalisation for jobs' creation in your country (or region)?". It is based on responses from six (out of Africa's eight) Regional Economic Communities and on individual assessment of 23 African countries.

Source: AUC/OECD 2020 Expert Survey on Digitalisation in Africa.

StatLink https://doi.org/10.1787/888934220971

Digital security calls for urgently improving continental co-operation

Only a fifth of African countries have a legal framework for cybersecurity (digital security), while just 11 countries have adopted substantive laws on cybercrime (digital security incidents) (Farrah, 2018; OECD, 2015[6]). In 2014, the 23rd Assembly of the AU Heads of State and Government adopted a Convention on Cybersecurity and Personal Data Protection as a first step towards continental co-operation. Yet, as of June 2020, only 14 AU member states had signed it, and 5 had ratified it (Ghana, Guinea, Mauritius, Namibia and Senegal). This is still far from the 15 ratifications required for the Convention to enter into force (AUC, 2020b).

Why is co-operation urgent for digital security? The cost of cybercrime in Africa is increasing and brings the risk of holding back Africa's digital revolution (Farrah, 2018). Several assessments show that Africa's online ecosystem is one of the most vulnerable in the world (Serianu, 2017; KnowBe4, 2019). Serianu (2017) estimates that the cost of cybercrime in Africa was about USD 3.5 billion in 2017, with Nigeria and Kenya alone suffering losses of USD 649 million and USD 210 million, respectively. In addition, the rise of digital technologies poses a host of new and more complex challenges to country-level regulators, including taxation in the digital age, digital security, privacy, personal data protection and cross-border flows of data. The intensity of these challenges arises from the combination of the fast-evolving nature of technology, the need for governments to respond with "fit-for-purpose" regulatory frameworks and enforcement mechanisms, and their global reach and cross-border nature (OECD, 2019c). Therefore, lawyers and experts within government regulatory agencies cannot deal with these issues in isolation.

Annex 1.A1. Tech cluster development in Egypt, Kenya, Nigeria and South Africa

Egypt's tech cluster development

The Egyptian government has long supported local start-ups through dedicated financing initiatives. In 2010, the government inaugurated the Technology Innovation and Entrepreneurship Centre (TIEC) with the aim to support entrepreneurship and innovation in the local information and communications technology (ICT) industry. The Centre provides facilities and funding to early-stage start-ups. It also furnishes an intellectual property framework to foster ICT innovation and growth in the local economy. In 2017, the TIEC launched the Fekratek Sherkatek (Your Idea, Your Project) initiative which funded 42 local start-ups with EGP 100 000-500 000 (USD 5 620-28 100) each. In 2018, the Centre created Falak Startups Accelerator, a four-month acceleration programme which offers funding of up to EGP 1 million (approx. USD 63 000), office space and mentorship to early-stage start-ups.

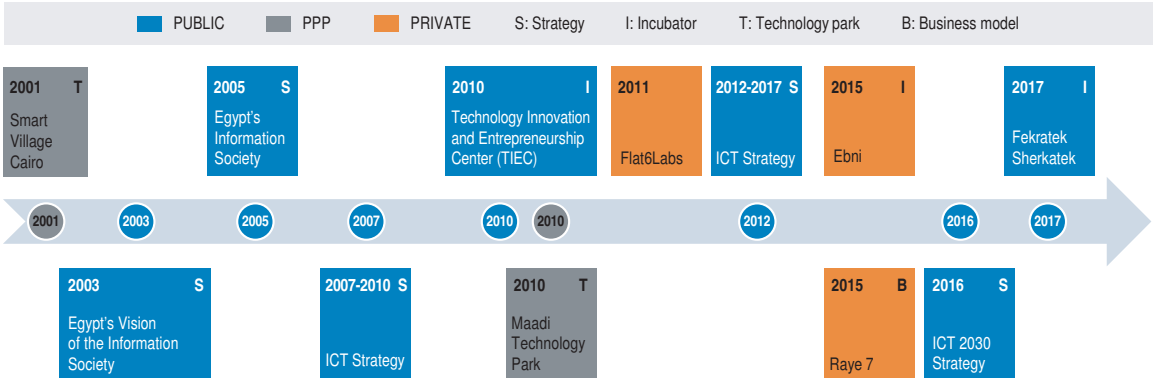
Egypt is also among Africa's early adopters of technology parks. In 2001, the government started the development of the Smart Village Cairo initiative, a public-private partnership tech park for multinational software companies (e.g. IBM, CISCO and Microsoft), business process outsourcing (e.g. Raya), government offices, research centres and many other local technological firms. The park spreads over 3 million m^2. Since 2017, the government has invested in the new Maadi Technology Park that aims to be a technology cluster and business park.

Local investors played key roles in supporting early-stage start-ups. Angel investors and accelerators (e.g. Algebra Ventures, Cairo Angels, Ebni, EdVentures, Flat6Labs) provide mentoring, networks and funding ranging from EGP 50 000 (approx. USD 2 800) to EGP 150 000 (about USD 8 000).

- Since its inception in 2016, Cairo-based Algebra Ventures has provided Series A and Series B investment for 15 technology-driven start-ups. It joins a list of international investors, mostly from the Middle East (e.g. DiGAME, BECO Capital and Silicon Badia), that provide financing and expertise for start-ups to scale in Egypt and abroad.
- Flat6Labs is an early-stage venture, which provides seed capital and physical hosting at its premises and assists entrepreneurs throughout the critical first steps of development. Founded in 2011, Flat6Labs joined the Global Accelerator Network (GAN) in May 2012, as the first member from Africa.

As a result, the ecosystem has grown rapidly in recent years, attracting USD 59 million in equity investments in 2018, compared to USD 9 million in 2017. Cairo is the largest start-up ecosystem in North Africa. The city hosted over 400 active start-ups in 2019 that largely cater towards domestic consumers such as Swvl (bus transportation), Yaoota (online price comparisons), Vezeeta (medical appointment booking) and Wuzzuf (recruitment platform). Several start-ups such as Iqraaly, Bey2ollak and Eventtus have scaled geographically across the Middle East and North Africa, especially in Jordan, Lebanon, Morocco and the United Arab Emirates. In 2019, Swvl expanded to Kenya and Nigeria – suggesting a strategic pivot for Egyptian start-ups towards the sub-Saharan African market (Digest Africa, 2019).

Figure 1.A1.1. **Selected timeline of Egypt's tech cluster development**



Kenya's tech cluster development

In 2007, Safaricom introduced one of the first mobile payment platforms. This mobile money revolution has created the technological foundation and user base for a host of other innovations and start-ups in sectors such as fintech (e.g. Cellulant, CarePay and AZA Group [formerly BitPesa]), renewable energy (e.g. M-KOPA and Powerhive) and eCommerce (Twiga Foods and Copia Global). **Today,** Kenya is home to one of the four largest and most dynamic tech ecosystems in Africa. By 2018, the sector contributed more than USD 1 billion to Kenya's economy (KNBS, 2018).

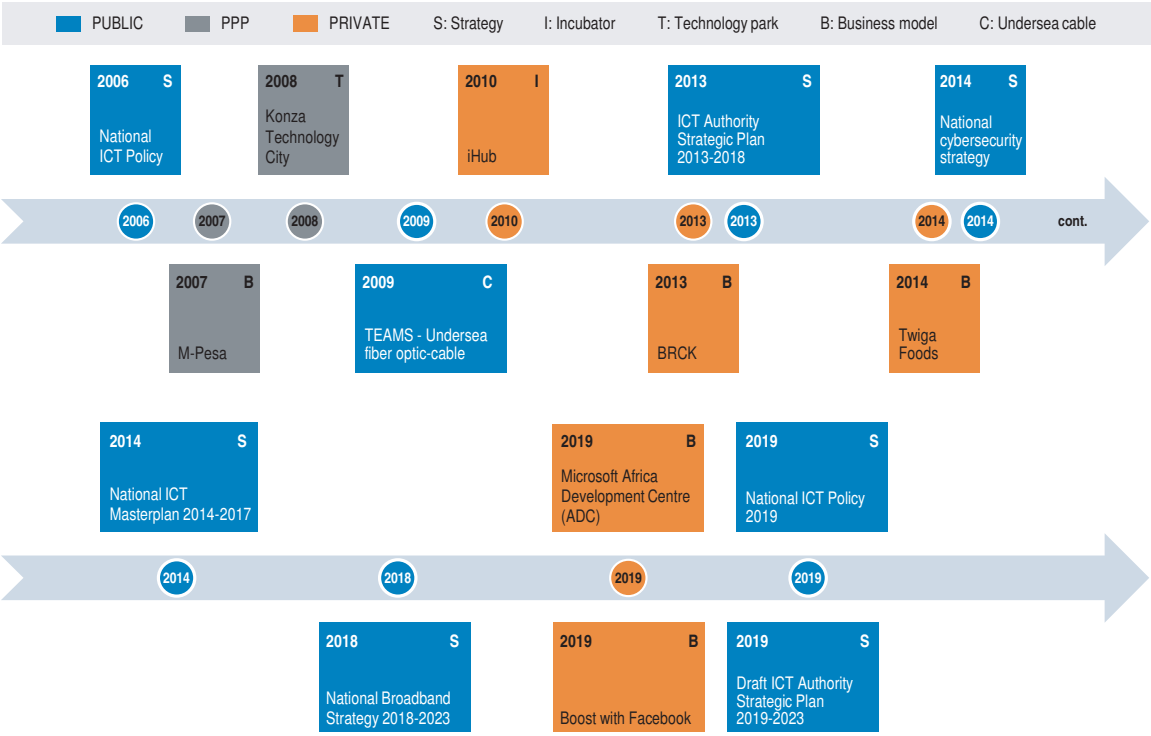
Beyond impressive numbers, Nairobi's start-up ecosystem has achieved great maturity and depth. It is home to more than 200 local start-ups and globally-established firms such as IBM, Intel and Microsoft. Since 2010, iHub has provided a dynamic environment, strong networks and high-quality infrastructure for Kenyan start-ups. By 2019, iHub start-ups had raised over USD 40 million in early- and growth-stage financing, and iHub portfolio businesses had contributed over 40 000 jobs to the East African economy. CcHub from Nigeria acquired iHub in one of the highest-profile deals in Africa's tech sector.

The success of tech sectors has attracted investments from leading global tech companies. In 2019, Microsoft launched its Africa Development Centre in Nairobi. The company expects to invest over USD 100 million in infrastructure and employment of local, qualified engineers over the first five years of operation. However, the scarcity of highly skilled talent is a major reason for concern for Kenyan tech firms. Local firms are increasingly forced to import professionals from other countries at high costs.

The Kenya Communications Act in 1998 provided the framework for liberalising and regulating the telecom market and ICT sector in Kenya. In 2004, the move resulted in a market-based licensing system that ended the monopoly of Telkom Kenya. In 2007, Government's Vision 2030 selected the ICT sector as a key pillar of development and approved the creation of the Konza Technology City as a flagship project (KoTDA, 2019). The project is expected to attract USD 15.5 billion in investment, create 100 000 jobs and generate USD 1 billion annually by the beginning of 2022 (Ventureburn, 2018).

In 2009, the Kenyan government led the investment in four undersea fibre-optic cables that improve the quality and reduce the cost of broadband Internet. Kenya's ICT sector is governed by a national policy implemented in 2019. However, other key strategic documents and several items of legislation have since been developed.

Figure 1.A1.2. **Selected timeline of Kenya's tech cluster development**



Nigeria's tech cluster development

Nigeria has the most vibrant start-up scene in Africa. The Lagos ecosystem, also known as the Yabacon Valley, reached an estimated capital value of USD 2 billion in 2017, the most valuable in Africa (Startup Genome, 2019) It hosts Africa's first unicorn (Jumia) as well as other dynamic start-ups in e-commerce (Konga, Carmudi and Jovago), logistics (Kobo360), health (Lifebanks) and booking platforms (Hotels.ng), among others. Furthermore, Nigeria's tech scene is expanding beyond Lagos. Other large cities, Ibadan and Abuja, have vibrant start-up communities in selected sectors such as agritech, education, energy and health.

This rapid rise of Nigeria's tech ecosystem largely results from two mutually reinforcing factors: the strong attractiveness of Nigeria's domestic market for the global tech giants, and a growing pool of skilled and entrepreneurial talent.

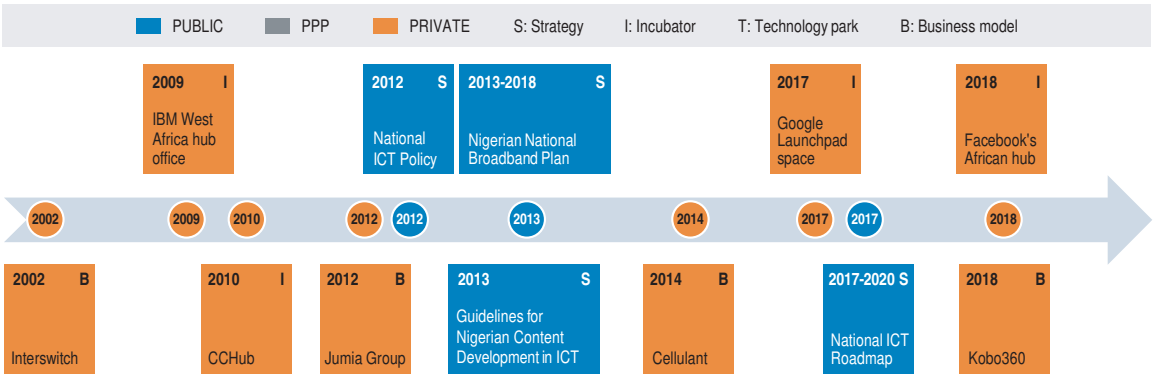
- **First, with a population expected to double from 206 million in 2020 to 401 million in 2050, the potential of Nigeria's ICT market is attractive for global tech companies.** In 2009, IBM opened its West Africa hub in Lagos and already invested over USD 50 million in competitive grants for local start-ups. In 2017, Google established its first worldwide Launchpad space in Lagos for early-stage start-ups outside of the United States. In 2018, Facebook launched its first African hub in Lagos. Other leading firms, such as MTN Nigeria, Nokia and MainOne, are now sponsoring start-up incubation. In 2019, over 147 Nigerian start-ups enjoyed a total funding of USD 377 million by over 100 venture capital investors, incubators programmes and other types of investors. About 90% of this funding originated from international investors (Techpoint, 2019).
- **Second, Nigeria's tech innovations benefit from a pool large of talented youth.** Many are entrepreneurial and ready to embrace the latest technologies. The

number of youth with a higher education is projected to quadruple from 7 million to 28 million by 2040. The Nigerian diaspora community also provides an important international network and experience, as well as specialised skills. In 2010, Nigeria's first local incubator, Co-Creation Hub (CcHub), emerged in Yaba, Lagos. In 2015, CcHub launched a USD 5 million innovation fund, which had helped over 50 tech start-ups by the end of 2018. In 2019, CcHub acquired Kenya's iHub, joining two of the biggest incubators in Africa.

At the beginning, the public sector played a limited role in the relative success of Nigeria's tech industry. In 2007, Nigeria's Information Technology Development Act established a dedicated agency – the National Information Technology Development Agency – with the mandate to develop and regulate the sector. This paved the way for several other federal strategies and plans. States such as Edo and Kaduna also launched their own local strategies and initiatives (World Bank, 2019).Progress on implementation was limited, however, as evidenced by the slow rollout of free Wi-Fi hotspots in designated schools, for example (Gillwald, Odufuwa and Mothobi, 2018). The latest National ICT Roadmap 2017-20 is more ambitious. It has set out an integrated framework and strategic direction for Nigeria ICT sector: i) governance; ii) policy, legal and regulatory frameworks; iii) industry and infrastructure; and iv) capacity building.

The promise of a globally competitive ICT industry in Nigeria is particularly important and central to the country's plans to diversify its economy away from oil. With the right policies, this could also help to stem the brain drain issue, supporting long-term GDP growth.

Figure 1.A1.3. **Selected timeline of Nigeria's tech cluster development**



South Africa's tech cluster development

South Africa hosts 78 tech hubs, the second-highest number in the continent, and about 60% of them are based in Cape Town. Whereas Johannesburg is the financial and economic capital of South Africa with many established firms, Cape Town is home to over 800 tech start-ups. They are active in multiple sectors such as fintech (Jumo, MFS Africa, Lulalend, Yoco), crypto exchanges (Luno and OVEX), education (African Leadership Academy), consumer services (Travelstart, SweepSouth), precision agriculture (Aerobotics) and ICT equipment (Stalcor, Sensor Networks, Nervedata, Cape). The Western Cape region also hosts business-offshoring processing which created more than 12 000 jobs in 2018 and 2019 (BPESA, 2019).

The Cape Innovation and Technology Initiative (CiTi) is Africa's oldest tech incubator, founded in 1998 by industry stakeholders and inspired citizens. Cape Town offers a wealth of skilled talents from the surrounding academic institutions, strong communications infrastructures and business linkage with the world. It also hosts a mature funding

landscape with venture capitalists such as **Naspers, one of the largest technology investors in the world**, and established accelerators and incubator hubs. For example, according to the company' financial statement published in March 2020, Naspers invested USD 1.3 billion in existing and new businesses between March 2019 and March 2020 and generated core headline earnings of USD2.9 billion.

Another good example is the **Silicon Cape Initiative** which was founded in 2009 as a membership-based community organisation to connect entrepreneurs, venture capitals, engineers and other partners working in the ecosystem. The membership base grew to over 350 000 members by 2018. The initiative signed a collaboration agreement with the digital cluster Hamburg@Work in Hamburg, Germany, to give its members access to European support networks, supply chains and markets, and other learning opportunities.

South Africa's government has actively pushed for the development of the digital ecosystem since the early-2010s. The timeline highlights **four digital strategy documents** since 2010. Yet, implementation has been weak, especially due to several changes and discontinuities in policy formulation between 2009 and 2014 (Gillwald, Mothobi and Rademan, 2018). The "digital divide" also demands further policy actions. For example, 61% of rural dwellers do not use the Internet, compared to 39% of urban dwellers. South Africa's National Development Plan 2030, elaborated in 2015, emphases the importance of affordable broadband and a better-structured ICT environment. This could give an impetus to South Africa's digital transformation.

Figure 1.A1.4. **Selected timeline of South Africa's tech cluster development**

Annex 1.A2. Africa's key continental strategies and flagship programmes for digitalisation

Table 1.A2.1. **Overview of Africa's key strategies for digital transformation**

	Strategies/ initiatives	Period/ launch dates	Key actors	Objectives	Key digital deliverables
1.	**Digital Transformation for Africa Strategy (DTS)**	2020-30	AUC UNECA Smart Africa AUDA-NEPAD ACBF AfDB RECs ITU ATU	The DTS aims to harness digital technologies and innovation to transform African societies and economies to promote Africa's integration, generate inclusive economic growth, stimulate job creation, bridge the digital divide and eradicate poverty for the continent's socio-economic development.	• Digital single market in Africa by 2030 • Harmonised policies, legislation and regulations and establish and improve digital networks and services • 99.9% of people in Africa with a digital legal identity as part of a civil registration process by 2030 • A vibrant sector approach to digitalisation of industry, trade and financial services, education, agriculture and health • Enhanced capacity and knowledge for all digital trade and digital economy stakeholders
2.	**Policy and Regulatory Initiative for Digital Africa (PRIDA)**	2018-22	AUC European Commission ITU	PRIDA aims to accelerate regulatory harmonisation and regional co-operation for digitalisation.	• Common positions across Africa on Internet governance • PRIDA Digital Platform • Harmonisation of ICT policy, legal and regulatory frameworks
3.	**Cybersecurity (digital security)**	2014	AUC	To protect African citizens, governments and businesses from issues relating to cybersecurity and cybercrime as information systems and digital infrastructures become more vulnerable in the midst of the growing digital economy.	• African Union Convention on Cyber Security and Personal Data Protection • Development of a strategy and action plans to address the African cybersecurity needs and gaps in resources and know-how • Development of data protection guidelines
4.	**Digital ID Blueprint for Africa**	2019-21	SMART Africa AUC UNECA AU member states RECs	A blueprint for a continental concept for digital identity – named the Smart Africa Trust Alliance (SATA) – to establish institutional ownership and accountability combined with a trust framework based on standards and trust assurance mechanisms to facilitate cross-border interactions and cross-border interoperability of digital ID schemes across the public and private sector.	• SMART Africa Trust Alliance Roadmap • Field-testing and country alignment • Pan-African Trust Framework • Digital ID implementation plans • Digital single market
5.	**DotAfrica (.africa)**	Launched in 2017	AUC Registry Africa	To create a new African Internet identity for users and businesses with the .africa geographic Top-Level Domain (gTLD).	• Africa domain for users and businesses
6.	**African Outer Space Programme**	Launched in 2016	AUC	The African Outer Space aims at building both ground and space infrastructure for throughput and low-latency communication, Navigation Positioning and Timing for precision services, tailored Earth Observation services applied in all sectors of the environment, agriculture, mining, energy and other areas; research and innovation in space sciences, engineering and applications.	• Technology and tailored services for food security and disease prevention, and digital catalogues on disease vectors, environmental factors and population distribution • Location-based mobile services, mapping of government ICT infrastructure to support the E-Government Strategy • Spatial information on key infrastructure, such as for transport, energy sources and power systems, and distribution networks to support PIDA
7.	**Digital Economy for Africa initiative (DE4A)**	2020-30	AUC World Bank	The DE4A aims to ensure that every individual, business and government in Africa is digitally connected by 2030 as outlined in the AUC Digital Transformation Strategy for Africa.	• Universal, affordable and good quality broadband access by 2030 • At least 250 000 km of fibre across the region, satellites, Wi-Fi based solutions and other innovations • Greater financial inclusion and availability of cashless payments

Note: AUC = African Union Commission, UNECA = United Nations Economic Commission for Africa, AUDA-NEPAD = African Union Development Agency - New Partnership for Africa's Development, ACBF = Africa Capacity Building Foundation, AfDB = African Development Bank, RECs = Regional Economic Communities, ITU = International Telecommunication Union, ATU = Africa Telecommunications Union.
Source: Authors' compilation.

Table 1.A2.2. **AU Agenda 2063 flagship programmes and priority programmes contributing to digitalisation and job creation in Africa**

	Strategies/ initiatives	Period/ launch dates	Key actors	Objectives	Key digital deliverables
1.	**Programme for Infrastructure Development in Africa (PIDA) – Phases I and II**	Medium term: 2021-30 Long term: 2031-40	AUC AUDA-NEPAD AfDB UNECA RECs	PIDA is the key strategic framework for the development of world-class regional infrastructure, of which four of the flagship programmes of Agenda 2063 are included, centred on the provision of digital infrastructure.	• Strategic framework for the development of regional and continental infrastructure in energy, transport, ICT and transboundary water resources • Power transmissions constructed, built or upgraded
2.	**African Continental Free Trade Area (AfCFTA)**	Launched in 2019	AUC RECs	AfCFTA aims to achieve a single continental market for goods and services by 2030.	• AfCFTA e-commerce protocol • AUC African e-commerce start-ups web-portal platform • Africa e-commerce platform • Postal e-commerce platform • Strong production and manufacturing networks
3.	**African Union Financial Institutions**	2014-34	AUC African Association of Central Banks (AACB) African Securities Exchanges Association (ASEA) Afreximbank	The initiative aims at mobilising domestic and external resources and promoting African monetary co-operation to accelerate economic integration and socio-economic development of the continent.	• Financial integration and inclusion through the development of fintechs in Africa • Establishment of a Pan-African Payment and Settlement System • Establishment of a virtual Pan-African Stock Exchange
4.	**African Commodities Strategy**	2020-30	AUC	The strategy aims to use commodity-led industrialisation as a driver for achieving the structural social and economic transformation of Africa.	• Digitalisation of commodity markets • Digitalisation of factors of production • Digitalisation of research and development tools
5.	**Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024)**	2014-24	AUC	STISA-2024 supports Africa's transition to an innovation-led, knowledge-based economy within the overall framework of the AU Agenda 2063.	• Online e-skills development programme on basic knowledge and skills in digital security and privacy to 300 million per year by 2025 • Digital app on motivating girls from dropping out of schools • E-platform for promoting education for African girls and women through networking, knowledge sharing and responsibility • Development of tele-health applications, agricultural industrial chains, environmental data platforms, and space infrastructure and applications
6.	**Decade Plan of Action for TVET and Youth Employment**	2019-28	AUC	The plan articulates strategic actions that will guide and influence reforms and development of technical and vocational education and training (TVET) in Africa including meeting the existing and future labour market demands over the next ten years.	• The use of digital technologies to enhance teaching, learning and assessment
8.	**Continental Strategy for Technical and Vocational Education and Training (TVET Strategy)**	Launched in 2015	AUC	The TVET Strategy provides a strategic framework for the development of national policies to address the inherent challenges in TVET including governance, relevance, innovation and creativity, and employability.	• Training for adaptation and use of appropriate technologies to facilitate youth employment and employability
7.	**Pan African e-Network**	Launched in 2009	AUC Government of India Data Center at the Telecommunications Consulting of India Limited	The Pan African e-Network aims to connect African Union member states to India through a satellite and fibre-optic network.	• Capacity building and sharing of experiences of e-services and tele services
8.	**African Virtual and E-University**	Launched in 2019	AUC	The university aims to accelerate the development of human capital, science and technology, and innovation through increased access to tertiary and continuing education in Africa by capitalising on the digital revolution and global knowledge.	• Launch of virtual higher education courses through the Pan-African University digital platform

Note: AUC = African Union Commission, UNECA = United Nations Economic Commission for Africa, AUDA-NEPAD = African Union Development Agency - New Partnership for Africa's Development, AfDB = African Development Bank, RECs = Regional Economic Communities.
Source: Authors' compilation.

Notes

1. In Rwanda, person-to-person transfers increased by 377% in just five weeks after the decision, and the number of transactions reached 3 million per week, compared to 0.9 million the week before the decision (press article available at https://nextbillion.net/covid-rwanda-mobile-money/).
2. M-PESA, Kenya's mobile money service, originated in 2005 as an experiment for loan payments via mobile phones in micro-credit schemes, in a public-private partnership between the United Kingdom's Department for International Development, the Government of Kenya and Vodafone.
3. Throughout this report, the definition of youth (or young people) refers to that of the Africa Union Youth Charter, which considers the age group 15-35 years old. However, due to data availability, statistics in this report correspond to ages 15-29.
4. To address endogeneity concerns in identifying the causal effects, this paper uses earthquake-induced disruption to the submarine cable networks as an instrumental variable for e-mail use.
5. As the fixed (wired-) broadband Internet penetration remains very limited (less than 5% of the population in 2018), the majority of African people access the Internet through their mobile devices.
6. For a definition of digital security, cybersecurity, digital security incident and cybercrime, see OECD, 2015: 4.

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Chapter 2

Policies to create jobs and achieve Agenda 2063 in the digital age

This chapter discusses public policies that can use Africa's digital transformation to trigger large-scale job creation and achieve Agenda 2063 objectives. In each of the three policy domains presented, the chapter highlights policy levers and the most relevant practices that African policy makers can mobilise at local, national, regional and continental levels. The first section focuses on bridging the digital divide through place-based policies. The second section presents policy priorities to upgrade Africa's large informal sector, including skills development, labour regulations to deal with emerging forms of employment and digital solutions for financial inclusion. The last section examines how policy makers can empower Africa's small and medium-sized enterprises and start-up ecosystems to compete and innovate in the digital world.

IN BRIEF

Three sets of policies can help policy makers harness Africa's digital transformation to create a massive number of jobs across the continent and fulfill the ambitions of the African Union's Agenda 2063:

- First, place-based policies will be necessary to unleash employment opportunities beyond large urban areas. Accelerating the development of broadband infrastructure in intermediary cities can yield high returns, as 73% of Africans will continue to live in rural areas and intermediary cities by 2040. Supporting digital innovations for rural development, expanding last-mile access to the Internet and reducing the costs of Internet services are complementary components to turn digital access into job opportunities. In most African countries, reducing current prices of data services by half would make them affordable for 75% of the population.
- Second, making digitalisation benefit informal workers will require equiping youth with adequate skills for the digital era, preventing precarious working conditions for own-account workers on e-platforms, and expanding the availability and adoption of fintech solutions for the informal economy. A test-and-learn approach can create a policy environment that is fit for purpose, exemplified by recent regulatory sandboxes and regulator technologies applied across African countries.
- Third, policy makers must support Africa's dynamic small and medium-sized enterprises and start-up ecosystems so they can prosper and actively participate in the digital age. Building an African digital single market is critical. Governments should deepen regulatory harmonisation, put in place the enabling environment to develop business services for firms, enable smaller firms to tap digital-enabled trade opportunities, facilitate intellectual property registration and develop mechanisms to finance start-ups. Though venture capital funding for Africa's start-ups grew sevenfold between 2015 and 2019, 85% of it went to just four countries in 2019.

Policies to create jobs and achieve Agenda 2063 in the digital age

Bridging Africa's spatial divides

Connect intermediary cities to the broadband network

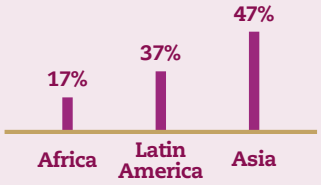
African cities connected to the broadband fiber network

Big cities 61%

Intermediary cities 35%

Ensure affordable prices of Internet services

Share of population that can afford 1 GB of data, 2018



Support digital innovations for agri-food value chains

83% of agritech solutions **do not require high connectivity**

Preparing African workers

Improve school-to-work transitions for youth

45% of youth feel their **skills don't match** local labour markets

28% of youth feel **underqualified** and

17% feel **overqualified**

Support the emerging class of iWorkers

iWorkers could make up more than

10%

of Africa's total labour force by 2030

Unlock the potential of fintech for the informal economy

50% of Africa's informal own-account workers have a smartphone

Empowering African start-ups and SMEs

Implement digital trade facilitation and competition policies

57% of **Africa's exports of services** were **delivered on line** in 2017...

... and the **total volume of digital trade** has **exploded**

Encourage intellectual property rights registration

In 2018, only **17 000 patent applications** (0.5% of the worldwide total) were registered in Africa. 81.6% of them emanated from non-residents.

Introduce new funding mechanisms for early stage and women-led start-ups

Young start-ups (1 to 5 years old) **received only 5.4%** of **venture capital funding** in 2019

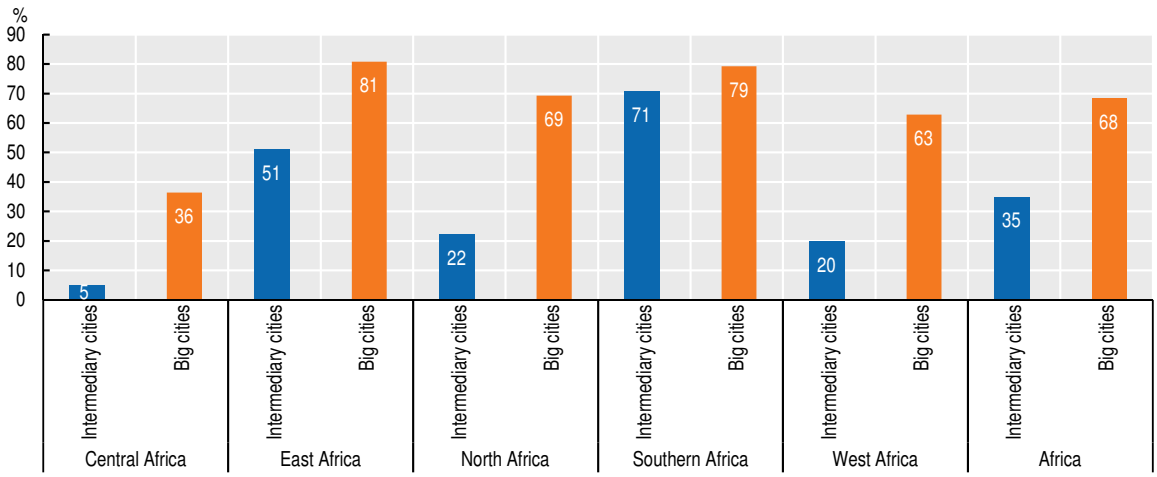
2% **Women-led start-ups received only 2%**

Bridging Africa's spatial divides will unleash job opportunities beyond large cities

Accelerating broadband infrastructure development in intermediary cities can unlock high-potential regional supply chains

The majority of Africa's intermediary cities are located far from a high-speed terrestrial fibre-optic network. In Central Africa, only 5% of the intermediary cities are within 10 kilometres (km) of the backbone network, compared to 36% of the big cities (Figure 2.1). In Southern and East Africa, on the other hand, the backbone network has expanded further across the urban networks, with respectively 71% and 51% of the intermediary cities connected to the terrestrial fibre-optic broadband network. Box 2.1 explains the methodology used to analyse the spread of Africa's broadband communications infrastructures across space. Annex 2.A1 shows the results on a map and reports the unconnected cities by population size.

Figure 2.1. **Share of cities within ten kilometres of the terrestrial fibre-optic network in Africa's regions, 2019**



Source: Authors' calculations (see Box 2.1).

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Box 2.1. **A brief description of the spatial analysis on the spread of digital technologies in Africa**

This report combined three geolocalised datasets to explore the spread of digital technologies across African regions as well as their link with local economic development and jobs:

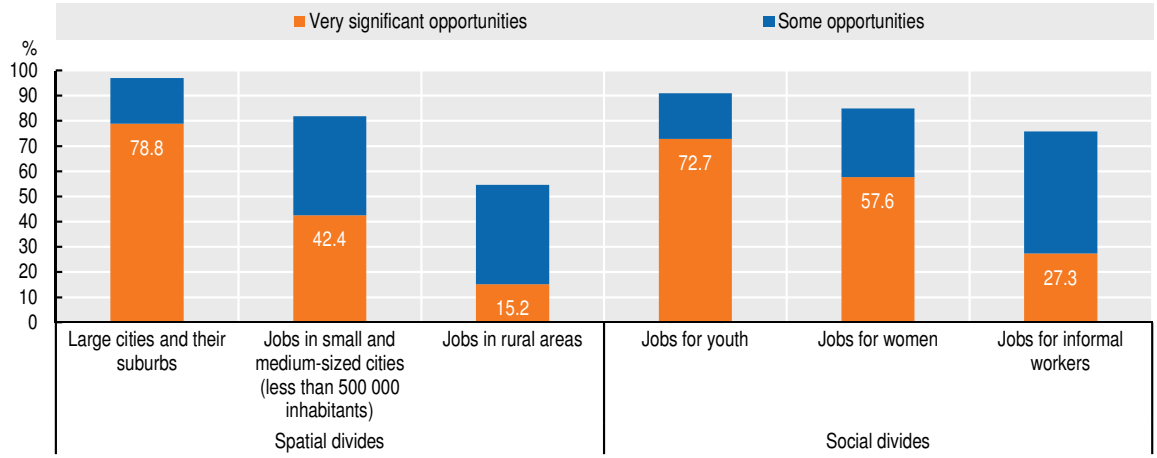
- First, we mobilised the geocoded maps of terrestrial fibre-optic backbone networks in Africa provided by AfTerFibre's Network Startup Resource Center (Many Possibilities, 2020).
- Second, we overlapped these datasets with the Africapolis database, which geolocalises all African urban agglomerations with more than 10 000 inhabitants in 2015 (OECD/SWAC, 2019). This helped us identify the distance of each agglomeration to fibre broadband backbone networks.

Box 2.1. **A brief description of the spatial analysis on the spread of digital technologies in Africa (*continued*)**

- Finally, we matched these with geocoded subnational data from Afrobarometer surveys. This allowed us to compare various socio-economic characteristics and employment profiles of African households according to their distances to a backbone network during the 2014-15 period.

Investing in high-speed communications infrastructures for intermediary cities can connect a large population to the terrestrial fibre-optic network. Nearly six in ten (57%) of all African cities that are not connected to the network lie within only 50 km of it; in 2015, they accounted for a total estimated population of 146 million. Attracting private investments for broadband connectivity for small towns and intermediary cities would allow resource-constrained governments to benefit from strong multiplier effects. According to an expert survey by the African Union Commission and the OECD, digitalisation can help unleash new opportunities for direct job creation in large and intermediary cities, while these opportunities are rather limited in rural areas (Figure 2.2). In addition, broadband connectivity brings positive spillovers in the connected regions, in terms of both employment and firms' productivity (Sorbe et al., 2019).

Figure 2.2. **Opportunities brought by digitalisation for creating jobs in Africa according to geographical situation and social group: Results from the AUC/OECD 2020 Expert Survey on Digitalisation in Africa**



Note: This figure shows answers to the survey question, "How do you rate the following opportunities of digitalisation for job creation in your country or region?" It is based on responses from six (out of Africa's eight) Regional Economic Communities and on individual assessments of 23 African countries. Respondents to the survey included policy makers, experts on digitalisation and representatives of private companies working in Africa's telecom and digital activities.

Source: AUC/OECD 2020 Expert Survey on Digitalisation in Africa.

StatLink https://doi.org/10.1787/888934203434

As Africa's rural population continues to grow, intermediary cities can act as transmission hubs that serve the rural hinterland, strengthen rural-urban linkages and drive rural transformation. Africa's rural populations will continue to grow in absolute terms at least beyond 2050 (see Chapter 1). Increasing productive activities – such as food processing, agricultural inputs supply services, logistics or warehousing facilities – in intermediary cities will be crucial to connecting Africa's rural-urban supply chains

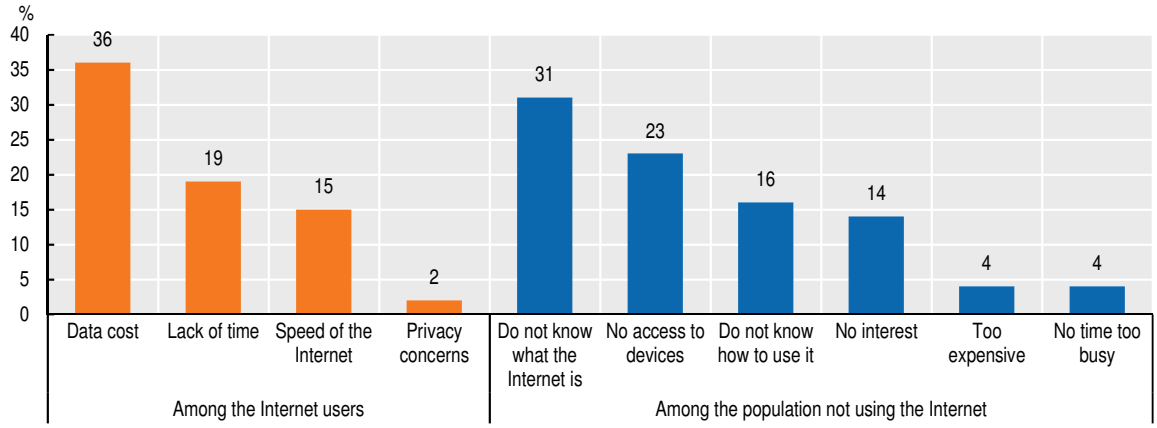
(Traoré and Saint-Martin, 2020; Minsat, 2018). This will also help local small and medium-sized enterprises (SMEs) meet regional demand. Firm-level data on Côte d'Ivoire show that when the location quotient, or concentration, of firms increases by 10% in intermediary cities like Daloa or in Odienne, firms operating there increase their sales by 15-17% (Fall and Coulibaly, 2016).

Greater investment in connecting border cities to the communications infrastructures could increase opportunities for transborder activities, jobs creation and economic development. The proximity of border cities is spurring promising transborder co-operation. Many of the intermediary cities in Africa are located within 50 km of national borders.[1] Neighbouring countries are creating cross-border special economic zones (SEZs). In 2018, Burkina Faso, Côte d'Ivoire and Mali launched the first cross-border SEZ in Africa – called SKBO – with the aim of encouraging agro-industrial and mining companies to set up in the area spanning between the cities of Sikasso, Korhogo and Bobo Dioulasso (AUC/OECD, 2018). Similarly, in 2019, Ethiopia and Kenya announced their intention to convert the Moyle region into a cross-border free trade zone (UNCTAD, 2019).

Governments need to ensure last-mile connectivity

Affordability of data and Internet-enabled devices is an essential complement to infrastructure development for digitalisation to benefit a larger number of African households (Box 2.2). Subscriptions to mobile phones have steadily increased; however, the high cost of data services is the main factor limiting the use of Internet services. Among the Internet users surveyed in ten African countries in 2017, over a third (36%) stated the cost of data as the main limitation to Internet use (see Figure 2.3). Of those who do not use the Internet at all, the cost of Internet-enabled devices is the second-most stated barrier to accessing the Internet (23%); right after the lack of awareness about the Internet. Similarly, research on mobile financial services shows that barriers to using Internet services include other factors such as lack of money or regular income, low levels of digital literacy and limited knowledge of basic financial concepts. For instance, self-exclusion may also occur due to low levels of financial and digital literacy (OECD, 2018a). Usually, these barriers are higher in remote and rural areas.

Figure 2.3. **Main limitations to Internet use in selected African countries, 2017**



Note: The ten African countries considered included Ghana, Kenya, Lesotho, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania and Uganda.

Source: Adapted from Gillwald and Mothobi (2019) based on *RIA After Access Survey data, 2017.*

StatLink https://doi.org/10.1787/888934203453

Box 2.2. **Improving the indicators of data affordability for African countries**

To achieve development objectives, the UN and the AU formulated pricing targets for digital data:

- **In 2011,** the UN Broadband Commission set a global target for broadband affordability. Entry-level broadband (defined as 500MB of mobile data) should cost 5% or less of average national income per capita (as measured by GNI per capita). In 2018, it revised this target from a price threshold of 5% to less than 2% of monthly GNI per capita, and doubled the data allowance from 500MB to 1GB.
- **In 2020,** the African Union set the following target: "By 2030 all our people should be digitally empowered and able to access safely and securely to at least (6 MB/s) all the time where ever they live in the continent at an affordable price of no more than USD 1 cent per MB (i.e. USD 10 for 1GB)" (African Union, 2020).

Taking stock of the dearth of quality data covering a large number of African countries, and of African stakeholders' targeted policy objectives, this report develops a specific method to estimate what would be the cost of nearly universal access to digital data on the African continent. The method aims to estimate the maximum price of 1GB of data that would be affordable (defined as no more than 5% of their monthly income) for 75% and 95% of the population, respectively. It relies on data from Research ICT Africa (RIA), which cover 48 African countries and are available quarterly from 2014 onwards. For this exercise, it uses country averages for 2018, and then applies the following steps:

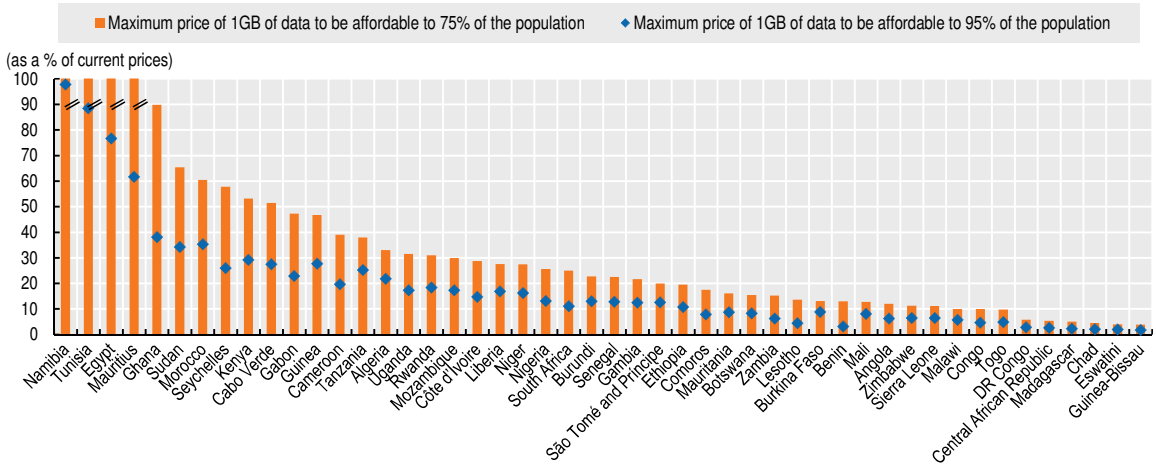
1. Convert annual prices from current USD to USD PPP 2011 using World Bank GDP deflator to make them comparable across African countries.
2. Compute how much an individual should earn monthly so that the current price of a 1GB bundle would only represent 5% of its monthly income.
3. Use the World Bank's online analysis tool for global poverty monitoring (PovcalNet) to assess the percentage of people living below these income thresholds in each country.
4. Use the reversed methodology to assess the price of 1GB bundle in each country so that a large majority (75% or 95%) of the population can afford it.

Moving forward, African countries and regional institutions should scale-up efforts to collect more granular data to assess affordability and to ensure comparability. To have a full picture, policy makers must examine a range of indicators which reflect the status of individual broadband markets. Since 2000, the OECD, for example, has developed a comprehensive methodology for comparing broadband data prices experienced by consumers in its member countries. This methodology uses a "basket" approach where a consumption pattern describes different types of users, and the prices of broadband services from each provider covered help to calculate the resulting cost for each type of user (OECD, 2017a; OECD, 2020d). The granularity of the data collected allows separate treatment of data and voice offers from data offers only. The baskets are reviewed and revised periodically (every 3 years on average) as consumption patterns change and the digital markets evolve over the time. A new update is to be released by end-2020 (OECD, forthcoming). More information can be found at www.oecd.org/sti/broadband/broadband-statistics/.

In 38 out 48 African countries for which data are available, current prices of data services would have to be halved to be affordable for 75% of the population and would need to be reduced even further to achieve universal affordability. Despite their gradual decrease over the past decades, data services on the continent are the most expensive in

the world. In 2018, only 17% of Africa's population could afford one gigabyte (1 GB) of data, compared to 37% in Latin America and the Caribbean, and 47% in Asia (Nguyen-Quoc and Saint-Martin, forthcoming). In Mozambique, about six in ten households stated that they could not afford the necessary devices required to access the Internet (Gillwald and Mothobi, 2019). This share is four in ten in Uganda and three in ten in Rwanda. Only in four countries (Egypt, Mauritius, Namibia and Tunisia) are today's prices affordable to three-fourths of the population (Figure 2.4).

Figure 2.4. **Maximum price of 1GB of data to be affordable to 75% and 95% of the population in selected African countries, 2018 (as a percentage of current prices)**



Source: Authors' calculations based on Research ICT Africa (2019), *Research ICT Africa Mobile Pricing (RAMP)* (database), and World Bank (2020), *PovcalNet* (database).
StatLink https://doi.org/10.1787/888934203472

Ensuring sound competition among telecommunication providers can enhance diversity and affordability of last-miles services. Spectrum allocation policies, which assign scarce radio frequency bands to operators, should facilitate licensing procedures for telecom service providers aiming to cover underserved populations or geographic areas. For example, allowing small operators to use virtual or mobile network facilities can improve product diversity and market competition. Countries can also exploit vacant radio spectrum bands, previously used by television broadcasting, for broadband Internet transmission, as the successful tests in Malawi and four other southern African countries demonstrate (see Chapter 3). Microsoft has also been experimenting with TV White Spaces since 2009 and has implemented pilot projects to connect communities in countries such as Botswana, Colombia, Ghana, Kenya, Namibia, the Philippines, Tanzania, South Africa, the United Kingdom and the United States (OECD, 2018e).

Innovative public-private alliances can help design cost-effective solutions to connect less densely populated rural areas (OECD, 2019f). SES, the world-leading satellite operator, estimates that about 30% of Africa's rural population may never be technically reachable with the terrestrial fibre-optic network in a cost-effective way (AU-EU DETF, 2019). In Nigeria, for example, Internet service providers find that extending service to rural areas via the terrestrial fibre-optic network is commercially unviable due to low commercial returns, higher maintenance cost, and the lack of reliable grid electricity supply (World Bank, 2019). To expand coverage in their rural areas, some countries are encouraging private investment through a variety of incentives and new partnerships.

For example:

- In Algeria, Ghana, Kenya and Nigeria, the public sector partnered with mobile telecom companies and with the telecommunications equipment providers to bring cost-effective mobile broadband services to their rural populations, via microwave systems called RuralStart 2.0 (GSMA, 2018; ITU, 2020).
- MTN, the pan-African telecom operator, announced in 2019 that it would deploy more than 5 000 Open Radio Access Networks (Open-RAN) sites across its 21 African operations to bring 2G, 3G and 4G connectivity to areas that were previously under-connected (Parallel Wireless, 2019). Guinea and Uganda are already benefiting from this technology.

Governments can use Universal Service and Access Funds (USAFs) as a policy vehicle for rural connectivity. Thirty-seven African countries created USAFs – special programmes with funding schemes for universal Internet access and services. USAFs are typically financed through mandatory contributions by mobile network operators and other telecom companies with the aim to expand connectivity and digital services to underserved locations (GSMA, 2014). A recent review (Thakur and Potter, 2018) found that governments can better use USAFs. About USD 408 million, or 46% of funds collected across Africa, were still unspent by end-2016. Some countries, such as Nigeria and Tanzania, have used their USAFs to promote rural connectivity:

- Nigeria has established the Universal Service Provision Fund, which invests in Community Resource Centers in semi-urban and rural areas. It provides subsidies for operators to expand their broadband service in these areas through the Rural Broadband Initiative.
- Tanzania, in partnership with two telecom companies (World Telecom Labs and Amotel), has used part of its USAF to connect its villages with over 1 500 inhabitants via a microwave-based solution. The system went live in 2016 and connected 2.5 million rural people for the first time.

Greater continental co-operation under the direction of the Digital Transformation for Africa Strategy is necessary. Transborder co-operation can lower transit costs and interconnection rates, yielding benefits for both coastal and landlocked countries. Prohibitively high tariffs can restrain access to backhaul infrastructure (i.e. subsea cables and international bandwidth) for small service providers (see Chapter 1).

Policies need to identify and support the most promising digital innovations for rural development

New technologies such as smart contracts, real-time payments solutions and distributed ledger technologies (also known as blockchain) can fundamentally transform the agricultural sector and help address the specific challenges of smallholders. Smallholder agriculture and rural non-farm activities are central to reduce poverty and enhance the livelihoods of large numbers of African people; still, they face significant obstacles to access markets and generate sufficient income (Fan and Rue, 2020; Poole, 2017). A stocktaking exercise of these so-called Disruptive Agricultural Technologies highlighted that their focus ranges from enhancing agricultural productivity (32%) to improving market linkages (26%) and, to a lesser extent, data analytics (23%) and financial inclusion (15%). The top five countries with the highest activities in agricultural technology, or agritech, are Kenya, South Africa, Nigeria, Ghana and Côte d'Ivoire. Over 83% of agritech solutions do not require high connectivity and can operate with intermediate connectivity (Kim et al., 2020).

Policies can use a number of channels to diffuse digital innovations for rural development

Scaling up smart contracts and real-time payments solutions can enhance rural-urban supply chains. Several examples show how smart contracts and digital payments help better match demand and supply, reducing the number of intermediaries, offering higher prices and stable markets to farmers and reliable supplies to vendors. 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 (Bright, 2019). However, policies must help scaling up beyond single business cases.

Digital solutions can provide farmers with location-specific agronomic information and tailored advisory services at lower costs. Agritech and data-related start-ups are on the rise across the continent: Farmerline and Esoko in Ghana, Data Science in Kenya, Korbitec in South Africa, OroData in Nigeria and Eduweb in Kenya (UNECA, 2018). Governments can collaborate with tech companies to diffuse affordable and user-friendly solutions for agricultural extension services and spread the best farming practices. Here are some case studies, which stakeholders could use for mutual learning and scaling up:

- **Ethiopia's** Agricultural Transformation Agency has developed the Ethiopian Soil Information System, or EthioSIS. This system provides a digital map analysing the country's soils down to a resolution of 10 km by 10 km which it updates regularly (Annan, Conway and Dryden, 2015; das Nair and Landani, 2020). Soil mapping has resulted in yield improvements of up to 65%, thanks to more informed use of fertilisers and better soil management.
- In **Kenya**, DigiFarm for Consumer allows financial service providers to connect to its platform, access farmers' data and offer them services on the hub (GSMA, 2019a).
- In **Malawi**, weather-based index insurance, the provision of drought-tolerant seeds and ICT-enabled weather information services assist farmers. Some 140 000 rural smallholder households have benefited.
- In **Uganda**, the MUIIS initiative provided weather forecasts, agronomic information and access to financial services to smallholder farmers, increasing yields and incomes for over 200 000 farmers.

New digitally-enabled business models can help improve product traceability for international trade. In Botswana and Namibia, radio frequency identification (RFID) chips are being used in the beef sector to better track and monitor animals' health status and movement (Deichmann et al., 2016; World Bank, 2016). Blockchains offer promising solutions for real-time tracking and tracing of the origins of products at lower costs (OECD, 2019a). For example, Anheuser-Busch InBev applies blockchain systems to collect geo-location tags and match farmers' profiles for each transaction in the supply chain (AB-InBev, 2019). Although promising, some challenges remain to be addressed to scale up the use of blockchain technologies in Africa's agri-food value chains (Box 2.3).

Other promising innovations for agricultural development include shared-economy models and digital tools for land rights. Pay-as-you-go (PAYGO) renting models allow users to pay for lumpy investment goods in small increments (CTA, 2019). Examples include ColdHubs (for cold chains in Nigeria), Kobiri (for the rent of mechanised equipment in Guinea) or SunCulture (for solar irrigation pumps in Kenya). In partnership with the local authorities and blockchain-based start-ups, countries such as Ghana, Rwanda and Zambia have developed new solutions to manage land titling (see Annex 2 A2 for further details).

Box 2.3. **Key challenges to applying blockchains in the agri-food value chain**

A blockchain is a digital database containing information such as records of individuals, land and financial transactions that can be simultaneously used and shared within a large decentralised, publicly accessible network (i.e. a distributed ledger). It stores transactions between parties efficiently and in a verifiable and permanent way (CTA, 2019). All users on the network hold an identical copy of the ledger, which makes the blockchain theoretically undisputable and tamper-proof (OECD, 2018b).

Despite the potential to transform the agri-food industry in Africa, scaling up blockchain-enabled solutions meets important challenges:

- **Technical challenges.** The high-energy consumption, poor cost efficiency and transaction speed of blockchains pose challenges to its scalability. Another challenge is to link public and private ledger types, as they use different systems. Leonard (2019) recently projected that 90% of blockchain-based supply chain projects would stall by 2023 due to technological concerns.
- **Regulatory challenges.** On an institutional and regulatory level, another huge challenge is merging the current complex legal frameworks – that govern rights of ownership and possession along supply chains and across borders – with blockchains and smart contracts. As transparency is a fundamental element of blockchains, there should be careful consideration of the types of data to protect and disclose and of ways to incentivise supply chain actors to share data.
- **Building digital capacity challenges**. The complexity of blockchain systems requires building digital capacity throughout the whole agricultural ecosystem. In the 2017 Geodis Supply Chain Worldwide survey, only 6% of supply chain professionals said they completely keep track of their tier-two suppliers, likely due to the high cost of investigation (Geodis, 2017). Further experimentation and adjustment are needed to adapt the technologies to the local context. Recent blockchain application for responsible business conduct in the mineral value chains in Burkina Faso, the Republic of the Congo (Congo), Mali and Niger suggests that the technology can only complement and not substitute in-person verification (OECD, 2019b; OECD 2018c).

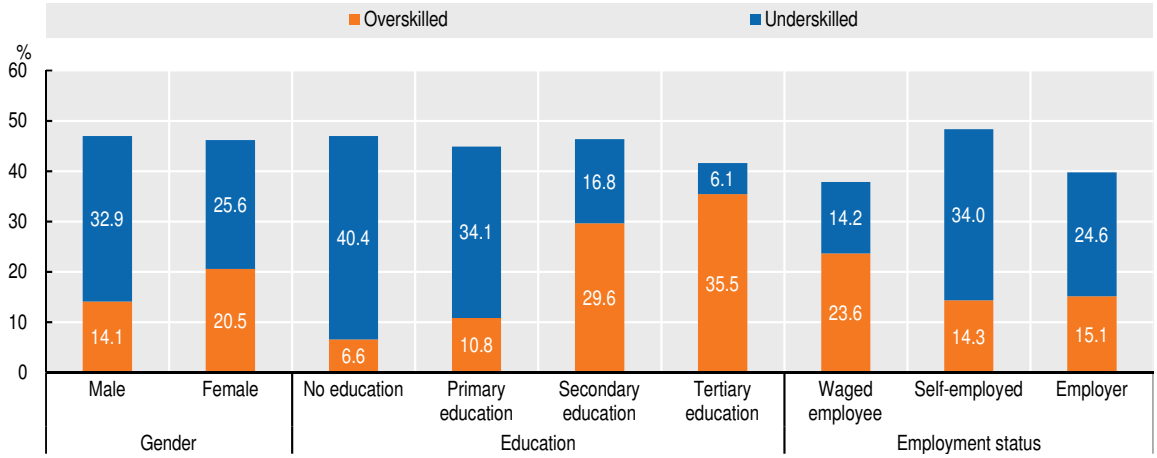
Skills development, labour regulations and policies for financial inclusion are critical to preparing African workers for the digital transformation

Policy makers need to forge new alliances for skills development and improve school-to-work transitions for youth

Most young Africans have skill sets that do not match their local labour markets. Between 2000 and 2020, Africa has made impressive progress in secondary and tertiary education completion rates among its youth (Chapter 1). However, both under-qualification and over-qualification of young workers in labour markets are pervasive across the continent (Morsy and Mukasa, 2019; AfDB, 2020). Surveys across 11 African countries highlight that nearly one in two youth feels his or her skills are inappropriate for the local labour markets, with 28% of youth feeling underqualified and 17% feeling overqualified. High educational attainment does not guarantee a better match: 35.5% of young graduates from the tertiary education feel overqualified for their jobs, while 6.1% feel underqualified (Figure 2.5). This skill mismatch creates dissatisfaction at work, affecting

the overall productivity of the workforce and impeding firm dynamism, profitability and competitiveness (OECD, 2017b).

Figure 2.5. **The proportion of youth with skills mismatches in ten African countries, by gender, educational attainment and employment status**



Notes: All estimations account for sampling weights. The ten countries included are Benin, Congo, Egypt, Liberia, Madagascar, Malawi, Tanzania, Togo, Uganda and Zambia. The shares of respondents with appropriate skills (not shown) and of over-skilled and under-skilled respondents add up to 100%.

Source: Adapted from Morsy and Mukasa (2019) based on ILO's School-to-work transition survey data for ten African countries across various years.

StatLink https://doi.org/10.1787/888934203491

Africa's education systems will need to equip youth with additional skills for the digital era. It is difficult to guess which specific skill sets will be the most demanded in local job markets within 10 or 15 years. Skills such as problem-solving and resilience will certainly be key to adapt to changing labour market conditions (World Bank, 2016). Youth will also need solid foundational skills, including good literacy, a basic knowledge of science, technology, engineering and mathematics, and digital skills. In Benin, Liberia, Malawi and Zambia, 60% of employers on average equally value technical skills (efficient use of materials, technology equipment and tools) and soft skills (teamwork and communication) as capital factors for their business development (Arias et al., 2019). Going up the value chain, jobs in activities such as marketing, logistics and quality control as well as in agri-business will require more advanced technical skills including data analytics or digital marketing (ACET, 2018; AUC/OECD, 2019).

School-to-work transition programmes need rethinking, in term of both focus and implementation. About 70% of Africa's population are under 30 years old. A significant proportion of this young labour force is not in education, employment or training. They are outside the education and training systems, jobless or own-account workers in the informal sector. Low levels of Internet usage among these youth (see Figure 1.8 in Chapter 1) could limit the reach and effectiveness of approaches such as Massive Open Online Courses or on-job training within enterprises.

Policies should focus more on developing a wider skill base for young people. In most African countries, the formal sector is too small relative to the size of the youth cohorts entering the job market. For example, in Nigeria, the African country with the largest population, the local economy created an estimated 1.6 million formal sector jobs between 2013 and 2016. This compares to about 9 million youth turning 18 in Nigeria over the same period (Mastercard Foundation/Laterite, 2019). With such a job shortage in the formal economy, policies should focus more on developing a wider skill base for young

people. The gender gap in digital skills is particularly worrying (E-skills4girls, 2020). Box 2.4 provides examples of gender-sensitive policies supporting skills development across the continent.

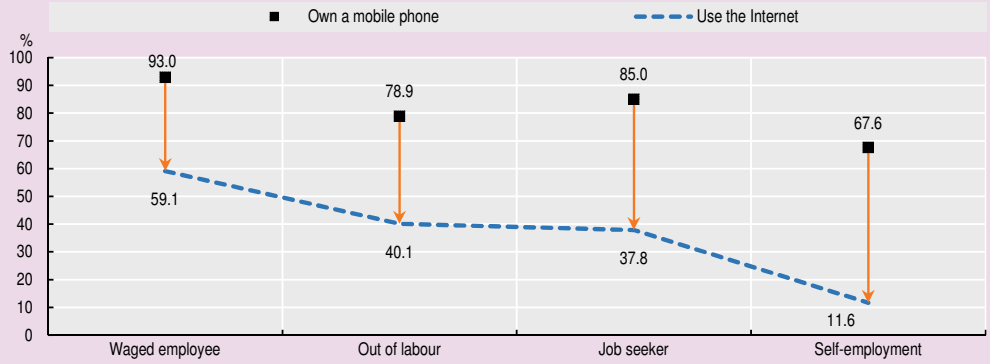
Tech hubs, incubators and tech companies can be of great relevance in preparing Africa's youth for the transition to work. They can help design more effective training methods and new channels for lifelong learning and strengthen informal training institutions. A number of global tech companies are now carrying out initiatives around entrepreneurship and the development of digital skills for young Africans. Boot camps and joint incubation programmes with local tech hubs are part of this vibrant ecosystem. Academic programmes are creating new alliances with these actors.

- In 2019, Microsoft launched its Africa Development Centre in Nairobi. The company expects to invest over USD 100 million in infrastructure and employment of qualified local engineers over the first five years of operation. It is also engaging in a number of training initiatives on the continent.
- In May 2018, Facebook launched NG_HUB in Lagos in partnership with the Co-creation Hub to provide 50 000 young Nigerians with skills for own-business development and to nurture a strong mutual learning community of entrepreneurs (Oludimu, 2018). Beyond Lagos, the company has partnered with seven other tech hubs across the country (Jackson, 2018). #SheMeansBusiness (launched in March 2018) is another entrepreneurship training programme. It helps Nigerian women start and grow their own businesses.
- In partnership with Facebook and Google, the African Institute for Mathematical Sciences (AIMS) created a new master's degree programme, "African Masters in Machine Intelligence", in 2018. AIMS is a pan-African network of centres of excellence in the areas of science, technology, engineering and mathematics.

Box 2.4. **Examples of gender-sensitive policies supporting skills development in Africa**

Africa has the widest digital gender gap (25%). Among Africa's young women, aged 15-29, the self-employed lag far behind others in terms of Internet usage (Figure 2.6).

Figure 2.6. **Mobile phone and Internet usage among Africa's young women, aged 15-29, by employment status**



Source: Authors' calculation based on Afrobarometer (2019), *Afrobarometer* (database).
StatLink https://doi.org/10.1787/888934203510

Box 2.4. **Examples of gender-sensitive policies supporting skills development in Africa (*continued*)**

Benin, Ghana and Rwanda focus their Universal Service and Access Funds (USAFs) on skill acquisition programmes for women entrepreneurs. The USAFs offer a promising path for implementing policies to reduce digital gender gaps in Africa (Thakur and Potter, 2018):

- The Rwanda Universal Access Fund supports the Ms. Geek Africa programme – a competition run by Girls in ICT. Rwanda aims to encourage African girls, aged 13-21, to participate in the fields of science, technology, engineering and mathematics. Winners receive prizes in cash and equipment as well as training and mentorship to further develop their innovations, which seek to address some of Africa's pressing challenges.
- Ghana's Investment Fund for Electronic Communications (GIFEC) has invested in the Digital for Inclusion programme, which comprises, among other things, mobile financial services via a digital payment platform. The programme has reserved 60% of the local sales agent positions for women.
- In Benin, l'Agence Béninoise du Service Universel des Communications Électronique et de la Poste has supported the OWODARA project. This project developed a mobile phone-based system to provide prices of local agricultural goods (e.g. corn, millet, soybeans, peanuts) for the benefit of rural women entrepreneurs.

Other interesting initiatives focus on technical and vocational education and training for women. This is the case for Women and Digital Skills (Ghana), W.TEC (Nigeria) and WeCode (Rwanda). The regional chapters in this report provide further details on these initiatives.

Source: Authors' compilation.

The emergence of iWorkers calls for specific policies

With the expansion of e-platforms, a new category of own-account workers is on the rise on the continent: the iWorkers. Their work is entirely fuelled by the use of digital platforms and applications (such as Uber, Delivroo, Upwork, online click-work), through which prices and payments arrangements are set (OECD, 2016; Stanford, 2017). They remain self-employed but depend almost entirely on digital platforms to connect to their clients. In Africa's cities, iWorkers are flourishing in jobs such as driving taxis, delivering food by motorcycle (Lakemann and Lay, 2019) and designing websites. Mastercard Foundation (2019) estimates that iWorkers could make up more than 10% of Africa's total labour force by 2030.

While these "new forms" of self-employment provide opportunities to reach a wider customer base and pay lower operating costs, job quality is a concern. Many iWorkers face precarious working conditions (OECD, 2016; Graham and Woodcock, 2018). An Eurofound/ILO (2019) survey conducted in 75 countries between 2015 and 2017 found that: i) compensation is often lower than minimum wage in the respective countries, ii) incomes are often unpredictable, and iii) workers do not benefit from standard labour conditions as in a formal employment relationship.

Policy makers should start setting solid regulatory schemes and social protection for iWorkers. A number of African countries have recently assessed the working conditions for this category of own-account workers. In 2017, Egypt became the first African country to issue a national e-commerce strategy. In 2018, Liberia conducted a country-level assessment

of e-commerce platforms. Policies should also support collective action to help better regulate platform work. For example, in Kenya, a group of online workers came together to set up an association in 2019, the first experience of its kind in the country (Melia, 2020).

Additionally, the global nature of online labour platforms calls also for an international approach to domestic actions. These platforms often have headquarters outside of Africa and do not fall into the jurisdiction of African governments. Unilateral tightening of regulation may put African workers at a disadvantage with workers elsewhere and potentially eliminating this livelihood option. Co-operation is key:

- Setting international standards for responsible business conduct for lead platform companies can help tackle practices such as "uncontestable non-payment" (Berg et al., 2019).
- Promoting certification, such as Fairwork, on employment conditions for platforms can also help hold these platforms accountable (Graham and Woodcock, 2018).

African governments can help increase the availability and adoption of fintech solutions for the informal economy

Financial technologies are key to boost financial inclusion among actors in the informal economy. For example, in Tanzania, the deployment of a mobile learning and interactive SMS system on financial literacy content, Arifu (integrated into M-Pawa, a mobile savings and loan product) significantly improved saving and borrowing behaviours among smallholder farmers. Arifu users took out larger loans (TZH 1 017/USD 0.44), repaid them quicker (by 5.46 days) and had larger first payments (TZH 1 730/USD 0.76 more) (Dyer, Mazer and Ravichandar, 2017). Similarly, the Ugandan mobile savings and loan product, MoKash, tackled illiteracy in rural areas by providing a didactic platform with pictorials instead of text, as well as on-the-ground help to assist customers with registering and performing initial transactions.

The spread of fintech – technology-enabled innovation in financial services – offers new ways of doing business. For example, the convergence of social media, mobile e-commerce and digital payments could disrupt the retail sector rapidly. In eight African countries,[2] 90% of sales of consumer goods go through informal retail distribution channels (PwC, 2016). Small retailers around the world consistently identify the same sets of issues where digital solutions could add real value: working capital financing, payment solutions, customer relationships, inventory managing and business intelligence (e.g. forecasting and business statics) (CGAP, 2019). A recent policy review (OECD, 2020a) shows that fintech is driving innovative funding mechanisms for smaller enterprises, such as recoverable grants, pay-for-success convertible notes and blockchain-based financing solutions (OECD, 2019c; CFF, 2018).

Fintech can help informal firms to formalise by allowing them to progressively adopt formal tools and processes. Currently, 50% of all own-account workers in Africa's informal economy have a smartphone (ILO, 2018). Mobile money services are often the first formal financial channel used by informal actors (GSMA, 2019b; Klapper, Miller and Hess, 2019). Some informal firms already utilise digital applications and free social media tools to promote their products and services. Empirical evidence shows that adopting mobile financial services reduces the size of the informal sector in developing countries by 2.4 to 4.3 percentage points of gross domestic product (GDP) (Jacolin et al., 2019).

African policy makers can capitalise on regulatory reforms in fintech to expand the availability of fintech innovations. Box 2.5 highlights a number of regulatory initiatives in Africa. In 2019, Rwanda was the world's top country in the GSMA Mobile Money Regulatory Index, which scores 90 countries based on the extent to which their regulatory framework

enables widespread mobile money adoption (GSMA, 2019c). Five other African countries were classified in the top 10 (Malawi, Lesotho, Liberia, Tanzania and Burundi) and another five in the top 20 (Ghana, Angola, Guinea, the Democratic Republic of the Congo and Kenya).

Box 2.5. **Examples of regulatory sandboxes in African countries**

"A regulatory sandbox refers to a limited form of regulatory waiver or flexibility for firms, enabling them to test new business models with reduced regulatory requirements. Sandboxes often include mechanisms intended to ensure overarching regulatory objectives, including consumer protection. Regulatory sandboxes are typically organised and administered on a case-by-case basis by the relevant regulatory authorities" (OECD, 2019d; Attrey et al., 2020). To meet their potential, regulatory sandboxes need to i) have a clear thematic focus and policy objectives), and ii) adopt a transparent and standardised selection process.

Table 2.1. **Operational regulatory sandboxes in Africa**

Country	Creation	Examples of products tested
Mauritius	2016	• Blockchain and cryptocurrency (Be Mobile, FusionX, PIRL, SALT Technology Ltd, XenTechnologies Ltd) • Credit and capital solutions for individuals and SMEs (Finclub) • Crowdfunding (Olive Crowd, FundKiss) • Identity management system (Selfkey)
Sierra Leone	2018	• Mobile payment aggregator (Noory, MyPay) • Saving facility for farmers (icommit) • Mobile educational application, financial literacy content (InvestED)
Mozambique	2018	• Online payment aggregator system (Quick-e-Pay, PagaLu) • Digital banking solution (Zoona and Socremo) • Remittances facility (Mukuru)
Kenya	2019	• Crowdfunding platform (Pezesha Africa Limited) • Cloud-based data analytics platform (Innova Limited)

In certain cases, policy makers may encourage the adoption of digital financial services by informal actors. For example, in 2014, the Government of Uruguay created tax incentives to promote the use of digital payments by firms and consumers; in the following three years, formal financial transactions increased sevenfold (Klapper, Miller and Hess, 2019). Similarly, in the framework of the Rwanda National Payment System (RNPS) Strategy 2018-2024, the National Bank of Rwanda and the Ministry of Finance and Economic Planning now actively encourage network operators and payment service providers to propose digital payment solutions to merchants (NBR, 2017). Other initiatives that provide digital legal identity to citizens such as Digital ID Blueprint for Africa are critical to enhance the functioning and trustworthiness of digital financial services.

Interoperability is key to sustain the diffusion of fintech and mobile money services, notably to accelerate the creation of Africa's common digital market. Interoperability is the ability of different IT systems to access, exchange and use information seamlessly in real time, enabling all participants to operate across all systems. So far, cross-network transactions do not take place in real time, and their unit cost is high (Ndung'u, 2019). Initiatives for regional interoperability are now taking root across the continent. For example:

- In July 2018, the East African Securities Regulatory Authorities agreed to employ regulatory sandboxes to encourage innovation among capital market practitioners who operate regionally (Wechsler, Perlman and Gurung, 2018).
- In 2018, Orange and MTN, two of the continent's largest operators, created Mowali, a digital payment infrastructure connecting mobile money services within one inclusive network in 22 African countries.

- Regional Economic Communities such as the West African Economic and Monetary Union (WAEMU) and the Southern African Development Community (SADC) are also developing projects to streamline payments in their regions and bring region-wide interoperability. These initiatives are particularly important in the context of the AfCFTA implementation.

Policies for digitalisation can empower Africa's dynamic enterprises to compete and innovate

Chapter 1 highlighted that two promising groups of entrepreneurs can benefit the most from using digitalisation to scale up and create new jobs. A first group is mostly dominated by early-stage start-ups and high growth SMEs bringing new technologies and business models to disrupt or create new markets. A second group is dominated by start-ups and SMEs that deploy existing products or proven business models as they seek to grow through specialisation in niche markets, market extension or step-by-step innovations. Implementing policies that empower these dynamic entrepreneurs to compete, grow and create more jobs in the digital era is critical.

Trade facilitation and competition measures are critical to ensure African firms can participate in digitally-enabled trade

Innovative entrepreneurs need global business partners and a regional mindset to grow. Connecting new African entrepreneurs with existing worldwide ecosystems or clusters can provide them with access to funding, markets, talent and support systems. This can enhance their innovation capabilities and positively affect their confidence, competitiveness and growth prospects (Accenture, 2019). In South-East Asia, many successful start-ups, such as the e-commerce giant Lazada and the transportation and logistics app Grab, were born with a regional mindset that helped them grow early and fast (Forbes, 2019).

Digital connectivity can enable Africa's entrepreneurs to enter new niches. To be reachable online, SMEs can opt for developing their own website or for using social media or specialised trade platforms (Amazon, Alibaba, Jumia, etc.). These digital tools enable payment arrangements and better communication tools, co-ordination and tracking systems along the value chain while increasing visibility to potential customers and business partners. For example, a number of small tourism companies in East Africa have successfully served new niche activities within wildlife tourism and eco-tourism and for tourists from emerging markets (Foster et al., 2017). Results from an econometric analysis of 27 000 manufacturing SMEs in 116 developing countries (including 31 African countries)[3] confirm that SMEs which adopt digital technologies are more likely to engage in international trade. Having a website is positively associated with a 4.6 percentage point increase in the share of imports among firm inputs and a 5.5 percentage point increase in the share of direct exports in firms' sales.

With the appropriate digital tools and skill sets, entrepreneurs can produce digitally delivered services and avoid weak transport and logistics infrastructure. Since 2015, electronic transmission has become the dominant mode used in Africa's trade in professional services (such as finance, insurance ICT and technical support). It accounted for USD 18.8 billion, or 57% of Africa's export in professional services in 2017, up from USD 8.0 million in 2005. The gaming industry is another promising area. Forecasts say the gaming industry will surpass USD 200 billion of revenue globally by 2023, up from an estimated USD 145.7 billion in 2019 (Newzoo, 2019). In 2016, Kiro'o Games released Aurion, an African-themed video game, to the global market via the Steam platform. This small company of 20 employees, based in Cameroon, raised USD 57 000 in April

2016 to develop games from 1 310 backers through Kickstarter, an online crowdfunding platform (Kickstarter, 2019). It joins a recent wave of African video game makers from Egypt, Nigeria and South Africa that focus on producing unique, local narratives for the continental market (Dahir, 2017).

Trade facilitation measures remain critical in the era of digital trade

The high costs of moving physical goods, combined with slow and unreliable custom processes, hamper Africa's intra-regional trade and SMEs' survival rates on export markets. Jumia's recent exit from Cameroon, Rwanda and Tanzania highlights this problem (Financial Times, 2019). Only 18% of new exporters in Africa survive beyond three years (AUC/OECD, 2019). In addition, only 11.2% of African SMEs have an internationally recognised quality certification.

Policies should aim to improve regulation and remove bottlenecks along the following segments of cross-border e-commerce: the online creation of businesses, international e-payments, cross-border deliveries, aftersale services, and standards and certification (WTO, 2018).

- **Cross-border recognition of e-documents is essential.** Streamlining and interconnecting customs administrations through one-stop border posts (OSBPs) could simplify administrative procedures for regional trade. For example, the East-African Community (EAC) has reduced transit times and costs by fully operationalising the OSBPs in all its member countries in November 2018 (EAC Secretariat, 2018).
- **Regulatory harmonisation needs to accelerate in certain areas.** These include licences for e-commerce, online tax registration and declaration for non-resident firms, electronic authentication and payment, online dispute resolution, and intellectual property rights. SMEs may not be able to comply with many national legislations on data and digital trade (OECD, 2004; Ferencz, 2019; Koski and Valmari, 2020). Regional Economic Communities are well-placed to:
  - Co-ordinate the establishment of coherent data protection frameworks that are compatible with international standards
  - Promote communication and support initiatives on compliance mechanisms.

Regulators and competition authorities need to safeguard against anti-competitive behaviours in the digital marketplace

The digital marketplace can enhance SMEs' access to markets by lowering installation costs, improving co-ordination with distant partners and enhancing access to information. Global online platforms such as Alibaba, Amazon, eBay and TripAdvisor and regional ones such as Jumia, Takealot and Kilimall increase SMEs' visibility while requiring little initial investment. E-commerce in Africa remains limited due to a low level of trust in online shopping and difficulties in shipping and paying across borders (López-González and Jouanjean, 2017). Amazon currently accepts sellers from only 23 African countries.[4] Google Play Store accepts developer registration from 37 African countries and merchant registration from 27 African countries.[5] Thus, developers and merchants from the other African countries cannot sell goods or applications on these platforms.

Governments must ensure competition in the digital economy so that many more African firms can join e-commerce platforms. Monopoly control over data and differences in scale can affect the distribution of gains between firms operating on e-platforms. Calligaris, Criscuolo and Marcolin (2018) document firm-level mark-ups across 26 OECD countries to show that, in digital sectors, a few "superstar" firms enjoy disproportionate

market power and account for a higher share of the profits. Firms operating in "digital intensive" service sectors enjoy a 2-3% higher mark-up than firms operating in less digital intensive sectors. The gain is substantially higher (up to 43%) if a firm is operating in one of the top digital sectors. This differential widened during the period of study, 2001-14, and resulted mostly from the steep increase in mark-ups for the top firms.

Regulators and competition authorities need to ensure that competition policies and investigation tools are up to date and agile enough for data markets regulation. The digital transformation may introduce new dimensions of competition in markets and new ways to achieve anticompetitive outcomes, such as the use of algorithms to collude or the anticompetitive acquisition of start-ups by incumbent players (OECD, 2020b; OECD 2018d). Competition laws need, for instance, to limit exclusivity requirements and preserve "multihoming" where sellers can work with multiple platforms.[6] In addition, dominant e-commerce platforms can substantially favour their own brands through recommendation systems and unmatched advantages in market data. To address these two issues, in 2018, Indian regulators banned foreign e-commerce platforms from imposing exclusivity requirements and selling products from companies in which the platforms had equity. The OECD Competition Assessment Toolkit can also assist governments in eliminating barriers to competition in a changing environment by providing a method for identifying unnecessary restraints on market activities and developing alternative, less restrictive measure. In 2019, Tunisia applied this methodology to review the competitiveness and efficiency of its wholesale and retail trade sectors, as well as road and maritime freight transports (OECD, 2019e).

Governments can actively promote open standards and fair access for businesses to data and to consumers on platforms while balancing legitimate concerns about personal privacy rights. Consumer data can increasingly serve as a competitive asset when providing products at a price of zero, or when developing personalised prices. Users' data and content will also need to be portable across platforms so that data transfer does not bar users from switching to a superior platform. For example, regulators could make it mandatory for e-platforms to adopt open policies for their application programme interfaces (API). An API contains the set of routines, protocols, and tools that specify how different software should interact. Bilateral and regional co-operation may be needed across borders to ensure that common standards are applied and that information is available to regulators (OECD, 2020b).

Dedicated initiatives can support intellectual property registration for start-ups

Too few African entrepreneurs file for intellectual property (IP) protection. In 2018, only 17 000 patent applications, or 0.5% of the worldwide total (Table 2.2) were registered in Africa, of which a large majority (81.6%) emanated from non-residents (WIPO, 2019).

Table 2.2. **Numbers of applications for patents, industrial designs and trademarks by world region, 2018 (percentage)**

	Patent	Industrial design	Trademark	Total (all types of IP)
Africa	0.5	1.3	1.7	1.5
Asia	66.8	69.7	70.0	69.5
Europe	10.9	23.0	15.8	15.4
Latin America and the Caribbean	1.7	1.2	5.3	4.3
North America	19.0	4.1	5.8	8.0
Oceania	1.1	0.7	1.4	1.3
World (total)	**100**	**100**	**100**	**100**

Source: Authors' calculations based on WIPO (2020), *WIPO Statistics Database*, October 2019.

In most cases, the IP registration process remains costly, slow and cumbersome to navigate for local start-ups and inventors. For example, the cost to register and maintain a 30-page patent for the ten first years is about USD 37 000 in the ARIPO (African Regional Intellectual Property Organization) system and USD 30 000 in the OAPI (Organisation Africaine de la Propriété Intellectuelle) system (see Table 2.3). This is about 6 to 7 times higher than in South Africa (USD 5 216) or in Malaysia (USD 4 330) and more than 10 times higher than in the United Kingdom (USD 2 500). Relative to the country's income level, Kenya's patent registration fees are 13.3 times its GDP per capita, while for Senegal and Ethiopia the ratio is 10.2 and 7.9, respectively (Brookings, 2020). Consequently, most of Africa's young innovators find themselves obliged to market their products without IP protection (ITC, 2016).

Table 2.3. **Estimated patenting costs in ARIPO and OAPI systems and in South Africa (in USD)**

Stage of patent process	Costs – ARIPO* (USD)	Costs – OAPI** (USD)	Costs – South Africa (USD)
Filing	1 797	5 150	1 589
Examination	1 165	n/a	n/a
Prosecution	1 060	2 879	120
Grant	1 830	1 62	180
Cumulative annuities	31 990	21 941	3 327
Total	37 842	30 132	5 216

Note: *ARIPO: African Regional Intellectual Property Organization. **OAPI : Organisation Africaine de la Propriété Intellectuelle. n/a = not applicable.
Source: De Andrade and Viswanath (2017), *The Costs of Patenting in Africa: A Tale of Three Intellectual Property Systems.*

Policies need to support entrepreneurs register and defend their copyrights, brands, patents, industrial designs and trademarks. Making it easier to use IP (in particular patents and design rights in specific business activities) will help some young firms to obtain financing, drive job growth and spur innovation (OECD, 2015). In most African countries, three areas require particular attention:

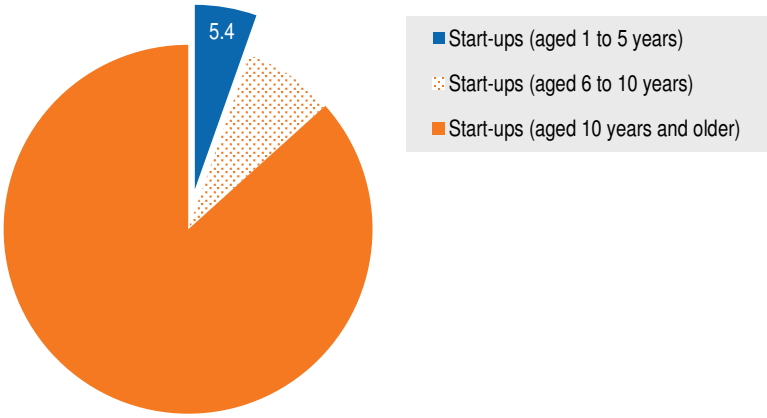
- **Streamlining application procedures.** An example of best practice comes from Kenya. In 2015, the Kenya Copyright Board collaborated with Microsoft 4Afrika to develop more user-friendly interfaces for registration. Innovators in Kenya are now able to register their IP and obtain copyrights through an automated online registration system. They can also receive a patent, trademark or certification mark from the Kenya Industrial Property Institute (ITC, 2016). The system resulted in a 100% increase in applications in the first four months and expanded to serve the Common Market for East and Southern Africa (Microsoft, 2016).
- **Reducing examination times and lowering the costs of IP registration for local entrepreneurs.** Since 2016 in India, for example, the government has set up a fast-track scheme to enable start-ups to register patents and trademarks for their inventions. Selected facilitators provide start-ups with high-quality services throughout the filing application process, including fast examination of patents at lower fees. The government bears all facilitator fees, and the start-ups enjoy an 80% reduction in the cost of filing patents.
- **Strengthening the IP rights enforcement mechanisms and simplifying the procedures for their owners to receive royalties.** In Nigeria, for example, about 70% of surveyed stakeholders considered that weak enforcement of the country's intellectual property regime caused adverse effects on the Nollywood movie industry (Oguamanam, 2018). SMEs, online content producers and stakeholders in the creative economy often lack the resources and knowledge to defend their IP rights. In 2013, the Nigeria Copyright Commission disclosed that the country was losing over USD 1 billion to piracy annually (ICC/BASCAP, 2015).

Policy makers can support funding mechanisms for start-up ecosystems

Venture capital (VC) funding for Africa's start-ups grew sevenfold between 2015 and 2019. Tech start-ups raised a total of USD 2.02 billion in VC funding in 2019, a 74% increase compared to USD 1.16 billion in 2018 (Partech, 2020). Most (54.5%) VC funding went to fintech and the financial sector.

The funding ecosystem for entrepreneurs remains fragile and inadequate. Just four countries (Egypt, Kenya, Nigeria and South Africa) have attracted the lion's share (85%) of these VC funds. In a sample of 7 000 African start-ups, less than 10% have been able to raise funds from investors and venture capital. Only 5.4% of the total funds raised went to start-ups younger than five-years-old (Figure 2.7). Start-ups founded by women in particular lack financing (see Box 2.6). Financing for Africa's start-ups and SMEs in general remains far below need. The International Finance Corporation (IFC, 2017) estimated that the 44 million micro, small and medium-sized enterprises in sub-Saharan Africa needed USD 404 billion of finance in 2017, creating a financing gap of approximately USD 331 billion, or 16% of the continent's GDP.

Figure 2.7. **Distribution of funding for Africa's start-ups, by age of the start-up (as a percentage of total funds raised)**



Source: Authors' calculations based on Crunchbase (2019), *Crunchbase Pro* (database).
StatLink https://doi.org/10.1787/888934203529

Box 2.6. **Entrepreneurship and financing challenges for African women**

Dynamic female entrepreneurs are prevalent in Africa, with some emerging in digital activities. Out of 58 countries around the globe evaluated by the Mastercard Women Index 2019, Botswana, Ghana and Uganda recorded the highest percentages of women-owned businesses (Mastercard, 2019). Moreover, a significant proportion of women are opportunity-driven entrepreneurs in those countries: 54% in Uganda, 50% in Botswana and 44% in Ghana.

- **Young African women are the most entrepreneurial worldwide.** Globally, the highest total entrepreneurial activity (TEA) rates for women are found in sub-Saharan Africa (21.8% to 25.0%), followed by Latin America and the Caribbean (17.3%), while the global average rate is 10.2% (Elam et al., 2019). TEA represents the percentage of the adult working-age population (aged 18-64) who are either nascent or new entrepreneurs. In Nigeria, nearly four in every ten working-age women are engaged in early-stage entrepreneurial activity (40.7%).

Box 2.6. **Entrepreneurship and financing challenges for African women** ***(continued)***

- **Female-led digital start-ups are taking a stronger hold across the continent.** In **Nigeria**, for example, the personal savings and investment platform PiggyVest, launched in 2016, counts more than 350 000 users saving a total of over USD 2.7 million across the country every month. **Uganda's** JusticeBot is an online platform that helps the public access justice by providing free legal information and connecting people to legal service providers, through an always-on chatbot on Facebook's Messenger. **Botswana's** Tempest Gold is a property digital platform that facilitates both landlord-tenant relations and property listings management.

However, female-led start-ups, or those with at least one female founder, receive a much smaller share of the flow of global venture capital funding. In 2018, start-ups in emerging markets with a woman on their founding team received 11% of seed-financing and 5% of later-stage venture capital (IFC/We-Fi/Village Capital, 2020). In Africa, women-led start-ups only received 2% of the venture capital funding in 2019.

Adapting risk assessment methods, directly funding acceleration programmes, public procurements, and tapping sovereign wealth fund can improve funding for local start-ups

Local banking and most local VC investors rely on the cash flow-based valuation system, which works well for older asset-based companies but often undervalues young enterprises with rapid growth potential. Consequently, many early-stage entrepreneurs face obstacles in obtaining loans from local banking systems, in spite of having promising business ideas. For example, among the 93 fast-growing tech firms located in the Yabacon Valley (Lagos) surveyed by Ramachandran et al. (2019), 60% reported access to finance (and in particular local investments and VC) as a major or severe obstacle.

It is urgent to adjust risk assessment and valuation methods for entrepreneurs. Traditional risk assessment and valuation approaches may fail to grasp the full potential of local entrepreneurs. Evaluating start-ups requires a greater emphasis on their business models, including suitability for the local context, scope for business expansion on the targeted market segments, team composition, motivation and education profiles. So far, few experienced investors have started considering these alternative valuation methods for start-ups (Wulff, 2020). African governments can use public guarantee mechanisms to encourage business angels and private venture capitals to invest more in entrepreneurs. Making data publicly available on entrepreneurial activities can help identify high-potential new businesses, provided it respects international standards and laws on data privacy and data protection. Capacity building agencies, such as incubators, foundations, training institutes and mentoring programmes, can help entrepreneurs prepare their projects better in order to attract more investment.

Governments can carry out direct funding and acceleration programmes for start-ups. Start-up accelerators aim to help companies scale up by connecting them to investors, business partners and clients. In some cases, they also provide some start-up capital, generally in exchange for an equity participation. The case of Egypt offers an illustrative example (see Annex 1.A2 in Chapter 1).

Prudent public procurements can boost demand for start-ups. In 2012, the Federal Government of Nigeria decided to test an innovative mobile phone-based input subsidy

programme that provides fertiliser and improved seed subsidies through electronic vouchers. A four-year contract was awarded to Cellulant, a local fintech start-up, to create a mobile wallet solution (e-wallet) connecting farmers with input-suppliers and financial institutions. This programme has become one of the largest agritech solutions in Africa using mobile wallet technology (Cellulant, 2019). Through this initiative for agricultural inputs, called the growth enhancement support scheme, the Nigerian government distributed USD 7.3 million in subsidies to farmers. Since 2012, the e-wallet technology has delivered services to about 12 million farmers in Nigeria (Cellulant, 2020). Following a satisfactory evaluation in 2016 (Wossen et al., 2017; Uduji et al., 2018), the contract was subsequently renewed for another four years, until end-2020.

Countries with a sovereign wealth fund (SWF) should consider setting up small venture capital funds within their investment structures to support the development of start-up and SME ecosystems. Angola (see Box 2.7), Gabon and Senegal are paving the way. For instance, Angola's SWF (FSDEA) and Gabon's Okoume Capital devoted part of their budget to supporting entrepreneurial start-ups and innovation ecosystems. Senegal's FONSIS (Fonds d'Investissement Stratégiques) invested in Teranga Capital, which in turn provides financing for SMEs (OECD, 2020c). Given the flourishing number of incubators in Africa, sovereign and strategic investment funds could even initiate a partnership with them to help them succeed. In recent years, Africa has been one of the most dynamic regions in the world in terms of SWF creation. From 2009 to 2015, assets under African SWF management increased by 39%, from USD 114 billion to USD 159 billion (Quantum Global, 2017). In 2020, there are 18 SWF currently operating in 14 countries on the continent (SWF Institute, 2020). Six of these African SWFs have assets over USD 1 billion.

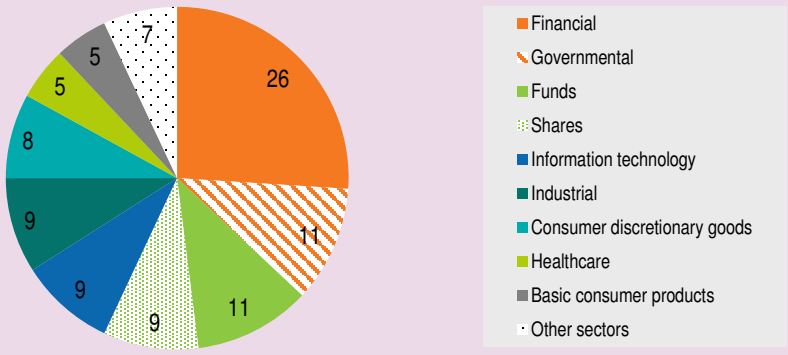
Box 2.7. **Angola's move towards strategic use of its sovereign wealth fund for financing start-ups**

Angola's sovereign wealth fund FSDEA (Fundo Soberano de Angola) targets economic sectors which have a higher return potential and which are central for economic diversification, productivity and structural transformation. It has dedicated investment funds for six strategic sectors – infrastructure, hotels, timber, mining, agriculture and healthcare – and a Mezzanine Investment Fund. The latter targets other emerging opportunities, including start-ups and venture financing. It has a portfolio of USD 250 million for entrepreneurship financing.

The FSDEA's investment portfolio is currently broadly diversified in terms of assets (Figure 2.8) and geographical areas. In accordance with the investment policy enacted by the Executive, two-thirds of the investment portfolio are allocated to private equity activities in emerging and border markets to generate high long-term returns (FSDEA, 2020). However, private equity activity in infrastructure, agriculture, forestry, mining and health in sub-Saharan Africa is emphasised in order to support the socio-economic development of the region. The FSDEA has a much greater investment focus on regional development in sub-Saharan Africa than other sovereign wealth funds (Markowitz, 2020).

Box 2.7. **Angola's move towards strategic use of its sovereign wealth fund for financing start-ups (*continued*)**

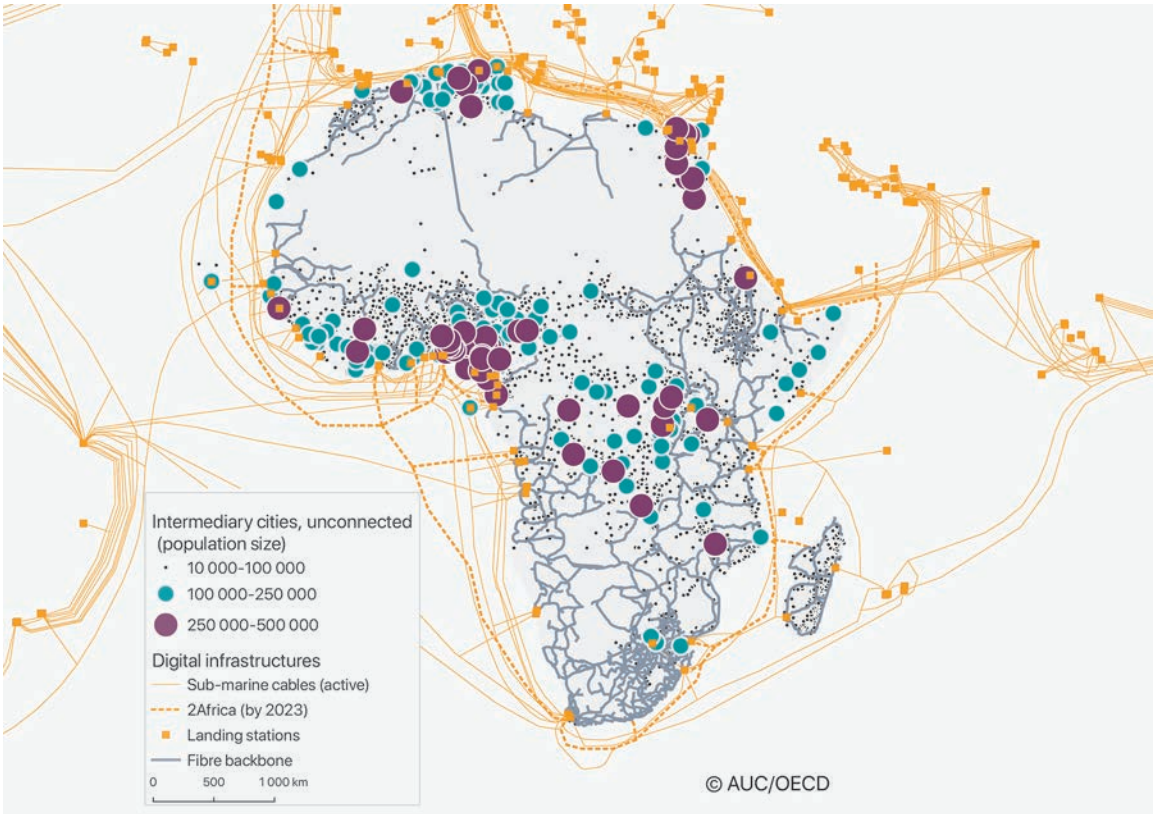
Figure 2.8. **Sectoral distribution of Angola's sovereign wealth fund net investment portfolio, as of July 2020**



Source: Authors' compilation based on FSDEA (2020), "Investment strategy"; Markowitz (2020), "Sovereign wealth funds in Africa: Taking stock and looking forward"; and Quantum Global (2017), "Sovereign wealth funds as a driver of African development".

StatLink https://doi.org/10.1787/888934203548

Annex 2.A1. Mapping Africa's communications infrastructure in 2020 and unconnected intermediary cities by population size



Note: The subsea cable project "2Africa" will connect Europe, the Middle East and 21 landings in 16 countries in Africa, with the aim of delivering high-speed Internet by 2023, and is larger than all active sub-marine cables today. Population size across African cities relies on the Africapolis database (with a 50-country coverage) and other sources of geo-located towns (only for Madagascar).

Source: Authors' calculations based on three main datasets: Many Possibilities (2020), *The African Terrestrial Fibre Optic Cable Mapping Project* (database); OECD/SWAC (2019), *Africapolis* (database); World Bank (2017), *The Southern African Human-development Information Management Network (SAHIMS) static 2017 update: Madagascar - Geo-located Towns* (database).

Annex 2.A2. Leveraging digital tools for land rights: New solutions to a long-standing problem

Improving the governance of land right systems is a crucial part of unlocking economic growth, creating jobs and reducing poverty in Africa. Land titling relies greatly on customary land tenure where land is managed by a village chief, traditional ruler or council of elders: about three-quarter of Africa's land cover is under customary tenure, while statutory tenure is in the form of a renewable fixed-term lease. More than 90% of Africa's rural land is undocumented (Byamugisha, 2013). Table 2.A2.1 highlights some inherent typical problems with such land right management systems.

Table 2.A2.1. **Examples of digital solutions to strengthen the governance of land rights**

Problems	Proposed solutions	Main digital technologies used	Examples
Overlapping property rights claims	Creation of immutable and transparent digital land registries to mitigate risks of error and reduce the average time required to confirm land entitlement	Blockchain	Ghana, Kenya, Rwanda
Housing shortage	Eased purchase mortgage financing to facilitate new housing construction	Web interface and mobile application	Ghana´s BenBen web and mobile application
Mapping of land by type of usage (i.e. agricultural land, forests, urban areas, roads and water)	Use of satellite images and machine learning to validate data accuracy and to improve the mapping of land cover (based on how they appear in the images)	Satellite images and machine learning	Mobile application by Zambia's Ministry of Land and Natural Resources and Medici Land Governance

Ghana, Kenya, Rwanda and Zambia are now applying blockchain-based digital technologies to strengthen their land right systems:

- **In Ghana**, since 2016, digital technologies help create immutable and transparent digital land registries (Ghana's Bitland works with the Land Administration Project, which was created by the Lands Commission and the World Bank). BenBen is a Ghanaian web and mobile application underpinned by blockchain technology that allows certified business actors to manage land records and perform land transactions (e.g. proving ownership, confirming a sale or accessing credit). BenBen has reduced the average time to confirm land entitlement from 12 to 3 months and the average time to receive feedback from the Lands Commission from 30 to 3 days (Berryhill, Bourgery and Hanson, 2018).
- **In Kenya,** the Ministry of Lands announced the adoption of blockchain and artificial intelligence technology to streamline its registry by easing the transfer of information and ensuring transparency and processing of land acquisition. The process of digitising land in Kenya started in 2013 as per Section 9 of the Land Registration Act 2012. It gives the Registrar of Lands the mandate "to maintain the register and any document required in a secure, accessible and reliable format which includes amongst other ways, electronic files" (Bashir, 2018). In March 2019, the ministry announced that phase one of digitisation of land records would be finalised by 2020 (Mwangi and Mutheu, 2019).
- **In Rwanda,** in November 2018, the Rwanda Land Management and Use Authority (RLMUA) and the Rwanda Information Society Authority inked an agreement – renewable to up to two years – with the United States Medici Land Governance (MLG) to design a paperless and corruption-proof process for land registration. The new technology uses blockchain solutions to easily share data, enabling more efficient and rapid land transfers and streamlining workflows. It also creates an interface with Rwanda's tax authorities.

- **In Zambia**, satellite images and machine learning validate data accuracy. Zambia's Ministry of Land and Natural Resources created a mobile application, jointly with the MLG. The memorandum of understanding signed between the institutions in 2018 led to streamlining a titling process that builds on the 50 000 homes on which MLG collected governance information. The next step, begun in May 2019, will lead to the issuance of no fewer than 250 000 certificates of title related to real estate property under the jurisdiction of the Lusaka City Council in and around the capital city.

Tackling land rights is a complex policy issue. Any digitalisation initiative will need to adapt to local conditions and social institutions. First, it is important to ensure appropriate technologies are accompanied by regulatory oversight to safeguard data security and privacy protection. For example, Kenya's Land Registration Act 2012 gave the Registrar of Lands the mandate to develop an electronic land registry programme. However, the programme has stalled due to various challenges including torn and missing land records and poor ownership. Governments wishing to tap into such new technology options will need to implement a set of policies, regulations, workflows and performance standards as well as ensure broad public awareness that goes beyond the technologies themselves (Deininger, 2018). Working with social institutions remains essential in order for a locally legitimate process to adjudicate disputed claims (e.g. clarifying rights and agreeing on boundaries prior to a formal register entry).

Second, the importance of inclusive and empowering solutions, that take into account social institutions cannot be stressed enough. Studies carried out by Toulmin (2009) reveal that, even if the institutional capacity to provide formal land title registration in ways that are fair and reflective of the local context and complexity, such registration is often not needed: the rights of secondary land rights holders (i.e. women and herders) tend to be expropriated because they often are left out of the register. In fact, evidence demonstrates that focusing on titling alone may not necessarily lead to greater tenure security for women. It can instead do the opposite. To ensure tenure security, policies must expand the range of interventions that address internal and external constraints women face when exercising their land rights (Salcedo-La Viña, 2020) to ensure that they can also make land-use related decisions.

Notes

1. In the case of West Africa, the populations of these border cities have been growing faster than those of other cities in the region (OECD/SWAC, 2019).
2. Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Nigeria, Tanzania and Zambia.
3. The sample includes more than 27 000 SMEs from the World Bank Enterprise Survey. The regressions control for a number of firm characteristics such as ownership status (foreign versus domestic owner), the experience of the manager, capital intensity and the capital utilisation rate. Using the Generalised Linear Model estimator, the regression also includes fixed effects for each country, sector (ISIC 3-digit level) and year.
4. Authors' calculations based on the list of countries accepted for seller registration on Amazon Seller Central, https://sellercentral.amazon.com/gp/help/external/200405020?language=en-US&ref=mpbc_200417280_cont_200405020 (accessed 3 April 2020).
5. Authors' calculations based on Google Play Console help, https://support.google.com/googleplay/android-developer/answer/9306917?hl=en&visit_id=637215196617653600-1175332302&rd=1 (accessed 3 April 2020).
6. For example, the dominant ride-hailing platform may have exclusivity requirements obliging its drivers to work exclusively for the company and thus discouraging drivers from trying out and working with competing platforms.

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Chapter 3

Digital transformation for youth employment and Agenda 2063 in Southern Africa

This chapter examines the relationship between digitalisation and youth employment in the countries of Southern Africa (Angola, Botswana, Eswatini, Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe). The first two sections assess digital development across two groups: countries in the Southern African Customs Union (SACU) and non-SACU countries. They highlight problems that the countries face in using digitalisation to address challenges of youth employment.

The last three sections discuss public policies that can help create more and better jobs through digitalisation in Southern Africa. The first of these sections considers measures to ensure equitable and affordable access to communications infrastructure. The second examines public policies to prepare the workforce for future skill demands. The last section reviews interventions that can build an integrated digital economy in the region and enhance strategic regional value chains with digitalisation.

IN BRIEF

Southern Africa is witnessing a two-speed digital transformation. In countries of the Southern African Customs Union (SACU) – Botswana, Eswatini, Lesotho, Namibia and South Africa – the latter is leading the digital transformation which could potentially lower persistently high unemployment rates. However, current barriers in infrastructure, skills and affordability are likely to widen the digital divide. The richest 40% of the population are twice as likely to have access to the Internet as the poorest 40%.

In contrast, non-SACU countries – Angola, Malawi, Mozambique, Zambia and Zimbabwe – remain at early stages of digitalisation with only 25% of the population having access to the Internet. Weak infrastructure and poor educational outcomes are preventing the large pool of informal workers from adopting and benefiting from digital technologies.

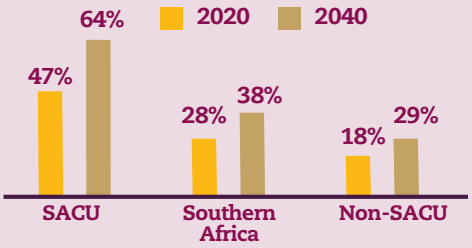
The region will need to address these challenges by focusing on three policy levers:

- **Developing reliable and affordable communications infrastructure beyond urban centres.** Currently, only 22.6% of the region's population can afford one gigabyte of prepaid mobile data. Effective regulations are key to attract private investment, while proactive public interventions may be necessary to ensure universal and affordable access.
- **Expanding the provision and quality of education and promoting lifelong learning to meet future skills demand.** Under a business-as-usual scenario, the share of youth with an upper secondary or tertiary education is expected to increase from 27.8% in 2020 to 38.2% in 2040.
- **Accelerating the implementation of existing regional initiatives.** Since 2012, Southern African Development Community countries have adopted 29 different initiatives related to ICT regulation. The regional industrialisation strategy also needs to embrace the digital transformation of strategic value chains.

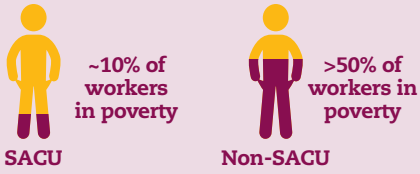
Southern Africa

Youth employment

% of **youth with post-secondary education** is increasing faster in SACU countries

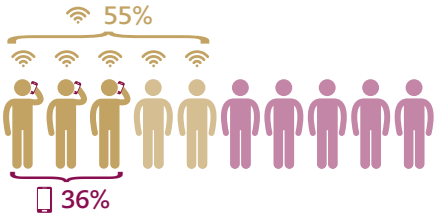


Structural unemployment remains high, and working poverty is pervasive in non-SACU countries

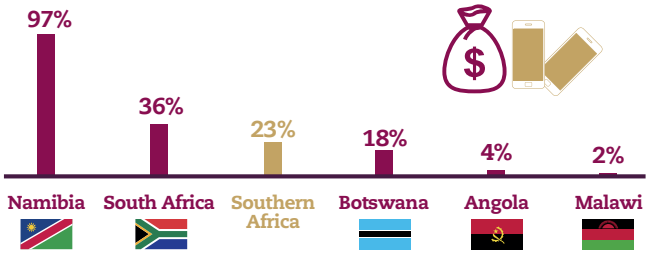


Communications infrastructure

55% of the population **live in areas covered by 4G technology,** but only 36% have access to it



Only 23% of the population **can afford 1GB per month of data**

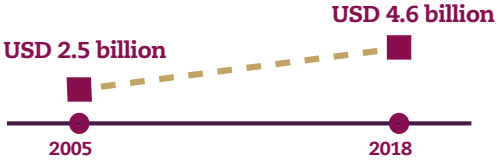


Digital economy

Cape Town hosts the most advanced start-up ecosystem in Africa

Between 700 to 1 200 active tech startups

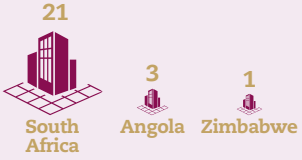
Exports of digitally-deliverable services are growing fast...



... mainly driven by South Africa
(growing from 77% to 93% of the region's total between 2015-18)

A two-speed **digital transformation**

Number of data centres



South Africa has the highest number of data centers in Africa

What's next for policy makers?

- Ensure reliable and affordable **communications infrastructure**
- Provide youth with **skills** for the digital economy
- Accelerate the implementation of **existing regional initiatives**

Southern Africa regional profile

Table 3.1. **Selected indicators on digital transformation in Southern Africa**

			Southern Africa (5 years ago)	Southern Africa (latest year)	Source	Latest year
Digital sector	Communications infrastructure	Percentage of the population with a cell phone	24.3	52.7	ITU	2018
		Percentage of the population with 4G coverage	32.8	80.4	GSMA	2020
		International Internet bandwidth per Internet user (kilobits/second)	5 571.3	14 746.0	ITU	2018
	Telecommunication sector	Total capital expenditure (as a percentage of total revenue)	21.7	16.3	GSMA	2018-20
		Earnings before interest, taxes, depreciation and amortisation (as a percentage of total revenue)	41.7	44.5	GSMA	2018-20
		Total employed headcount within the telecom companies (head account full-time equivalent).	14 676	27 531	GSMA	2016-17
Digital economy	Start-up development	Number of active start-ups that raised at least USD 100 000	50	130	Crunchbase	2011-20
	Digital services	E-commerce sales (in USD million)	93.7	155.3	UNCTAD	2014-18
		Export of professional and IT services delivered electronically (in USD million)	3 231.3	4 637.8	UNCTAD	2014-18
Digitalised economy	Internet use among people	Percentage of the population that use mobile phones regularly	75.4	70.8	Gallup	2018
		Percentage of women with Internet access	26.7	33.1	Gallup	2018
		Percentage of the poorest 40% with Internet access	18.7	23.3	Gallup	2018
		Percentage of rural inhabitants with Internet access	24.3	27.1	Gallup	2018
	Digital-enabled businesses	Percentage of firms having their own website	23.6	37.3	World Bank	2018*
		Percentage of firms using e-mail to interact with clients/suppliers	51.8	67.3	World Bank	2018*
		Percentage of goods vulnerable to automation that are exported to OECD countries	n.a.	13.0	World Bank	2020
	Access to finance	Percentage of the population with a mobile money account	14.0	86.0	Demirgüç-Kunt et al.	2017

Note: *Data for 2018 or the latest 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 Communications 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* (database); GSMA (2020a), *GSMA Intelligence* (database); ITU (2020a), *World Telecommunication/ICT Indicators Database*; UNCTAD (2020), *UNCTADSTAT* (database); World Bank (2020a), *Enterprise Surveys* (database); World Bank (2020b), *World Development Report 2020*.

Southern African Customs Union countries benefit from the rapid expansion of their digital sectors but need to address the widening social and spatial divides

Digitalisation could help governments tackle high unemployment

SACU countries face persistently high unemployment. The unemployment rates in these countries have remained at over 15% since the 1990s (AUC/OECD, 2018). Most of the employed are waged employees in the formal sector (ranging from 85% in South Africa to 43% in Lesotho), while informal employment is relatively limited. In these five countries, the services sector accounts for the largest share of employment (ranging from 71% in South Africa to 46% in Lesotho). South Africa stands out for its low rate of entrepreneurship and high rate of structural unemployment. Today, COVID-19 is a major threat to the job market in South Africa: empirical research estimates a 40% decline in active employment in 2020, half of which is job terminations, thus suggesting persistent labour market effects of the crisis (Zizzamia et al., 2020).

Digitalisation offers opportunities for direct job creation in the region. An example of this is the jobs that the growing information and communications technology (ICT) sector is directly creating in the telecommunications and broadcasting sectors. Over the period 2015-19, employment in these two sectors has increased, by 2.2% and 1.8%, respectively (ICASA, 2020). In South Africa, the shift towards services sectors caused by digitalisation is responsible for most of the country's employment growth in recent years; notably, between 2000 and 2019, the financial and community services sectors accounted for over half of the increase in employment (Aslam, Bhorat and Page, 2020). However, the jobs that digital technology companies create are mostly for better-educated workers and entrepreneurs.

Digitalisation can also indirectly create new jobs – including jobs for youth and female workers – by boosting productivity and offering new business models. Klonner and Nolen (2010) found that mobile phone coverage in South Africa has increased wage employment by 15 percentage points. This is mostly due to the increased employment of women. Digitalisation also enables new business models to emerge, such as those in the Business Process Outsourcing (BPO) sector. The sector created 13 733 new jobs in South Africa in 2019. Youth workers account for 87% of these new jobs, while female workers account for 65% of them. The majority of BPO jobs (86%) are voice-based – frontline customer services, sales and lifecycle management, while a small proportion (16%) are in non-voice jobs such as back-office processing, finance and accounting, and information technology (IT) outsourcing (BPESA, 2019).

At the same time, digitalisation poses new threats to jobs:

- **Automation may accelerate the process of de-industrialisation and reduce the demand for formal sector jobs in the region**. In South Africa, for instance, one in three jobs could be at risk of complete automation. In the automotive sector, one of the most dynamic sectors in the country, 87% of job losses result from the growing efficiency of factories through automation and enhanced technology (Chigbu and Nekhwevha, 2020). With the COVID-19 crisis expected to accelerate the global adoption of robots in the manufacturing sector (see Chapter 1), this risk could increase unemployment and displace more jobs.
- **There are risks associated with low-quality employment on digital platforms.** The numbers of gig workers (i.e. those active on digital platforms like Uber, SweepSouth and other free social media) are rising, especially in South Africa. Gig workers represent at least 1% of the South African workforce; as their numbers are

growing by well above 10% yearly, they could be in the millions in the next decades (Fairwork Foundation, 2020). The increasing social and economic importance of these independent workers collides with their non-standard employment status, which can prove particularly challenging especially in times of crisis.

Despite these risks, emerging evidence suggests that digitalisation could be a net job creator in the region. For South Africa, McKinsey & Company estimate that although 3.3 million jobs are expected to be displaced due to increased digitalisation and automation, digital technologies could also create 1.2 million direct jobs in new ICT occupations. They project that another 3.3 million will be indirectly created thanks to digitalisation (McKinsey & Company, 2019).

The COVID-19 pandemic motivated governments to accelerate Africa's digital transformation. During the COVID-19 crisis, the South African government has provided a special Social Relief of Distress grant requiring a simple registration through WhatsApp or alternative channels for workers receiving no other official social grants (Fairwork Foundation, 2020). To continue educational activities during COVID-19 lockdowns, the ministries of education in Malawi, Namibia, South Africa, Zambia and Zimbabwe have offered e-learning resources for use by students and teachers (UNESCO, 2020). The Central Bank of Lesotho has negotiated fee reductions and has relaxed transaction limits to encourage the use of mobile money.

Prior to the crisis, governments in the region had begun using digital technologies to increase the efficiency and transparency of their governance systems. Box 3.1 gives several examples of e-governance initiatives in South Africa.

Box 3.1. **E-governance initiatives in South Africa**

Over the last two decades, the South African government has taken numerous steps to promote e-government in the country. Several programmes have proved relatively successful:

- In 2001, the South African Revenue Service (SARS) introduced an electronic tax filing and payment system in accordance with the government's broader e-government strategy for public services. For the fiscal year 2018/19, SARS received 4 886 360 personal income tax returns. Of this total, 2 667 667, or 55%, were submitted electronically.
- The Khanya Project is an initiative of the Western Cape province of South Africa. Its objective is to use technology to enhance teaching and learning at foundation, primary and secondary school levels. The pilot project was launched in 2006 in five schools, where interactive whiteboards were used for different grades and subjects. By the end of July 2011, 90% of the 1 570 government schools in the Western Cape had acquired computer technology, with a total of 46 120 computers in use.
- The Health Patient Registration System (HPRS) project aimed to create a patient and service provider electronic registration system as part of the National e-Health Strategy 2012-2016. At the end of 2017/18, 2 968 healthcare facilities were using HPRS, and over 20 million people were registered in the system. This has significantly improved and standardised data collection as well as lightened the data capturing workload at the facility level.

Sources: Genesis Analytics (2019a), *Evaluation of Phase 1 Implementation of Interventions in the National Health Insurance (NHI) Pilot Districts in South Africa*; South African Revenue Service (2018), *SARS Annual Report 2018/19*; SMART (2011), "Western Cape Education Department, South Africa: Khanya Technology in Education Project".

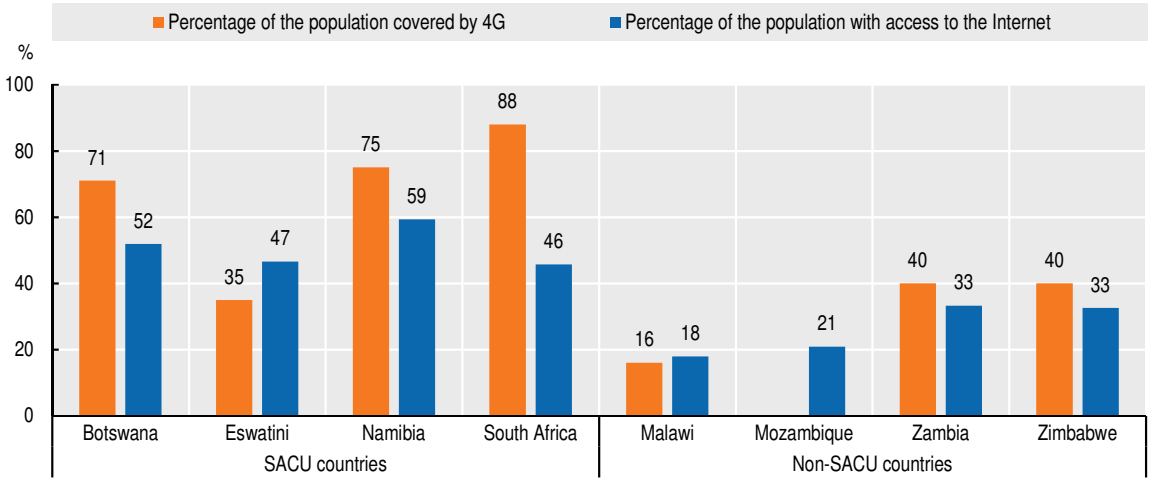
SACU countries benefit from the rapid expansion of communications infrastructure but face a widening digital divide

The region has invested considerably in first-mile communications infrastructure that link SACU countries to the global Internet. A network of submarine cables and cross-border terrestrial links connect all Southern African countries to the Internet. As of 2020, South Africa has six operational submarine cable connections, and others are planned. However, the stability of these cables remains a concern due to repeated outages and disruptions (Browdie, 2020). By 2024, the 2Africa cable should improve the reliability of Internet connections, as it will be sunk 50% deeper than existing cables. Landlocked countries have managed to increase their connections to submarine cables through timely investments. For instance, Lesotho's overall international bandwidth capacity grew by nearly 36% between 2018 and 2020. Nonetheless, challenges remain to lower transit costs between countries' borders and submarine cable landing station and to meet growth in data consumption.

Southern Africa has a relatively advanced middle-mile Internet infrastructure that expands the connection to most intermediary and large population centres. The fibre-optic network covers 71% of the population in intermediary cities (between 10 000 and 500 000 inhabitants) in Southern Africa, the highest rate in Africa (see Chapter 2). This network is more prevalent in big cities, where it covers 79% of the population. All SACU countries, except Namibia, have at least one active Internet exchange point (IXP) that facilitates domestic Internet traffic.[1]

Last-mile infrastructure connecting the Internet to end-users has expanded in the past decade, largely due to the expansion of high-speed mobile Internet. The fourth generation (4G) network covered 71% of the population in Southern African countries in 2019, up from only 5.1% in 2012 and above Africa's average of 60%. That said, the share of the population with Internet access in SACU countries is considerably higher than the share in Southern Africa's non-SACU countries. Similarly, the 4G mobile network has a higher coverage in SACU than in non-SACU countries (Figure 3.1).

Figure 3.1. **Internet access and 4G coverage in selected Southern African countries, 2018**



Note: SACU = Southern African Customs Union.

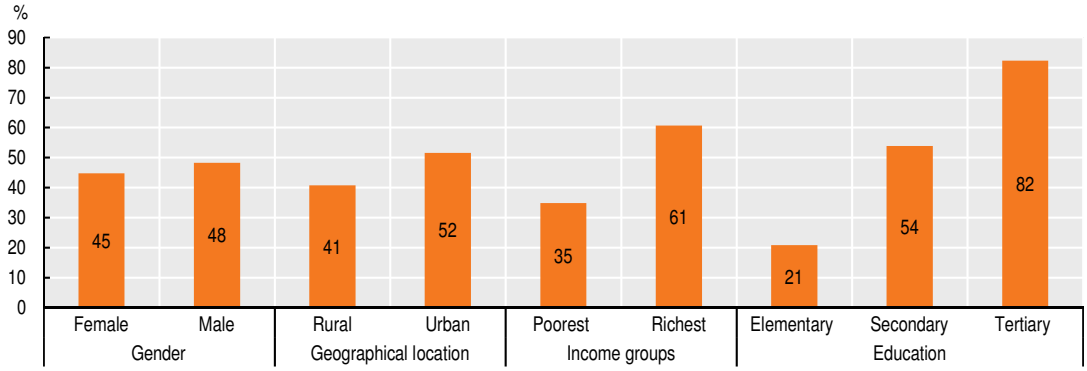
Sources: Authors' calculations based on data from GSMA (2020a), *GSMA Intelligence* (database), www.gsmaintelligence.com and Gallup (2019), *Gallup World Poll* (database), www.gallup.com/analytics/232838/world-poll.aspx.

StatLink https://doi.org/10.1787/888934203567

South Africa, in particular, has built one of the most advanced communications infrastructure on the continent with the support of large private investments. Large investments from Telkom, Liquid Telecom South Africa, Broadband InfraCo, municipal providers and mobile network operators such as MTN and Vodacom have improved network capabilities. South Africa is expected to be one of the first countries in Africa to launch commercial 5G services, following ongoing investments from Rain, Vodacom and MTN. In 2020, Liquid Telecom began offering a wholesale 5G service using its 3.5 gigahertz concession (Lancaster, 2020).

Despite the progress in improving both coverage and the quality of communications infrastructure, governments need to increase access to digital technologies, especially among the most disadvantaged populations (Figure 3.2). Lack of appropriate digital skills and literacy levels are significant barriers to digital inclusion, as reflected by the gap in Internet access across education levels. Similarly, the population belonging to the top 40% income group are twice as likely to have access to the Internet as the poorest 40%. The inequalities in digital adoption could exacerbate existing socioeconomic inequalities, and Southern Africa is home to six of the world's top ten unequal countries (AUC/OECD, 2018). SACU countries need to develop policies that promote access to the last mile services to begin reaping the benefits of digital infrastructure development.

Figure 3.2. **Internet use by socioeconomic group in Southern African Customs Union countries, 2018**

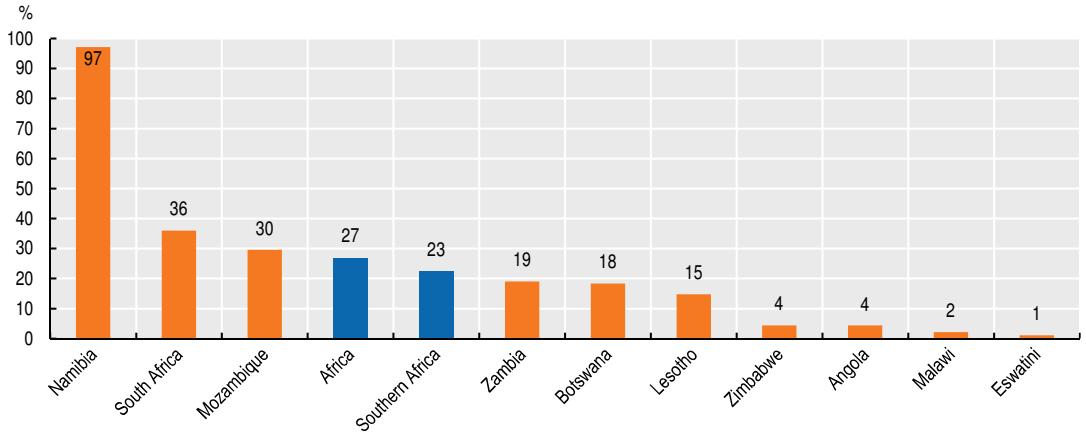


Note: The Southern African Customs Union countries are Botswana, Lesotho, Namibia, South Africa and Eswatini.
Source: Authors' calculations based on data from Gallup (2019), *Gallup World Poll* (microdata), www.gallup.com/analytics/232838/world-poll.aspx.
StatLink *https://doi.org/10.1787/888934203586*

The low level of 4G uptake, despite its rapid rollout, shows that the region should give greater consideration to demand for mobile technology adoption than supply. In South Africa, for instance, while 90% of the population benefit from 4G coverage, less than 30% have adopted it (GSMA, 2019). Surveys on Internet usage among youth in the region reveal that demand-side challenges such as digital literacy, affordability of services and devices, limited access to electricity, and availability of locally relevant content and applications are some of the main obstacles to Internet uptake (RIA, 2017).

Affordability of mobile services is also a significant barrier to Internet use for a large share of the population. On average, only 22.6% of Southern Africans can afford one gigabyte (GB) of prepaid mobile data, the bandwidth needed to send or receive about 1 000 e-mails and browse the Internet for about 20 hours a month (Figure 3.3). Within countries, wide disparities exist between prices charged by service providers that dominate the market and those charged by the cheapest service providers. The most extreme difference is in South Africa, where the price charged by the dominant operator for a basket of services (USD 11.26) is almost 2.5 times that offered by the cheapest provider (USD 4.65) (Box 3.2).

Figure 3.3. **Affordability of one gigabyte of mobile data monthly in Southern African countries, 2018**



Note: Affordability is defined as having the price of the cheapest prepaid one gigabyte of mobile Internet fall below 5% of the average monthly household income.
Sources: Authors' calculations based on price data from RIA (2020a), *Mobile Pricing* (database), https://researchictafrica.net/ramp_indices_portal/, and on income distribution from World Bank (2020c), *PovCalNet* (database), http://iresearch.worldbank.org/PovcalNet/home.aspx.
StatLink *https://doi.org/10.1787/888934203605*

South Africa leads the region's digital economy, but broadening the digital transformation requires addressing the spatial divide and skill mismatches

South Africa provides the core of a dynamic digital economy in the region. The country is home to 700-1 200 active tech start-ups in multiple sectors. Start-ups in South Africa not only dominate in number, they are also often more advanced in terms of size and funding compared to their peers in the rest of Southern Africa. Table 3.2 shows further notable examples of digital start-ups in South Africa and other countries in the region. In Namibia, for instance, FABLab is adapting sensors for localised uses; its initial focus on environmental sensing may expand to water and waste management and to parking and transport management in the future.

The region's digital trade activities are on the rise. Southern Africa's annual e-commerce sales rose from USD 93.7 during the 2005-09 period to USD 155.3 million during the 2014-18 period, equivalent to an average of 3-5% of merchandise export values. Similarly, between 2005 and 2018, the value of the region's digitally enabled services exports (e.g. insurance pensions, financial services) grew from USD 2.5 billion to USD 4.6 billion.

Table 3.2. **Ten examples of digital start-ups in Southern Africa**

Company	Sector of activity	Year of foundation	Country	Number of employees	Funding amount (USD million)
JUMO	Fintech	2014	South Africa	264	146.7
African Leadership Academy	Education	2008	South Africa	242	83.2
Yoco	Fintech	2013	South Africa	173	23.0
Payitup	Fintech	2017	Zimbabwe	n/a	13.0
Zazu Africa	Fintech	2015	Zambia	15	2.2
Zonful Energy	Clean energy	2014	Zimbabwe	27	0.9
Tupuca	E-commerce	2015	Angola	51	0.5
Musanga	Logistics	2016	Zambia	7	0.3
Izyshop	E-commerce	2015	Mozambique	3	0.3
Augmenta Cyber Security	Digital security	2017	Botswana	5	0.04

Note: These companies were selected to highlight promising examples in various countries in the region. Fintech refers to technology-enabled financial services. The numbers of employees were retrieved from the LinkedIn profiles of the companies. n/a = not available.
Source: Crunchbase (2020), *Crunchbase Pro* (database), www.crunchbase.com.

Venture capitalists and corporate investors have been instrumental in developing technology ecosystems in the region. Venture funds, development finance, corporate involvement and ever-growing innovative communities have contributed to their growth. Mobile operators and Internet providers, due to their close involvement in the digital space, have supported the majority of the tech hubs across the continent (GSMA, 2020b). The South African company MTN and communications infrastructure providers such as Liquid Telecom have launched in-house tech hubs in several markets on the continent and other supporting programmes for local entrepreneurs. Large tech companies are also strengthening the ecosystems by establishing a physical presence within tech hubs. In South Africa, for example, IBM collaborated with Wits University to set up a university-based incubator which promotes youth entrepreneurship and helps students develop the skills they will need for the digital economy by working with academia, corporates, government and entrepreneurs.

The capacity of the digital sector to multiply jobs has been limited to a few digital enclaves, or islands of excellence. Currently, jobs in ICT services (e.g. call centre work, coding, finance, accounting and legal support) are largely concentrated in South Africa's major cities of Cape Town, Johannesburg and Durban; in 2017, only 4% of these jobs were located in other cities (Genesis Analytics, 2019b). Within the major cities, ICT services jobs are mostly found in business centres in affluent areas to which employees must travel from lower-income areas. The business centres enjoy excellent access to physical and digital infrastructure, skills and business partners but only employ small cliques of highly qualified technical experts.

Addressing the widening skill mismatch will be key to take advantage of digitalisation and tackle the threats of workforce displacements and automation. South Africa relies on a large pool of educated youth; 50% of its population achieve an upper-secondary or tertiary education up from only 28% in the early 2000s. Nonetheless, evidence from OECD (2017a) shows that, in 2015, 52.3% of South African workers were employed in occupations for which they did not have the correct qualifications, with 27.9% of them underqualified and 24.4% overqualified. In addition, as digitalisation is likely to induce a reallocation of the labour force in the coming years, especially of low-skilled workers, South African decision makers will need to take bold steps to sufficiently reskill displaced workers. McKinsey & Company (2019) estimate that, by 2030, the demand for workers with high educational attainment will increase by an additional 1.7 million employees. Thus, strengthening the education system to generate the skills needed at a sufficient scale will be vital.

Digital transformation remains at early stages in non-SACU countries despite its potential to improve agriculture and the informal sector

The digital transformation offers opportunities for agricultural and informal workers

In Southern Africa's non-SACU countries, the informal sector and agriculture absorb large shares of workers who cannot find employment in the formal sector, including in mining. Self-employment and family work dominate job creation in Mozambique (83%), Zambia (77%) and Angola (67%) (Figure 3.4). In Mozambique, Zambia and Zimbabwe, the majority of the population still works in subsistence agriculture. In resource-dependent countries, such as Angola and Zambia, mining accounts for only 3.5% of employment despite contributing 14% to gross domestic product (GDP) (OECD/AUC, 2018).

While unemployment rates are lower in non-SACU than SACU countries, underemployment and working poverty remain pervasive in the former. As in many other sub-Saharan African countries, the magnitude of unemployment in non-SACU countries is masked by underemployment, as people work in low-quality or part-time jobs. Working

poverty is therefore much higher in these countries. Over the 2010-19 period, more than 50% of workers lived in poverty in three of the five non-SACU countries: Malawi, Mozambique and Zambia. In comparison, only one in ten workers in Botswana, Namibia and South Africa received poverty-level wages over the same period (ILO, 2020).

Figure 3.4. **Distribution of employment by occupational status in Southern Africa, 2020 (as a percentage of the population)**

Note: SACU = Southern African Customs Union.

Source: Authors' calculations based on ILO (2020), *ILOSTAT* (database), https://ilostat.ilo.org/.

StatLink https://doi.org/10.1787/888934203624

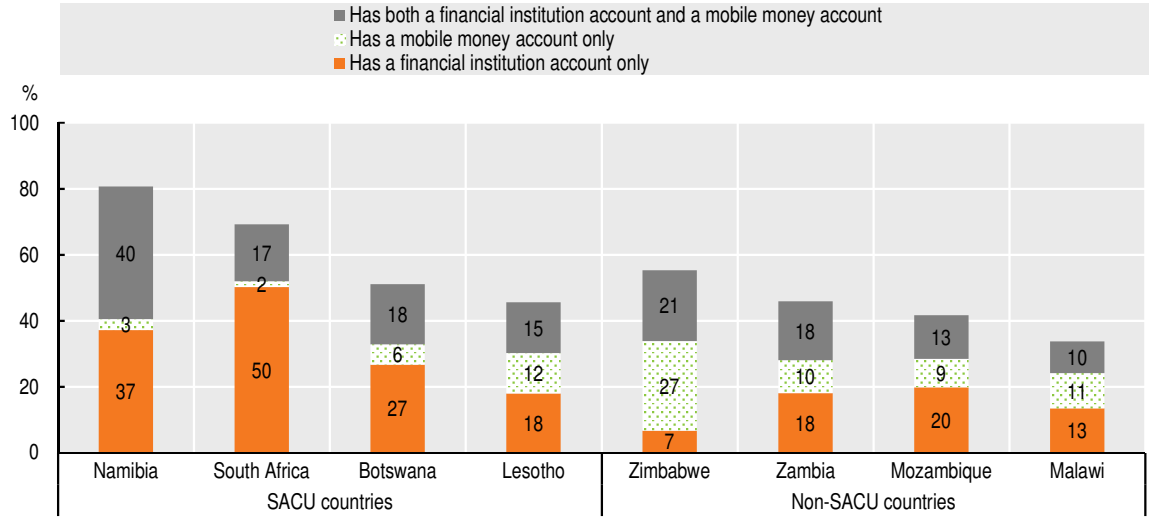
Digitalisation offers the potential to transform the rural-urban value chains and empower agricultural workers. E-commerce platforms allow producers to reach a wider market and increase efficiency by eliminating trade intermediaries. New ways of generating, storing and sharing information on products and processes significantly improve the traceability of supply chains. Digital connectivity can also complement the creativity and knowledge of local actors by enabling them to engage in new niches. For example, in Zambia, the Maano Virtual Farmers' Market is an e-commerce platform for listing and trading agricultural produce for farmers and international buyers. This system allows for greater transparency in negotiations and pricing and for more effective transactions. The application reached over 1 000 Zambian farmers with a total USD 50 000 worth of transactions during the pilot in May-October 2017 (FAO, 2018).

Technology-enabled financial services (fintech) offer a new range of products to informal actors, especially those in non-SACU countries with underdeveloped financial sectors. The use of mobile money services has contributed significantly to financial inclusion in non-SACU countries. In Zimbabwe, for instance, 27% of the population have only a mobile money account (see Figure 3.5). Mobile money has been instrumental in alleviating liquidity shortages, particularly a lack of access to hard currency, by giving a 24-hour option to deposit, withdraw or transfer money and to pay for goods and services, including electricity, from mobile phones (Fanta et al., 2016). During the COVID-19 crisis, Malawi, Mozambique and Zambia have encouraged mobile money use through fee waivers and through increasing transaction and balance limits.

Non-SACU countries are witnessing a rise in innovative business models and technology start-ups that feed into their nascent digital economy. In Zambia, the direct contribution of the ICT sector to GDP more than doubled between 2010 and 2018, from 1.6% to 4.4% (World Bank, 2020d). Tech start-ups offering innovative digital solutions are increasingly emerging

in low-income countries. In Malawi, for instance, iMoSYs provides monitoring systems with access to reliable information for effective strategic decision making in a variety of sectors, such as water management, eHealth and industrial automation. Traditional corporations such as Standard Bank increasingly contribute to the digital economy by setting up incubators in several countries, including Angola and Mozambique. Large telecommunications companies are also stepping up. Liquid Telecom partnered with BongoHive in Zambia to offer high-speed Internet access and cloud-based services to entrepreneurs.

Figure 3.5. **Financial inclusion in selected Southern African countries, 2017 (as a percentage of the population aged 15 and over)**



Note: SACU = Southern African Customs Union.
Source: Demirgüç-Kunt et al. (2018), *The Global Findex Database 2017*, http://microdata.worldbank.org/index.php/catalog/global-findex.
StatLink https://doi.org/10.1787/888934203643

Weak infrastructure and low educational attainments pose challenges to the digital transformation in non-SACU countries

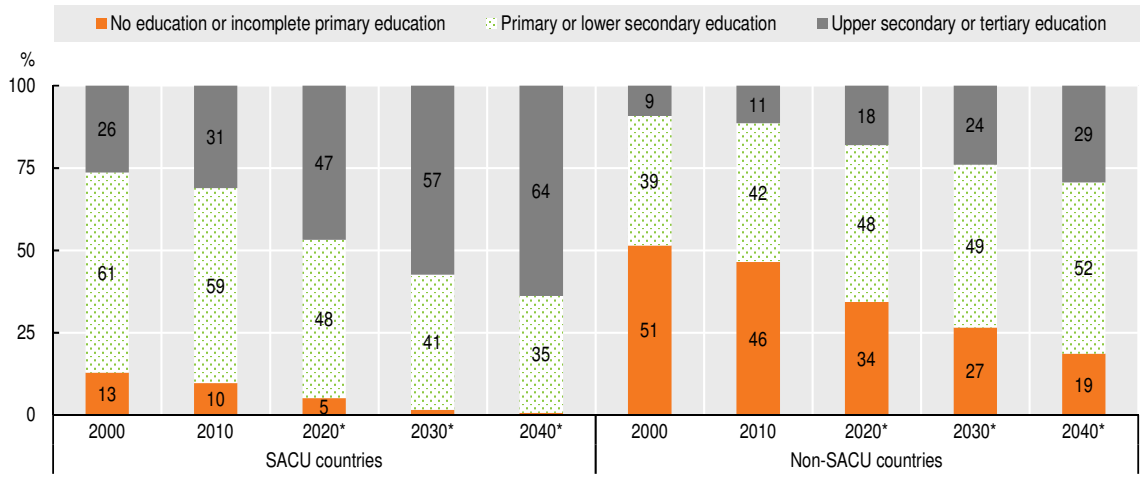
Access to both basic and communications infrastructure remains highly limited. Access to digital services and applications is mostly constrained by basic infrastructural issues. In most non-SACU countries, less than 40% of the population had access to electricity or benefited from 4G coverage in 2018. On average, only 25% of the population in non-SACU countries had access to the Internet, far below the SACU countries' coverage, which reached almost 50% of the population, and Africa's average of 34%. Worse yet, in Angola, despite relatively good coverage, mobile penetration has been declining since 2014 due to the combined effects of an economic slowdown and the lack of competition in the telecom market.

Internet speed in the region, especially in landlocked countries, is slow, though marginally increasing, and calls for regional policies on cross-border connectivity. In addition to unequal access to communications infrastructure, most Southern African countries have to deal with issues of Internet speed. It takes more than seven hours to download a 5 GB movie in Angola, Eswatini and Malawi. As a result, 36.5% of youth in Mozambique list the speed of Internet as a major constraint to Internet usage (RIA, 2018a). Additionally, landlocked countries, like Malawi, Zambia or Zimbabwe, face costs in expanding their telecommunications networks to an undersea Internet cable. A regional approach to facilitating cross-border connectivity will thus be essential to improve speed, affordability and overall digital inclusion in landlocked countries.

In non-SACU countries, poverty also prevents the local population from owning digital devices and accessing the Internet. In Mozambique, 76% of the surveyed population who have the opportunity to connect to the Internet in their area cannot afford Internet-enabled devices (RIA, 2018b). Similarly, in Angola, limited competition among mobile operators results in stagnated data prices (IFC, 2019). Ensuring affordability by removing all excise duties on feature and entry-level smartphones and strengthening competition through adequate regulations in the telecom sector would reduce Southern Africa's digital divide.

Low levels of educational attainment limit the potential of non-SACU countries to benefit from the opportunities that new technologies offer. In these countries, only 18% of youth currently have an upper secondary or tertiary education, compared to 47% in SACU countries. Under a business-as-usual education scenario, the proportion of youth in non-SACU countries completing an upper-secondary or tertiary education could reach 29% by 2040 (compared to 64% in SACU countries; see Figure 3.6). This figure could reach 76% (233 million people) by 2040 if non-SACU countries can replicate Korea's fast-track education scenario with more ambitious investments in education and health. For the moment, illiteracy rates are still high. In Mozambique, for example, illiteracy is 39%, and the rural population, particularly women, are the main victims (World Bank, 2019).

Figure 3.6. **Youth cohorts, aged 15-29, by educational attainment in Southern Africa according to a business-as-usual scenario, 2000-40**



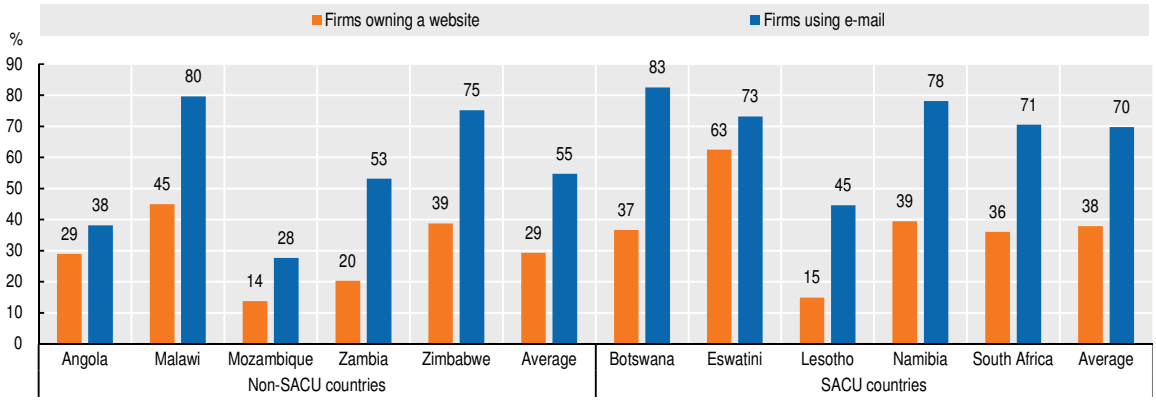
Note: SACU = Southern African Customs Union. * = projections.

Source: Authors' calculations based on Wittgenstein Centre for Demography and Global Human Capital (2018), *Wittgenstein Centre Data Explorer Version 2.0 (Beta)* (database), www.wittgensteincentre.org/dataexplorer.

StatLink https://doi.org/10.1787/888934203662

Digital adoption remains limited among Southern Africa's firms, with insufficient skills being an important contributing factor. In non-SACU countries, only 29% of companies have a web presence, and 55% of companies employ the Internet to interact with their clients and customers, compared to 38% and 70%, respectively, in SACU countries (Figure 3.7). Such digital adoption is even less frequent among smaller firms. The shortage of skills lowers the likelihood of digital adoption among young entrepreneurs. Moreover, low digital literacy prevents them from efficiently using digital solutions that could assist them in their work. As the majority of firms in Southern Africa do not use the most basic tools of the Internet, strong and sustained government efforts are critical to encouraging digital adoption before promoting more sophisticated interventions.

Figure 3.7. **The prevalence of digital adoption among formal manufacturing and service firms in Southern Africa (as a percentage of firms)**



Note: SACU = Southern African Customs Union.
Source: Authors' calculations based on World Bank (2020a), *Enterprise Surveys* (database), www.enterprisesurveys.org/en/data
StatLink https://doi.org/10.1787/888934203681

Southern African governments need to ensure equitable and affordable access to communications infrastructure for all

Countries should support private investment in high-speed and affordable infrastructure

Southern African countries need to continue investing in basic and communications infrastructure. Despite increasing broadband coverage, the region's communications infrastructure require considerable investment to ensure universal coverage and international competitiveness as technology evolves. For example, Alper and Miktus (2019) estimate that Southern Africa would need to invest USD 2.1 billion to reach full 4G coverage by 2025. In addition, the region needs to continue to increase the coverage and quality of electricity connections; 8.7% of formal manufacturing and services firms in the region cite electricity as the main constraint to doing business.

Attracting investment from the private sector and finding external sources of financing are vital to meeting this challenge. In the short to medium term, public resources in Southern Africa will be highly limited due to the COVID-19 pandemic and ensuing economic crisis and to governments' structural weakness in raising domestic revenues. Several non-SACU countries, such as Mozambique, Zambia and Zimbabwe, already faced debt distress before the COVID-19 crisis (see Chapter 8). The private sector has played a key role in providing technical expertise and financing communications infrastructure, investing approximately USD 2.5 billion a year over the 2015-19 period. In non-SACU countries, development partners' assistance will also be crucial to finance infrastructure and support the implementation of digital policies. In Malawi, the World Bank invested USD 74.2 million in the Digital Malawi Program to improve access to digital technologies through four pillars: policy and legislation, digitalisation of public sector institutions, improved digital capacity, and project management (World Bank, 2017).

Effective regulations, notably through spectrum allocation policies (see Chapter 2), are critical to encouraging competition and investment among private telecommunications companies. Countries need to strengthen their regulatory capacities to ensure fair competition between operators. In Mozambique, a lack of transparency regarding

spectrum allocation has created uncertainty around long-term investments in the mobile market (World Bank, 2019). Similarly, in Angola, lack of adequate equipment prevented fair frequency allowance, as the government was unable to identify free spectrum to release to operators (IFC, 2019).

Regulatory adjustments, especially in infrastructure sharing, can provide a sound foundation for deploying 5G in the region. In the short term, the 5G era is not imminent in most Southern African countries, as existing technologies such as 4G are enough to support the current demand for mobile Internet connectivity (GSMA, 2019). Nonetheless, arrangements to increase infrastructure sharing will be necessary to reduce the cost of densifying the transmission network needed to deploy 5G (OECD, 2019a). In Korea, for example, mobile operators hope to save around USD 933 million over the next decade by sharing their infrastructure for the 5G network (Telecompaper, 2018). In South Africa, the infrastructure sharing business is at a rudimentary stage. Out of 30 000 towers, only 10% are owned and operated by independent companies (Asif, 2019).

In certain cases, innovative public-private partnerships can help crowd in private investments. Cross-border public-private partnerships, for instance, can facilitate communications infrastructure development projects within a fragmented regional economic space and help landlocked countries benefit from regional economic growth (Baxter, 2020). Liquid Telecom became a key player in the development of the regional backbone network, expanding across 17 000 kilometres in Botswana, Lesotho, South Africa, Zambia and Zimbabwe with connections to Central and East Africa via the Democratic Republic of the Congo. Southern African countries can also learn from Rwanda's successful partnership with Korea Telecom that built 4G infrastructure and provided wholesale high-speed mobile traffic to domestic Internet service providers (see Chapter 5).

Co-ordinating the roll out and maintenance of different physical infrastructures can reduce the cost of installing communications infrastructure. Exploiting different types of physical infrastructure can also help cut costs. Some of the national and regional backbone projects have taken advantage of available electricity grids, railway lines and oil pipelines and of their right to install fibre-optic cables within the region. Power utility companies such as ESKOM (South Africa), NAMPower (Namibia) and Powertel (Zimbabwe) rolled out fibre-optic infrastructure. Zambia Telecom leased fibre-optic infrastructure from ZESCO, a state-owned power company, and Copperbelt Energy Corporation.

Developing regional communications infrastructure can also reduce the digital divide in Southern Africa. In 2012, the Southern African Development Community's Regional Infrastructure Development Master Plan selected 18 ICT infrastructure projects to support, estimated to cost around USD 21.4 billion in the plan's first phase, from 2012 to 2017 (SADC, 2019). By mid-2019, two projects were completed. Both of them focused on developing an integrated broadband infrastructure across the region; they included seven programmes for expanding the terrestrial fibre-optic network to connect landlocked countries to the undersea cable and four programmes for enhancing IXPs in the region. These projects should reduce Internet costs, given that most member states currently rely on telecommunications gateways in European countries to manage or direct digital traffic to the region and the rest of the African continent (Nhongo, 2018).

Proactive government efforts are critical to ensuring equitable access

Enabling regulatory frameworks are key to ensure universal access to and use of communications infrastructure, especially in remote and economically disadvantaged regions. They can facilitate infrastructure sharing, and open access wholesale models can help redirect resources towards under-served communities and reduce costs for

end-users. In Zambia, the anticipation of a fourth operator entering the market was enough to spark a decrease in data prices by more than 70% between 2018 and 2019 (RIA, 2020b). Although the bulk of the investment required to expand Internet access can come from the private sector, active public interventions may be necessary to ensure coverage in remote areas that have limited commercial attractiveness (see Box 3.2).

Box 3.2. **The South African Competition Commission's ruling on data affordability**

Affordability is a serious concern for the equality of Internet use in South Africa. Only 36% of the country's population can afford one gigabyte of data. According to a survey, 47% of South Africans list affordability of data as the primary constraint to Internet usage, with the cost of devices in second place at 36% (RIA, 2017). Unequal allocation of spectrum and cost-based facilities has affected the quality of Internet connections provided by smaller operators and prevented competition (Chetty et al., 2013). It also enabled the two largest operators, MTN and Vodacom, representing 74% of market shares in 2018, to maintain high prices despite aggressive pricing by competitors (CCSA, 2019).

In 2020, the leading operators reduced data prices in response to the South African Competition Commission's threat of prosecution. In 2019, the Commission ruled for an immediate reduction of 30-50% on market leaders' data prices and the provision of a "lifeline" package of daily free data for prepaid subscribers. As a result, MTN and Vodacom reduced their data tariffs from ZAR 149 to ZAR 99 (South African rand) per gigabyte effective 1 April 2020. Nonetheless, as these prices simply align with those of outside competitors, Cell C and Telkom, they may not necessarily increase Internet use by poorer households (RIA, 2020c).

Source: Authors' compilation based on a literature review.

Some governments have launched national broadband plans with specific coverage targets. For example, South Africa aims to provide a minimum broadband speed of 5 megabits per second (Mbps) for its entire population and 100 Mbps for at least half of its population by the end of 2020. Botswana has set a target of 100 Mbps in urban areas and 50 Mbps rural areas by 2022.

The innovative use of TV white space can upgrade rural broadband networks at low cost. The TV white space reallocates unused broadcasting frequencies in the wireless spectrum for data transmission and Internet. In Malawi, tests of TV white space use for broadband were successful and were then replicated in Botswana, Mozambique, Namibia and South Africa. Two challenges remain for the widespread adoption of such technology. First, as of 2020, among Southern Africa's countries only Eswatini, Lesotho, Malawi and Zambia have completed the transition from analogue to digital broadcasting to free up radio frequencies previously used by television channels. Others have progressed at a slower pace, largely due to funding and network constraints (ITU, 2020b). Second, using TV white space requires supporting regulation. In the case of Malawi, the necessary regulation was not ratified quickly enough to implement the technology nationally (Markowitz, 2019). South Africa, on the other hand, despite delays, published its technical regulations to establish a TV white space network and plans to deploy it commercially in early 2021 (Moyo, 2020).

Governments can better use their Universal Service and Access Funds (USAFs) to lead investment in remote areas. As of 2018, all Southern African countries, except Malawi, implemented a USAF – a special programme with funding schemes for universal Internet access and services (Thakur and Potter, 2018). Lesotho's successful experience with administering its fund, established in 2009, provides a good example in the region. The

programme fully spent its annual allocations while sustaining relatively low operating costs, below 20% of total revenues. Over the 2009-16 period, the programme benefited at least 110 000 people in 320 villages in rural areas, supporting the deployment of 46 base stations to remote areas and connecting 40 schools to the Internet. As of 2016, the programme has shifted its focus towards access to broadband by rolling out public Wi-Fi services (RIA, 2016).

Investing in human capital is necessary to equip workers with the right skills for the future

Governments can use digital tools to expand the provision and quality of education

Countries must act now to assess the results of the most successful COVID-19 initiatives in digital education and must work together to scale them up to national and regional levels. Prior to the pandemic, the use of ICT in education was slowly growing in the region. In 2017, the government of Botswana launched e-Thuto, an interactive web-based platform bringing together teachers, students and parents and making educational material and administrative information easily accessible. Today, it serves close to 35 000 students in Southern Africa, from primary to high school level (Kuwonu, 2020). In Zambia, the Ministry of General Education is leveraging digital technologies to assess learning and track school performance through the Let's Read project. This project aims to help 1.4 million children from more than 4 000 schools to read with comprehension and fluency in one of Zambia's seven official local languages of instruction (World Bank, 2020d).

Enhancing the quality of foundational education is essential to prepare the workforce for the digital transformation. Currently, seven out of nine Southern African countries rank higher in digital skills development than the African average, according to the World Economic Forum's *Networked Readiness Index* (WEF, 2016). Nonetheless, in most of the region's countries, the education system is not configured to enable or to deal with issues emerging from digitalisation. Lack of foundational skills (i.e. literacy and numeracy) and of basic digital skills excludes the poorest from the benefits of digitalisation. In Lesotho, close to 60% of respondents identified digital illiteracy as the main reason for not using the Internet (RIA, 2016).

Updating education curricula according to industry needs is critical to reducing the prevailing skill mismatch in the region, especially in SACU countries. In Lesotho, for instance, no institution offers training in sewing machine repair, which is a skill in high demand in the apparel industry. Similarly, of the approximately 1 800 students enrolled at the National University of Lesotho, only about 40 major in ICT-related fields despite lower unemployment rates for graduates in those fields than for those in other fields (World Bank, 2018). Inputs from industry bodies, leaders and academia are necessary to drive the digital transformation of Southern Africa at the policy level. Formalised institutions facilitating these linkages, such as the Joburg Centre for Software Engineering in South Africa, can assist in this process (Markowitz, 2019). In addition, providing tailored career advice to students early in the schooling system could help reduce dropout, increase access to further education and improve labour market outcomes (OECD, 2017a).

Governments need to expand technical and vocational education and training (TVET) to ensure life-long learning

Expanding technical and vocational education and training (TVET) programmes could improve workers' capabilities and facilitate the school-to-work transition (OECD, 2017b). The digital economy requires a range of skills, from the ability to use a mobile phone, the

Internet and social media to the capacity to analyse advanced data, develop applications and manage networks. Skills development should not be limited to schools; it should also be available to the broader public through partnerships with TVET and community colleges. In South Africa, the government set the ambitious target of expanding the TVET college system to 2.5 million enrolments by 2030 as a way to reduce the 3.4 million young people not formally employed nor in education or training (Field, Musset and Álvarez-Galván, 2014). In Botswana, Malawi, Namibia and Zambia, UNESCO's five-year Better Education for Africa's Rise project assists local governments in improving their TVET systems by identifying relevant sectors (such as agro-processing and construction in Malawi) and potential partnerships to give youth a better chance of finding decent work (UNESCO, n.d.).

Public and private initiatives are helping disseminate entrepreneurial and digital skills. Initiatives such as those presented in Table 3.3 could contribute to addressing a wide variety of challenges that Southern African countries face, including high unemployment rates, informality and skills gaps, and to relieving pressure on the formal education system. In 2018, the government of Zimbabwe announced it would allocate USD 15 million for the construction of innovation hubs in six universities and the infrastructural overhaul of the higher and tertiary education sector (FurtherAfrica, 2019). In South Africa, the Inclusive Youth Employment Pay for Performance Platform has developed partnerships between several funders, investors, local government and service providers to train 600 young people in jobs in high-growth sectors (such as technology), and it expects to increase the partnerships to 5 400 jobs (Boggild-Jones and Gustafsson-Wright, 2019).

Table 3.3. **Six examples of initiatives to develop digital skills for youth in Southern Africa**

Name	Year began	Description	Location
iKamva National e-Skills Institute	2012	The institute develops capacity covering the total spectrum of digital skills, from basic to high-end expertise.	South Africa
IBM Digital-Nation Africa Programme	2015	The programme invests USD 70 million in building much-needed digital, cloud and cognitive skills to help support Africa's 21st-century workforce.	Botswana, South Africa
Digital Malawi Project	2017	This project has four components with different budget allotments: digital ecosystem (USD 10 million), digital connectivity (USD 34 million), digital platform and services (USD 24 million) and project management (USD 5 million).	Malawi
Africa Code Week: SAP	2016	SAP offers free online training and coding workshops to people between 8 and 24 years old. In 2019, 3.85 million youth were engaged, and 39 000 teachers participated.	Botswana, Zimbabwe
mHub's Digital Code Week	2019	mHub has trained a total of 178 teachers from six districts in Northern Malawi in basic coding skills which they later passed on to 805 students.	Malawi
iSchool Zambia	2011	iSchool Zambia provides devices, power, teacher training and curriculum-related software to schools. A partnership between iSchool, the Zambia Information and Communications Technology Authority and Microsoft has supplied computers, digital content and software to 400 schools.	Zambia

Source: Authors' compilation.

The region should develop a culture of lifelong learning to prepare for Africa's digital transformation and adapt to future skills requirements. Southern African countries need to remain proactive in assessing future technological progress and anticipating skill needs. SACU countries, where a large share of the youth population have completed higher education, need to continuously improve workers' capabilities through reskilling and upskilling programmes. Indeed, low-skill jobs that are intensive in routine tasks are the most susceptible to automation and offshoring. Thus, displaced workers will likely compete with other low-skilled workers for jobs with low and possibly decreasing wages (OECD, 2020). In addition, the recognition of skills acquired through previous work experience (formal or informal) could help individuals find employment opportunities or

advance in their careers, especially as many Southern Africans have been denied access to formal education and training in the past (OECD, 2019b; OECD, 2017a).

Countries need to quickly implement regional initiatives and strengthen their coherence

Countries need to accelerate ongoing initiatives to harmonise regulations for an integrated digital economy in the region

Countries in Southern Africa have created a number of regional initiatives to realise an integrated digital economy and facilitate the digital transformation in the region. Table 3.4 lists prominent digital initiatives by countries in the Southern African Development Community (SADC). Notably, Digital SADC 2027 provides the overarching framework for regional digitalisation, with a key focus on infrastructure, a coherent ICT regulatory framework and industrial development. Another important initiative is the plan by the Common Market for Eastern and Southern Africa to develop a Digital Free Trade Area (DFTA). The DFTA will be a digital platform enabling duty-free and quota-free trading and providing a regional market worth USD 17.2 billion (TrendsNAfrica, 2019).

Table 3.4. **Examples of digital transformation initiatives by the Southern African Development Community**

Initiative	Years	Description
Digital SADC 2027	2012-27	The 2012 SADC Regional Infrastructure Development Master Plan's ICT pillar whose objectives include universal, harmonised broadband frequencies, fibre-optic backbone infrastructure, spectrum allocation, harmonised ICT regulatory framework, centres of excellence
Analogue to Digital Migration	2009-present	Technical support to member states in meeting analogue-to-digital migration
HIPSSA Model Laws	2008-13	Driven by the Communications Regulatory Authority of Southern Africa (CRASA) to reduce roaming costs in the region
Declaration on Information and Communication Technologies	2001-present	SADC ICT policy, highlighting infrastructure and regulation

Source: Table 1 from Markowitz (2019), *Harnessing the 4IR in SADC: Roles for Policymakers*, Occasional Paper 303.

A review of regional integration in SADC highlights 29 different strategies, plans, model laws, policy guidelines and frameworks related to ICT regulation at the SADC level since 2012 (SADC, 2019). These initiatives address new regulatory challenges at national and regional levels, such as taxation, consumer protection and digital security, inherent in the cross-border nature of the digital economy. They also provide a pragmatic and timely response to the rapidly evolving regulatory needs of the digital economy. For example, while the continent-wide 2014 Malabo Convention on Cyber Security and Data Protection has not yet entered into force, countries in Southern Africa have already agreed on a SADC model law for such emerging issues thanks to the European Union/ International Telecommunication Union HIPSSA initiative, Support for Harmonisation of the ICT Policies in Sub-Saharan Africa (Greenleaf and Cottier, 2020).[2]

Countries need to accelerate the implementation of these initiatives, which has often encountered various difficulties. For example, the negotiation to abolish roaming charges that began in 2010 has not been fully completed due to resistance from private operators. Similarly, although the HIPSSA initiative has assisted countries in tailoring model laws to their national contexts, some remain unenforced at the national level. While most African countries have passed laws and promulgated regulations for managing the digital economy, these largely reflect domestic and not regional concerns. The changing priorities of member states and the slow implementation of integration initiatives sometimes lead

to new policies overlapping with existing ones that are yet to be implemented (SADC, 2019; Markowitz, 2019).

Data governance to enable the seamless flow of information across borders is a critical regulatory area of focus. Southern Africa is characterised by a hub-and-spoke relationship where nine under-connected countries co-exist with one relatively hyper-connected country, South Africa. For example, South Africa has 21 data centres, while Angola has 3 and Zimbabwe 1. In 2020, three of the world's biggest data companies – Microsoft, Amazon Web Services and Huawei – announced the establishment of cloud computing facilities in South Africa (Uwagbale, 2020). These investments aim not only to tap domestic clients in South Africa but also to serve the rest of the continent. The smooth flow of information between Southern African countries' borders is vital to the competitiveness of the region as a whole, so consumers and producers in the digital economy can access the latest technologies.

The regional industrialisation strategy needs to embrace the digital transformation of strategic value chains

Embracing Africa's digital transformation is critical to enhancing key value chains in Southern Africa. The Action Plan for SADC Industrialization Strategy and Roadmap focuses on building regional value chains in the agro-processing, mineral beneficiation, manufacturing and pharmaceutical sectors (the so-called "strategic growth paths"). Accelerating the digital transformation can help increase market participation and modernise these value chains. For example, the ongoing digital transformation at the global scale is likely to accelerate the *servicification* of manufacturing and the regionalisation of long and complex value chains such as the automotive industry (see Chapter 1). Similarly, blockchain applications can fundamentally improve the production, organisation and distribution of the agri-food industry in Africa. However, countries will need to tackle certain challenges to realise such potential (see Box 2.1 in Chapter 2).

Using blockchain requires digital capacity among actors in the value chains. An example is the first TRADO pilot for Malawi's tea sector. TRADO is an initiative that aims to provide cheap financing for working capital to agricultural producers in exchange for supply chain data. The flow of data on products and supply chain party participation, enabled by blockchain, help improve pricing models of trade finance and reduce financing costs. The pilot, carried out with Unilever in 2018, showed a lower gain (a 0.68 percentage point increase) than expected (a 1-3 percentage increase). The lower gain resulted from buyers not having the capacity to carry out the digital transactions.

Countries should strengthen linkages between the digital innovation hubs and the actors in the strategic sectors. The region enjoys several hubs (see Table 3.5), such as the Southern Africa Innovation Support Programme (SAIS). The purpose of the SAIS initiative is to facilitate the growth of innovation ecosystems in Southern Africa. The programme is a partnership between the SADC Secretariat and the ministries responsible for science, technology and innovation in Botswana, Namibia, South Africa, Tanzania and Zambia. Connected Hubs, one of the programme's components, aims to share best practices in innovation support and develop a networked community of innovation actors among the countries of SADC. Since its pilot in 2018, Connected Hubs has built bridges between 20 business support organisations across seven countries, supported over 500 early-stage entrepreneurs and strengthened 24 early-stage, impact-driven start-ups (SAIS, n.d.).

Co-operation among government authorities and the private sector is vital. Many digital applications and platforms operate across regulatory boundaries and conduct business in a number of sectors. The fintech sector, for instance, has proven to be a critical tool for upgrading the agri-business sector (see Chapter 2). Several government authorities share

regulatory responsibility for this sector, such as central banks, ministries overseeing telecommunications and competition authorities. However, a recent review of policies for digitalisation in Lesotho, Malawi and South Africa reveals limited collaboration across government agencies (Markowitz, 2019). Strong leadership is critical to inspire a common vision towards the digital transformation across sectors, industries and government authorities and to foster dynamic collaboration among them.

Table 3.5. **Seven examples of innovation hubs in Southern Africa**

Name	Year of establishment	Notable features	Location
Alphacode	2015	Alphacode identifies, partners with and supports extraordinary next-generation financial services entrepreneurs.	Johannesburg, South Africa
Silicon Cape Initiative	2009	The Silicon Cape Initiative is a social enterprise aimed at encouraging technology and IT entrepreneurship in the Western Cape.	Cape Town, South Africa
BongoHive	2011	Zambia's first technology and innovation hub, BongoHive has supported over 1 300 start-ups by enhancing skills, accelerating growth, strengthening networks and increasing collaboration.	Lusaka, Zambia
mHub	2014	mHub is an innovation hub and incubator that trains and mentors innovators and entrepreneurs. It has trained over 4 000 youth.	Lilongwe, Malawi
Impact Hub Harare	2015	Impact Hub Harare is a social business incubator, an innovation lab and a social enterprise community of more than 100 members.	Harare, Zimbabwe
Kianda Hub	2015	Kianda Hub provides co-working space and organises the annual Seedstars Luanda competition. Seedstars Luanda 2019 attracted seven local start-ups.	Luanda, Angola
Southern Africa Innovation Support Programme (SAIS)	2011	SAIS is a regional initiative that supports the growth of new businesses through strengthening innovation ecosystems and promoting cross-border collaboration between innovation role-players in Southern Africa. For the 2017-21 period, the SAIS 2 Innovation fund provided EUR 1.3 million to 9 projects (out of 176 requests received).	Windhoek, Namibia

Source: Authors' compilation.

Notes

1. In Southern Africa, Angola and Mozambique also have active IXPs.
2. Angola, Botswana, Lesotho, Malawi and South Africa have enacted data privacy laws as far back as 2011. Zimbabwe enacted a data privacy law for the public sector in 2002. Eswatini and Zambia have also introduced or prepared data protection bills.

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Chapter 4

Digital transformation for youth employment and Agenda 2063 in Central Africa

This chapter analyses the actual and potential contribution of the digital economy to accelerating job creation in Central Africa (Burundi, Cameroon, Central African Republic, Chad, Republic of the Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon and São Tomé and Príncipe). Despite the boom in the use of digital services in 2020 due to the coronavirus (COVID-19), Central Africa is struggling to increase the Internet penetration rate among the population in general, and public and private companies in particular and thereby create more jobs. The chapter opens with the opportunities digitalisation brings for reducing unemployment, while pointing out the constraints related to the limited communications infrastructure. It then highlights the untapped potential of digital development, and identifies areas in which this could facilitate a rapid expansion of youth entrepreneurship, notably through the creation of start-ups. The conclusion formalises the priorities for improving the contribution of digitalisation to job creation.

IN BRIEF

The economies of Central Africa are making slow progress in creating digital jobs, due to significant structural constraints: less than 48 in 100 people have access to electricity, while the mobile phone subscription rate (66.9%) remains ten points below the African average. Only 9 out of every 100 people use a computer in Central Africa. One-third (34.2%) of the region is covered by 4G. The high cost of subscriptions explains the low Internet penetration rate, which is 26% compared to an average of 35% for Africa, and the few jobs created by digital technology.

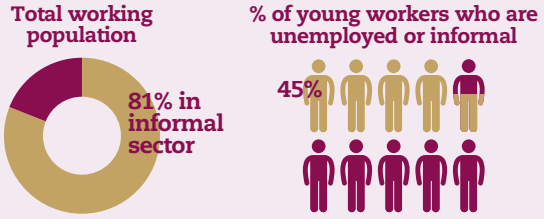
With an agricultural sector that employs 70.3% of the working population and generates only low incomes, the structure of the region's economies, especially those that export minerals, is not conducive to digital development. Yet the potential is real: with a young population having increasingly access to education and stable national regulatory frameworks, it is possible to create dynamic start-ups.

To address these issues, four policy areas should be explored: (i) developing communications infrastructure to facilitate access; (ii) strengthening education systems to equip the workforce with the adequate skills; (iii) leveraging digital technologies to promote entrepreneurship and foster the digital transformation of regional value chains and (iv) implementing decisions taken at the continental, regional and national levels that encourage economic diversification. These decisions include the introduction of a specific tax system for the digital economy, the pooling of infrastructure potential between countries and an increase in public-private partnerships (PPPs).

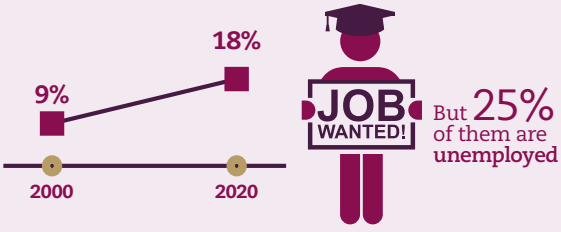
Central Africa

Youth employment

Unemployment and informal employment remain predominant

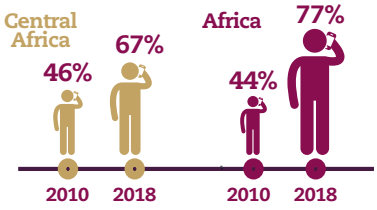


The number of **youth with post-secondary education** has doubled



Communications infrastructure

Mobile phone subscription rates are increasing, but are now below Africa's average



of intermediary cities in the region are **connected to fibre-optic broadband** (the lowest rate in Africa)

Mobile communications cost on average 22% of monthly income

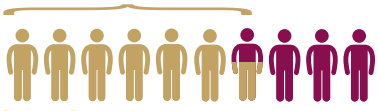
Digital economy

Mobile money transactions increased 9-fold since 2010...

...but, the **potential of digital entrepreneurship** remains largely untapped

Only **9** start-ups raised over USD 100 000 during 2011-20

Youth under the age of 30 represent 65% of the population...



...but only 33% of them **have access to the Internet**

What's next for policy makers?

- Co-ordinate **investment in digital infrastructure regionally** in order to expand coverage and affordability
- Encourage **digital entrepreneurship** by improving the regulatory framework
- Encourage the **digital transformation** of regional value chains
- Leverage **public-private partnership** to facilitate the school-to-digital-work transition

Central Africa regional profile

Table 4.1. **Selected indicators on digital transformation in Central Africa**

			Central Africa (5 years ago)	Central Africa (latest year)	Source	Latest year
Digital sector	Communications infrastructure	Percentage of the population with a cell phone	4.6	23.2	ITU	2018
		Percentage of the population with 4G coverage	19.2	55.4	GSMA	2020
		International Internet bandwidth per Internet user (kilobits/second)	4 536.6	10 902	ITU	2017
	Telecommunication sector	Total capital expenditure (as a percentage of total revenue)	18.4	18.3	GSMA	2018-20
		Earnings before interest, taxes, depreciation and amortisation (as a percentage of total revenue)	28.9	n.a.	GSMA	2018-20
		Total employed headcount within the telecom companies (head account full-time equivalent).	9 716	10 607	GSMA	2016-17
Digital economy	Start-up development	Number of active start-ups that raised at least USD 100 000	1	9	Crunchbase	2011-20
	Digital services	E-Commerce sales (in USD million)	81.2	108.4	UNCTAD	2014-18
		Export of professional and IT services delivered electronically (in USD million)	841.9	645.4	UNCTAD	2014-18
Digitalised economy	Internet use among people	Percentage of the population that use mobile phones regularly	55.4	63.1	Gallup	2018
		Percentage of women with Internet access	16.6	23.9	Gallup	2018
		Percentage of the poorest 40% with Internet access	14.0	15.9	Gallup	2018
		Percentage of rural inhabitants with Internet access	11.4	16.8	Gallup	2018
	Digital-enabled businesses	Percentage of firms having their own website	22.5	22.6	World Bank	2018*
		Percentage of firms using e-mail to interact with clients/suppliers	47.3	46.9	World Bank	2018*
		Percentage of goods vulnerable to automation that are exported to OECD countries	n.a.	9.0	World Bank	2020
	Access to finance	Percentage of the population with a mobile money account	4.0	23.0	Demirgüç-Kunt et al.	2017

Note: * Data for 2018 or the latest 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* (database); Gallup (2018), *Gallup World Poll* (database accessed on 1 February 2020); GSMA (2020), *GSMA Intelligence* (dataset); ITU (2020), *World Telecommunication/ICT Indicators Database* (database); UNCTAD (2020), *UNCTADSTAT* (database); World Bank (2020a), *World Bank Enterprise Surveys* (database); World Bank (2020b), *World Development Report 2020*.

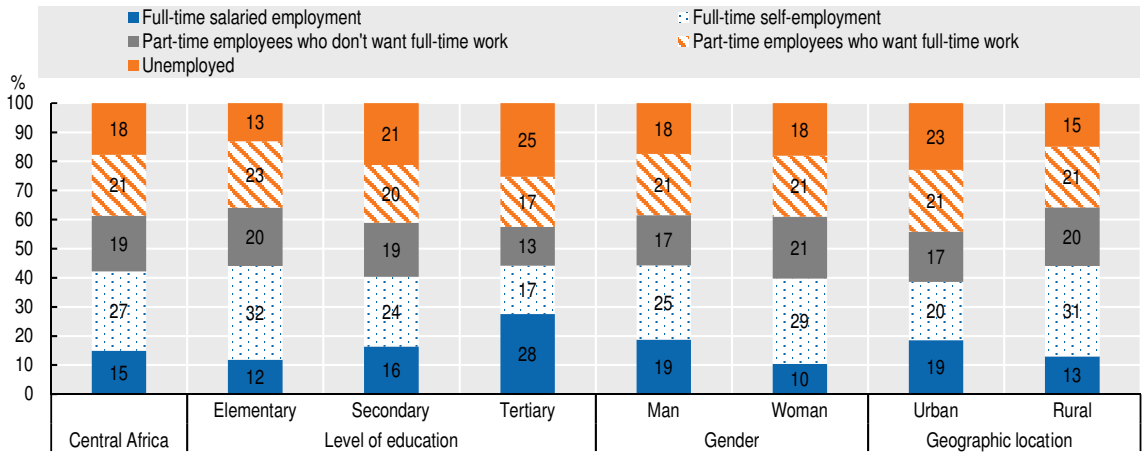
Digitalisation offers opportunities to create jobs, but access to communications infrastructure remains disparate across Central Africa

The digital economy and job creation are central to the African Union's Agenda 2063

Underemployment remains high in Central Africa, as does precarious employment. As much as 81% of the working population is precariously employed in the informal sector (ILO, 2020), and more than two-thirds earn their livelihood from agriculture. The African Union's Agenda 2063 aims to reduce vulnerable employment in Africa from 73.89% to 41% between 2020 and 2063. Despite the low unemployment rate in the subregion (7.1% in 2019), underemployment exceeds 70%, reaching 80% in Gabon and São Tomé and Príncipe (ILO, 2020).

More than 60% of the population in Central Africa is aged 15-34 years. By 2030, around 3 million young people will reach working age each year. However, this potential is under-exploited as young people are without work and do not fully contribute to wealth creation. Indeed, unemployment and informal employment remain predominant, affecting 45% of young workers in Central Africa. The informal sector is an outlet (32%) for those with only a basic education, or no education at all. In comparison, higher education graduates are more likely to be unemployed (25%), a sign of a mismatch between their skills and the needs of the labour market (Figure 4.1).

Figure 4.1. **Youth employment in Central Africa by socio-economic group, 2010-18 average**



Notes: The data include seven Central African countries: Cameroon, Burundi, Central African Republic, Chad, Congo, Democratic Republic of the Congo (DR Congo), Gabon. 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: Gallup (2018), *Gallup World Poll* (database), www.gallup.com/analytics/232838/world-poll.aspx.

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The digital economy represents a tremendous opportunity for the structural transformation of Central Africa. For this reason, it was chosen as the second goal of Agenda 2063, which states that digitalisation should lead to "well-educated citizens and a skills revolution underpinned by science, technology and innovation". This goal is part of the African Union's aspiration to create a "prosperous Africa, based on inclusive growth and sustainable development" (African Union, 2015). In Cameroon, the number of direct

jobs created in information and communications technology (ICT) is reported to represent 3-5% of the labour force, while each ICT job generates 4.9% of jobs in other sectors (Wamba and Ndjie, 2019). However, these jobs are less sustainable when supported by start-ups with little or no structure.

Access to digital tools in Central Africa is the lowest on the continent

Although it still lags behind other regions of the continent, there has been a leap forward in Central Africa's adoption of mobile phones. By 2018, 66.83% of the population had taken out a mobile phone subscription (ten percentage points lower than the African average), compared to 45.76% in 2010 (World Bank, 2020c). In comparison, fixed line subscriptions accounted for fewer than 3% of new subscriptions over the same period. Despite this, the region is trailing behind in terms of access to digital tools. For example, computer use remains reserved for 9.81% of the population in Central Africa, compared to the continental average of 10.1% (Table 4.2).

Table 4.2. **Mobile phone subscription and computer use in Central Africa (per 100 inhabitants)**

	Mobile phone subscriptions (per 100 inhabitants)		Computer use (%)	
	2010	2018	2010	2018
Burundi	19.34	56.53	8.89	10.91
Cameroon	42.46	73.19	3.94	13.81
Central African Republic	22.32	27.41	0.53	0.96
Chad	24.05	45.12	0.2	0.23
Congo	87.01	95.34	0.78	11.17
DR Congo	18.31	43.38	0.03	0.04
Equatorial Guinea	42.31	45.16	4.37	15.9
Gabon	99.13	138.28	10.72	35.51
São Tomé and Príncipe	56.95	77.05	6.11	9.8
Central Africa	45.76	66.83	3.95	9.81
Africa	44.3	76.7	5.8	10.1

Source: Authors' calculations based on the International Telecommunication Union (ITU, 2020), www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

Weak purchasing power, combined with a lack of competition between operators, helps explain why the region is lagging behind. The cost of mobile phone communication remains a major obstacle to digital expansion in the subregion. With an average monthly per capita income of USD 195.76, and average communication costs of 21.9% of this income, it is difficult to achieve the figure of almost 80% mobile phone subscriptions seen in other African subregions (Table 4.3). Moreover, the mobile phone market is oligopolistic, and limited competition is a barrier to reducing costs. On average, each country has only three operators for a population of 150 million inhabitants in the region. Airtel (India), Orange (France) and MTN (South Africa) are established in several countries in the region.

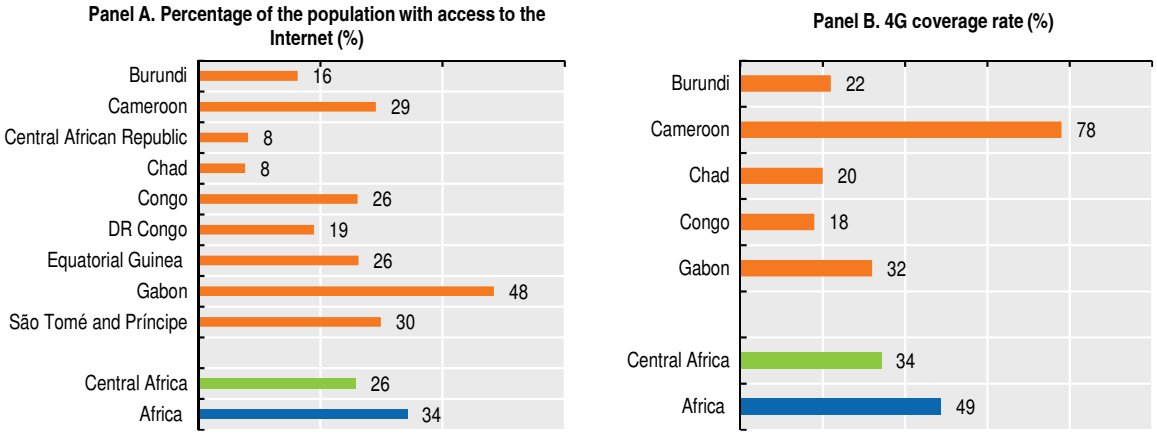
Table 4.3. **Incomes and mobile phone subscription costs in Central Africa**

	Average annual income in USD	Mobile phone subscription costs as a percentage of GNI*
Burundi	280	30.03
Cameroon	1 400	12.02
Central African Republic	489.6	38.48
Chad	720	36.02
Congo	1 710	
DR Congo	430	25.2
Equatorial Guinea	7 180	
Gabon	7 210	3.07
São Tomé and Príncipe	1 720	8.45
Central Africa	2 348.84	21.90

Notes: *Gross national income.
Source: Authors' calculations based on World Bank (2020c), *World Development Indicators* (database) and ECA (2019), "Digital Transformations and Economic Diversification in Central Africa: Issues, Challenges and Opportunities".

Beyond access to telecommunications and digital tools, the region suffers from poor Internet and 4G access. In 2018, only 25.8% of the population had access to the Internet, compared to 34.2% in Africa (Figure 4.2). Similarly, low 4G coverage, compared to the African average, suggests poor service quality when it is accessible. Despite the implementation of policies to increase 4G coverage, only 34.2% of the population in Central Africa was covered by a 4G network, compared to 48.77% across the continent as a whole. Only Cameroon had a coverage rate of 78%, thanks to its network of relay antennas.

Figure 4.2. **Internet penetration rate and 4G coverage in Central Africa, 2018**



Source: Authors' calculations based on Gallup (2018), *Gallup World Poll* (database), www.gallup.com/analytics/232838/world-poll.aspx and GSMA (2020), *GSMA Intelligence* (database) www.gsmaintelligence.com/.
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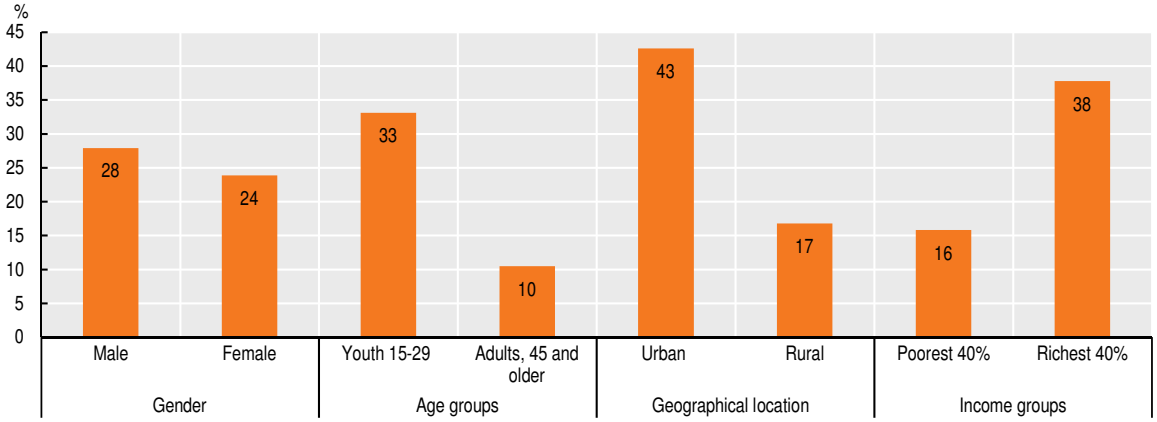
The varying rates of Internet penetration are also characterised by socio-economic, gender and geographical inequalities. Although low, compared to other subregions, Internet access for young people is a key issue in Central Africa. While they represent more than 65% of the population (ECA, 2019), only 33% of 15-30-year-olds have access to the Internet (Figure 4.3). Similarly, there are significant inequalities in terms of access between urban and rural areas due to the lack of terrestrial fibre optic networks linking the major conurbations to peripheral cities. For example, only 5%

of intermediate cities are within 10 km of the basic network, compared to 36% of large cities (see Chapter 2, Figure 2.1). Increased Internet access for young people, especially outside large conurbations, would help to facilitate their integration into both the informal and formal labour markets.

Figure 4.3. **Internet access by socio-economic group in Central Africa, 2018**



Source: Authors' calculations based on Gallup (2018), *Gallup World Poll* (database), www.gallup.com/analytics/232838/world-poll.aspx.

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There are two main explanations for the varying rates of Internet coverage and the poor quality of services in Central Africa:

- **The lack of infrastructure and limited fibre optic networks**. Landlocked countries such as Chad, the Central African Republic, Burundi and the Democratic Republic of the Congo are poorly served by fibre optic and do not have direct access to submarine cables. Increasing the Internet penetration rate requires financial investment, with a view to joint projects and network expansion policies.
- **The high costs of mobile data and digital tools (smartphones and computers)**. In 2018, the cost of one GB of mobile data amounted to 6.35% of the monthly per capita income in Cameroon, three times higher than the international standard, set by the United Nations at a maximum of 2% of monthly per capita income (Table 4.4). In Equatorial Guinea, a one-gigabyte connection cost an average of USD 34.80, compared to USD 2.80 and USD 4.10 in Rwanda and Ghana respectively (A4AI, 2018). Compared to the rest of the continent, the highest tariffs are found mainly in the Economic and Monetary Community of Central Africa (CEMAC). A survey of Internet use in Cameroon and the Democratic Republic of the Congo also revealed that the cost of digital services was a barrier to Internet use for more than 20% of the population surveyed (GSMA, 2016a).

The high cost of mobile data is due to several factors including: the existence of numerous taxes on Internet communications, which not only prevent the expansion of mobile telephone and Internet service use but also, and more importantly, prevent their inclusion in businesses; and the limited competition in the telecommunication sector, where the number of operators is very small, about three per country (ECA, 2019).

Table 4.4. **Price of 1 GB in USD and as a percentage of 2018 average monthly income in Central Africa**

Country	Price per GB in USD	Price of 1 GB as a percentage of monthly GNI per capita
Burundi	3.22	13.31
Cameroon	3.48	3.07
Central African Republic	9.20	28.30
Chad	12.18	23.20
Congo	8.87	7.83
DR Congo	12.57	33.52
Equatorial Guinea	34.80	-
Gabon	6.96	1.26

Source: Authors' calculations based on A4AI (2018), *Mobile Broadband Data Costs*, a4ai.org/extra/mobile_broadband_pricing_usd-2018Q4.

Despite its potential, the development of the digital economy remains limited and uneven in Central Africa

The adoption of national strategies and regulations for the digital ecosystem is an encouraging sign and could be accelerated in the current context

The COVID-19 crisis has prompted accelerated use of new technologies in many Central African countries. Full or partial lockdowns have increased the use of new technologies in the region, particularly through telecommuting (videoconferencing), and have encouraged the rapid adoption of new regulations. For example, in April 2020, the Bank of Central African States (BEAC) introduced regulations to promote the interoperability of mobile money accounts across the region to encourage contactless payments (Financial Afrik, 2020). Moreover, since March 2020, schools have been using distance learning and online courses via social network platforms or applications (Facebook, Zoom, TeamLink, WhatsApp and Google Learning). The Economic Community of Central African States (ECCAS) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) also reaffirmed their commitment to providing immediate support to member states, for example by making USD 196 000 available to facilitate educational continuity in Gabon, in particular through innovative teaching/distance learning arrangements using all relevant media (online, offline, television, radio, printed materials – UNESCO, 2020). In Cameroon, which has more than 73% formal employment, the service sector would have experienced the largest slump in activity if telecommuting had not been so dynamic (Andrianarison and Nguem, 2020).

More and more countries are adopting national strategies to support the development of their digital ecosystems. Most countries are below the global average in terms of digital service provision (*e-governance, e-learning, mobile money,* etc.). As a result, the lack of content adapted to the local context is a major barrier to increased Internet use. Indeed, it is cited as the main barrier by 43% in Cameroon and 45% in the Democratic Republic of the Congo, followed closely by the cost of data and lack of digital skills (GSMA, 2016a). However, governments are increasingly recognising the importance of developing a digital ecosystem offering local content to encourage the emergence of a digital economy. It is therefore essential to create an enabling policy environment, with the adoption of digital agendas or strategies.

Several examples exist throughout the region:

- In **Gabon**, the government wants to transform the country into a "regional digital hub". It has invested in infrastructure, including the construction of a submarine fibre optic cable landing station and a terrestrial network of more than 1 100 km through a PPP (Box 4.1). The number of Internet subscribers has increased sevenfold since 2010.
- In the **Democratic Republic of the Congo**, the National Digital Plan 2025 aims to reduce youth unemployment by 25% and create more decent jobs in start-ups (DRC, 2019).
- In **Cameroon**, in the wake of "major achievements", the Digital Cameroon 2020 strategic plan should contribute to achieving growth and full employment targets over the next five years, through more intensive use of ICT in production tools. The goal is to increase the number of direct digital jobs created from 1 000 in 2016 to 50 000 in 2020 (Ministry of Posts and Telecommunications, 2016).
- In the **Congo,** with its three pillars of e-citizenship, e-government and e-business, the government also plans to increase employment in e-commerce (Republic of the Congo, 2019).

Box 4.1. **Gabon's Internet connectivity success**

In 2018, Gabon was the sixth most connected country on the African continent (World Bank, 2018). This performance can be explained by the institutional framework for the digital sector supported by the Agence nationale des infrastructures numériques et des fréquences [National Agency for Digital Infrastructure and Frequencies] (Aninf), established in 2011. It enabled the acquisition of 1 100 km of terrestrial fibre optic cable from Libreville, the submarine cable landing station, thanks to an investment of USD 58 million made with the contribution of the World Bank. The liberalisation of the telecommunications sector has also attracted foreign direct investment (FDI). Group Vivendi Africa (GVA) has been the leading Internet service provider in Gabon since 2017. Thanks to an investment of XAF 15 billion and the commissioning of the Central African Backbone (CAB) submarine cable, Internet access costs have been cut by a factor of ten and the Internet penetration rate has increased by 28% to 48.4% (Digitalbusiness.africa, 2018).

Source: Authors' compilation based on a literature review.

Improving the institutional framework for the digital sector requires the creation of telecommunications regulatory agencies. These national, public agencies are involved in preventing digital security incidents and protecting consumers, providing users with better services and signing agreements. Their main mission is to enforce telecommunications and ICT laws and regulations, to ensure that access to networks open to the public is provided under objective, transparent and non-discriminatory conditions, and to guarantee healthy and fair competition in the sector. Enforcement helps to create an environment that inspires public confidence and makes the sector more dynamic. In addition, consultation meetings between consumers and Internet service providers have sometimes resulted in lower tariffs. At the regional level, the regulatory agencies (Table 4.5) have contributed to the digital revolution in their respective countries.

Table 4.5. **Regulatory agencies in Central African countries**

Country	Body	Year established	Key policies
Burundi	Agence de régulation et de contrôle des télécommunications [Telecommunications Regulatory and Control Agency] (ARCT)	2010	Guaranteeing consumer protection
Cameroon	Agence de régulation des télécommunications [Telecommunications Regulatory Agency] (ART)	2010	Defining the conditions and obligations for interconnection and infrastructure sharing
Central African Republic	Autorité de régulation des télécommunications et de la poste [Telecommunications and Postal Regulatory Authority] (ARTP)	2012	Accelerating interconnection between populations
Chad	Autorité de régulation des communications électroniques et des postes [Postal and Electronic Communications Regulatory Authority] (ARCEP)	2014	Accelerating network interconnection between populations
Congo	Agence de régulation des postes et des communications électroniques [Postal and Electronic Communications Regulatory Agency] (ARPCE)	2009	Setting tariffs related to communications
DR Congo	Autorité de régulation de la poste et des télécommunications du Congo [Postal and Telecommunications Regulatory Authority of the Congo] (ARPTC)	2002	Expanding network provision
Equatorial Guinea	Autorité de régulation des postes et télécommunications [Postal and Telecommunications Regulatory Authority] (ARPT)	2009	Stepping up the construction of infrastructure
Gabon	Autorité de régulation des communications électroniques et des postes [Postal and Electronic Communications Regulatory Authority] (ARCEP)	2012	Improving quality of service
São Tomé and Príncipe	Autorité générale de régulation [General Regulatory Authority] (AGER)	2005	Guaranteeing consumer rights

Source: Authors' compilation based on ITU (2020), *ITU Statistics* (database), www.itu.int/en/ITU-D/Statistics/Pages/default.aspx and national administrations.

Improving the regulatory framework has thus contributed to the emergence of dynamic digital entrepreneurship in the region. In Cameroon, for example, video game start-up Kiro'o Games, founded in 2015, was able to open its capital to private investors to finance its expansion. The company is seeking to raise USD 1 million and has already registered subscriptions for USD 380 000, including USD 110 000 from 89 investors, most of whom are Cameroonians living abroad. Other examples exist throughout the region (Table 4.6; Box 4.2). However, the potential for job creation remains limited for the time being, due to the small size of these structures. AppsTech for example, a business application solutions provider founded in 1999 and operating in more than 40 countries with revenues estimated at between USD 1 million and 10 million, only has about 100 employees.

Table 4.6. **Examples and estimated sizes of digital start-ups in Central Africa, 2020**

Company	Sector	Year founded	Country	Revenue (in USD million)	Number of employees	Total funds (in USD million)
Diool	E-commerce	2015	Cameroon	n/a	11-50	2.1
Gaboncoin	Advertising platform	2012	Gabon	1-10	2-10	n/a
Helios Towers	Telecommunications	2012	DR Congo	n/a	35	105
Empleoguinea	Online recruitment	2010	Equatorial Guinea	1-10	1-10	n/a

Note: Information on the number of employees is taken from LinkedIn profiles (accessed 25 June 2020), n/a = not available.
Source: Authors' compilation based on Crunchbase (2020), *Crunchbase Pro* (database), www.crunchbase.com.

Box 4.2. **Start-ups are spreading, particularly in the health sector, despite a difficult environment**

The creation of start-ups is evidence of the strong creative potential among young people in Cameroon, where the African innovation research site Briter Bridges lists 96 such start-ups.

At the age of 25, Arthur Zang became famous with his now renowned Cardio Pad. This medical tablet allows cardiologists, of whom there are far too few, to perform electrocardiograms and monitor patients remotely. Having caught the attention of Cameroon's President in 2011, he received a grant of EUR 35 000 from the head of state to develop a prototype, which he released in 2013 (ID4D, 2017). A year later, he launched his company, Himore Medical Equipment, which created 14 jobs thanks to loans of around EUR 50 000 from local banks, without taking any risks. Apart from access to finance, the obstacles encountered by Arthur Zang relate to low investment in research and development, and to manufacturing process capabilities. In the absence of a local medical device industry, he had to find foreign partners in China and Korea to manufacture the components, which were then assembled in Yaoundé.

Another computer engineer, Alain Nteff, also seeking to solve a public health problem, co-founded the social enterprise Gifted Mom in Cameroon in 2014. The company's goal is to reduce maternal mortality by offering pregnant women and young mothers follow-up medical care through a mobile application. The follow-up care is provided by doctors employed by Gifted Mom. In 2015, Gifted Mom found investors by taking part in a business acceleration programme in South Africa. Seeking out promising entrepreneurs, South African platform ALN Ventures bought a USD 20 000 stake in the company. This came in addition to the prizes it has won, such as the Digital Africa competition, providing initial funding of USD 220 000.

Source: Authors' compilation based on a literature review.

The creation of community technology hubs is an important addition to the national strategies and supports the development of digital start-ups. These hubs offer a range of services to the local ecosystem, acting as incubators and accelerators for local start-ups, facilitating networking between digital entrepreneurs and providing co-working spaces (Table 4.7). They also promote discussion between policy makers and the digital start-up community through forums such as Kinshasa Digital Week in the Democratic Republic of the Congo. However, the development of these technology hubs remains relatively limited in the region, with the exception of Cameroon, which stands out with its 18 hubs (Box 4.3).

Table 4.7. **Examples of technology hubs in Central Africa**

Name	Date created	Location	Key information
ActivSpaces	2010	Buea and Douala, Cameroon	A group of 87 start-ups generating USD 250 000 in revenue and organising more than 2 000 events. One of the first co-working spaces to offer free and open access.
Ja Gabon	2013	Libreville, Gabon	Has trained nearly 4 000 young people in financial education and entrepreneurship to improve their employability.
Bantu Hub	2015	Brazzaville, Congo	Launched a mentorship programme in 2015, including accelerated entrepreneurship training and technical, marketing and other support for young digital entrepreneurs.
Centrafrique Tech Hub	2017	Bangui, Central African Republic	Digital and physical learning space.
Ingenious City	2018	Kinshasa, DR Congo	Has launched 55 start-ups, including 21 in the technology field.

Source: Authors' compilation based on a literature review.

Box 4.3. **Digital clusters concentrated in Cameroon**

According to the AfriLabs 2019 report, Cameroon has 18 of Africa's 644 tech hubs, compared to 11 in the DRC and 90 in neighbouring Nigeria – the country with the most tech hubs, ahead of South Africa and Kenya. The Cameroonian clusters include *ActivSpaces* in Douala and Buea, *O'Botama*, *IT Kola* and *ZixtechHUB*. Some operate as incubators offering co-working spaces, others as business accelerators.

The country's main hub, called **Silicon Mountain** in Buea in the southwest region, gave rise to the *Zoomed* application, developed by Bruno Zuo to remotely track vehicles by SMS, and the *Njorku.com* search engine, developed by Churchill Mambe Nanje to help the unemployed find jobs.

Another hub, the **Cameroon Silicon River**, was launched by the authorities in Yaoundé in 2019 to encourage innovation in the administrative capital. Last but not least, *Minajobs.net* is a frequently consulted platform. It provides information on recruitment in all sectors, with an average of 1 467 companies recruiting out of just over 9 000, according to information provided by the National Employment Fund.

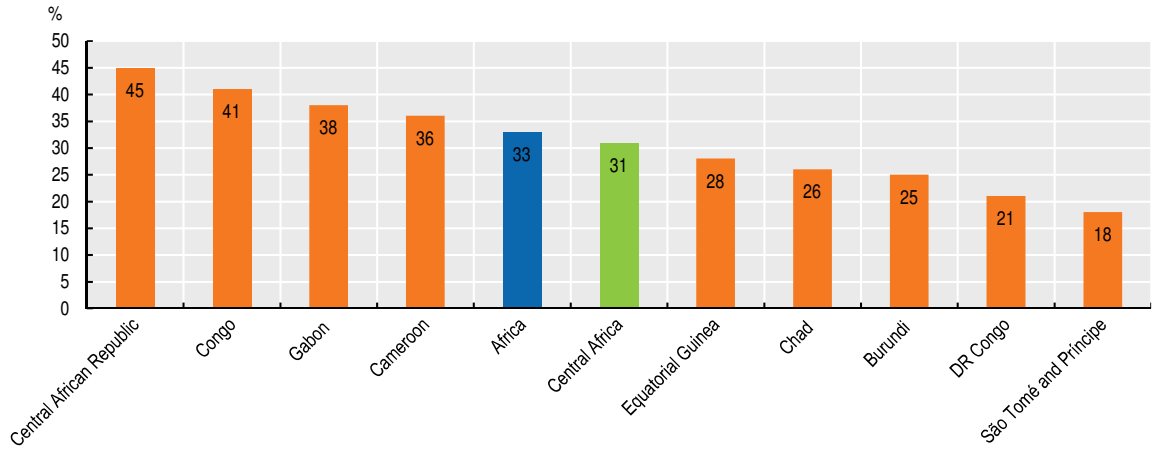
However, these hubs rely on a fragile digital environment. In 2017, instability caused by the separatist conflict in the country had already led the authorities to shut down the Internet in the two English-speaking regions for three months, forcing the Silicon Mountain stakeholders to move their offices near Douala. Equally, the cost of accessing communications infrastructure remains a major obstacle to the development of these hubs despite Cameroon's ambition to multiply ICT jobs by 50 by 2020.

Source: Authors' compilation based on a literature review.

Weak regulatory infrastructure and human capital hamper the emergence of digital enterprises, limiting direct job creation

Digital transformation will not create enough direct jobs. According to data from World Bank's Enterprise Surveys, only 31% of the companies surveyed have a website through which they can conduct their business (Figure 4.4), although the digital entrepreneurship ecosystem is varied. This rate is lower than Africa as a whole (33%) and is very uneven across the countries.

Figure 4.4. **Share of companies using their own website**



Note: Data for 2018 or the latest available.
Source: Authors' calculations based on World Bank (2020a), *World Bank Enterprise Surveys* (database), www.enterprisesurveys.org/en/survey-datasets.
StatLink https://doi.org/10.1787/888934203757

There are two non-exhaustive explanations as to why so few firms have their own websites. First, the private sector is dominated by informality, limiting access to the financing needed to invest in purchasing computer equipment or new technology. Second, the high cost of digital-related services and the high rate of digital security incidents prevent small entrepreneurs from considering the Internet as an important sales channel. In addition, the number of Internet exchange points between the different access providers is low (ECA, 2019). The low adoption of new technology by local businesses explains the limited development of e-commerce and online service platforms in the region.

Table 4.8. **Trade in goods (via e-commerce) and digital-related services in Central Africa, 2010-17 (USD million)**

	Online sales or e-commerce		Digital-related services	
	2010-13	2014-17	2010-13	2014-17
Burundi	7	8	11	16
Cameroon	99	113	598	547
Congo	35	7	270	165
DR Congo	51	8	145	29
Gabon	3	1	212	164
São Tomé and Príncipe	1	1	3	10
Central Africa	196	138	1 240	930

Source: Authors' calculations based on UNCTAD (2020), *UNCTADSTAT* (database), https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=158359.

Despite the pushes by Cameroon and Gabon, the development of trade in digital services and online sales in Central Africa remains weak and is facing a slowdown (Table 4.8). This phenomenon of potential "premature de-digitalisation", borrowing Dani Rodrik's description of premature de-industrialisation, could be explained by the region's instability, the strong fluctuations in connections, lack of confidence and the immaturity of the regional digital market. In addition, policies to simplify online services are slow to take shape and achieve their objectives.

The COVID-19 health situation could rekindle interest in the development of e-commerce in the region. Indeed, despite the lack of reliable statistics, e-commerce is in high demand through online orders of items with flexible delivery. According to the Economic Commission for Africa, e-commerce is reviving the sales of African companies during the COVID-19 crisis. The opening of the Electronic World Trade Platform (eWTP), by the *Alibaba Business Group*, to a larger number of countries on the continent, for example, could allow a greater participation of African SMEs to global trade during the COVID-19 crisis.

Better access to communications infrastructure could encourage the development of businesses using digital tools. For example, the construction of a data centre, planned in the Republic of the Congo in the coastal town of Pointe-Noire and representing an investment of USD 30 million, has the potential to create many direct and indirect jobs in the region. In the medium and long term, this new data centre will increase the country's digital information management and storage capacities, with potential externalities for neighbouring countries (Alley, 2020). Furthermore, improved high-speed Internet coverage is in turn increasing the productivity of firms and allowing them to expand their export prospects to more distant markets. Thus, trade in digital services and e-commerce should be more dynamic, creating new opportunities for businesses located in better connected areas. Similarly, the average survival rate of firms in Central Africa could increase if the regional regulatory framework facilitates the adoption of digital and financial tools.

Strengthening digital security should help boost consumer confidence and the adoption of new technologies. According to a 2018 report by McAfee, cybercrime costs 0.8% of global gross domestic product (GDP) in 2019, or USD 2 100 billion; sub-Saharan Africa loses USD 3 billion annually. In Central Africa, losses are estimated at approximately USD 400 million, mainly due to activities such as e-mail account spoliation, embezzlement of money transfers and mobile phone payment fraud. This is in addition to piracy, financial attacks and threats on mobile phones, and SIM box fraud. According to the Agence nationale des technologies de l'information et de la communication [National Agency for Information and Communication Technologies] (ANTIC) of Cameroon, there are multiple types of digital security incidents, including the installation of spy programs, hacker programs, information theft, website destruction, credit card fraud, identity theft, commercial fraud, breaches of trust and various scams. ANTIC has also indicated that in recent years Cameroon has lost nearly USD 6.9 million due to scamming[1] and about USD 6.4 million due to skimming.[2]

Table 4.9. **Digital security rankings of Central African countries**

Country	Score	World ranking (out of 175)	Regional ranking (out of 42 countries in sub-Saharan Africa)
Cameroon	0.432	91	13
Gabon	0.318	100	15
Congo	0.167	130	25
Chad	0.098	147	30
Burundi	0.087	151	33
São Tomé and Príncipe	0.064	158	36
Central African Republic	0.036	167	39
Equatorial Guinea	0.031	168	40
DR Congo	0.008	174	42

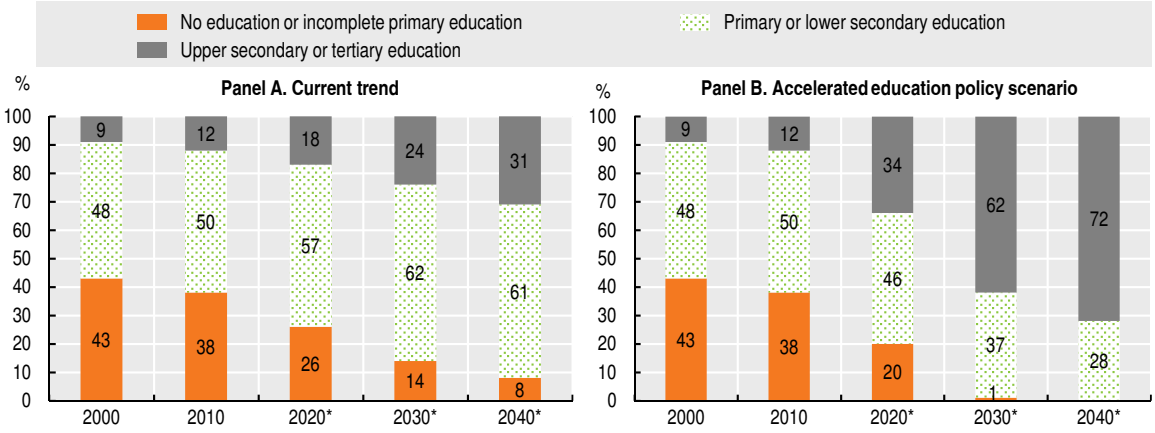
Note: The level of each country's cybercrime prevention development or commitment is assessed according to five pillars: (i) legal measures, (ii) technical measures, (iii) organisational measures, (iv) capacity building, and (v) co-operation, and then aggregated into an overall score. For more details on the calculation of this index, please refer to the ITU website.
Source: Authors' calculations based on ITU (2018), *Global Cybersecurity Index (GCI) 2018*, www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2018-PDF-E.pdf.

Persistent digital security incidents are hindering the development of digital start-ups, weakening the potential for job creation. Increasingly, start-ups in Central Africa are a way out of unemployment for young people. Unfortunately, their websites are regularly attacked by competitors. The loss of markets and customers as a result of misuse of information is forcing start-ups to limit recruitment.

Taking advantage of digitalisation will also require a workforce with the necessary technological and technical skills

Despite slow progress, more and more young people have access to education. In recent years, the number of young people having completed secondary or tertiary education has risen from 9% in 2000 to 18% today (see Figure 4.5, Panel A). Following similar trends, this proportion could reach 31% by 2040. If the region could make progress in education at a similar pace to Korea, the proportion of young people having completed upper secondary or tertiary education could reach 72% (Figure 4.5, Panel B). Education is a key determinant of informal employment in Central Africa. Among young workers with only basic education or no education, 32% are self-employed, a proportion that falls to 16% for those with higher education.

Figure 4.5. **Projections for youth educational attainment in Central Africa, 2000-40**



Note: * are for projections. Due to data availability, the figures reported are for the population aged 15-29.

Source: Authors' calculations based on Wittgenstein Centre for Demography and Global Human Capital (2018), *Wittgenstein Centre Data Explorer Version 2.0 (Beta)* (database), www.wittgensteincentre.org/dataexplorer.

StatLink https://doi.org/10.1787/888934203776

The mismatch between skills and the digitalised labour market in the region explains why it is lagging so far behind in terms of job creation. Despite a gradual improvement in educational attainment, the skills mismatch among young people means that they are unable to take full advantage of the use of new technologies or to move out of vulnerable and temporary employment situations. Of the organisations surveyed, 51.5% of companies in the Congo believe that lack of skills is a major obstacle to value creation, compared with 42.7% in Gabon, 26.7% in the Democratic Republic of the Congo, 24.3% in the Central African Republic, 20.4% in Cameroon, 10.3% in Chad, and 8.8% in Burundi (World Bank, 2020a). In 2016, 32.4% of young people surveyed in the Congo were in temporary employment and 8.2% wanted to use their skills to get better pay. For 85% of young people, their lack of specific skills (technological and technical knowledge) was hindering their transition into the labour market (ILO, 2016).

PPP policies and policies to improve scientific education are being pursued to develop basic, digital and entrepreneurial skills

The development of young people's digital managerial skills is based on PPPs. In Gabon, for example, the government, in partnership with UNESCO and Airtel, launched the *Train my Generation: Gabon 5 000* initiative in 2015, aiming to train at least 5 000 young people aged 17 to 35 years old in ICT through (i) an introduction to computers; (ii) tutoring through distance learning (e-learning); (iii) support for entrepreneurship and mobile applications development; and (iv) a scholarship in rare digital economy professions. To date, 1 538 students have benefited from training through ten centres established across the country (ITU-UNESCO, 2017). In Cameroon, the professionalisation of teaching within the framework of the Bachelor, Master, and Doctorate system has led university leaders to sign agreements with the private sector to offer students technical learning frameworks. Vocational streams currently account for 40% of the education system. At the regional level, the *Support Cluster for Professionalisation of Higher Education in Central Africa* facilitates in-company training for students (PAPESAC, 2011; World Bank, 2017).

Strengthening education in science, technology, engineering and mathematics (STEM) and ICT will be crucial, especially for young women. The region's countries currently rank at the bottom of the scale in terms of ICT-related human capital and basic ICT skills, mainly due to the low quality and quantity of human capital (38.33%) in the

higher education sector and, in particular, in STEM-related programmes, i.e. science, technology, engineering and mathematics (IFC/L.E.K., 2019). Barakabitze et al. (2019) show that this weakness is also due to a delay in communications infrastructure in schools. In Cameroon, for example, only 31% of secondary schools have a computer laboratory. One of the concerns of many Central African countries is poor STEM education for women. Women are 25% less likely than men to be able to use ICT for basic purposes, such as using simple arithmetic formulas in software (UNESCO, 2019). However, initiatives exist in the region to address this problem and would benefit from being expanded. In 2019, UN Women launched the *Tujenge STEM* programme in the Democratic Republic of the Congo, with the aim of training young women aged 18 to 34 in STEM entrepreneurship. The initiative operates within the *Ingenious City* technology hub to facilitate networking and incubation of start-ups (Table 4.7). In Cameroon, the Institut africain d'informatique [African Institute of Informatics] launched the *Mijef 2035* initiative in 2015, the successor to the *Operation 100 000 Women / Horizon 2012*, launched in 2002, which had trained 103 350 women and more than 60 000 young people in ICT.

Digitalisation could improve the productivity of workers in existing sectors and promote entrepreneurship, fostering indirect job creation

Digitalisation represents a genuine opportunity to create indirect jobs in the region. However, many of these jobs will remain informal, at least at the business start-up stage. In this category, unstructured start-ups will have to comply to receive efficient and sustainable support.

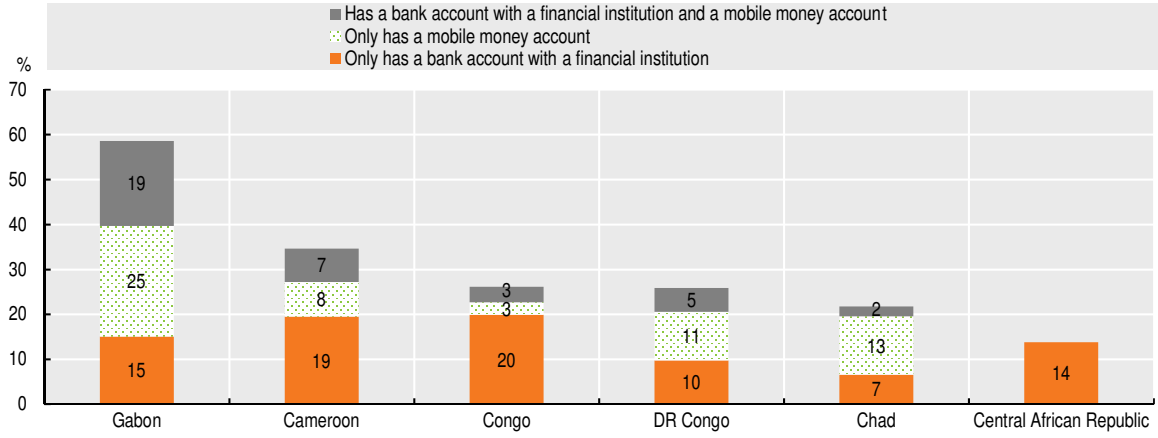
Fintech, which is rapidly gaining ground in Central Africa, could facilitate access to financing for young entrepreneurs. In Central Africa, 30.1% of the population had access to banking services in 2017, the lowest rate on the continent (World Bank, 2017b). Although only recently introduced, mobile money has undergone considerable development in recent years. In 2019, transaction volumes reached USD 1.8 billion, compared to only USD 200 million in 2010 (Table 4.10). Mobile money could contribute to the financial inclusion of previously excluded populations. In fact, in some countries such as Chad and the Democratic Republic of the Congo, a large proportion of the population has only a mobile money account (Figure 4.6). In addition, fintech companies could help to create jobs by offering innovative financing solutions adapted to young entrepreneurs. In Cameroon, for example, equity crowdfunding platform Guanxi Investment offers companies the opportunity to raise funds directly from the general public through the sale of shares. Nonetheless, low levels of income and financial education, multiple computer system malfunctions, and a lack of electrical and digital infrastructure are limiting the emergence of fintech businesses in the region.

Table 4.10. **Development of mobile money in Central Africa**

	Year	Number of registered accounts (millions)	Number of active accounts (millions)	Transaction volume (USD billion)	Transaction value (USD billion)
Central Africa	2010	13	8	0.2	11.3
	2019	48	20	1.8	30.5
Sub-Saharan Africa	2010	125	78	10.3	196.9
	2019	469	181	33.8	456.3

Source: Authors' calculations based on GSMA (2019), *Mobile money metrics* (database), www.gsma.com/mobilemoneymetrics/#global?y=2019?v=overview?g=global.

Figure 4.6. **Percentage of the population with a bank account, by account type (over 15 years old), 2017**



Source: Demirgüç-Kunt et al. (2018), *Global Findex 2017* (database), https://globalfindex.worldbank.org/.
StatLink https://doi.org/10.1787/888934203795

Improving financial inclusion in the region via mobile money and new financial technology requires the support of complementary policies

Capacity building, combined with user-friendly platforms, could improve customers' understanding and awareness of digital financial services. Currently, less than 40% of adults are financially literate in most Central African countries (GFLEC, 2015). Similarly, lack of digital skills is a significant barrier to the use of the mobile Internet, especially for women. In the Democratic Republic of the Congo, 75% of women reported needing help to use the mobile Internet and 17% of them are afraid of making a mistake and losing money (GSMA, 2015). The design of adapted products could be a significant factor in facilitating their adoption.

The extension of digital identity systems could make it possible to include more people in the digital transformation. In Central Africa, only 62% of adults have a document proving their identity, yet most commercial banks require government-issued identification to open an account. The introduction of a digital identity system could therefore improve access to financial services, as well as to mobile phones and public services. In Cameroon and Gabon, for example, nearly 50% of ID card holders use their identification for SIM cards or a mobile phone service (World Bank, 2019).

Leveraging new technology could improve farming techniques and bring producers and consumers closer together. As we have seen, the agricultural sector accounts for more than 70% of employment and contributes 30% of the region's GDP. Unfortunately, these jobs are precarious, vulnerable and seasonal. Moreover, climate change in the region is not conducive to the development of agriculture. Digitalisation (blockchain, smartphones and connected objects) could help improve agricultural techniques to increase farming productivity and resilience in the face of these climatic risks (rising temperatures, reduced precipitation, natural disasters or invasion of caterpillars and other insects that destroy crops). Applications such as eFarm/*Jangolo* in Cameroon (e-marketplaces linking farmers directly to buyers) or BanQu in the Democratic Republic of the Congo (a blockchain-based farmer identification tool) are helping to bring agricultural products closer to consumers and improve their traceability (CTA, 2019). In 2004, the CEMAC countries adopted a common agricultural strategy for member countries that aims not only to increase production volumes, but also to diversify output through a more rational system (CEMAC, 2004).

Developing digitalised regional value chains with a comparative advantage to accelerate the region's productive transformation. Central Africa is highly dependent on raw materials, with an export concentration rate of 0.81 in 2018 (UNCTAD, 2019, 2020). It lags far behind in terms of industrialisation, and regional trade is no more than 3%, with all countries exporting almost the same products. However, digitalisation can offer a response to the region's structural challenges, particularly in the fields of mining, hydrocarbons, wood, and cash crops (cotton, cocoa, coffee and bananas among others).

- In Gabon, for example, the use of satellite images by the Agence gabonaise d'études et d'observations spatiale [Gabonese Agency for Space Studies and Observations] (AGEOS) is contributing to the sustainable development of the **timber industry** by ensuring rational exploitation of the forest, wildlife and resources (ECA, 2019).
- In the Democratic Republic of the Congo, the **cobalt industry** could also benefit from digitalisation. Forty percent of the cobalt produced globally is used in batteries for smartphones and electric cars, and the Democratic Republic of the Congo produces around 60% of the world's cobalt and is believed to have 50% of its cobalt reserves. This sector includes major companies, but also features a multitude of artisanal producers, employing around 200 000 people. The use of digital tools could optimise the management of the various ore extraction sites, ensure the traceability of production, control quantities and improve safety at the various sites. Lastly, industrialisation, producing semi-finished or even finished products, could create more added value (ECA, 2019). In 2018, the Better Cobalt project, based on blockchain technologies, was launched to improve the traceability of production. The cobalt produced at these sites will thus be validated in accordance with the ethical sourcing standards defined by the OECD, while focusing specifically on issues related to child labour and human rights violations in the sector (RCS Global, 2018).

Promoting regional co-ordination on infrastructure and regulations could accelerate digital development in Central Africa

Developing communications infrastructure will contribute to ensuring access across Central African countries

Co-ordinating infrastructure projects at the regional level, with the support of private partners, would improve access to new technology. In this regard, the Programme for Infrastructure Development in Africa (PIDA), led by the African Development Bank (AfDB), the AU Commission and the New Partnership for Africa's Development (NEPAD), would benefit from being strengthened and accelerated. According to PIDA data, there are currently five infrastructure projects aimed at extending terrestrial fibre optic networks and connecting countries in the region to submarine cables. Nine projects aim to improve regional Internet exchange points. Among the most important of these are the Central African Backbone (CAB4), the Plan d'action consensuel de déploiement des infrastructures de communications électroniques de l'Afrique centrale [Consensus Action Plan for the Deployment of Electronic Communications Infrastructure in Central Africa] (PACDICE-AC), and the Border Frequency Coordination Agreement (ECA, 2019; Fukui et al., 2019).

Pooling resources from the public and private sectors to achieve significant savings. Alper and Miktus (2019) estimate that the region will need to invest USD 2.9 billion to achieve full 4G coverage by 2025. However, between 2014 and 2018, only 7% of regional and national government infrastructure financing budgets were allocated to ICT development, i.e. USD 162 million (ICA, 2018). Taking an integrated approach to the development of infrastructure projects by, for example, laying fibre optic cable prior to constructing physical infrastructure such as roads or pylons, could save up to

70-90% of the cost of installing broadband Internet, which remains expensive for states. Moreover, strengthening PPPs could accelerate these projects. The private sector has been the main investor in communications infrastructure. Over the 2015-19 period, the telecommunications service sector in Central Africa has invested an average of USD 750 million per year in communications infrastructure projects.

Harmonising the regulatory framework applicable to digital resources and strengthening shared strategies. This aspect should be broader and more multisectoral, moving beyond a narrow focus on digital security, according to the thirty-fifth session of the Intergovernmental Committee of Senior Officials and Experts (ICE) for Central Africa. The main priorities would be to adopt texts at the national level that are aligned with digital development policies at the subregional level. States should also expand their communications infrastructure and strengthen their regulatory framework. At this level, the legal and regulatory framework is laid down by ECCAS in model laws in an effort to harmonise digital policies and ensure consistency (Tsafak Djoumessi, 2018). Eight model laws on digital issues are currently in force in the region, however, they can be difficult to implement as they often overlap with laws adopted at the national level. Establishing working and implementation evaluation groups would help to reduce misunderstandings related to the implementation of the texts. Moreover, the institutions responsible for digital activities should consult every year to monitor the level of progress in each nation. Inter-country consultation committees could help to better harmonise legal frameworks at the ECCAS and CEMAC levels.

Implementing, monitoring and evaluating decisions taken at the continental, regional and national levels

Implementing policies to speed up progress towards the Agenda 2063 vision for digitalisation. It is important to design digital development programmes that comprehensively integrate training, use and protection, drawing on best practices. The patchy recognition of the electronic certificates issued by each country's public administrations undermines the security of data flows at the regional level. To ensure the smooth flow of data over the Internet and prevent national or subregional traffic from moving through countries outside the region, a programme for the deployment of Internet exchange points at the national and regional level is being rolled out under the aegis of the AU. In March 2019, the telecommunications ministers, meeting in Brazzaville, adopted a road map and an institutional framework for the regional digital development strategy (Table 4.11).

Table 4.11. **Selected subregional digital development strategies in Central Africa**

Domain	Strategies
Infrastructure and costs	Accelerating optical fibre laying and reducing the cost of accessing broadband and therefore Internet and telecommunications services.
Education and skills	Reforming the education and research sector; building human capacity within the regional economic communities in the field of the digital economy.
Public-private dialogue	Establishing public-private consultation frameworks.
Regulation	Adopting subregional legal reforms validated by the regional economic communities.
Funding	Creating a subregional digital solidarity fund to finance the start-ups that will be the employers of tomorrow.

Source: Authors' compilation based on ECA (2019), "Digital Transformations and Economic Diversification in Central Africa: Issues, Challenges and Opportunities".

To make the regional action plan a success, the focus must be on infrastructure, subscription costs and combatting digital security threats. Among other things, it will be necessary to:

- **Establish co-ordination agreements between the region's governments to improve access to and use of new technologies and reduce the costs borne by consumers and businesses.** These agreements would include a review of the various conditions and possibilities for sharing channels reserved for mobile operators and service providers. Between Cameroon and Chad, for example, a radio frequency sharing agreement has ensured equitable access to the spectrum and avoided interference in areas near the border (ITU, n.d). Similarly, in 2020, Gabon and Congo worked together to implement a free roaming agreement ensuring free calls between the two countries.
- **Relax and harmonise digital taxes at the regional level for start-ups using the Internet as their main resource.** Across all countries in the region, 80% of SMEs see taxation as the most significant constraint affecting their operations (World Bank, 2018). The varied and high taxes not only prevent the expansion of the use of mobile phone and Internet services, but also, and above all, they prevent companies from integrating them into their operations. A coherent national and community tax policy would enhance the capacity for job creation. In Chad, for example, statutory fees per subscriber amount to almost 20% of the annual income of the poorest consumers. Reducing the fees applied to incoming international calls, for example, could generate an additional 270 000 connections, including 40 000 via mobile Internet access. Moreover, resources newly available to operators could be reinvested and potentially generate more than 700 direct jobs in the sector (GSMA, 2016b).
- **Encouraging the transfer of knowledge in the digital sector through the creation of cross-border hubs and institutions.** More university institutes that specialise in education for digital professions will need to be established. The Cameroon-Congo Interstate University, which provides training in the fields of digital engineering, agriculture and ICT, was inaugurated in 2019 and has already welcomed more than 300 students from the two countries. Similarly, the creation of a cross-border technology hub/incubator with regional scope, as proposed by ECCAS, could encourage people to train in ICT-related professions and support innovative projects.
- **Strengthen the implementation, monitoring and evaluation of digital strategies, with an emphasis on youth employment components.** Countries in the region will need to adopt strategic digital plans specifically on youth employment, like the Digital Cameroon 2020 plan or the section devoted to this sector in the Emerging Gabon plan. Other countries have adopted similar plans. However, given the transnational nature of the digitalisation of economies, these national strategies should be part of a regional approach.

Notes

1. Scamming refers to all types of scam, especially those carried out on the Internet. Scams mainly consist of getting a person (the victim) to make a transfer from his or her bank account (criminal cybercrime). https://cybercriminalite-penal.fr/scamming/.
2. Skimming is a fraudulent activity that involves hacking bank cards, particularly from cash machines (ATMs). The cards are duplicated and used abroad, to the detriment of their owners and their bank accounts. www.panoptinet.com/cybersecurite-pratique/cest-quoi-le-skimming.html.

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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.

IN BRIEF

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.

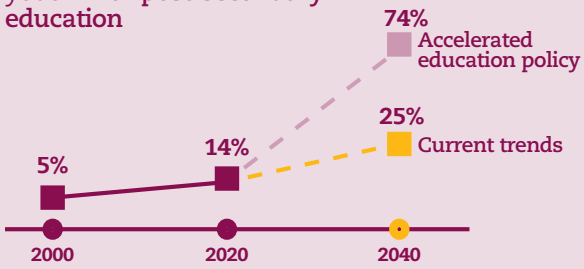
The conditions for leapfrogging to the digital age are ripe, but challenges remain. The region is home to a large pool of increasingly educated youth and relatively strong communications infrastructure, with the fourth-generation mobile network (4G) now available to almost three-quarters of the population. 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.

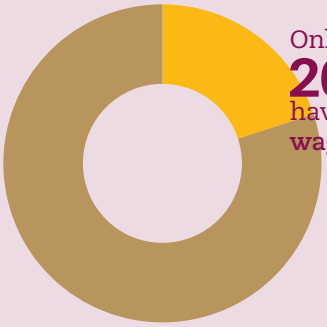
The region needs to address these challenges to create jobs in the digital era by: (i) investing in human resource capacity for future demand for skills; (ii) nurturing entrepreneurship and innovation in the digital economy; and (iii) co-operating to develop regional infrastructure and establish a single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

East Africa

Youth employment

The share of East African youth with **post-secondary education**

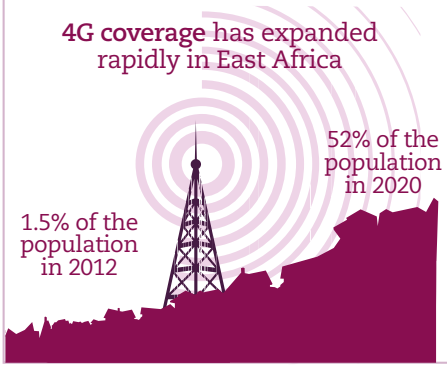




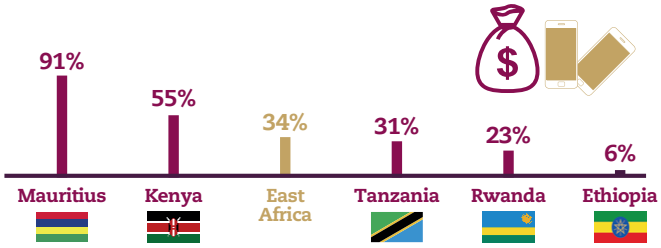
Only **20%** of youth have full-time **waged employment**

Communications infrastructure

4G coverage has expanded rapidly in East Africa



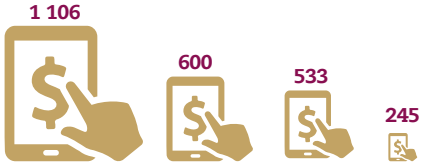
Only 34% of East Africans **can afford 1GB of mobile data** per month



Digital economy

East Africa has the **most registered mobile money accounts** in the world

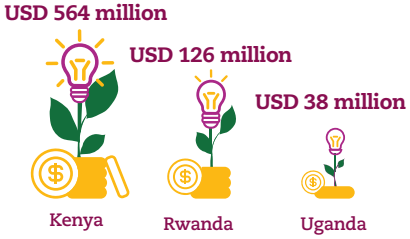
Account holders per 1 000 adults



The number of **start-up hubs** grew from a handful in 2009...

... to 113 in 2019

In 2019, East African **tech start-ups** raised over USD 729 million in investment



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
Digital sector	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
Digital economy	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
Digitalised economy	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:

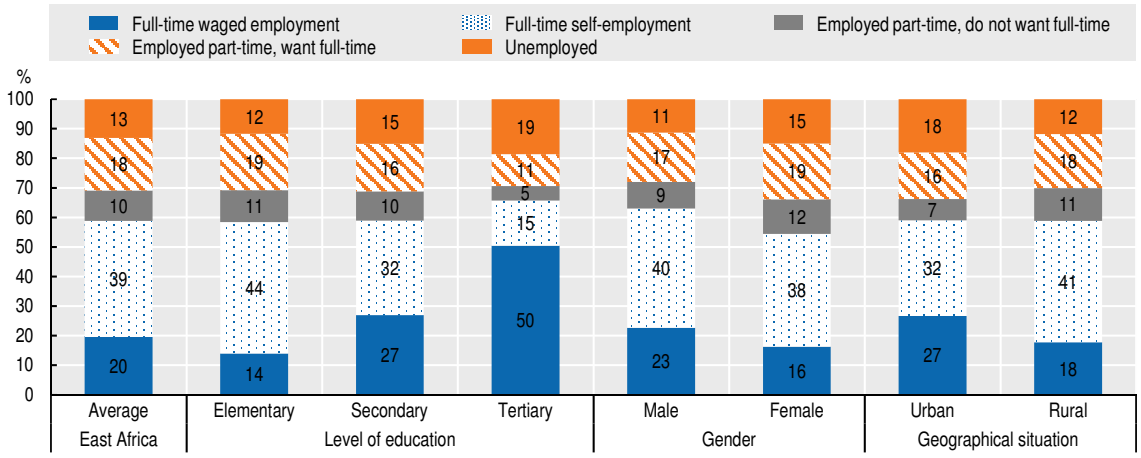
- **Invest in human resource capacity to meet future labour demand:**
  - facilitate the school-to-work transition
  - promote national digital literacy programmes that include disadvantaged groups
  - monitor technological development in East Africa.
- **Nurture entrepreneurship and innovation in the 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.

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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.

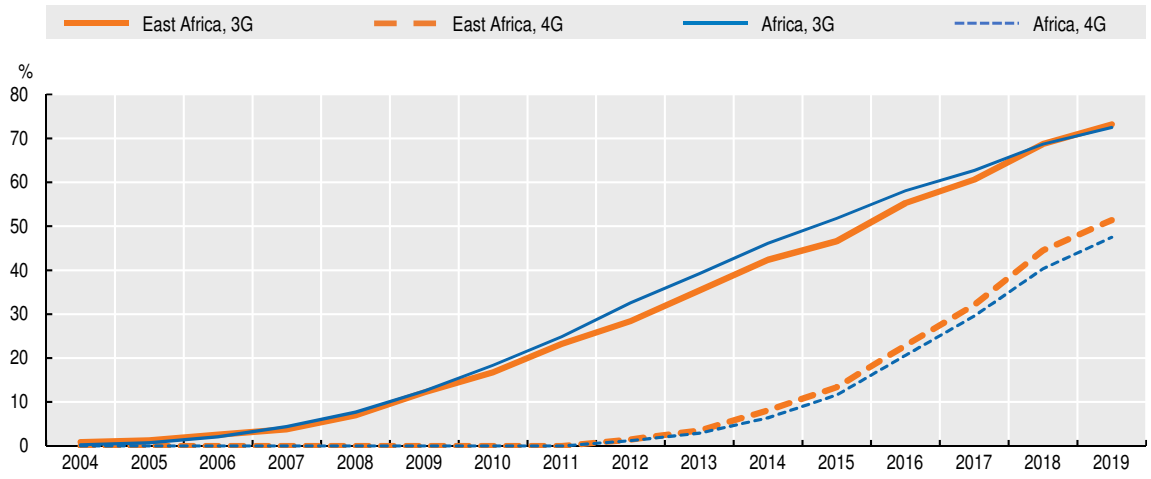
The coverage and quality of communications infrastructure has improved, but digital affordability remains a barrier to access

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**

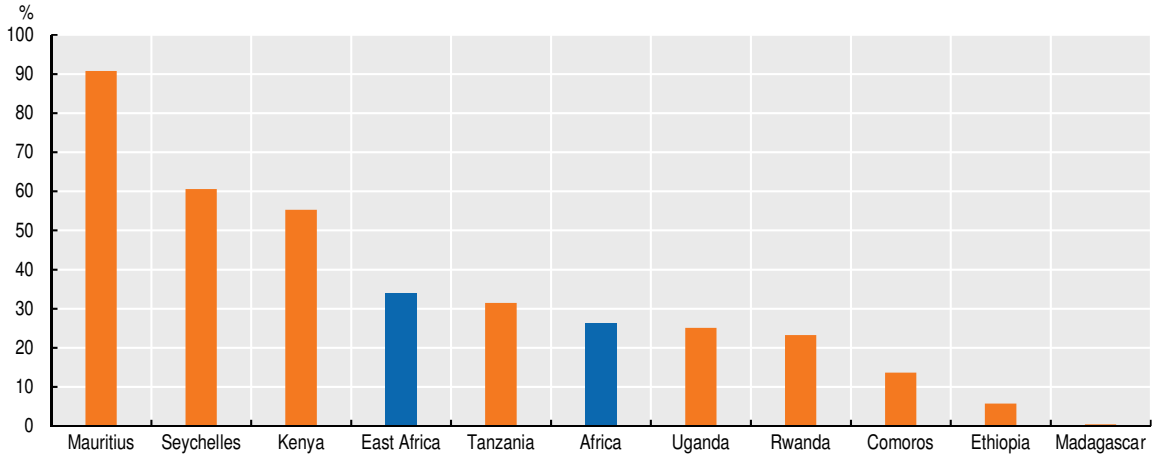


Source: Authors' calculations based on data from GSMA (2020), *GSMA Intelligence* (database), www.gsmaintelligence.com/.
StatLink *https://doi.org/10.1787/888934203833*

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/ and on income distribution data from World Bank (2020c), *PovcalNet* (database), http://iresearch.worldbank.org/PovcalNet/home.aspx.

StatLink https://doi.org/10.1787/888934203852

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.

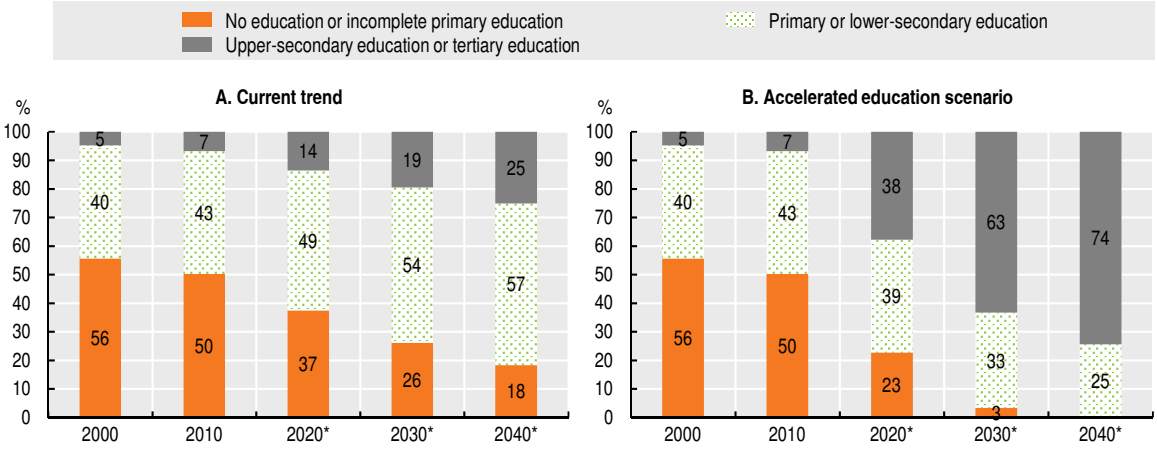
Table 5.2. **East Africa's strengths, weaknesses, opportunities and threats for using digitalisation to create jobs**

Strengths	Opportunities
1. A large pool of increasingly educated youth 2. A dynamic digital economy (especially in fintech) 3. Private sector interests in ICT investment to meet the rising local demands 4. A collective commitment to progress in digitalisation.	1. Direct job creation through entrepreneurship 2. Indirect job creation through productivity improvement and innovation in key sectors (e.g. agriculture, finance and public services) 3. Enhanced access to new markets through digital-delivery and electronic platforms 4. Online education and training opportunities.
Weaknesses	**Threats**
1. Weak physical infrastructure (especially electricity) 2. Low quality of education and digital skills 3. Limited digital adoption, especially among disadvantaged populations and firms 4. Scarce public financial resources for financing digitalisation.	1. A loss of jobs for semi-skilled workers and poor quality of jobs created by the digital economy 2. Global platforms that bypass regulatory and tax requirements 3. A mismatch of skills due to slow re-skilling of workers 4. Political risks of Internet shutdowns.

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/.

StatLink https://doi.org/10.1787/888934203871

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

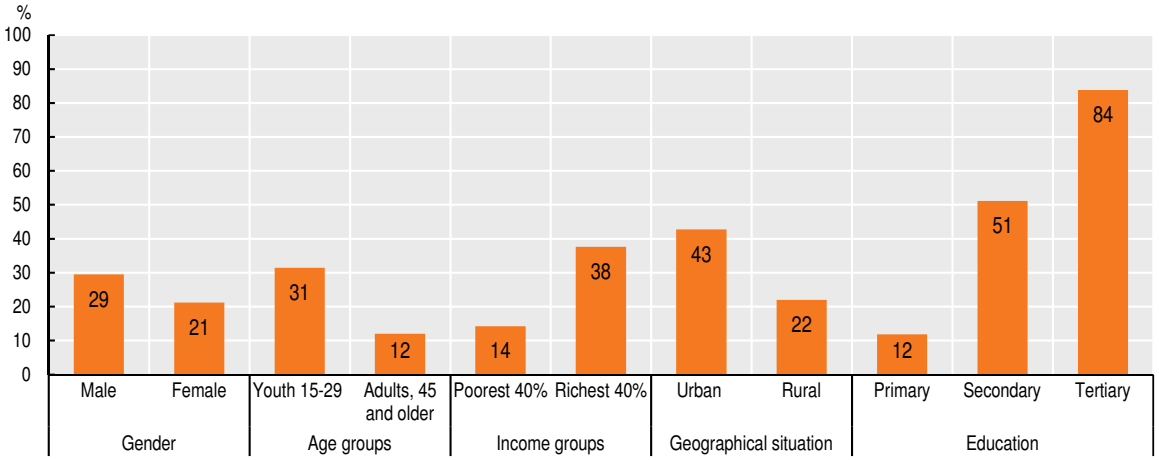
Physical infrastructure, especially electricity, remains a principal hindrance to digitalisation in East Africa. Eleven percent of the region's manufacturing firms cite electricity as their biggest obstacle to doing business, according to the World Bank's *Enterprise Surveys* (World Bank, 2020a). The 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.

StatLink https://doi.org/10.1787/888934203890

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 Chaux, 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. The numbers of employees were retrieved from LinkedIn (n.d.), *Profiles*, 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)[1] 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

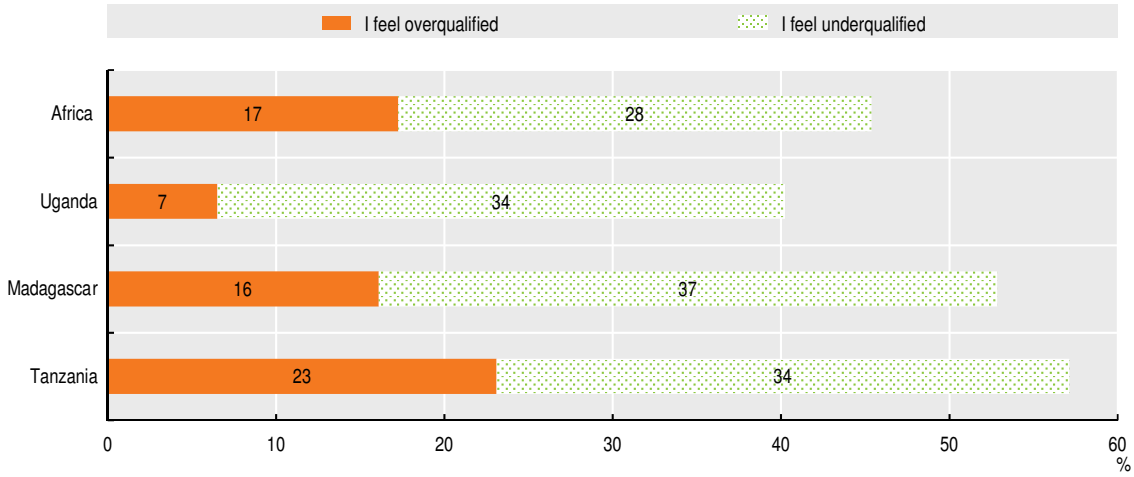
contain a revolt (Parker, 2019). In Ethiopia, Internet shutdowns have become common; the government shut it down in 2016, 2017 and 2019 to supposedly stop the leakage of exams amid anti-government protests (BBC, 2019). Other East African countries that have shut down the Internet for various reasons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

StatLink https://doi.org/10.1787/888934203909

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.

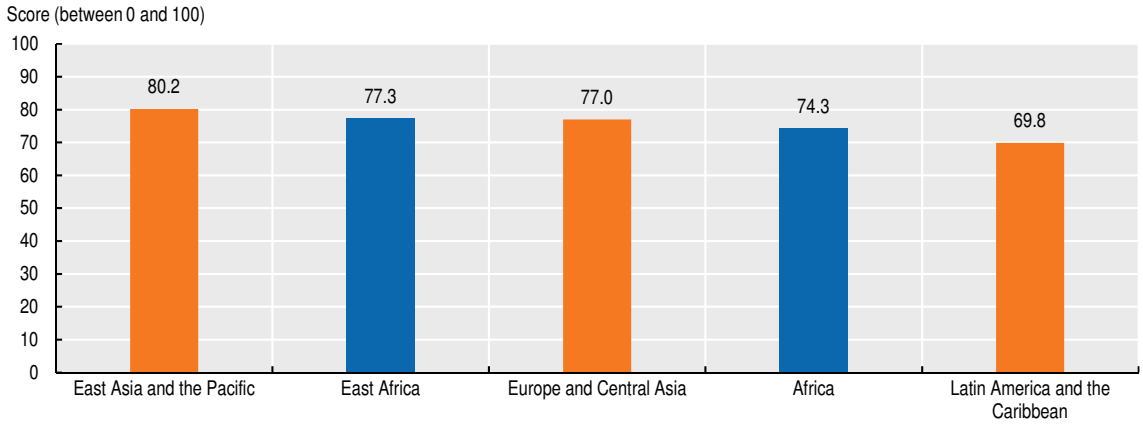
Governments need mechanisms for foreseeing and assessing technological advances in order to keep pace with changes, understand the impact of frontier technologies and identify potential responses. Close collaboration with platforms such as the Commission on Science and Technology for Development (CSTD) 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.

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	• Crowdfunding platform (Pezesha Africa Limited) • Cloud-based data analytics platform (Innova Limited)
Mauritius	2016	• Blockchain and cryptocurrency (Be Mobile, FusionX, PIRL, SALT Technology Ltd, XenTechnologies Ltd) • Credit and capital solutions for individuals and for small and medium-sized enterprises (Finclub) • Crowdfunding platform (Olive Crowd, FundKiss) • Identity management system (Selfkey)
Rwanda	2017	• Mobile wallet system (Riha Payment System)
Uganda	-	• The National Payment Systems Bill 2019 mandated the Central Bank to develop a regulatory sandbox framework for innovative fintech firms.
Tanzania	-	• The Capital Markets and Securities Authority agreed to implement a regulatory sandbox.

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 Savanah 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 Savanah 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 Savanah**

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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Chapter 6

Digital transformation for youth employment and Agenda 2063 in North Africa

Unemployment and the precariousness of youth employment remain major concerns in North Africa. The digital transformation presents several opportunities but also generates new risks for economies, requiring the implementation of adequate policies. Despite high mobile phone penetration, significant Internet service coverage and progress in e-commerce, the region still needs to build infrastructure, develop human capital, promote innovation and deregulate the digital environment if it is to exploit its full potential. The chapter starts with an overview of the labour market and digital development in North Africa. The following section highlights the risks and opportunities related to the digital transformation to support youth employment and fulfill the ambitions of the Agenda 2063. The last section proposes public policies to support and accelerate the digital transformation.

IN BRIEF

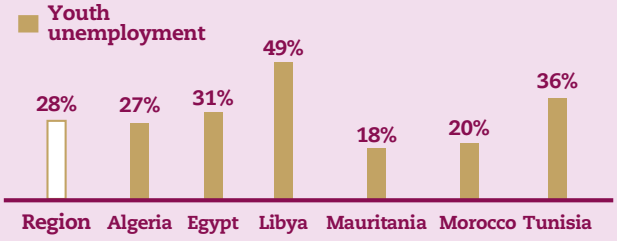
Employment is a major challenge in North Africa, with unemployment and rising inequality producing political instability in the region. Between 2010 and 2018, the average unemployment rate was 12.1%, with higher rates in Libya (19%) and Tunisia (15.8%) than in Morocco (9.2%). Youth unemployment, which has reached almost 50% in Libya, continues to be difficult to control, particularly among graduates. The digital transformation therefore presents many opportunities, given that the region is outperforming the rest of the continent in terms of digital development with 67% mobile phone access and 48.3% Internet access. The latter figure conceals a strong disparity between urban (53.9%) and rural (35.7%) areas. The mobile ecosystem directly employs 390 000 people in the Middle East and North Africa (MENA) region, more than half of whom work in distribution and retail, and indirectly creates another 650 000 jobs. To fully realise its digital potential, North Africa still needs to build infrastructure, develop the necessary human capital, deregulate the digital environment and strengthen its capacity to innovate.

The region could target three main policy areas to accelerate the digital transformation and create jobs: (i) strengthening digital finance (Fintech) development, (ii) developing digital skills, and (iii) supporting entrepreneurship and innovation. This will involve, in particular, loosening regulatory constraints, reducing the infrastructure gap with advanced countries, modernising education and training systems, supporting public-private partnerships (PPPs), promoting incentives and improving governance in the region.

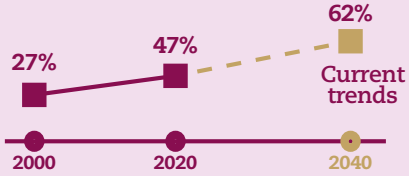
North Africa

Youth employment

A critical situation in some countries of the region

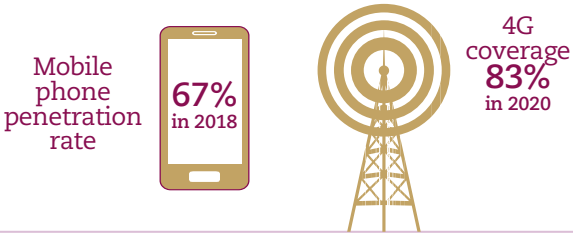


Almost 50% of the population aged 15-29 **have an upper secondary education** (the highest in Africa)



Communications infrastructure

North Africa is the **best-connected region on the continent**



Public policies must remove the obstacles to **infrastructure access**

% of the population with Internet access, 2018

Digital economy

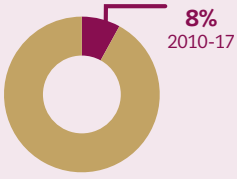
Limited access to finance hinders the development of dynamic start-ups

No. of start-ups that raised over USD 100 000 (2011-20)

Despite steady growth, **e-commerce** is still a minor part of exports

E-commerce annual growth rate

E-commerce as % of exports



What's next for policy makers?

- Improve the **regulatory environment** to accelerate Fintech development
- Encourage **public-private partnerships** to support innovative entrepreneurship and develop digital skills
- Facilitate the development of **data management infrastructure**

North Africa regional profile

Table 6.1. **Selected indicators on digital transformation in North Africa**

			North Africa (5 years ago)	North Africa (latest year)	Source	Latest year
Digital sector	Communications infrastructure	Percentage of the population with a cell phone	29.9	67.1	ITU	2018
		Percentage of the population with 4G coverage	35.0	83.4	GSMA	2020
		International Internet bandwidth per Internet user (kilobits/second)	12 535.3	37 764.0	ITU	2018
	Telecommunication sector	Total capital expenditure (as a percentage of total revenue)	19.7	19.3	GSMA	2018-20
		Earnings before interest, taxes, depreciation and amortisation (as a percentage of total revenue)	42.6	41.1	GSMA	2018-20
		Total employed headcount within the telecom companies (head account full-time equivalent).	103 731	125 764	GSMA	2016-17
Digital economy	Start-up development	Number of active start-ups that raised at least USD 100 000	30	116	Crunchbase	2011-20
	Digital services	E-Commerce sales (in USD million)	1 812.6	1 944.5	UNCTAD	2014-18
		Export of professional and IT services delivered electronically (in USD million)	7 061.6	7 222.0	UNCTAD	2014-18
Digitalised economy	Internet use among people	Percentage of the population that uses mobile phones regularly	85.2	81.7	Gallup	2018
		Percentage of women with Internet access	36.2	41.9	Gallup	2018
		Percentage of the poorest 40% with Internet access	33.1	32.6	Gallup	2018
		Percentage of rural inhabitants with Internet access	29.0	35.7	Gallup	2018
	Digital-enabled businesses	Percentage of firms having their own website	10.1	57.0	World Bank	2018*
		Percentage of firms using e-mail to interact with clients/suppliers	38.8	82.2	World Bank	2018*
		Percentage of goods vulnerable to automation that are exported to OECD countries	n.a.	23.0	World Bank	2020
	Access to finance	Percentage of the population with a mobile money account	3.0	14.0	Demirgüç-Kunt et al.	2017

Note: * Data for 2018 or the latest 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 (2020a), *Crunchbase Pro* (database); Demirgüç-Kunt et al. (2018), *The Global Findex Database 2017* (database); Gallup (2019), *Gallup World Poll* (database accessed on 1 February 2020); GSMA (2020), *GSMA Intelligence* (dataset); ITU (2019), *World Telecommunication/ICT Indicators Database* (database); UNCTAD (2020a), *UNCTADSTAT* (database); World Bank (2020a), *World Bank Enterprise Surveys* (database); World Bank (2020b), *World Development Report 2020*.

Unemployment and the precariousness of youth employment remain major concerns in North Africa

Employment is a major concern, given that unemployment and rising inequality have proven to be sources of political instability since 2011. Faced with imbalances in the labour market, both the African Union's Agenda 2063 and the United Nations' Sustainable Development Goals (SDGs) have placed employment at the heart of their strategic objectives. Between 2010 and 2018, the average unemployment rate in the subregion was 12.1% (Table 6.2), with higher rates in Libya (19%) and Tunisia (15.8%) than in Morocco (9.2%). Persistent unemployment is exacerbated by a low labour force participation rate (around 43.9%), characterised by a wide gender gap: 66.3% for men, compared with only 17.3% for women (ILO, 2019).

Table 6.2. **Employment situation in North Africa, 2010-18**

	Unemployment rate		In-work poverty rate	
	15+ years	15-24 years	15+ years	15-24 years
Algeria	10.7	27	0.11	0.12
Egypt	12.1	30.8	0.66	0.97
Libya	19	48.7	0.17	0.15
Mauritania	10.1	18.2	3.99	5.71
Morocco	9.2	19.5	0.80	0.95
Tunisia	15.8	35.8	0.15	0.16
North Africa (average)	12.1	27.8	0.98	1.35

Source: Authors' compilation based on ILO (2019), *ILOSTAT* (database), https://ilostat.ilo.org.

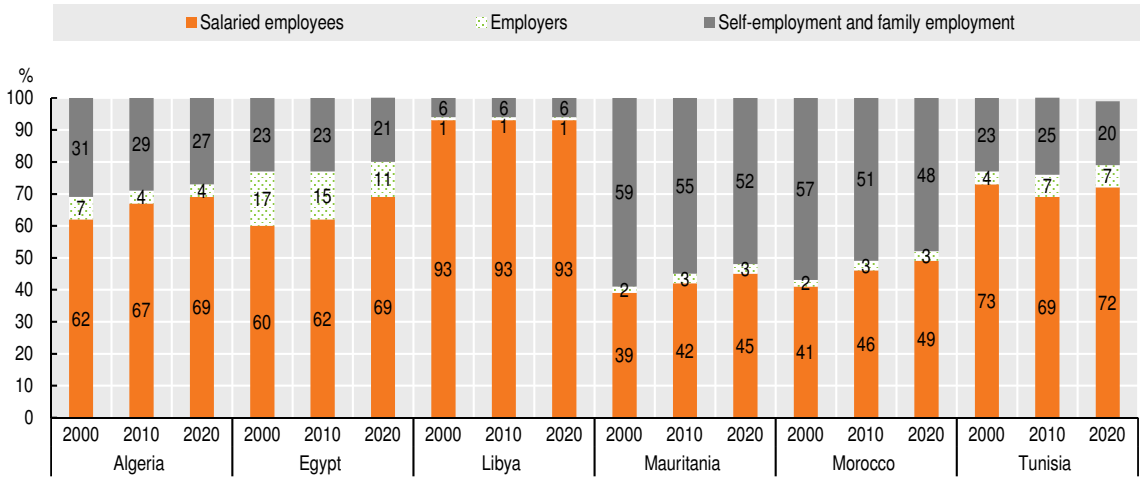
Beyond the thorny issue of general employment, youth unemployment remains a persistent challenge that North African countries struggle to manage given their large pool of young graduates. The youth unemployment rate is more than double the overall unemployment rate in most countries, and remains critical in Tunisia (35.8%) and Libya (48.7%). This is partly due to the mismatch between training profiles and labour market requirements, as well as the weak development of innovative start-ups capable of supplying stable employment opportunities. Those countries with high youth unemployment were the most affected by the political instability associated with the Arab Spring. Tackling the lack of access to employment, particularly among young people, is therefore crucial for political stability.

Moreover, the labour market is still beset by a substantial informal sector, accounting for between 30% and 70% of economic activity (ILO, 2015), which puts workers in a precarious position. The rate of informality contrasts with the low proportion of workers living below the poverty line (USD 1.90 per day), which is relatively low in North African countries. However, about one in 100 workers is poor in North Africa and there are disparities between countries in the region, a sign of ongoing social fragility. Beyond the urgent need to provide work for a large number of job seekers, it is therefore necessary to create decent jobs to improve the living conditions of the population and reduce growing inequalities.

The precariousness of employment in North Africa is linked to the fragility of the main employment sectors. Between 2010 and 2018, services contributed 47.7% of total employment, compared with 27.1% in the industrial sector and 22.8% in the agricultural sector. Industry, which is most likely to create stable, quality jobs, employs just a quarter of the labour force. Priority labour policies in the subregion should to some extent focus on this sector, which, beyond the quality of the jobs it provides, accelerates the productive transformation by enabling countries to occupy a higher position in global value chains.

The employment situation in North Africa is also a symptom of its focus on employed workers. Between 2000 and 2020, dependent employment has dominated, accounting for 62.1% of all employment, compared with 29.3% for self-employment and 8.6% for entrepreneurs, who are themselves employers (Figure 6.1). One explanation for this lies in the structure of the North African economy, characterised by the strong presence of extractive industries (Libya and Algeria) and tourism (Morocco, Tunisia and Egypt). Hence the need for significant private investment in the digital sector and innovative start-ups, to take advantage of the subregion's pool of skilled labour.

Figure 6.1. **Employment profile of North Africa, 2000-20**



Source: Authors' calculations based on ILO (2019), *ILOSTAT* (database), https://ilostat.ilo.org.
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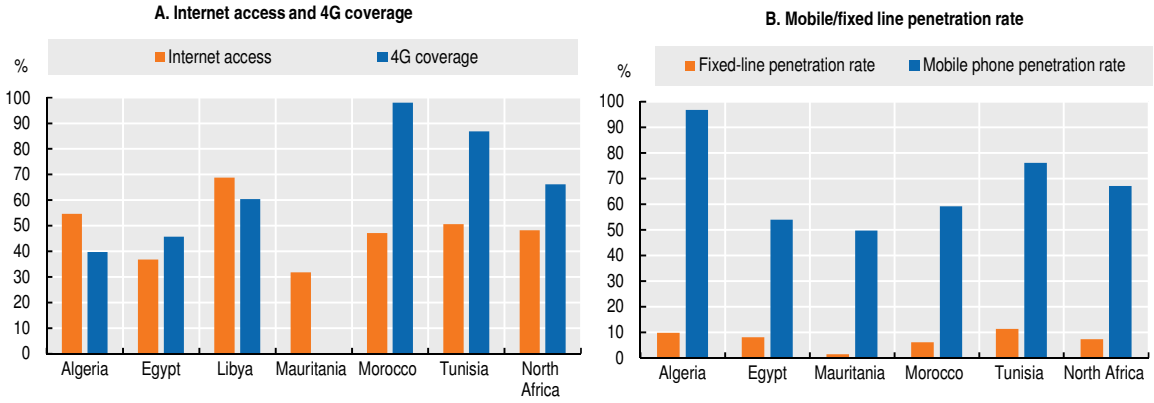
North Africa has a considerable lead in terms of digital development

The digital sector not only provides a pool of jobs for skilled young people, its positive externalities also influence many other sectors, where they improve productivity, contributing indirectly to job creation. If digitalisation is to serve as a lever for job creation through its various applications, communications infrastructure will be indispensable.

With an average mobile phone penetration rate of 67.1% and 4G coverage of 66.1% in 2018, North Africa is the best-connected region on the continent. Despite this lead and the continued growth in the number of mobile network subscribers, the region still has a way to go in terms of digitalisation. Overall, two-thirds (67.1%) of the population had access to a mobile network in 2018, while a similar proportion, 66.1%, were covered by 4G (Figure 6.2), giving an Internet access rate of 48.2%. Moreover, mobile phones have replaced fixed lines (less than 10% penetration in all countries except Tunisia).

Figure 6.2. **Access to digitalisation in North Africa (percentage of population, 2018)**



Source: Authors' calculations based on International ITU (2019), *World Telecommunication/ICT Indicators Database*, www.itu.int; GSMA (2020), *GSMA Intelligence* www.gsmaintelligence.com/; Gallup (2019), *Gallup World Poll* (database www.gallup.com/analytics/213617/gallup-analytics.aspx.

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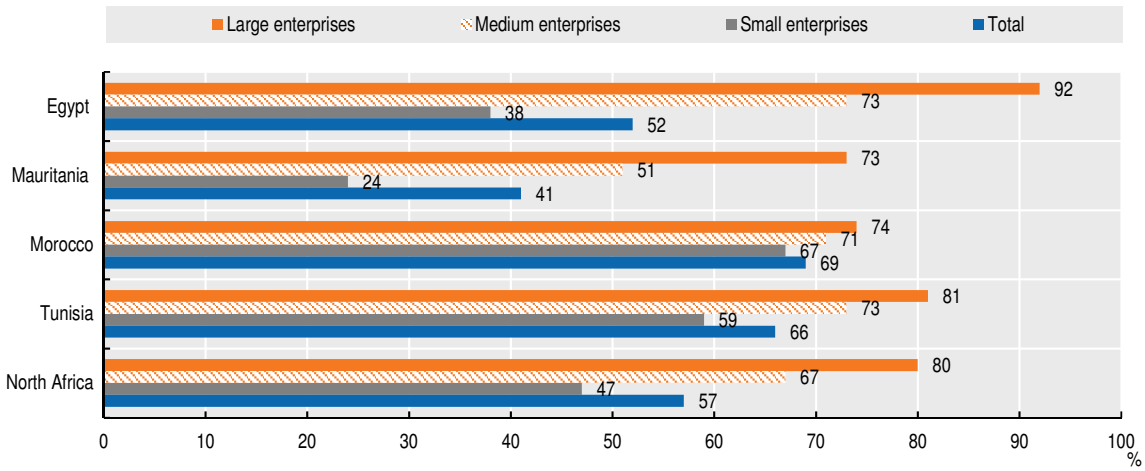
Despite this encouraging overall dynamic, disparities in digitalisation can be observed between certain indicators and countries. Mauritania and Egypt have lower levels of digitalisation than other countries. The telephone penetration rate is higher in Algeria and Tunisia, while 4G coverage is better in Morocco and Tunisia, which are service economies. Finally, Internet coverage appears to be better in Libya and Algeria. The digital potential of North Africa has made it possible to improve business communication through websites (Figure 6.3) and to develop e-commerce platforms.

Figure 6.3. **Proportion of businesses with a website in North Africa**



Note: The data shown on the graph refer to different years due to availability: Egypt (2016), Morocco (2013), Mauritania (2014) and Tunisia (2013).

Source: Authors' calculations based on World Bank (2020a), *World Bank Enterprise Survey*, www.enterprisesurveys.org/en/survey-datasets.

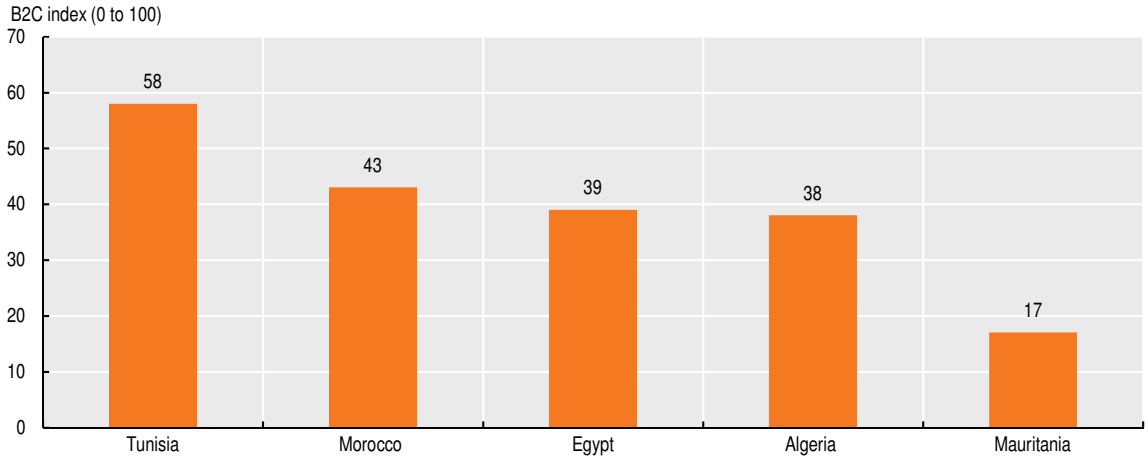
StatLink *https://doi.org/10.1787/888934203985*

In North Africa, with Morocco and Tunisia taking the lead, 57% of companies have a website, offering significant potential in terms of marketing and customer base. This rate is 47% for small businesses, 67% for medium-sized businesses and 80% for large firms. While a large majority of North African businesses have a website, these websites do need to be updated to make them an effective tool. In contrast to other countries, more

than half of small businesses in Morocco and Tunisia have a website, demonstrating a strong digitalisation trend.

Morocco and Tunisia's lead in terms of the use of digital tools for economic purposes is confirmed by the B2C E-commerce Index (Figure 6.4), given that both scored over 40 in 2019. To get the most out of e-commerce, electronic payment tools and efficient goods transport systems are a necessity. The inadequacy of these channels, which are vital to e-commerce, may explain the low B2C Index scores in North Africa, despite its good Internet coverage and high mobile phone penetration. Consequently, to enhance e-commerce and promote job creation, banks will have to provide electronic payment methods. Additional investment in transport infrastructure is also needed to facilitate the delivery of parcels from sellers to buyers.

Figure 6.4. **Business-to-Consumer (B2C) Index, 2019**



Notes: The B2C Index is based on four indicators strongly linked to online shopping: (i) account ownership at a financial institution or with a mobile-money-service provider (percentage of the population aged 15+); (ii) Individuals using the Internet (percentage of the population); (iii) Postal Reliability Index; and (iv) secure Internet servers (per 1 million people).

Source: Authors' calculations based on UNCTAD (2020b), "UNCTAD B2C E-commerce Index 2019", *UNCTAD Technical Notes on ICT for Development No. 14*, https://unctad.org/en/PublicationsLibrary/tn_unctad_ict4d14_en.pdf.

StatLink *https://doi.org/10.1787/888934204004*

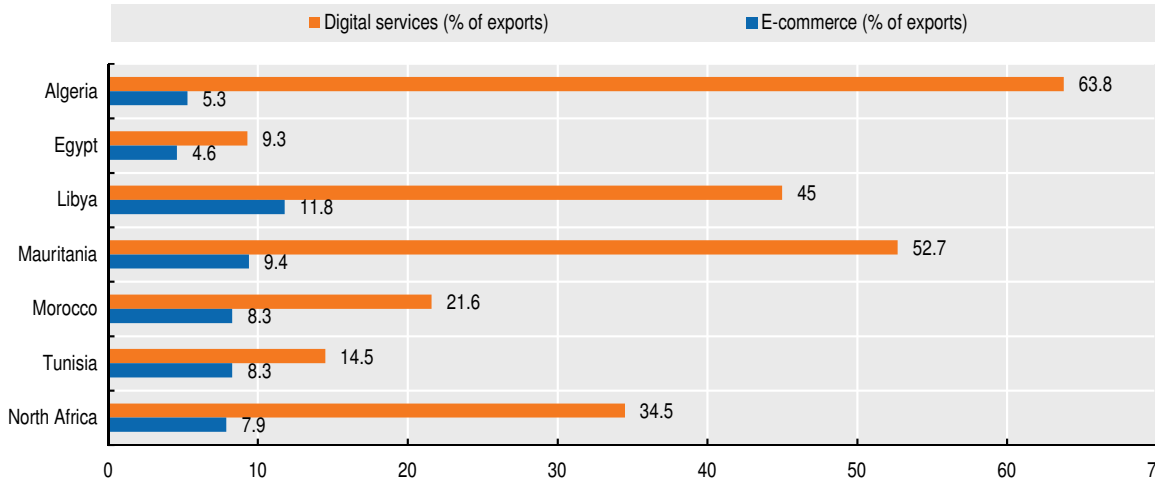
Well-developed fintech, along with broadband connections and modern and responsive payment systems, is enabling the development of a new economy that fosters the revival and creation of quality jobs for the benefit of young people in North Africa. The development of digital financial services can be a vehicle for economic, social and cultural transformation. These services are conducive to financial inclusion as they provide households and small and medium-sized enterprises (SMEs) with tailored financing and insurance solutions. They cut down on administrative processes and business costs, and generate new opportunities for the recovery of the economy as a whole.

Digitalisation has fostered the development of e-commerce in North Africa, which has evolved rapidly, experiencing an annual growth rate of 6.2% over the 2005-17 period. This growth has been made possible by technological resources (smartphones, mobile and Internet access, 4G) and human capital, bolstered by a large number of young graduates. However, the contribution of e-commerce to exports remains low, at around 8% between 2010 and 2017, with different trends seen in different countries (Figure 6.5).

Services that can be delivered via the ICT network alone are emerging, such as customer support in various sectors (after-sales services, insurance and banking), and present opportunities for job creation. Indeed, in response to high labour costs in

developed countries and the boom in ICT in many developing countries, a number of companies have offshored their call centres. Paradoxically, the contribution of digital services to exports is relatively higher in countries with low digital coverage (Algeria and Mauritania), due to their limited export potential (Figure 6.5). However, the turnover generated by digital services has experienced a downward trend in recent years due to the Arab Spring, which led to the relocation of many companies offering this type of service.

Figure 6.5. **E-commerce and digital services (average for 2010-17)**



Source: Authors' calculations based on UNCTAD (2020a), *UNCTADSTAT*, (database), https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=158359.

StatLink https://doi.org/10.1787/888934204023

The low level of e-commerce and digital services, coupled with the lack of active start-ups, indicates that North Africa is not yet in a position to really capitalise on digitalisation to boost employment. Indeed, the region continues to be characterised by weak start-up development, unevenly distributed within and between countries, according to *Crunchbase* (2020b): in Egypt only 92 start-ups have been able to raise more than USD 100 000 between 2011 and 2020; for Algeria, Morocco, and Tunisia, it was respectively 3, 13, and 13. Moreover, the impact of start-ups on jobs remains geographically limited due to their location in urban centres. This concentration of start-ups, coupled with geographical inequalities in Internet access, underscores the need to not only improve the institutional framework underpinning their development, but also ensure their spread to other cities.

Egypt, Morocco and to a lesser extent Tunisia are the three North African countries with the most fintech start-ups[1], due to a conducive ecosystem characterised by strong government support, good private sector involvement and satisfactory levels of education. Conversely, barriers often noted as affecting the region's countries include a lack of confidence, resistance to change, overly rigid or outdated regulations (e.g. in relation to crowdfunding, blockchain), digital security and reliability issues, and market fragmentation (Wamda Research Lab, 2017).

The low digital dividend in North Africa can also be linked to the quality of education, the lack of technological skills and the mismatch between labour market needs and training curricula. North African countries ranked low on the Enabling Digitalization Index[2] in 2018 (Euler Hermes, 2019), with Morocco in 77th position, ahead of Egypt (80th), Tunisia (84th), Algeria (92nd) and Mauritania (114th). In the MENA region, only 56% of employers believed their company had sufficient skilled employees to achieve their

goals, while 55% believe there is a gap between the skills they are looking for and those of job-seekers (YouGov, 2016). This skills gap is even more pervasive when it comes to basic digital literacy due to the training profiles available. Indeed, as suggested by Youth Employment in the Mediterranean (YEM, 2020), the proportion of higher education students enrolled in engineering, manufacturing and construction programmes remains low overall (Table 6.3): only 20.7% of men and 10.2% of women are enrolled on science programmes. Training courses must therefore be realigned with the requirements of the labour market if countries are to reap the rewards of digitalisation.

Table 6.3. **Percentage of students enrolled in engineering, manufacturing and construction programs in 2018**

	Algeria	Morocco	Tunisia	North Africa
Percentage of women	13.9	3.3	13.3	10.2
Percentage of men	26.5	4.2	31.5	20.7

Source: Youth Employment in the Mediterranean database (YEM, 2020), https://unevoc.unesco.org/yem/DatasetsYEMFR.

The digital transformation presents many opportunities for youth employment but requires the implementation of adequate policies

While digital technology is a boon for North African countries, it may also bring to the fore new risks for economies, notably in terms of digital security. By stimulating economic growth, it nevertheless seems that digitalisation will help to resolve issues around employment, especially for young people.

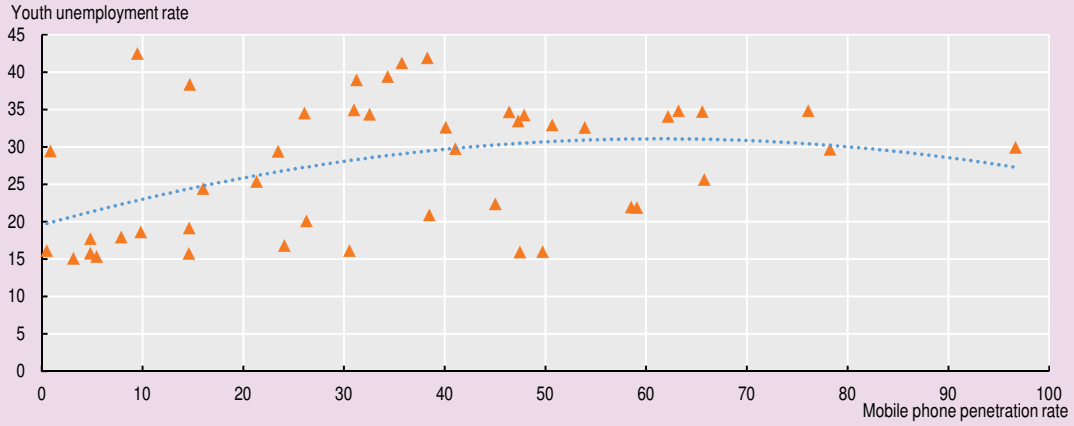
E-commerce (buying and selling on line) is undoubtedly the top economic opportunity linked to digitalisation. The world's biggest brands now showcase their products on line and large commercial groups like Facebook and Amazon have seen their turnover increase rapidly thanks to digitalisation. Digitalisation can enable start-ups to communicate easily with a large customer base and achieve economies of scale given that they operate in the electronic realm. For example, platforms such as Avito, Jumia, Vongo, Affariyet, Bazar and Mytek have established themselves in North Africa by capturing a large share of the attention of online consumers, 70% of whom are aged between 18 and 34. On average, 250 000 people spend 16 minutes and 26 seconds each day on Avito (Herpin, 2020). The development of e-commerce has been boosted by the widespread use of mobile phones. In 2017, mobile commerce or m-commerce will account for a quarter of the turnover generated by online merchants.

In the health sector, the use of digitalisation to produce health maps, hold remote consultations and set up health platforms represents a real step forward. Digitalisation is widely used in medical settings to reduce errors in patient follow-up. It has also fostered the growth of telehealth, which has broadened access to health care. In 2016, the World Health Organization (WHO) and the ITU launched a national programme in Egypt called "mDiabetes" which harnessed mobile technology for the benefit of diabetic patients. Similarly, Ain Shams University's virtual hospital provides institutional telemedicine services through a "Treat and Teach" initiative, serving Egypt, Arab countries and the African continent. The Moroccan Telemedicine Society (SMT) launched the pilot phase of its telemedicine project in 2018, at the health centres in Anfgou and Imilchil (North Africa Health, 2020). Many digital health start-ups have emerged in North Africa, through platforms that allow patients to easily find and book an appointment with a doctor available nearby: D-Kimia, Smart Medical Services and Shezlong in Egypt, SihhaTech in Algeria and Daba Doc based in Morocco and now available in five countries including Algeria, Tunisia, Nigeria and South Africa.

Digitalisation can have several applications (education, finance, agriculture, etc.) and improve the effectiveness of public action. ICT can facilitate the dissemination of teaching materials, and facilitate student evaluation and the administration of grades. Virtual libraries and online access to a range of scientific publications also present valuable opportunities. The continuity of education provided by various platforms (Zoom, Microsoft Teams, Meet, etc.) during the COVID-19 health crisis is a good illustration of how ICT can be used in education. These opportunities extend to the agricultural sector, where ICT can provide farmers with information on weather and crop conditions as well as pesticide monitoring tools, improving their profitability. Public authorities also use digital channels (SMS, WhatsApp, etc.) to disseminate awareness messages and facilitate administrative procedures for businesses (business start-up, tax returns, tax payments, etc.) and households (identity cards, passports, criminal records, etc.). E-government or e-administration remains a valuable opportunity that can be harnessed to achieve greater efficiency in public administration and improve governance. Public policies promoting digital innovation in a range of areas can accelerate the digital transformation and, at the same time, improve youth employment in North Africa.

Box 6.1. **Digitalisation and unemployment in North Africa**

Figure 6.6. **Unemployment rate and mobile phone penetration rate**



Source: Authors' calculations based on World Bank (2020c), *World Development Indicators* (database), https://databank.worldbank.org/source/world-development-indicators

StatLink https://doi.org/10.1787/888934204042

The inverted U-shaped curve suggests that the relationship between employment and digitalisation can be both negative (skill-biased technological change effect) and positive (leapfrog effect). The negative effect of digitalisation can be explained by deskilling and the difficulty of adapting certain job profiles. Conversely, young graduates with a better command of digital tools have a better chance of finding work, given the strong growth of the use of ICT in production processes. However, the positive or negative effects of digitalisation on employment should be put into perspective given the significant size of the informal sector. All else being equal, the skill-biased technological change effect can be observed in Egypt and Tunisia, in view of the persistent unemployment, despite the advanced level of digitalisation in these two countries. Conversely, Morocco has a lower unemployment rate, along with positive digitalisation indicators, providing a good example of leapfrogging.

In MENA countries, the mobile ecosystem contributed 4.5% of gross domestic product (GDP) and 2.9% of productivity in 2018. The mobile ecosystem directly employs 390 000 people in the MENA region, more than half of whom work in distribution and retail, and indirectly creates another 650 000 jobs in other sectors of the economy (GSMA, 2019).

Source: Authors' compilation based on a literature review.

Despite the countless advantages of digitalisation for the region's economies, it does carry some risk given the changes involved.

- The use of digital tools for professional purposes (website, e-mail, etc.) requires a level of competence that many professionals across different sectors do not have, particularly within SMEs. Without ICT training or retraining, companies that fail to integrate digitalisation into their management processes could disappear, at the risk of exacerbating employment problems for a workforce unable to adapt to the needs of the market.
- The pace of automation is also much faster in the production of electrical machineries, automobiles and aircraft components, which constitute a large share of exports for several North African countries such as Morocco and Tunisia. In total, 23% of goods export to the OECD from North Africa is prone to robotisation, much higher than from Africa (14.1%), developing Asia (18.9%) and LAC (19.0%).
- Another constraint linked to digitalisation is the risk of company records being hacked, resulting in the dissemination of sensitive data or other digital security incidents that can lead to heavy losses for companies. Digital tools can also be used to rapidly disseminate false information, particularly by terrorist groups, who, in an effort to generate fear, claim responsibility for attacks or demand ransoms for hostages. Faced with these risks, as digitalisation develops, it must also be made secure to limit the adverse effects of digital security threats.

Public policies to support and accelerate the digital transformation for job creation in North Africa

Despite its high digital potential compared with the continent's other regions, North Africa is not yet benefiting from the dividends of digitalisation (improved productive efficiency and effectiveness, better quality of life, accelerated learning for young people, increased government transparency, etc.). This weakness is linked to low participation in the labour market, especially of young people and women. Public policies are therefore required to improve the digital accessibility of the labour market to potential participants. The region's countries must take steps to enhance the potential of the current technological transformation and the development of the digital economy. To this end, governments should support the development of fintech, improve the linkages between education systems and the new needs of the labour market, and develop entrepreneurship and innovation in the digital economy.

Fintech: A vector for digital transformation in North Africa

Resistance to change is a major barrier for digital transformation in North Africa generally, and for the development of fintech in particular. Access to digital methods of financing investment in this region is mainly influenced by the legal framework, regulations, and the lack of infrastructure and trust in digital tools. North African legal systems are based on civil law, which prohibits anything not laid down in law. This ultimately leads to a regulatory gap. For example, non-banking entities are not permitted to offer alternative banking services as this is not explicitly provided for by law. This means that legal certainty and clarity are essential for fintech development (Lukonga, 2018). In the same vein, banking regulations in these countries have favoured those in dominant positions, i.e. large banking groups such as Attijariwafa Bank or Commercial International Bank (CIB). This has discouraged innovation and creativity in the area of payments relative to other regions in Africa (see the chapter on East Africa). The infrastructure gap is also a serious barrier to the development of digital financial services.

Finally, security concerns and fears about data breaches and/or the proliferation of fraud have dampened the demand for digital financial services in the region.

Loosening regulatory constraints

Setting out a strategic roadmap including far-reaching banking and financial reforms, with bold goals for Internet access, data transmission, electronic payments, and more (Table 6.4), bringing the various stakeholders on board, is essential if North Africa is to adapt to technological disruption. Such an approach must start with greater openness, promoting competition and encouraging the development of tailored technological solutions. It must also mobilise all stakeholders around a common goal and help young people find decent work in the digital age. Morocco's central bank, Bank Al-Maghrib, for example, passed Act 103-12 allowing non-banking entities to provide electronic payment solutions and giving actors in the marketplace the freedom to position their e-wallets and adapt their offerings (PwC and Casablanca Finance City, 2020).

Table 6.4. **National strategic objectives for the digital sector in North Africa**

	Accessibility	E-commerce
Algeria	• Strengthen, develop and diversify digital technologies used to access and secure high-speed and ultrafast broadband infrastructure. • Roll out fibre optics nationwide.	• Implement an e-commerce statistical information system.
Egypt	• Achieve Internet coverage of 90% of the population, 40% with a very high-speed Internet connection in 2021.	• Double the number of companies using e-commerce by the end of 2020.
Morocco	• Reduce the digital access gap by 50% by the end of 2020.	• Make Morocco a regional digital hub by strengthening digital exports, reducing the digital gap and transforming the most important sectors of the national economy.
Mauritania	• 25% of households have access to the Internet (thanks to the expansion of 4G) in 2023. • 80% of the population has access to the Internet (thanks to the expansion of network coverage).	• Expand access for all citizens by stimulating private investment in broadband Internet.
Tunisia	• Three in five families connected to broadband and 50% mobile broadband penetration by 2021.	• Establish a digital culture through the digitalisation of content. • Improve the competitiveness of businesses, across all sectors, through investment in ICT and their positioning in the digital economy.

Source: Authors' compilation.

In North Africa, the cautious approach, which reflects the desire to limit risk and slows down innovation, must give way to a risk-tolerant strategy. As such, governments should relax the rules around enabling infrastructure, such as open application programming interfaces (APIs), the cloud and data sharing, to encourage the emergence of fintech firms and promote investment in this area. In the same vein, deregulating telecommunications and finance could encourage the emergence of non-banking operators offering solutions adapted to SMEs and support the development of digital solutions (see chapter on East Africa). This deregulation needs to be carefully assessed, considering its potential impact on the health and stability of the financial system. Governments could also encourage partnerships between public banks and fintech firms to improve their penetration and enhance consumers' access to digital financial services. They should allow ICT companies (especially SMEs) to offer their connectivity services using their own infrastructure rather than being dependent on incumbent operators. Moreover, the region's competition authorities must ensure that the obstacles faced by new entrants are not compounded by incumbent operators enacting illicit strategies (exclusive distribution, loyalty discounts, etc.). This will ultimately facilitate innovation and the acquisition of market share by SMEs.

The regulatory authorities in these countries must gradually shift from a regulatory approach to an experimental approach. These authorities are often seen as conservative and they lack capacity, which contributes to their risk aversion and lack of awareness of the opportunities offered by disruptive technologies (Lukonga, 2018). It is for this reason that governments in North Africa should build capacity within the public and regulatory bodies responsible for the digital sector. An experimental approach that gradually clears the regulatory bottleneck is required. The Central Bank of Tunisia, for example, has just launched a regulatory sandbox, which allows fintech firms to test their innovative solutions on a small scale with volunteer customers (Box 6.2). A *sandbox* was also established in June 2019 by the Central Bank of Egypt to monitor the regulatory dynamics of fintech firms, ensure financial inclusion, improve SME access to banking and financial services, and support the transition to a digital economy that promotes de-cashing (AFI, 2018).

Box 6.2. **The regulatory sandbox: A tool for fintech experimentation in Tunisia**

Launched in 2020 by the Central Bank of Tunisia, the regulatory sandbox is a space for would-be entrants (especially young entrepreneurs) to develop their financial products and/or services. It enables the authorities to both better understand the fintech ecosystem and adapt the regulatory framework.

Within the sandbox, financial products and services based on new technologies (or new permutations of existing technologies) can be tested without having to comply with the various regulatory requirements. At the end of the testing period, all those who meet the regulatory authorities' testing criteria can apply for the relevant authorisation or approval. The testing period lasts nine months from the date of admission to the sandbox and can be extended by three months on request.

This mechanism enables fintech operators to understand and comply with the regulatory requirements in force so they can advertise services adapted to the market. It also enables the Central Bank of Tunisia to understand the complexity of technological innovations with a view to adjusting regulatory provisions and supervisory and monitoring processes if necessary.

Source: Authors' compilation based on a literature review.

For countries without adequate regulation, a monitoring and supervisory framework governing fintech services and providers will be important. The region's central banks will therefore have to create stronger co-ordination units, get buy-in from the multiple departments affected by fintech developments and involve the relevant public authorities closely in licensing and oversight of these entities (World Bank, 2018). Establishing co-ordination mechanisms enables regulators to pool their efforts with a view to identifying and resolving any regulatory inconsistencies and gaps that arise. Introducing reporting requirements for licensed entities also enables supervisory bodies to monitor changes in fintech market structures and, consequently, to identify risks and provide timely policy responses.

Furthermore, only market confidence in the integrity and security of digital finance can safeguard the development of fintech. In this context, governments need to invest in strong mechanisms to protect consumers and provide remedies in the event of unfair practices by service providers. They must likewise implement a legal and regulatory framework for data protection and privacy, as well as digital security standards and governance requirements. Finally, they must introduce appropriate standards and/or legislation

to support the certification of IT security and risk management within IT networks. The supervision and monitoring of providers should also cover their readiness to address digital security risks as well as banks' inappropriate risk management practices *vis-à-vis* third parties, and prohibit the concentration of risk among the same providers. Moreover, collaborative arrangements between financial regulators and other non-traditional regulatory bodies should be strengthened (Lukonga, 2018).

Reducing the infrastructure gap

The spread of digital technology should be an opportunity to develop payment infrastructure in North Africa. As such, the region's governments must first address the current underinvestment in communications infrastructure by strengthening fibre optic networks and promoting the use of 4G and 5G technologies. Efforts should also focus on developing and upgrading payment infrastructure and opening up the market to financial service providers. Governments are invited to facilitate the integration of financial service providers into their national settlement infrastructure, whether payment systems or clearing houses.

The development of fintech firms in North Africa must go hand in hand with policies to develop communications infrastructure and connectivity. Governments should support private investment seeking to improve broadband accessibility and connectivity, accelerate the installation of fibre optic networks, increase the number of Internet exchange points[3] and promote the interoperability of virtual platforms. On this last point, interoperability between banks and payment institutions in Morocco was initiated in 2018. The aim is to enhance the potential profitability of the various entities by making it easier to access a vast and still underexploited market segment and providing services tailored to microenterprises.

Many North African countries are in a position to transform into connectivity hubs if they can harness their potential. These countries can capitalise on their terrestrial networks to complement submarine connectivity in the Mediterranean. Egypt, Morocco and Algeria could therefore further develop their position as connectivity hubs. Algeria, for example, has an impressive 75 000 kilometres of fibre optic cable. If it were to connect this infrastructure to sub-Saharan Africa and the cables in the Mediterranean Sea, the country could change the geography of the global Internet infrastructure (World Bank, 2018). In this context, broadband markets must be made less concentrated and more competitive, by promoting the entry of private actors, primarily the relevant national IT companies. Similarly, pilot projects for fast 5G wireless networks in the region's major cities are proving fruitful, attracting industrial groups and boosting the employment of qualified young people. Finally, specific financing facilities, including the proactive use of public subsidies, can facilitate access to networks and support young tech-savvy entrepreneurs.

Public interventions must also work to resolve existing infrastructure bottlenecks, especially in rural areas, to help the less privileged social strata benefit from the development of fintech. According to data from the Gallup World Poll, only 35.7% of the population in rural areas has access to the Internet, compared with 53.9% in urban areas in North Africa. In this context, governments can support private innovation in these areas, such as the development of satellite networks that increase Internet coverage and boost the communication capabilities of rural communities. Similarly, incentive policies that promote collaboration between different operators in the local market can stimulate investment in remote areas. Finally, a reliable electricity supply in these areas would avoid any disruption to the provision of digital financial services to rural populations (European Bank for Reconstruction and Development, European Investment Bank and World Bank, 2016).

Fostering closer ties between potential digital finance operators

In North Africa, public policies must support ICT investment efforts through "accelerator" mechanisms that provide start-up development programmes, as well as incentives for importers and/or producers of high-tech equipment. Governments in the region must therefore revise their legislation to make it easier for start-ups to work with accelerator financial partners and benefit from their expertise. Moreover, a policy to target subsidies towards investment in communications infrastructure and reduce tariffs on high-tech imports is also needed to cut costs and stimulate demand. Tunisia, for example, passed a law on start-ups in 2018 (the Start-up Act), making it easier for young entrepreneurs to raise funds, the government to award grants and tax benefits, and project owners to take time off work and get help filing international patents.

The public sector should partner with the private sector to bolster potential demand for fintech firms. This will unblock initiatives, stimulate supply and boost youth employment. As such, public policies will have to provide for public and/or sectoral financing facilities to enable consumers (especially those with reduced purchasing power) to procure the equipment required to make electronic payments (smartphones, computers, telephone chips, etc.). Governments must therefore implement incentive mechanisms to encourage young people to use digital platforms, whether for financing (on the entrepreneur side) or to pay for services (on the consumer side). Morocco, for example, is one of the first countries on the continent to make a major effort to pass a law that facilitates participatory financing or crowdfunding. In Tunisia too, a bill on crowdfunding was passed in July 2020 in the wake of the Start-up Act. Moreover, the Central Bank of Egypt has made it compulsory for government bodies to use electronic payment methods for sums above EGP 20 000 (Egyptian pounds), benefiting service providers (AFI, 2018a).

Finally, governments should recognise the importance of partnerships between microfinance institutions and mobile phone operators on the one hand, and, most significantly, between these financial institutions and digital financial service providers on the other. The first type of partnership promotes digital savings and credit services, mobile interoperability with e-wallets, etc. The second type of partnership facilitates credit scoring solutions and the use of blockchain technologies (AFI, 2018b). Above all, regulatory authorities must understand the importance of these partnerships and how the financial sector is changing in general. They must also optimise potential synergies between digital finance and microfinance, which will benefit both fintech (convenience, effectiveness, etc.) and microfinance institutions (operational efficiency, client diversification, etc.). This can be facilitated by clarifying (or abolishing) rules around outsourcing and by introducing a requirement to share credit information.

Skills development: A guarantor of the digital transformation in North Africa

The technological disruption caused by the digital revolution is reshaping the world of work and changing the nature of demand, and skills must adapt to this change. In this context, North African governments have a central role to play in laying the foundations for the inclusive and equitable development of digital skills, enabling them to adapt to the various changes in the labour market. In particular, this means modernising education systems and improving technical and vocational training. As such, the region's governments must attach particular importance to lifelong learning and reskilling the workforce, to create conditions conducive to the sustainable supply of digital skills. Finally, they should implement public policies to support and, where necessary, co-ordinate partnerships with the private sector, and to monitor and evaluate the various digital literacy programmes.

Modernising the education system and improving technical and vocational training

Education policies in North Africa must be proactive, innovative and based on a participatory approach. Technology is changing the way young people prepare to enter the labour market. It influences not only the ends of education, but also the means (IBRD, 2019). Learning must therefore be based on experiential education that develops children's communication, teamwork, resilience, self-confidence, negotiation and expression skills at an early stage. This approach to learning must engage both teachers and parents. Likewise, the region's governments must integrate the use of ICT into teaching methods, equip school children with digital educational tools and develop digital educational platforms. The free online educational platform Nafham, available in Algeria and Egypt, is one example. It publishes original content, based on curricula from several countries in the region, and has made use of crowdsourcing to enable lessons to be downloaded. Furthermore, supporting specialised educational start-ups has shown to help disseminate digital educational content. In Egypt, for example, the start-up Tutorama connects students and their parents to tutors. This platform provides a form of personalised teaching, giving young people more space to understand and assimilate textbook teaching.

New digital technologies present an opportunity to innovate and modernise the education system in North Africa. The digital revolution requires an awareness of the new skills needed to make a smooth transition into the labour market. As such, education programmes should adapt to the new reality by incorporating soft skills, in particular cognitive skills, socio-behavioural skills and critical thinking. For example, Moroccan legislation sets out the skills that students should acquire at school: mastery of languages, social skills, an understanding of civic affairs and early preparation of students for their future careers (IBRD, 2019). New e-learning and practical self-study tools must also be adopted and digital culture courses developed. The Egyptian Knowledge Bank (EKB), a digital learning platform launched in 2016, has provided access to resources and educational tools for teachers, researchers, students and the general public. The objective is not only to advance scientific research and promote new teaching methods for teachers, but also to provide new educational resources for students.

Governments must bridge the technological skills gap by ensuring that technology complements the labour component. The evolving world of technology should push governments not only to embrace the idea of reforming the education and training system, but also to set out a programme for learning and adapting to change. The skills-based approach adopted in Morocco and its replication in the digital and technology field is proving useful to the region. The aim is to transform qualifications so they provide knowledge and skills applicable to the digital sector. Morocco's comprehensive reform of the training system was based on a participatory approach through which different stakeholders (state, regions, employers, trade unions, sectors and businesses) have engaged in both steering and implementing the vocational training system. Professional associations are then involved in identifying the training needs of companies and managing the training system, in collaboration with the Office for Vocational Training and Labour Promotion (Maurin and Melonio, 2011).

The need for technologically literate workers should prompt authorities to rethink the tertiary education programmes provided. This would mean placing particular emphasis on Science, Technology, Engineering and Mathematics (STEM) rather than social studies, which have long been prioritised by public sector employers (World Bank, 2018). The aim would be to permeate educational courses with ICT-related disciplines (data analysis, financial engineering, computer sciences, coding, software development, etc.) and to encourage greater openness to innovation and risk-taking to enhance creativity among

young people and create a technological ecosystem in which they can turn ideas into projects (AUC/OECD, 2019).

Beyond STEM, education programmes in North Africa need to strengthen business skills, entrepreneurial spirit and cognitive and non-cognitive skills (social and emotional skills such as curiosity, self-control, etc.). All this will facilitate the creation (and the uptake) of digital technologies, limit technological dependence on countries in the global North and create conditions conducive to young people's integration into the labour market (AfDB, 2019).

Public authorities should also pay particular attention to technical and vocational training through the establishment of rich and adapted programmes. The ultimate aim of these programmes must be to improve the skills of young people who want to take advantage of the opportunities offered by Industry 4.0 in general, and the digital sector in particular. This means integrating basic educational and general vocational skills into training courses, with the aim of increasing the versatility of young people in certain sectors (AfDB, 2019). There is also a need to develop training programmes for trainers and to equip them with teaching materials and educational software. The Centre for the Development of Vocational Skills (CDCP) in Tunisia, for example, provides certified training for trainers, accredited by the American Institute of Professional Studies (AIPS). This centre seeks to integrate the rapid evolution of learning styles in the wake of the technological revolution and to rethink the patterns of knowledge transmission, while incorporating new visual formats.

Educational strategies in North Africa must guarantee the development of a culture of lifelong learning to prepare for the digital transformation and adapt to the demands of the digital economy. These strategies should be based on the need to acquire a certain number of basic skills to be able to continue on the education and/or training pathway. Moreover, the requirements in terms of technical and professional competence should be made more demanding to ensure the development of the necessary skills. At each stage, the use of ICT should be expanded to ensure the lesson content is disseminated on a large scale. In parallel, governments should support the development of an educational software industry, which is lacking in the majority of North African countries (World Bank, 2013).

Fostering PPPs for digital skills development

Human capital development policies seeking to upskill and/or promote the re-qualification of certain cohorts in the labour market (reskilling) are necessary to weather the upheavals expected in the North African labour market. Public policies must help to reduce the gap between future labour market needs and the qualifications of tomorrow. As such, governments should support private sector efforts to meet the expected high demand for professionals able to combine their traditional expertise with digital and STEM skills, as well as for experts able to facilitate seamless interaction between human and machine (digital mechanical engineers, business operations data analysts, user interface specialists, etc.). More specifically, this will involve financing programmes/contracts for companies that want to recruit the above-mentioned profiles, set up online collaboration platforms or offer technical training for their executives. Furthermore, it will be necessary to support companies that want to train young people in the digital domain, following the example of Germany, which has a dual vocational and educational training system. Such policies generate new employment opportunities for young people, increase the skills and productivity of workers and offer new and more flexible ways into work for job seekers (World Economic Forum, 2017).

Public policies need to address women's technological skills to harness a yet untapped pool of human capital in North Africa. To improve the female participation rate, gender-based discrimination must be tackled through partnerships between public institutions and private operators facilitating women's access to technology. Implementing a regulatory framework that prohibits unequal pay for men and women and promotes the mobility and security of working women would also help. Finally, countries in the region can deploy collaborative mechanisms to promote flexible working arrangements by removing restrictive laws, improving women's access to credit and promoting more gender-balanced workplaces (World Bank, 2018).

Involving the private sector in defining curricula in North Africa could facilitate the transition from school to work. Such a collaboration could strengthen the capabilities of the public education sector and the alignment between each country's skills development agenda and future labour market needs. Engaging the private sector in the co-creation of vocational training courses would therefore be a relevant endeavour. In Morocco, under a partnership with the National Agency for the Promotion of Employment and Skills (ANAPEC), the Federation of Information Technology, Telecommunications and Offshoring (APEBI) is seeking to boost employability in the IT sector through the co-creation of training courses and vocational qualification certificates. The CQP certification programme (a professional qualification certificate for new technology developers) is a perfect illustration of this.

Partnerships can be expanded to include national and international non-governmental organisations (NGOs) to facilitate the development of entrepreneurial ICT and digital skills. Partnerships of this kind facilitate the development of programmes to encourage ICT-related entrepreneurial skills and ensure a minimum level of digital literacy. An interesting example is the Digital Livelihoods: Youth and the Future of Work at Scale project, a partnership between the Canadian government, the Digital Opportunity Trust and a number of African countries (including Morocco). This programme works to equip young people with the skills and education they need to use ICT to create new businesses, find jobs and access financial products and services (UNESCO, 2017). North African governments should ensure they are in a position to evaluate the different programmes established with partners, so that they can identify and strengthen those that are working well, clarify best practices and inform public policies. By enhancing co-ordination between the government agencies and intersectoral bodies involved in digital training programmes, it will be possible to ensure these evaluations are both rigorous and objective. Research and data-sharing efforts are also needed to facilitate regional and global analyses.

In North Africa, adopting a decentralised approach could help strengthen the links between training courses on the one hand and the skills needs of local businesses on the other. Stakeholders with the capacity to identify the skills required in the different regions must collaborate so the specificities of each region can be taken into account, alongside a shared national vision for the digital sector. Meeting the needs of local businesses to boost graduate employment and creating training courses adapted to the specificities of each region have proven fruitful. In particular, the supply of higher education courses is especially rich and diverse in regions where public and private institutions compete to offer the most cutting-edge and innovative courses. Good examples of this are the Cities of Professions and Skills in Morocco. These are regional multisectoral and multifunctional facilities offering new training courses and modern programmes that meet the expectations of sectoral and regional ecosystems. A selection of pilot regions have been designated to host the first Cities, including Souss-Massa, where high-level training will be provided, including on digital subjects.

Entrepreneurship and innovation in the digital economy: Two pillars for digital transformation and job creation in North Africa

Beyond their direct involvement in creating jobs for young people, governments should cultivate an enabling environment for entrepreneurship and innovation. Improved governance can also accelerate the digital transformation and improve employability in the region.

Creating an entrepreneurial environment conducive to digital transformation

To succeed in their digital transformation, North African countries must support the development of a new economy that encourages entrepreneurship, generates more opportunities for young people and builds public sector capacity to support SMEs. Incentives and entrepreneurial skills development, supported by digital hubs and tailored education programmes, are in place (Table 6.5). Flat6Labs is a good example of an entrepreneurship accelerator programme. It provides a range of preparatory workshops that aim to help young entrepreneurs secure financing for their start-ups. It offers various investment tickets and welcomes start-ups focused on innovation and the knowledge economy in a number of sectors, including education, energy, transport, fintech, green tech, ICT, electronics and industrial solutions. Such a programme is made possible by the presence of an educated, connected and tech-savvy population, as well as public authorities' willingness to cultivate an entrepreneurial ecosystem, which is already growing. Similarly, the development of such an ecosystem can only be achieved by tapping into appropriate funding sources, from both national and international investors. In Egypt, for example, the growth of start-ups has prompted national venture capital firms and angel investors to seize the opportunity and increase their funding. Algebra Ventures is a classic example. Since it was founded in 2016, significant financing has been granted to around 15 companies specialising in a range of sectors. Beyond local financing, international investors such as DiGAME, EndureCap, BECO Capital and Silicon Badia have provided additional financing and expertise to enable local companies to grow.

Table 6.5. **Examples of start-up incubators in North Africa**

Name	Date created	Country	Notable features
Flat6Labs Cairo	2011	Egypt	Provides start-up financing (up to EGP 250 000) and follow-on financing (up to EGP 1 million) to selected start-ups, strategic mentoring, premises and entrepreneurship training and workshops, in return for the transfer of 10% of the company's shares to the hub, which has mentored more than 70 start-ups and over 140 companies in the MENA region.
WikiStart Up	2011	Tunisia	The first private incubator in Tunisia, it encourages the creation of start-ups by providing an innovation-oriented ecosystem and facilitating access to expertise, business development tools, financing and an international professional network enabling rapid growth.
New Work Lab	2012	Morocco	Develops support programs to accelerate the creation of businesses and jobs, strengthening the skills and leadership of young Moroccans. In 2020, it worked with more than 300 entrepreneurs.
Hadina Rimtic	2014	Mauritania	The country's first ICT incubator. In 2017, the Entrepreneurship Marathon was launched in partnership with the World Bank and the Mauritanian Ministry of the Economy to support new start-ups and raise awareness among more than 2 800 young people about the opportunities offered by entrepreneurship.
Tatweer Entrepreneurship Campus (TEC)	2017	Libya	Promotes an entrepreneurial ecosystem in Libya through various programmes, including business incubators, co-working spaces and training programmes on technology, business administration and financial management. Over the 2017–20 period, the programme has supported more than 75 entrepreneurs, creating more than 1 000 value-added jobs.

Source: Authors' compilation.

A supportive entrepreneurial ecosystem in North Africa is only possible if policymakers focus on the factors that enable multidimensional digital platforms to develop and on creating a level playing field. This means ensuring the availability of cloud-based services, geolocation, security, etc., which enable the development of multidimensional digital platforms. The regional expansion of Uber, for example, (already present in Egypt and Morocco) could prove interesting in this context. Governments must also amend regulations to facilitate young entrepreneurs' entry into the market through these platforms, particularly those linking job offers with job seekers, offering tailored training and hosting start-up incubators, along the lines of the Upwork platform. In particular, in energy-based economies, the development of digital platforms for factory automation or redesigning cloud-based energy platforms can encourage the emergence of an ecosystem of private providers.

Governments should pay particular attention to data and consider data as "national assets" if they want to achieve their goal of digital transformation. Public policy must focus on management (collection, access, security, etc.) and governance (ownership, financing, storage, etc.) of these assets. Likewise, governments in the region should facilitate the development of physical infrastructure to manage data from non-traditional sources, which the existing communications infrastructure does not have the capacity to accommodate (e.g. Internet of Things). Setting up data centres designed to host servers and computer storage systems would promote the development of a national digital ecosystem. This would facilitate access to ICT and reduce the cost of experimenting with new technology for young entrepreneurs facing financial constraints. It would also help to adapt technology use to the business cycle (OECD, 2019). Egypt has the region's highest number of data centres[4] and the government, through partnerships with incumbent operators based in the country, is promoting the installation of these centres so that it can harness smart technologies to provide various services (related, in particular, to the Internet of Things, cloud computing and artificial intelligence platforms).

Fostering innovation, creating jobs for young people

Governments in North Africa should help entrepreneurs acquire new technologies that enable them to design new business models and long-term development solutions. Public policies to support the development of local content for SMEs can help them innovate through the production of software and manage their resources, access information and reduce costs more effectively. They can also help reduce time-to-market and improve market positioning (UNCTAD, 2019). In this context, ensuring legal and policy clarity for local content developers, hosting providers, content delivery networks and other relevant stakeholders is essential (African Union (AU), 2019). In the same vein, laws protecting intellectual property can strengthen young entrepreneurs' motivation to innovate in North Africa. This would involve implementing policies to protect trademarks and related rights as well as measures to facilitate the filing of patents. In particular, the introduction of franchise rights, database rights, licences for the use of the products of research and development and copyright in software are likely to encourage innovation and create jobs.

Policies promoting triangular collaboration between governments, universities and the private sector are facilitating the establishment of technology hubs and incubation centres in North Africa. This collaboration is creating an environment conducive to the cross-pollination of ideas and the co-creation of projects, fostering innovation in the region (Table 6.6). These hubs and centres often provide additional logistical support and technical assistance to young entrepreneurs. In recent years, Egypt has become home to several leading incubators (EBNI, 1864 Accelerator and EdVentures), whose ultimate objective is to support a range of technology start-ups. It is also home to one of the first

technology parks among African adopters, having launched Smart Village Cairo in 2001, with the government more recently investing in the new Maadi Technology Park in 2017 (Oxford Business Group (OBG), 2019).

Table 6.6. **Examples of technology parks in North Africa**

Name	Location	Funding model
Maadi Technology Park	Egypt	PPP, investment area specialising in ICT with the aim of creating 40 000 direct and 100 000 indirect job opportunities.
Technopark	Morocco (Casablanca, Rabat, Tangier and Agadir)	This PPP hosts 280 Moroccan start-ups and SMEs, nearly 2 000 employees with an average age of less than 30 and more than 10% of the national ICT turnover (excluding telecoms), attracting more than 60 new start-ups each year.
Smart Tunisian Technopark Elgazala	Tunisia	Bringing together private companies, public bodies and universities to create synergy and cross-fertilisation between these stakeholders. More than 250 companies including ten subsidiaries of major global groups (Microsoft, STMicroelectronics, Ericsson, Alcatel-Lucent, etc.) as well as Tunisian success stories (Telnet, Omniacom, Picosoft, Cynapsys, EBSYS, etc.) are housed in the different areas of this site.

Source: Authors' compilation.

The growth and expansion of these technology parks can be achieved through "clustering" policies that support the digital economy and advance the region's digital transformation. Policies to attract firms operating in the digital sector, and more broadly in ICT, are enabling the region's countries to benefit from technology transfers and increase local capacity for innovation. Moreover, policies to attract highly qualified foreign skills and, above all, expatriates working at universities, laboratories and technology giants (Google, Apple, Facebook, Amazon and Microsoft in particular) are required. Morocco, for example, was able to launch, through PPPs, the Maroc Numeric Cluster (MNC), to strengthen the ICT ecosystem and make the digital sector a vehicle for economic and social development (Box 6.3).

Box 6.3. **Maroc Numeric Cluster: the digital sector in service of the economy**

This mixed public-private body, launched in November 2010, brings together several of Morocco's ICT stakeholders. An initiative of the Ministry of Industry, Trade, Investment and the Digital Economy, it aims to promote the digital economy in Morocco. MNC is a partner of two "competitiveness clusters" (Systematic Paris Région and Images & Réseaux in Brittany) as well as the local productive system cluster 16000 Images de Poitiers. The main aims of this cluster are to develop and support innovative and collaborative projects, mobilise skills in the ICT sector, bring together universities and companies and officially endorse projects and training (Mediterranean World Economic Foresight Institute (IPEMED, 2014).

MNC works on projects in a wide variety of areas: mobility, multichannel, digital enterprise, the cloud and security, big data, the Internet of Things, smart cities, multimedia and smart education. Through these projects, it has opened up a number of opportunities for Moroccan start-ups and companies to develop new value-added services for citizens, cities and businesses.

Source: Authors' compilation based on a literature review.

Governments in North Africa can act as facilitators by providing support mechanisms for young innovators. This can be done by offering local solutions as well as by providing greater support for innovation within companies. Such support can be provided through new financing and technological knowledge transfer mechanisms. In Egypt, for example, the government set up a programme in 2004 to finance start-ups through the Technology

Innovation and Entrepreneurship Centre (TIEC), one of the first initiatives of its kind in the region. In late 2017, the Ministry of Investment and International Cooperation launched a start-up incubation project called *Fekretak Sherketak* ("Your Idea, Your Project") that helped found 42 local start-ups with amounts ranging from USD 5 000 to USD 30 000 each (OBG, 2019). Along similar lines, given the dominance of SMEs in the economic fabric of North Africa, the region's governments must redouble their efforts to facilitate market access for this group. Public administrations can therefore support these entities' innovative projects through public procurement, following the model of the Small Business Act. They can also create national digital procurement platforms to help these companies manage their purchases and thereby reduce their costs.

Accelerating the digital transformation through better governance

North African countries will only be able to sustain an entrepreneurial ecosystem and safeguard an innovative environment if they are disciplined in their governance. The inefficiency of public services and the low level of trust in public authorities resulting from a lack of transparency can be addressed through the development of a digital administration. Such an administration would certainly increase the responsiveness, effectiveness and transparency of administrative services and help to create a climate of confidence and innovation for businesses. The adoption of *open data* and *open government* in North Africa is now proving to be indispensable. Morocco has already demonstrated its utility, having launched a national portal in May 2011, as part of wide-ranging reforms. Similarly, Tunisia has had its regulatory framework in place since 2011, following the adoption of a law granting access to administrative documents, and has launched a national data portal. This portal provides access to data on a wide variety of topics and is complemented by open data portals linked to various government departments (OECD, 2017).

Public policies to combat corruption using digital tools are also needed in North Africa. The digitalisation of the administration and the development of digital public services reduce the number of points of contact and therefore the risk of corruption, discrimination and informal payments. Offering paperless electronic solutions, such as digital public procurement applications, improves governance, curbs corruption and builds trust. Indeed, electronic public procurement facilitates interactions and the exchange of information between the administration and economic operators. In Tunisia, the Tunisia Online E-procurement System (TUNEPS), an online public procurement platform, aims to make public procurement more efficient and transparent, with the corollary of better public finance management. For SMEs, the digitalisation of public procurement processes promotes competition and increases transparency. It enables them to overcome limited technical and financial capacity, save on costs and avoid the risk associated with corruption. Morocco and Tunisia, for example, have recognised the significant role played by SMEs and have reserved 20% of the estimated annual value of public procurement for them (OECD, 2016).

Notes

1. For more detail, see Economic Commission for Africa (UNECA, 2018).
2. The Enabling Digitalization Index is based on five criteria: regulation and business environment, education and research facilities, connectivity, logistics infrastructure and market size.
3. The advantage of this type of infrastructure is that it smooths the flow and increases the speed of Internet traffic, and enables 5G connectivity and the Internet of Things.
4. Egypt has 12 data centres, whereas Morocco has five, Tunisia two and Algeria only one. For more detail, see Internet Society (2020).

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Chapter 7

Digital transformation for youth employment and Agenda 2063 in West Africa

This chapter examines how public policies can leverage digitalisation to accelerate productive transformation and provide solutions to youth unemployment in 15 countries in West Africa. The first two sections provide an assessment of labour market and digital development in the region and highlight opportunities and challenges that countries face in leveraging digitalisation. The third section explores the main channels through which West African countries can make the most of the digital transformation to tackle youth unemployment and fulfill the Agenda 2063. Finally, based on these assessments, the last section highlights strategies and policy interventions that can help West African countries build an integrated digital economy.

IN BRIEF

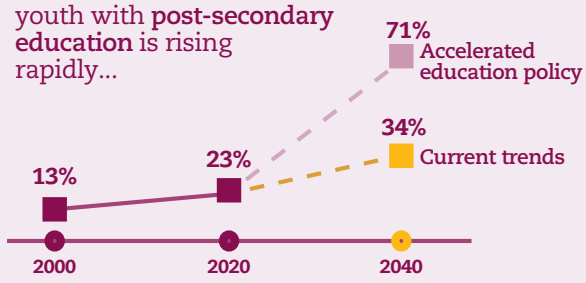
Digital transformation can improve youth employment in West Africa, which is a crucial issue for the future, with under 24-year-olds accounting for 65% of a total population of 420 million. The new digital era holds great promise for the region, in terms of the emergence of start-ups and local ecosystems. The advent of digital finance (Fintech), for instance, has already strongly stimulated entrepreneurship and self-employment in a region with a significant informal sector (92% of jobs) and in a context of underemployment and high youth unemployment. In the region, the mobile ecosystem already employs 200 000 people formally and 800 000 informally, particularly in the sale and distribution of mobile services and devices, and contributes 3.5% to gross domestic product (GDP). In addition to those directly employed in the sector, there are 600 000 indirect jobs. Nonetheless, significant challenges remain in the region, including a lack of adequate communications infrastructure, skills or regulation. Policy makers will need to address these issues through strategic policy responses.

The region can actively support and accelerate the digital transformation to tackle employment challenges by targeting four impactful policy areas: (i) strengthening government support of technology parks and start-up incubators, and monitoring progress; (ii) strengthening regulatory frameworks and supportive measures to expand the adoption of fintech products; (iii) supporting SMEs and small producers to use digital technologies and strengthen their integration into local, regional and global value chains; and (iv) investing in skills development and digital-related technical and vocational education and training (TVET) initiatives for youth.

West Africa

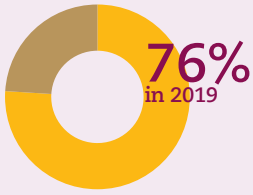
Youth employment

The share of West-African youth with **post-secondary education** is rising rapidly...



... but the high number of **mismatches** is driving unemployment

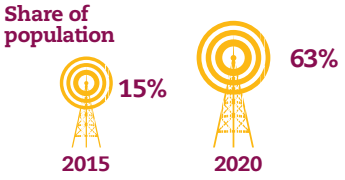
Mismatch rate among youth in Côte d'Ivoire



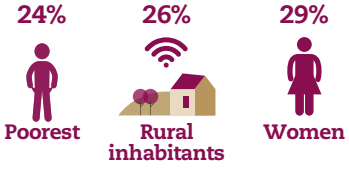
Communications infrastructure

Access to communications infrastructure is improving, but with significant usage gaps

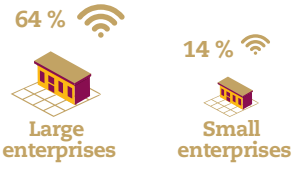
The 4G network coverage has expanded fast



Percentage of the population with Internet access (2018)

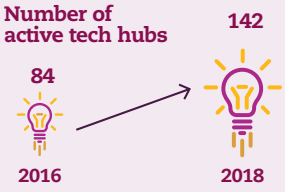


Proportion of manufacturing businesses with a website



Digital economy

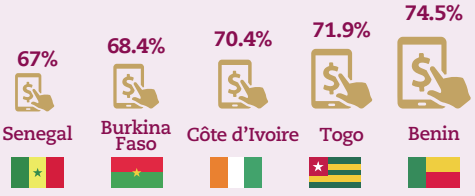
The digital ecosystem is growing fast



E-commerce is experiencing robust growth

Mobile banking is fostering financial inclusion

% of adults with a mobile banking account



What's next for policy makers?

- Strengthen **government support** for technology parks and incubators
- Implement **supportive regulatory frameworks** for the innovation of Fintech products
- Support **SMEs and small producers** in the use of digital technologies
- Invest in **skills and digital-related TVET initiatives** for youth

West Africa regional profile

Table 7.1. **Selected indicators on digital transformation in West Africa**

			West Africa (5 years ago)	West Africa (latest year)	Source	Latest year
Digital sector	Communications infrastructure	Percentage of the population with a cell phone	15.2	40.1	ITU	2018
		Percentage of the population with 4G coverage	14.5	62.7	GSMA	2020
		International Internet bandwidth per Internet user (kilobits/second)	5 310.4	16 518.0	ITU	2018
	Telecommunication sector	Total capital expenditure (as a percentage of total revenue)	27.4	21.5	GSMA	2018-20
		Earnings before interest, taxes, depreciation and amortisation (as a percentage of total revenue)	52.0	34.0	GSMA	2018-20
		Total employed headcount within the telecom companies (head account full-time equivalent)	24 803	27 531	GSMA	2016-17
Digital economy	Start-up development	Number of active start-ups that raised at least USD 100 000	22	129	Crunchbase	2011-20
	Digital services	E-Commerce sales (in USD million)	409.7	892.4	UNCTAD	2014-18
		Export of professional and IT services delivered electronically (in USD million)	1 476.8	7 032.0	UNCTAD	2014-18
Digitalised economy	Internet use among people	Percentage of the population that use mobile phones regularly	72.8	74.6	Gallup	2018
		Percentage of women with Internet access	13.0	29.0	Gallup	2018
		Percentage of the poorest 40% with Internet access	11.1	24.1	Gallup	2018
		Percentage of rural inhabitants with Internet access	11.9	26.3	Gallup	2018
	Digital-enabled businesses	Percentage of firms having their own website	13.9	26.1	World Bank	2018*
		Percentage of firms using e-mail to interact with clients/suppliers	42.3	56.4	World Bank	2018*
		Percentage of goods vulnerable to automation that are exported to OECD countries	n.a.	11.7	World Bank	2020
	Access to finance	Percentage of the population with a mobile money account	7.0	69.3	Demirgüç-Kunt et al.	2017

Note: *Data for 2018 or the latest 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* (database); Gallup (2019), *Gallup World Poll* (database accessed on 1 February 2020); GSMA (2020a), *GSMA Intelligence* (dataset); ITU (2020), *World Telecommunication/ICT Indicators* (database); UNCTAD (2020a), *UNCTADSTAT* (database); World Bank (2019a), *World Bank Enterprise Surveys* (database); World Bank (2020a), *World Development Report 2020*.

The West African labour market remains dominated by informal employment

Digital transformation represents a real opportunity for youth employment, especially of the most qualified young people, and has the potential to accelerate West African countries' achievement of the goals set out under Agenda 2063, adopted by the African Union (AU).[1] This jobs dividend can be realised by shifting activity to the formal economy to create stable and decent jobs. Digital transformation also offers an opportunity to remove the barriers facing companies when they start the formalisation process.

Accounting for more than 92.4% of total employment in West Africa (ILO, 2019a), the informal sector is a major obstacle to the achievement of the Sustainable Development Goals (SDGs)[2] **and Goal 4 of the African Union's Agenda 2063 to build transformed economies able to create jobs.** For example, SDG 8 on stable and decent employment was only 16% achieved in 2019, and West Africa's performance on this goal remains low (12%). Although the informal sector enables a large proportion of the population to participate in economic activity and facilitates labour market flexibility, it also increases workers' vulnerability. The in-work poverty rate remains very high in most countries, especially in the most informal economies: 61.7% in Guinea-Bissau, 47.9% in Mali and 44.8% in Benin (ILO, 2019b).

Young people are most at risk of unemployment in West Africa, with average unemployment rates twice as high as among people aged over 25, according to African Development Bank (AfDB) figures. In Senegal, 63% of unemployed people are aged 15-34, with unemployment particularly high among the 20-29 year old age group (18.8% of 20-24 year olds and 16.3% of 25-29 year olds) and graduates, with 22.8% unemployed among those with two years of higher education (ANSD, 2018). At around 9% in Ghana, youth unemployment goes hand in hand with widespread underemployment, where young graduates work in small businesses in the informal sector. In Nigeria, youth unemployment (15-24 year olds) stands at 36.5% (NBS, 2018). Moreover, political crises and post-conflict situations have an impact on youth unemployment, which peaked at 18% in Mali in 2015 and settled at around 15% in 2019 (ILO, 2019b).

The predominance of informal employment is partly explained by the difficulty of accessing credit, as well as the often prohibitive procedures for setting up or formalising a company, due to administrative delays. Indeed, the business climate remains unattractive, as illustrated by the World Bank's *Doing Business 2020* report. Togo, placed 97th out of 190 countries, is the highest ranked West African country, followed by Côte d'Ivoire (110th). The boom in digital tools could present an opportunity to facilitate access to credit, formalisation procedures and tax payment.

By facilitating companies' shift to the formal sector, digital transformation could act as a lever for stable and secure jobs. Formalisation improves corporate governance and enables companies to increase their profits by an average of 20% (Investisseurs & Partenaires, 2019). It gives them easier access to financing and provides a positive signal to markets about their credibility and the reliability of their products. Moreover, formal companies offer a safer working environment, retain workers (especially if they are skilled), and support their development.

Informality is exacerbated by the predominance of jobs in precarious sectors, increasing the vulnerability of workers in West Africa. Between 2000 and 2020, 42% of jobs were in the agricultural sector and 41% in services. The employment landscape is dominated by self-employment and jobs in family businesses (over 80%), while salaried

positions account for only 16% of the total (ILO, 2019b). The employment landscape and its sectoral distribution favour both informality and precariousness. Self-employment is often informal and occurs in the agricultural or service sector. Ultimately, digital transformation offers a valuable opportunity to create more stable jobs in the primary and tertiary sectors.

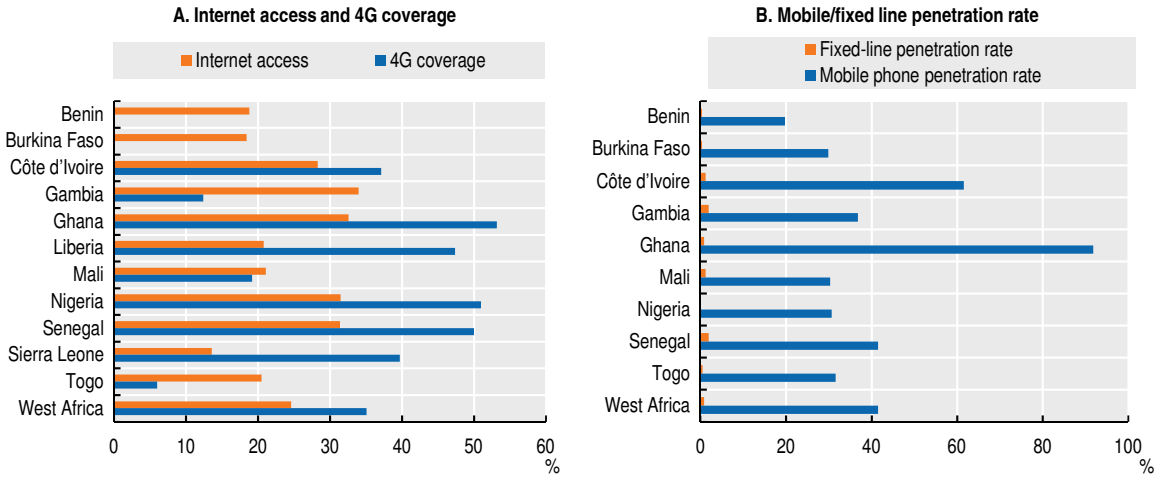
There is a severe lack of major innovative entrepreneurs in West Africa able to employ unskilled workers who turn to self-employment due the dearth of job opportunities. Employers accounted for only 1.84% of employment on average in 2020. The employment model in West Africa, based on individual entrepreneurship supported by microfinance institutions, is in question: while it has helped to limit extreme poverty, it has not facilitated stable jobs that enable workers to escape from poverty.

The agriculture and service sectors, the largest reservoirs of jobs in West Africa, lack large companies capable of raising significant financial resources and mobilising innovative technologies to achieve economies of scale and productivity gains. Such large companies could efficiently and effectively employ workers who are often low-skilled and in most cases only able to succeed through individual entrepreneurship. The aim of organising productive activities in this way is to provide stable employment and ensure a level of pay that keeps workers above the poverty line.

Digital transformation has accelerated in the region, but the infrastructure and skills gaps expose stark inequalities

Digital transformation in West Africa presents a real opportunity to address the challenges of employment and financial inclusion. Beyond creating direct jobs, the digital ecosystem improves productivity in many sectors. Furthermore, the COVID-19 health crisis has shown that digital transformation will provide innovative solutions in many vital sectors. Access to communications infrastructure is assessed using the telephone penetration rate and Internet and 4G coverage rate (Figure 7.1).

Figure 7.1. **Access to the digital transformation in West Africa (percentage of the population, 2018)**



Source: Authors' calculations based on ITU (2020), *World Telecommunication/ICT Indicators Database*, www.itu.int; GSMA (2020a), *GSMA Intelligence* (database), www.gsmaintelligence.com/; Gallup (2019), *Gallup World Poll* (database), www.gallup.com/analytics/213617/gallup-analytics.aspx.

StatLink *https://doi.org/10.1787/888934204061*

Despite the number of mobile subscribers continuing to grow, West Africa's digital connectivity is still weak. Overall, in 2018, less than half the population (41.5%) had access to a mobile network, while more than a third (35.1%) had 4G coverage. Only one in four people have Internet access. These figures clearly show that West Africa does not yet have sufficient access to communications infrastructure to draw upon for growth and job creation.

The digital transformation of West African countries has been stimulated by the development of communications infrastructure, particularly submarine cables. In 2019, sub-Saharan Africa was connected to the global telecommunications network via 18 active multilateral submarine cables[3] (excluding bilateral submarine cables), including eight on the west coast. This expansion has led to a 3-5% increase in the Internet penetration rates in West Africa compared with the rest of the continent (Cariolle, 2020).

Access to communications infrastructure remains uneven across the subregion, dampening the benefits not only at the country level, but also at the regional level, due to the difficulty of ensuring digital interconnectivity. Some countries such as Ghana, Côte d'Ivoire, Senegal and to some extent Nigeria have coverage rates above the regional average, but major efforts are yet to be made in Benin, Burkina Faso and Togo. Small countries often face challenges in achieving economies of scale, due to the level of investment required to connect the whole territory.

In addition to the poor digital coverage of many West African countries, the quality of coverage is weak (telephone network, Internet access), leading to suboptimal use. In most countries, mobile phones have replaced fixed-line phones, which have a penetration rate of less than 1%. This situation reduces the potential for asymmetric digital subscriber line (ADSL) connections. Ongoing investments by individual countries and mobile operators to adopt fibre and accelerate the migration to 4G will ensure that Internet speeds are reasonable over the coming years. For example, in 2019, the Orange Group announced the creation of an international fibre optic network, called the "BAFO" (African fibre optic backbone), which will link eight West African countries where the operator is active, including major regional capitals (Dakar, Bamako, Abidjan, Accra, etc.). Despite difficulties around access, many companies are using digital tools to increase their visibility by creating websites, to communicate with their customers and to conduct business transactions via online platforms.

High Internet connection costs also discourage the use of applications or technologies that require a continuous connection. Twenty gigabytes (GB) of mobile data cost EUR 30 in Côte d'Ivoire, while the same provider sells packages that include free phone calls and SMS with 100 GB of mobile data for EUR 19.99 throughout Europe (Kouamé, 2019). This high cost is attributable to the lack of communications infrastructure and two types of vulnerability: the risk of submarine cable breakage and "digital isolation" (Cariolle and Goujon, 2019). The multiplicity of stakeholders, competition with incumbent operators, the question of ownership of transactional data and the lack of communications infrastructure in rural areas remain major challenges (World Bank, 2019a).

Although having a website is now essential for running and managing a company, this tool is still underutilised in West Africa (Table 7.2). Only 24% of companies have a website, despite its benefits in terms of marketing and access to a very large customer base. This proportion is even lower among small businesses (14%). Moreover, 36% of large companies do not have a website, reflecting low digital coverage and the dominance of the informal sector, especially in small countries with few communications infrastructure, such as Sierra Leone, Liberia and Guinea-Bissau.

Table 7.2. **Proportion of businesses with a website in West Africa**

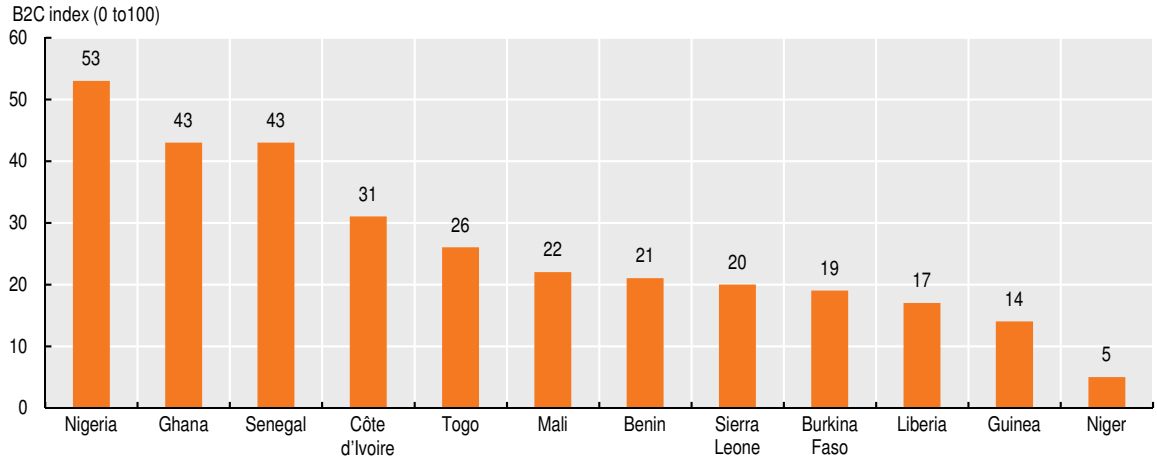
Country	Large companies	Medium companies	Small companies	All companies
Benin	94	58	3	38
Burkina Faso	44	30	9	17
Côte d'Ivoire	54	36	8	18
Cabo Verde	47	17	18	19
Ghana	75	48	22	33
Guinea	77	21	16	19
Gambia	100	43	14	22
Guinea-Bissau		31	5	9
Liberia	16	25	7	13
Mali	72	43	36	42
Niger	78	52	17	33
Nigeria	70	48	15	22
Senegal	83	59	16	35
Sierra Leone	41	28	3	7
Togo	49	40	20	30
West Africa	64	39	14	24

Note: Data are for different years due to availability: 2009 (Burkina Faso, Cabo Verde), 2013 (Ghana), 2014 (Senegal, Sierra Leone), 2016 (Benin, Côte d'Ivoire, Guinea, Niger), 2017 (Liberia, Mali, Nigeria, Togo), 2018 (Guinea-Bissau).
Source: Authors' calculations based on World Bank (2019a), *World Bank Enterprise Survey*, www.enterprisesurveys.org/en/survey-datasets.

The low number of websites among West African businesses is linked to the low proportion of households with access to a computer, the scarcity of innovative start-ups and the limited digital skills of workers. In contrast to the mobile phone penetration rate (41.5%), less than 5% of households have a computer (OIF, 2018). Moreover, the education system places little emphasis on digital education, leading to workers having low levels of IT skills. For example, in Benin, 53.6% of graduates in 2015 were in social, information and business sciences, compared with 4.7% in engineering and 8.7% in natural sciences, mathematics and statistics (OIF, 2018). Moreover, of those companies that have a website, very few update it. As such, website management – one of the first manifestations of digital transformation – has not yet been mastered in West Africa.

The Business-to-Consumer (B2C) Index, which measures countries' ability to conduct e-commerce, is still low (Figure 7.2). In Africa, the highest B2C Index scores are 68.4 in Mauritius and 54.4 in South Africa. Nigeria, Ghana and Senegal have the highest scores in the region due to their dynamic economies and digital infrastructure potential. Consequently, investments are needed to improve not only Internet coverage, but also the logistics services between buyers and sellers.

Figure 7.2. **Business-to-Consumer (B2C) Index, 2019**



Notes: The B2C Index is based on four indicators strongly linked to e-commerce: (i) account ownership at a financial institution or with a mobile-money-service provider (percentage of the population aged 15 and over); (ii) individuals using the Internet (percentage of the population); (iii) Postal Reliability Index; and (iv) secure Internet servers (per 1 million people).
Source: Authors' calculations based on (UNCTAD, 2020b), "UNCTAD B2C E-commerce index 2019", *UNCTAD Technical Notes on ICT for Development No.* 14, https://unctad.org/en/PublicationsLibrary/tn_unctad_ict4d14_en.pdf.
StatLink https://doi.org/10.1787/888934204080

Despite the gap in communications infrastructure, e-commerce has been driven by both specialised and generalist websites. Table 7.3 presents the top five e-commerce sites in the four most dynamic economies, based on their traffic. The e-commerce market in West Africa is dominated by *Jumia*, a Nigerian platform present in many countries, followed by *Afrimarket*.

Table 7.3. **Top five e-commerce sites in the most dynamic economies of West Africa**

Country	Côte d'Ivoire	Ghana	Senegal	Nigeria
Website	*Jumia.ci*	*Afriyie Electroworld Limited*	*Jumia.sn*	*Jumia.com.ng*
	Afrimarket.ci	*CediBasket*	*Afrimarket.sn*	*Konga.com*
	Vendito.ci	*Shopingh.com*	*Food.jumia.sn*	*Slot.ng*
	Kaym.ci	*Ugodeal*	*Promo.sn*	*OLX.com.ng*
	Shop.pdastoreci.com	*Zewnic*	*Africashop.sn*	*Dealdey.com*

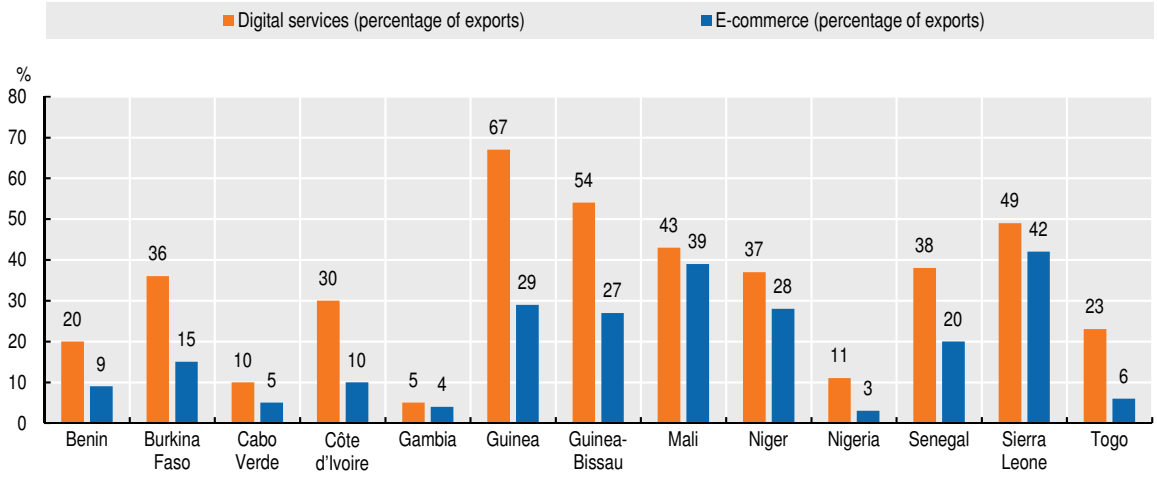
Source: Authors' own elaboration.

E-commerce faces challenges related to postal addresses and transport. When orders are placed on line, poor road links between cities and the remoteness of some rural populations make delivery difficult. According to the *Boston Consulting Group* (BCG), some sites report that between 30% and 40% of products ordered are returned because the delivery service has failed to find the destination address (Ecofin Agency, 2020). Poorly co-ordinated distribution networks compound this situation. The goods delivery sector in West Africa needs to be properly organised to make it a reliable source of jobs and capable of supporting the development of e-commerce.

Despite constraints around communications infrastructure and the low proportion of companies with a website, e-commerce is experiencing robust growth at 9.1% per year, while digital services (up 21.2% per year) are expanding in cities. Between 2010 and 2017, the share of e-commerce in exports was still low (around 19%, compared with 33% for digital services), but its contribution was higher in small countries, despite relatively low turnover (Figure 7.3).

E-commerce and digital services can support new job-creation initiatives targeting young graduates. The countries best placed to benefit from this jobs dividend are Senegal, Côte d'Ivoire and Nigeria, due to the high turnover recorded in e-commerce and digital services, linked to the offshoring of hotlines and call centres from developed countries.

Figure 7.3. **E-commerce and digital services deliverable using ICT (average 2010-18)**



Source: Authors' calculations based on UNCTAD (2020a), *UNCTADSTAT* (database), https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=158359

StatLink https://doi.org/10.1787/888934204099

To better capitalise on digital transformation, employees' technical and vocational skills must be developed through education. The education system in West Africa is not yet in a position to equip all young graduates with the digital skills they need. Indeed, training in computer science and basic software is accessible to only a few privileged learners, due to equipment costs and the predominance of the humanities. In West Africa, 37% of young people have not attended or completed primary education, with a similar share (40%) having completed primary school and moved on to lower secondary school. Only 23% of young people have attended high school (the upper level of secondary education), which is crucial if they are to learn digital skills (WCHC, 2020). Students need strong science, technology, engineering and mathematics (STEM) skills, as well as digital skills. These need to be combined with management and marketing skills to enable students to adapt to the challenges of the labour market.

Young people's low level of digital skills and the mismatch between curricula and market requirements could lead to division in the labour market. Indeed, the impact of digital transformation is linked to workers' skill level. While employment opportunities will improve for skilled young people, the 54% without the required skills will see their chances of entering the labour market fall and find themselves unable to turn to self-employment using digital technologies. Likewise, low-skilled workers are at high risk of losing their job. Reskilling, upgrading and vocational training are essential to reduce the digital divide in the labour market.

Box 7.1. **Digital transformation and job creation in West Africa**

In the wake of Gordon's (2012) paper on the impact of the third industrial revolution (computers, telephones and the Internet) on labour productivity and employment in the United States, a vast literature highlighting the benefits and risks of digital transformation, particularly in developing countries, has developed. One of the authors' main arguments is that the ICT boom favours skilled employment in the short term at the expense of unskilled employment, thus supporting the Schumpeterian process of creative destruction associated with digital transformation.

On a theoretical level, the impact of digital transformation on employment can be divided into two schools of thought: "leapfrogging" proposed by Brezis et al. (1993) and "skill-biased technological change" developed by Michaels et al. (2014), Akerman et al. (2015), and Acemoglu and Restrepo (2017). The first school of thought argues that countries lagging behind technologically are encouraged to adopt new technology that can boost productivity and employment. The lagging behind of West African countries has therefore stimulated their adoption of innovative services that generate employment. Conversely, the second school of thought highlights the fact that digital transformation polarises the labour market, increasing the demand for skilled workers at the expense of unskilled workers, and thereby increasing inequality.

Few studies have actually assessed the contribution of ICTs to job creation in developing countries. Hjort and Poulsen (2017) set out three channels through which better Internet access positively affects employment: productivity, business creation and increased exports. Using a sample of 50 000 companies in 117 developing and emerging countries, Paunov and Rollo (2016) also show that businesses' use of the Internet improves labour productivity. Similar results obtained by Cariolle et al. (2017) based on a sample of more than 30 000 companies in 60 countries corroborated the skill-biased technological change thesis.

In the West African subregion, by 2018 the mobile ecosystem already employed 200 000 people formally and 800 000 informally, particularly in the sale and distribution of mobile services and devices, and contributed 3.5% to GDP. In addition to those directly employed in the sector, there are 600 000 indirect jobs. If the indirect effects of productivity improvements in other sectors are taken into account, this contribution is estimated to be 8.7% of GDP (GSMA, 2020b). This dynamic of direct and indirect employment, in relation to the mobile ecosystem, shows that the "leapfrogging" effect outweighs the potential adverse effects associated with the "skill-biased technological change" effect in West Africa.

Source: Authors' compilation based on literature review.

Digital transformation presents many employment opportunities in the region but requires the adoption of complementary policies

By improving labour productivity and efficiency through the development of new innovative services, digital transformation is a plentiful source of employment in West Africa. Mobile phone and messaging services reduce unproductive travel by enabling employees and companies to communicate effectively. Likewise, 3G and 4G coverage allows data to be accessed and transferred quickly, facilitating decision-making.

The digital transformation of administrative procedures (e-government) is a powerful tool for public efficiency that can also provide an enabling environment for business to create jobs. For example, the digital transformation of tax returns and payments makes collecting tax revenues more efficient. It simplifies procedures for companies, saves time and helps improve the allocation of human resources by companies and the government.

E-government is an innovative tool that helps boost public revenues, streamline expenditure and tackle corruption by reducing human involvement in public service administration. In Benin, medium-sized enterprises have been obliged, since 2019, to declare and pay their taxes on line. Large companies have been subject to this requirement since 2018. Furthermore, since January 2020, the Directorate General of Taxes has developed an application that allows motorists to pay their vehicle taxes by mobile phone. The roll-out of the remote procedure for filing salary taxes and social security contributions is understood to have brought in an additional XOF 1 billion after just one month. Similarly, Ghanaians can now pay their taxes on line on the *Ghana.GOV* platform.

E-government can extend to all areas of administration and generate significant productivity gains. It can cover a range of areas, from port operations to immigration and visa procedures, or from e-justice to the interoperability of government databases. In March 2019, the government of Ghana launched "E-Justice", an electronic platform for recording court cases, accessing legal services and paying fines. The platform also automatically assigns cases to courts and judges, thereby reducing the risk of corruption and conflicts of interest.

Beyond facilitating formalisation processes, digital transformation can increase the activity, opportunities and visibility of informal actors, while encouraging them to formalise, with a view to creating more stable jobs. In the informal sector, digital transformation must rely on basic technologies (Unstructured Supplementary Service Data) and universal applications (WhatsApp or Facebook) to collaborate with different stakeholders and promote products. Digital transformation will also make it possible to build trust between buyers and sellers by using branding to guarantee the credibility and quality of products and making customer feedback visible to all stakeholders. Digital transformation can support the SDGs by deploying network infrastructure, improving connectivity and making relevant digital services (health, finance, education) available.

In terms of health, digital transformation contributes to the achievement of SDG 3, through prevention and remote consultations, especially in areas without health centres. In terms of awareness-raising, *My Healthline*, an SMS information service on contraception, sexuality, HIV/AIDS and sexually transmitted infections provided by Orange, sends regular prevention messages to pregnant women and young mothers in Mali. In Ghana, the *mPedigree* application uses an SMS code to enable people to check whether their medicines are counterfeit (Gonzales and Dechanet, 2015). Meanwhile in Benin, the *KEA Medicals* hospital information system provides a universal medical identity for all patients using a label with a QR code, enabling medical data to be communicated between doctors and different hospitals.

Digital transformation also facilitates access to education (SDG 4), especially university education, which is hampered by the lack of infrastructure and teachers. In the absence of massive investment in the education sector, digital transformation remains the best solution for maintaining any significant level of education. It enables learners and educators to connect across a global knowledge-sharing network. In 2014, the Orange Foundation launched the Digital Schools programme for the most disadvantaged children, to provide free digital content to primary and secondary school pupils in countries where Orange operates, including Côte d'Ivoire, Niger, Senegal, Mali and Guinea.

The agricultural sector, which employs 42% of the workforce, can also mobilise digital tools to increase its output. Information on new cultivation techniques or pesticide combinations, crop conditions, weather and product prices, disseminated through ICT, can reduce production costs and improve yields. Digital transformation minimises geographical and seasonal disparities in the price of perishable goods (Aker and Fafchamps, 2015), reduces transport and transaction costs, builds trust in businesses and their reputation, and expands professional networks (Overa, 2006). Moreover, producers

benefit from reliable and practical signals on which to act in a less uncertain environment and in turn improve their production, investment and sales decisions.

However, the digital revolution can give rise to a new form of crime, particularly in some West African countries: more than 10 000 cyberattacks were identified in Nigeria, Côte d'Ivoire and Senegal in 2015 (Gonzales and Dechanet, 2015). These cyberattacks can involve fraudulent use of bank data, hacking bank accounts or disseminating confidential and strategic information. According to McAfee (2014), cybercrime costs Nigeria 0.08% of its GDP each year, while losses are estimated at EUR 3.8 million for Côte d'Ivoire in 2013 and EUR 2.2 million for Senegal (Gonzales and Dechanet, 2015).

Digital transformation has enabled terrorist groups present in West Africa to establish a communication strategy and assert themselves. These groups use the Internet, videos and multimedia for propaganda, to claim responsibility for attacks, and so on. They also use the Tor network, which allows people to connect anonymously, and video game chat rooms to talk to each other or recruit people. In such a context, making the Internet safe remains a significant challenge.

The protection of private data remains challenging in the context of rapid digital transformation. Indeed, personal data collected by mobile operators must be stored within a regulatory framework that guarantees data security and prevents data being used for unlawful purposes.

Public policies to support and accelerate digital transformation in West Africa

Digital transformation can accelerate productive transformation and provide solutions to youth unemployment through four channels: (i) developing a dynamic digital environment conducive to the creation of digital start-ups and direct employment; (ii) promoting innovative financing for SMEs thanks to the emergence of fintech; (iii) integrating SMEs and informal workers into regional and global value chains contributing to indirect job creation; and (iv) developing skills aligned with future market requirements. Public policies play an essential role in the transition process through these different channels.

Public authorities can actively contribute to the emergence of a dynamic digital ecosystem

Through the creation of technology hubs or "tech hubs" and partnerships with the private sector

The new digital era holds great promise for the region, in terms of start-up creation, private sector development and stronger trade relations. Although West Africa has begun its digital transformation with e-commerce platforms such as the *Jumia* group, policies must be integrated into an overarching approach to development, particularly in terms of investment in fibre optic cables and efforts to facilitate Internet access for the greatest number of people (Cariolle and Goujon, 2019). This would help SMEs to discover digital innovations that could facilitate their move upmarket. New dynamic sectors have emerged, such as Nollywood in Nigeria (Box 7.2).

Box 7.2. **Nollywood: successful integration into global value chains**

Nigeria's Nollywood has overcome the obstacles it faced in its early days to become a fully-fledged film industry, largely due to the Internet and smartphones. With 89.6% of its revenues coming from its online presence, it ranks second in the world behind *Bollywood* (India) in terms of the number of films produced and third after Hollywood and Bollywood in terms of revenues. Worth about USD 3 billion, or 1.42% of Nigeria's GDP, Nollywood employs more than a million people directly or indirectly, making it the country's second largest source of employment after agriculture. According to a report by PricewaterhouseCoopers (2018), a compound annual growth rate (CAGR)[4] of 21.5% is forecast until 2022, with revenues expected to reach USD 9.9 billion. Despite the challenges of piracy, *Nollywood* remains a promising source of revenue for the sector's stakeholders, with its online presence being the main driver of revenue growth. Growing interest among foreign companies and the credit line opened by the Central Bank of Nigeria (CBN) are other factors for success.

Source: Agence de presse africaine (APA), 28 July 2019.

Given the weak position of formal employment in the economy, providing support to local entrepreneurs could contribute to job creation. Digital transformation has been a strong stimulus for entrepreneurship and self-employment in West African countries with high rates of underemployment. As the salaried labour market cannot keep pace with population growth, more and more young people are turning to (mostly informal) entrepreneurship, especially in the digital sector. To support these young people, several tech hubs have been created, backed by public authorities and/or operators working in the digital sector (Table 7.4). Good examples include *Yabacon Valley* and the *Ekovolt* system in Nigeria (Box 7.3), the Information Technology and Biotechnology Village (VITIB in French) in Côte d'Ivoire and the Meltwater Entrepreneurial School of Technology (MEST) in Ghana. Between 2016 and 2018, the number of active tech hubs increased from 84 to 142, predominantly in Nigeria. According to the 2017 edition of the *MyAfrican Startup 100* honours list, 40 of the top 100 African start-ups are from West Africa, including 17 from Nigeria, five from Côte d'Ivoire and four from Ghana. Private stakeholders are active in the emergence of these start-ups in West Africa, including the *SmartUp* Digital Youth Foundation and the *CGECI Academy* in Côte d'Ivoire – an initiative of the General Confederation of Enterprises of Côte d'Ivoire – in addition to large companies like *Microsoft* or *Seedstars*, among others.

Table 7.4. **Examples of digital start-up incubators in West Africa**

Name	Date created	Country	Features
Jokkolabs	2010	Senegal, Côte d'Ivoire, Mali, Burkina Faso, Benin, Gambia	Launched in 2010 in Senegal, it offers shared workspaces as well as a community of entrepreneurs working on new technologies. Since its inception, the initiative has grown into a network of 12 innovation spaces across nine countries.
Co-Creation Hub (CcHUB)	2011	Nigeria	This incubator offers digital skills programmes for entrepreneurs and students, start-up incubation and an investment portfolio through its venture capital fund and partnerships with large private groups (Facebook, Google, MTN, etc.). In 2019, it acquired Nairobi's *iHub*, boosting its global visibility and network of digital start-ups.
Ghana Innovation Hub	2018	Ghana	This hub provides start-up incubation and acceleration programmes. Its partnership with *coLABS* helps connect entrepreneurs with relevant investment opportunities. *Moreover, coLABS* has committed to invest USD 5 million over the next three years in young entrepreneurs.
Djanta Tech Hub	2018	Togo	This tech hub has three objectives for 2025: to develop a network of Togolese start-ups (with more than 50 start-ups going through its incubation programme, of which at least ten raise more than EUR 100 000, and 200 new start-ups joining its network), to train 1 000 digital talents each year and to attract innovative international technology companies (at least 15 new companies).

Source: Authors' compilation.

While the emergence of tech hubs is encouraging, many of them are still struggling to operate effectively. The Biotechnology and ICT Free Trade Zone (ZBTIC in French) operated by VITIB in Côte d'Ivoire is struggling to get off the ground. Nevertheless, VITIB expects to provide more than 2 500 jobs five years after its launch. In 2011, West Africa had 11 free trade zones, mostly in low value-added and low-skilled labour-intensive sectors (Bost, 2011). The poor performance of these tech hubs is likely to be the result of a lack of government monitoring and support, which hinders their development. Similarly, without adequate infrastructure, these businesses are forced to invest more than their competitors. Companies in the Nigerian cluster *Nnewi* have had to invest in roads and water and electricity supplies themselves. This increase in overhead costs reduces their capacity to invest in research, development or improving skills and techniques (Kaplinsky and Morris, 2015). These major obstacles can only be overcome with the support of public bodies, which can create the right conditions for businesses to yield convincing results. Better public policies and a more stable political, economic and social environment would attract private sector stakeholders and investors, making it possible to stimulate technological innovation in the short and medium term that would benefit the countries' economies.

Box 7.3. **A successful example of a technology hub: Yabacon Valley**

Yabacon Valley, the nickname given to a tech hub located in Yaba, on the outskirts of Lagos, was created in partnership with local start-ups. According to *Voice of America (VOA) Africa,* this technology ecosystem is a first step towards cultivating the tech community. This initiative is the result of successful collaboration between local and international stakeholders. Some provide the talent, market knowledge and entrepreneurial spirit, while others provide the financing that is still lacking on the ground. Yabacon Valley received more than 20% of the capital raised in Africa in 2017, i.e. USD 115 million. Although below the flows attracted by developed markets, this volume of capital is evidence of very real interest from venture capital funds. The country's growing middle class is the preferred target group, as are traditional marketplaces and e-finance and e-retail companies.

Several less conventional initiatives are emerging, such as a crowdfunding platform for farmers *(Farmcrowdy)* and an application to facilitate blood donation *(LifeBank)*. Yabacon Valley is home to several incubators including the Co-Creation Hub (CcHUB), which is sponsored by major technology companies *(MTN Nigeria*, *Google, Nokia* and *MainOne*), and *Start Innovation Hub,* which targets start-ups in education, energy, agriculture and health. The Yabacon Valley ecosystem has grown to include major e-commerce start-ups such as *Jumia* and *Konga*.

Source: Le Temps, 18 November 2018; Voice of America (VOA) Africa, 15 July 2018.

Through adequate funding for start-ups

While the emergence of start-ups represents an opportunity for all economic operators in the region, technical and financial support often fails to meet their needs as it tends to target companies in less risky sectors. To break the vicious cycle that SMEs face when seeking funding, the *EIC Corporation* platform has been launched to create a bridge between the diaspora and the African continent through its Diaspora Angel Investors (DAI) fund. This digital platform is present in all West African countries. This initiative should be strengthened and supported by tailored public policies to better direct remittances from African migrants towards productive investments. This could involve lowering the cost of sending remittances to countries in the region, which ranks second in Africa for migrant remittances after North Africa. Better SME funding also requires tailored public policies on tax waivers, public guarantee schemes to promote bank financing for creditworthy

projects, and direct public funding for youth projects with positive knock-on effects. Many of the region's countries have policies to support youth entrepreneurship and these should be strengthened and promoted. Moreover, the development of fintech firms appears to be another effective way of fostering inclusive and innovative financing in the economy.

Despite the development of the sector and of dynamic start-ups, the digital economy will fail to create enough direct jobs to meet demand. However, digital transformation could stimulate indirect job creation by providing innovative sources of financing via financial technologies or by facilitating SMEs' and informal workers' integration into regional and global value chains.

The emergence of fintech firms could provide an innovative source of financing for the private sector, but the regulatory framework will have to be adapted accordingly

Fintech in West Africa

Fintech firms[5] respond to the needs of SMEs and are the new drivers of financing in West Africa. They facilitate the transfer of funds anywhere in the world and are able to harness blockchain – the data storage and transfer technology. Fintech firms leverage digital finance through mobile money/banking, especially for unbanked stakeholders (including those in the informal sector). This is particularly useful in places with poor access to banking services. Fintech's success lies in money transfer technologies, an extensive innovation which has developed from simple transfer activities to the creation of electronic wallets that make online shopping, tax payment and more possible.

Over recent years, the rise in fintech firms has been characterised by the widespread use of electronic financial services in West Africa. In its annual report on access to financial services via mobile phones published in 2017, the Central Bank of West African States (BCEAO) found that there were 36.5 million subscribers to mobile money services in the Union. Approximately 2 million transactions were processed per day on average in 2017, amounting to XOF 11 500 billion. Service providers include operators such as INTOUCH, m-Louma, Matontine, Wallet, Jokko santé, PayDunya and SudPay in Senegal, JULAYA and Janngo in Côte d'Ivoire, and Bizao and Moneywave in Nigeria.

Financing opportunities

To capitalise on the high level of mobile coverage, phone operators and banks have implemented co-operation agreements to increase access to financial services through mobile phones and promote financial inclusion. For instance, the Ecobank Group (whose mobile portfolio includes Xpress Account by BNP Paribas, Yup by Société Générale and the Banque internationale pour l'Afrique de l'Ouest) has joined forces with Orange, MTN, Airtel and Etisalat through its West African subsidiaries. Even microfinance institutions are exploring whether they can use mobile technologies to bring their services closer to their clients by using tablets to serve savings groups. Moreover, partnerships between microfinance institutions and e-money issuers have been set up to use mobile phones to digitise savings collection and loan repayment. This is the case for Caurie-MicroFinance and Microcred in Senegal, Alide in Benin and Advans Microfinance in Côte d'Ivoire. Reaching 57.1% of people in the West African Economic and Monetary Union (WAEMU) area in 2018 (BCEAO, 2019), mobile banking has fostered financial inclusion, with remarkable rates in some countries: Benin (74.5%), Togo (71.9%), Côte d'Ivoire (70.4%), Burkina Faso (68.4%) and Senegal (67%). Many countries have implemented fintech programmes, such as the Bali

programme in Senegal, launched in October 2018 with the support of the World Bank and the International Monetary Fund (IMF),[6] and the use of blockchain technology to solve land tenure problems in Ghana.[7]

Priorities to use fintech for innovative financing

Public policies on fintech should be part of an overarching approach to promote the digital economy. The institutional framework must therefore be clarified. At present, payment service providers are not regulated under a single separate category. These entities are neither microfinance institutions nor electronic money institutions, and the absence of harmonised regulation hinders their growth. The stark differences between countries give rise to additional costs for companies operating in the fintech sector. Likewise, despite the availability of human resources skilled in software development, there is a shortage of the specific skills required for innovation (cloud, big data, digital security).

National policies do not sufficiently support the development of fintech firms. The lack of support for and monitoring of these young companies affects their survival, regardless of the quality of the solutions they offer. The absence of a support strategy for tech companies deprives young entrepreneurs in the sector of access to adequate administrative, legal and financial assistance to make their businesses sustainable. National policies devote only a small share of investment to infrastructure to support the growth of fintech. One recommendation to mitigate these constraints would be to create a Fintech Lab with Côte d'Ivoire as a regional hub (Gonnet, 2018). The objectives would be to detect emerging technologies developed by fintech start-ups, to improve products, services and internal processes and to identify the talents of tomorrow (in IT or marketing). The next step would be to strengthen relationships with start-ups, build a pipeline of young companies in which to invest and encourage the development of the local fintech ecosystem by participating in efforts to innovate. Finally, the ambition would be to promote innovation in related sectors (e-health, e-transport, e-administration, etc.), accelerate the territorial and economic development of Abidjan, the region and other territories by increasing their attractiveness through investments and new foreign partners and, above all, to encourage companies to move out of the informal sector.

For fintech firms to contribute effectively to the region's development, a permanent framework for dialogue between the various stakeholders of the financing ecosystem is necessary. With this in mind, the World Bank and the BCEAO organised an international conference in October 2019 on financial technology companies, bringing together all stakeholders involved in the financing of the West African economy. This conference brought together the governors of the various West African central banks, the regional stock exchanges, representatives of the WAEMU states' ministries of finance, banking and microfinance institutions' professional associations and the Alliance for Financial Inclusion. Beyond this meeting, a permanent framework for dialogue was established to enable effective financing policies to be developed. Such policies include the interoperability platform[8] in Ghana and the granting of a licence by the Central Bank of Nigeria to *Yello Digital Financial Services Limited*, a subsidiary of MTN Nigeria, to provide financial services.

Digital transformation can also improve the spatial distribution of jobs by helping small producers integrate into regional value chains

In a context of accelerated globalisation, digital transformation can help West African countries to better capitalise on their complementarity. Regional value chains could be developed as an alternative to the global value chain, thereby enabling West African

countries to strengthen their comparative advantage (AUC/OECD, 2019). Indeed, some countries in the Economic Community of West African States (ECOWAS) have high levels of complementarity in terms of trade relations: Côte d'Ivoire with Senegal and Burkina Faso; Senegal with Mali, Ghana, Togo and Nigeria; and Gambia with Niger. Similarly, several countries manufacture the same goods, such as shea butter (produced by seven countries), cocoa (whose two major global producers are Côte d'Ivoire and Ghana) and gold, iron, copper, nickel and oil (produced in Ghana, Burkina Faso, Mali, Guinea, Liberia and Senegal). As such, integrated Special Economic Zones could present real opportunities. It is therefore essential that local transformation policies are based around carefully selected areas of activity with a strong knock-on effect on employment and the rest of the economy. To further strengthen regional integration, there should be a focus on strengthening trade relations by improving the transport infrastructure that connects the region's different countries, with a view to harnessing digital transformation.

The agro-industry sectors in Côte d'Ivoire, Ghana and Nigeria are linked to global value chains, but these countries have made little progress in terms of regional value chains. Regional industrialisation and private sector development initiatives are still in their infancy and focus on competitiveness and institutional barriers, particularly non-tariff barriers, political and economic fragility (OECD/AfDB/UNDP, 2014). Global value chains offer the opportunity to create new productive activities and new quality jobs, which are necessary for the structural transformation of economies. Countries can join a value chain without first having to establish all the other links in the chain. Thanks to technological and digital development, it is possible to join an international production network without having all the upstream capacity. In West Africa, agro-industrial value chains offer significant opportunities for expansion. Digital tools can help SMEs to better seize the massive opportunities offered by the regional and African market. By providing strong support to associations of small farmers and SMEs, public authorities and technical and financial partners can help a country to better capitalise on regional and global value chains, as Janngo in Côte d'Ivoire demonstrates (Box 7.4).

Box 7.4. **Janngo, a digital solution for integrating SMEs into value chains**

Based in Côte d'Ivoire, the company Janngo launched its digital platform Jexport (www.jexport.ci) in 2018. It aims to address issues around the competitiveness of SMEs to accelerate their integration into regional and global value chains. Janngo seeks to provide a holistic solution to the challenges that SMEs face when they try to access markets and capital, as well as capacity building. The Jexport tool seeks to help them export their goods around the world at the best price, while also helping freight forwarders and transport companies to bulk up their volumes, reduce their costs and optimise their transport capacity on key corridors. The platform provides end-to-end digital services and a turnkey tool for managing legal and compliance obligations. Jexport brings together freight forwarders, transport companies and other logistics professionals and gives them the opportunity to optimise their transport capacity and maximise their volumes on existing corridors, while increasing their capacity on new corridors.

Source: Ze-AfricaNews, 11 June 2020.

By using digital technology to facilitate producers' access to new markets, as well as that of other local stakeholders along the agricultural chain, greater integration into value chains can increase these stakeholders' income, improve their working conditions and create new jobs (PEJEDEC, n.d). Many of the region's countries primarily export agricultural products. The food economy accounts for 39% of West Africa's GDP

and will continue to be a source of employment for the region's young people (Allen, T., P. Heinrigs and I. Heo, 2018). Yet the value chains for these products are controlled by multinationals that process and distribute them. Public authorities must work to ensure that local stakeholders are properly integrated into agricultural value chains. Indeed, value chain development interventions seek to move beyond traditional markets, which are often characterised by low added value. Accessing new markets via digital tools often requires compliance with specific quality and quantity standards. Moreover, the prospect of serving new customers with higher purchasing power and more diversified consumption needs opens up opportunities for processing primary products, thereby adding more value. Meeting higher standards and adding value can increase the income of stakeholders along the value chain and create new jobs. These jobs could be in processing, mechanisation services, distribution and transport, and require a variety of skills, opening up economic opportunities for a larger population. SMEs involved in the agricultural and agro-industrial sectors should be encouraged and supported through various mechanisms.

Digital tools for financing value chains in West Africa can improve market opportunities. One option is digitising payments to small farmers in value chains. This method has been tested in Ghana by the rice producer Global Agri-Development Company Ghana Limited (GADCO) and the Agropay platform. GADCO, in partnership with mobile network operators, has provided digital payment services to small farmers, while the Agropay platform connects small farmers with major financial intermediaries so they can sell their goods directly and then provide lenders with a financial statement. Small farmers' practices and the seasonal nature of their financial flows have inspired myAgro in Mali and Senegal. It aims to collect prepayments for quality seeds using mobile money, to deliver the seeds and to provide technical support on how to use them. To reduce the imbalance in information between small farmers and lightweight tractor suppliers, Hello Tractor has developed a mobile application to risk-assess short-term equipment leasing finance or rental in Nigeria, Senegal, Mozambique, Tanzania and South Africa. Tailored support provided through well-targeted public policies using these methods is a godsend for traditional small farmers.

Digital transformation can improve the spatial distribution of jobs and improve the integration of SMEs and entrepreneurs into value chains in West Africa. In this region, the bulk of the employment generated by economic growth is confined to the economic and political capitals and, to a lesser extent, to urban areas more generally. The emergence of start-ups in employment areas outside economic and political capitals can enhance the effective use of local skills. Regardless of their sector, companies that use the Internet have grown twice as fast as those without an online presence (McKinsey, 2012). The impact of email on the productivity and turnover of firms in secondary cities is high (Cariolle et al., 2019). The growth of start-ups at the local level due to the expansion of incubators to the different regions of West African countries is helping to consolidate economic growth through job creation at the local level, in particular through better use of local skills. This could lead to a drop in migration between secondary cities and economic capitals, which can increase urban poverty. Finally, enhancing the regional economic potential of West African countries via digital technology helps to optimise the use of local skills and improve the spatial distribution of jobs, the success of which depends on integrating SMEs from different countries into regional and global value chains.

To better integrate SMEs and entrepreneurs into value chains, public authorities should support skills upgrading and help businesses to increase their productive capacity. Despite the existence of several hubs, it is crucial that West African start-ups are supported to enable them to successfully integrate into value chains. For example, Meltwater Entrepreneurial School of Technology, established in Ghana in 2008, offers

an intensive 12-month programme for aspiring African entrepreneurs and is working to break into Côte d'Ivoire to support start-ups in the region. Candidates selected each year receive a comprehensive MBA-style education covering a full range of skills required to build a technology company, including computer programming, software development, product management, finance, marketing, sales and leadership best practices. MEST is accepting applicants from Côte d'Ivoire, Ghana, Kenya, Nigeria and South Africa who want to participate in the intensive entrepreneurship training programme, launch their own digital start-up and receive start-up financing from the Meltwater Foundation. However, to improve the specific skills required by industries and value chains, basic education will need to be supplemented with technical and vocational training.

The region must invest in human capital to meet the growing demand for technical and soft skills

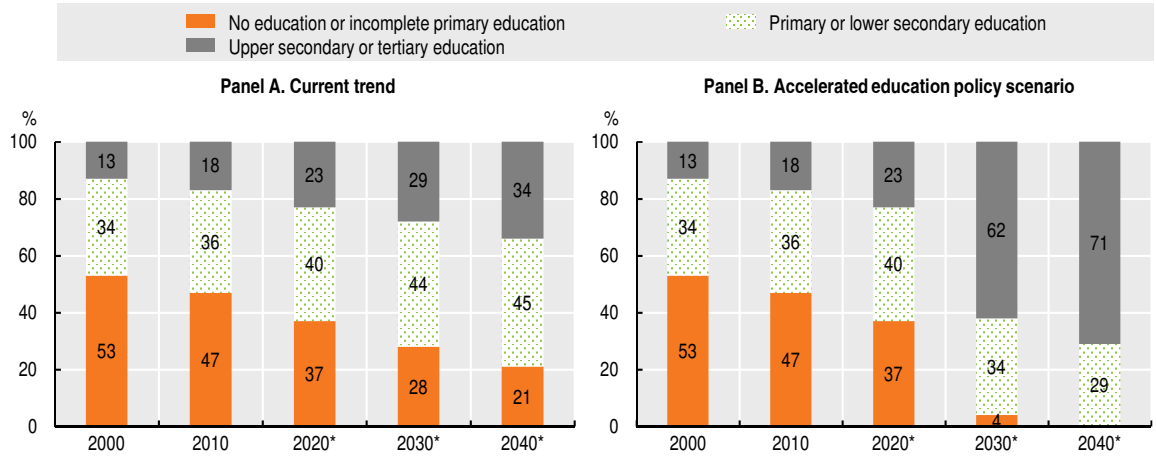
Although West Africa has great potential conducive to harnessing the demographic dividend (almost 44% of its population is aged under 15), its serious skills gap acts as a barrier to innovation. The region's countries have low levels of human capital. Ghana and Senegal take the lead with the highest score of 0.42, compared with 0.35 in Côte d'Ivoire and 0.34 in Nigeria (World Bank, 2017). Despite significant investment in training, sub-Saharan Africa still suffers from skills shortages (AUC/OECD, 2019). The global competitiveness indicators for higher education and training show that West Africa is lagging behind, particularly with regard to the quality of mathematics and science education (3.7), the availability of research and training services (3.9), and the level of staff training (3.7). The indicators are even more concerning for countries such as Mali and Niger. The low rate of enrolment in science and technology (22.2% compared with 38.8% in East Asia) translates into a severe skills shortage in the labour market. The number of technical specialists per 1 000 workers in 2007 peaked at 0.63 in sub-Saharan Africa, compared with 42.81 in China, while sub-Saharan Africa had 0.99 researchers per 1 000 workers compared with China's 4.76 (UNESCO Institute for Statistics, 2010). This gap negatively affects private sector development. In the agricultural sector, the skills shortage hampers development, modernisation and productivity improvements, despite the high export potential.

Despite gradual improvement, inadequate education remains a major obstacle, contributing to the digital divide. In an optimistic scenario, where the region manages to make progress on education at a rate similar to Korea, everyone would be guaranteed primary education by 2040. This would present an opportunity for digital technology to expand. However, this overly optimistic scenario seems unrealistic. States' education systems often perform poorly, despite their efforts to make adequate budgetary allocations. In a less optimistic scenario that follows the current trend, the proportion of young people with no or incomplete primary education in West Africa would still be very high by 2040, at more than 20% (Figure 7.4). Countries such as Niger and Mali would still have high rates of low educational attainment, ranging from 56% to 60% for the no or incomplete primary segment. This situation is a barrier to the smooth integration of economic actors into regional and global value chains in those countries lagging behind in education and is likely to inhibit opportunities for the creation of quality jobs. Conversely, countries like Ghana, Nigeria and Cabo Verde will be able to take full advantage of digital transformation, with education levels increasing significantly: with 42%, 55% and 29% of youth achieving tertiary education.

Given the high mobile penetration rate in the region, public policies should promote national digital skills development programmes, especially among disadvantaged groups. Digital transformation facilitates the integration of populations living in remote areas (including rural areas). However, SMEs in West Africa are slow to capitalise on this

opportunity. Many small enterprises operate in the informal sector and employ staff whose low level of human capital hinders the effective use of IT tools. Furthermore, the main barrier faced by African SMEs is the shortage of technical skills, given that employees are often unfamiliar with digital tools. In this context, public social policies should prioritise the development of digital skills among vulnerable populations to narrow the digital divide. More than 230 million jobs in sub-Saharan Africa will require digital skills by 2030, with Ghana alone likely to have 9 million digital jobs, which could potentially generate revenue of USD 4 billion by 2030 (IFC, 2019).

Figure 7.4. **Projections for youth educational attainment in West Africa, 2000–40**



Note: * are for projections. Owing to data availability, the figures reported are for the population aged 15-29.

Source: Authors' calculations based on data from the Wittgenstein Centre for Demography and Global Human Capital (database). Accessed from the website: http://dataexplorer.wittgensteincentre.org/wcde-v2/.

StatLink https://doi.org/10.1787/888934204118

Given the changing labour market, the digital transformation should be harnessed to update skills and reduce the skill mismatch. The high rate of unemployment among graduates is partly explained by the mismatch between skills and jobs, with graduate profiles rarely corresponding to what businesses are looking for in the labour market. In Côte d'Ivoire, for example, the mismatch rate is estimated at 75.87%, with the most common types being over-education (61.38%) and under-skilling (59.19%), in particular over-enrolment in arts and humanities (Kouakou and Yapo, 2019). Technology transfers suffer, as does the ability of countries to attract foreign direct investment (FDI) that could help restructure their economies. Public policies on education should make every effort to improve access to and the quality of secondary and tertiary education, especially in the technology streams (STEM), to develop the talent of tomorrow, ready for the fourth industrial revolution (4IR). Early awareness of the use of new ICT should be advocated in the digital age. An in-depth reform of teaching and learning systems should be planned, starting with the introduction of digital technology into training systems.

To reduce graduate unemployment, public authorities should develop mechanisms to facilitate the transition into the labour market, such as partnerships with the private sector and technical and vocational education and training programmes (TVET) (Table 7.5). The most effective way of matching supply with demand in the labour market is to strengthen the ties between general and vocational education, particularly at the secondary level. ICTs should be presented as tools for improving system governance, a learning objective, a pedagogical support tool and a vehicle for increased access to training and job creation. Structuring learning around ICTs provides the skills required to use production technologies. The ability to use business applications improves young

people's employability. Through ICT, new forms of training have emerged, such as distance learning – a significant lever for increased accessibility if well-designed educational material is built around this tool. Retraining and apprenticeships for unemployed young people must also be supported and public-private partnerships (PPPs) developed for the validation of the skills acquired. Countries such as Côte d'Ivoire have initiated reforms to enable schools and businesses to partner up to improve the quality of the technical and vocational education and training system. For this to be a success, it would be appropriate to revive career guidance services and, above all, to provide goal-oriented training that considers the structure of the economy.

Table 7.5. **Digital-skills-related TVET initiatives in West Africa**

Name	Short description	Country
Women in Digital Skills	Enables women in the informal sector to acquire computer skills in demand in the labour market to help them find a new job or start their own businesses. More than 200 volunteer mentors have trained over 5 800 women across eight regions of Ghana.	Ghana
Women's Technology Empowerment Centre (*W.TEC*)	Organises technology camps and mentoring and research activities, dedicated to women tech entrepreneurs. In 2019, W.TEC reached 27 000 girls and women, 86% of whom have pursued a career in STEM. A total of 1 800 women have started a business thanks to W.TEC support.	Nigeria
Sonatel Academy	A free TVET platform, launched in 2017, that aims to increase youth employment by providing digital skills training for six to seven months. Over the 2017-20 period, 350 students, 30% of whom were women, obtained medium to high-level qualifications.	Senegal
Orange and OpenClassrooms	A partnership to provide access to free training for unemployed people in Togo and Benin (among other African countries), through online courses via the mobile network and the creation of training centres for digital professions with a "guaranteed job" commitment.	Togo, Benin
Meltwater Entrepreneurial School of Technology (MEST)	Offers a 12-month full-time programme in which students – called "entrepreneurs-in-training" – take a higher education-level course in software development, business and communications.	Ghana, Nigeria, Côte d'Ivoire

Source: Authors' compilation.

Current regional strategies and priorities to harness digital transformation in West Africa

It is possible for West African countries to take full advantage of the benefits of digital transformation. To achieve this, the region must overcome major challenges including access to electricity, quality communications infrastructure, digital security risks, harmonising training systems and improving the legal and regulatory framework.

The monopolistic nature of the electricity sector hinders the advancement of digital solutions. An electricity supply is an essential prerequisite for the digital transformation of economies. In West Africa, the rate of access to electricity is 52% on average, with power outages that can reach 80 hours per month (World Bank, 2018). Moreover, electricity continues to be very expensive in the region and costs twice the global average. This leads to low domestic demand that is unable to attract investments in large projects that could achieve economies of scale. The region's countries are generally dependent on small, very expensive oil-fired power plants. A lack of planning means that countries are forced to rent power plants, which further increases bills. It is therefore essential that countries work together to provide more reliable access to electricity in West Africa (Cole et al., 2018). This is the objective of the West African Power Pool (WAPP), an ECOWAS institution that brings together all its member countries except Cabo Verde and 27 national electricity companies, which are working together to establish a single regional electricity market. Barriers to entry must also be removed to increase supply, reduce the current deficit and enable more innovative operators – particularly in renewable energies (solar, wind, etc.) – to offer cheaper, higher quality alternatives that emit less CO_2. The Akon Lighting project,

which has brought solar lighting to millions of people across several African countries, bears witness to the value of such measures (Ahouangansi, 2019). At the national level, some countries, such as Nigeria in 2013, have seen a marked increase in their level of electrification following the liberalisation of the electricity sector, making it possible to offer digital solutions in areas that were previously cut off.

To improve the capacity of countries in the region to capitalise on the digital transformation, massive investment in communications infrastructure will be required. Alper and Miktus (2019) estimate that the region will need to invest USD 3.1 billion to achieve full 4G coverage by 2025. However, between 2014 and 2018, only 5% of regional and national government infrastructure financing budgets was allocated to ICT development, i.e. USD 1.25 billion (ICA, 2018). Of the six countries in the region ranked by the Enabling Digitalization Index,[9] Senegal, Guinea and Liberia show huge gaps in connectivity, infrastructure and market size. Countries therefore need to overcome the infrastructure gaps that make access to the Internet and IT solutions expensive. For example, in Niger the average cost of a 128 kbps ADSL Internet connection is XOF 60 000, twice the average salary (Ahouangansi, 2019). Expanding the terrestrial wired infrastructure (backbone), including Internet exchange points, data centres and submarine cables, remains an important lever for closing the digital divide. Many projects are currently being implemented, such as: (i) the Priority Telecommunications Programme which seeks to roll out modern and reliable regional broadband infrastructure including the INTELCOM II Programme, alternative broadband infrastructure, submarine cables and the creation of a single liberalised telecommunications market; (ii) the project to modernise the information and communication infrastructure network, which has enabled Voice over Internet Protocol to be rolled out; (iii) the project to connect the global network to the 32 international links that have been installed to serve as a regional backbone supported by the development of a database management system (SIGTEL).

Promoting a regional approach to digital security could limit the risks and losses associated with ICT adoption. Progress has been achieved at the national level in recent years through the adoption of regulations in most countries. However, according to UNCTAD's Global Cyberlaw Tracker, which tracks the status of legislation in the areas of electronic transactions, consumer protection, data and privacy, and cybercrime prevention, only six countries in the region (Benin, Niger, Ghana, Côte d'Ivoire, Senegal and Gambia) have laws covering all of these areas (UNCTAD, 2020c). Taking a collective approach by, for example, organising inter-country consultations could help make such legislation more effective. In 2020, with the support of the European Union, ECOWAS adopted a joint digital security strategy to address the growing threat posed by digital security incidents and to enable the development of digital economies (ECOWAS, 2020).

A major remaining challenge to address is strengthening and harmonising training systems. According to the International Telecommunication Union (ITU, 2017), as a region Africa is last globally in terms of ICT skills level and below the global average. Therefore, strengthening human capital remains a priority if African countries are to harness the digital and productive technologies within their grasp. This underscores the relevance of improving education systems and research facilities in the region, as well as the teaching of mathematics, science and technology. Access to mobile phones can increase individual returns on education by facilitating communication through social networks (Aker et al., 2012) as well as learning during and after school. From this perspective, applying tax exemptions to smartphones and improving connectivity are of paramount importance. The region should also harmonise its education system, which differs from country to country. A harmonisation process is indeed under way in the WAEMU at the higher education level, through the Licence Master Doctorat (LMD) system, which is

achieving mixed results. ECOWAS, in partnership with the African Development Bank and the Government of Japan, took the positive step of commissioning a diagnostic study in April 2020 with a view to developing a coherent and holistic human capital strategy for West Africa.

The business environment and regulation also provide channels for the transmission of digital technologies. The aim here is to create the necessary conditions for trust and co-operation between stakeholders. In this respect, and building on the success of the Organization for the Harmonization of Business Law in Africa (OHADA), adopting the Pan-African Investment Code would be another positive step. ECOWAS has already adopted two protocols that directly concern foreign investment: one in 1984 on community enterprises and the other in 1979 on the free movement of persons, the right of residence and establishment. Given the dynamics of the integration programme in West Africa, this aspect could be accelerated and encourage massive investment in the region.

Notes

1. The 15 members of the Economic Community of West African States (ECOWAS) are Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo.
2. Although many SDGs indirectly relate to informality, it is only directly addressed by SDG 8 on access to decent work. Target 8.3 states: "Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalisation and growth of micro-, small- and medium-sized enterprises, including through access to financial services."
3. **West coast cables**: SAT3/SAFE (800 gigabit capacity), GLO-1 (2.5 terabits), ACE (5 terabits), MainOne (10 terabits), NCSCS (12.8 terabits), WACS (14.5 terabits), SAIL (32 terabits) and SACS (40 terabits). **East coast cables**: SEAS (320 gigabits), TEAMS (1.2 terabits), LION 2 (1.3 terabits), EASSy (10 terabits), SEACOM (12 terabits). **Cables in the Gulf of Aden**: Falcon (2.56 terabits), SEA-ME-WE 5 (24 terabits), AAE-1 (40 terabits), EIG (3.8 terabits). **Middle East and North Africa** (5.8 terabits).
4. The compound annual growth rate (CAGR) in finance measures the average annual growth rate over several years.
5. Fintech firms are small enterprises (start-ups and SMEs) that provide financial services using innovative solutions in a variety of areas: mobile payment, participatory financing, savings management, insurance and credit, online financial advice, decision aids using algorithms, and crowdfunding (World Bank, 2019b).
6. This IMF/World Bank roadmap, which takes the form of 12 proposals, guides their 189 member countries' domestic policy discussions on the benefits and risks of fintech. Above all, it seeks to reduce regulatory disputes and the risk of legal inconsistencies between the various member states.
7. A non-governmental organisation (NGO) based in Ghana has set itself the challenge of enabling institutions and private individuals who wish to do so to help survey their territory and register their land titles on a blockchain.
8. In May 2018, the Ghana Interbank Payment and Settlement Systems (GhIPSS), a wholly owned subsidiary of the Bank of Ghana, launched an interoperability platform, one of the first of its kind in Africa, to encourage the spread of mobile money services.
9. Measure of the number of people using the Internet as a percentage of the population, subscriptions to fixed and mobile telephone lines per 100 people, and the number of secure servers per 100 people.

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Chapter 8

Financing development in Africa

The chapter analyses the state of Africa's development financing in the face of the COVID-19 global crisis and highlights key policy areas to ensure its sustainability. The first section presents recent trends and dynamics of Africa's main sources of development finance before COVID-19 hit in 2020. The second section discusses the global economic impact of the coronavirus pandemic on domestic resource mobilisation and highlights the opportunities for digitalisation to improve Africa's tax revenues. The third section analyses the risks of declining external financial flows on African economies. It also identifies policy priorities to relaunch remittances, foreign direct investment and official development assistance to Africa. The last section examines both the urgent need for debt restructuring to free up critical development financing and reforms in debt management to ensure future debt sustainability.

IN BRIEF

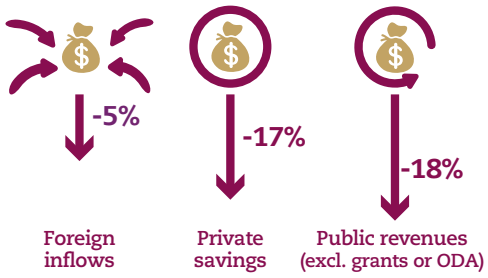
Africa's major sources of finance were decreasing before the COVID-19 health and economic crisis hit in 2020. Domestic financing, such as gross private savings and taxes, is the most important source of development finance in Africa and is likely to suffer due to the plunge in global and domestic economic activity. However, African governments can unlock the potential of digitalisation to mobilise domestic resources in the medium and long terms.

The global economic crisis is reducing Africa's external financial inflows. Lowering the cost of sending remittances is vital at a time when remittances are set to drop at an unprecedented rate. The global investment slowdown is affecting Africa's larger and less diversified economies, but policies can help capture new opportunities that arise from the reorganisation of global value chains. International co-operation is key to sustaining official development assistance flows and supporting recovery, particularly in low-income countries.

African governments urgently need debt restructuring, with private creditor participation, to free up resources for development financing and return to a growth trajectory. On average, African governments are spending more on debt servicing than on combatting the health and economic crisis. Reforms in debt and public finance management are necessary to maintain access to commercial credit and also to ensure long-term debt sustainability.

Financing development in Africa

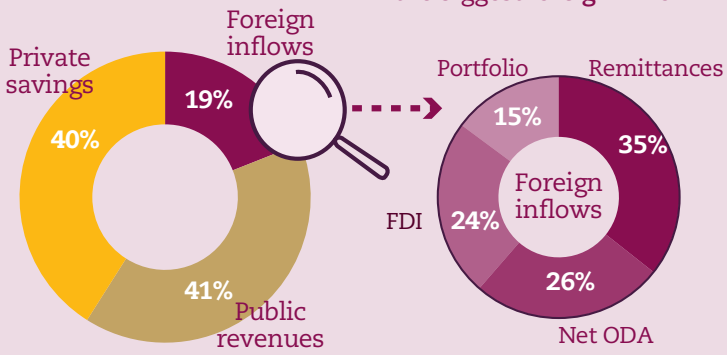
Financing per capita decreased from 2010 to 2018



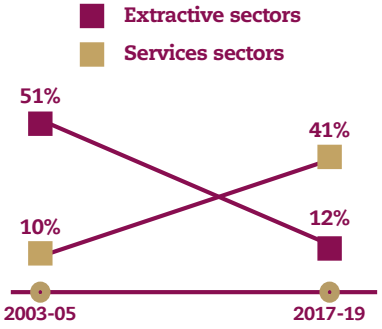
Africa had the **lowest public revenues per capita** in the developing world in 2018

Africa's finances (2014-18) were mostly **domestic...**

...while remittances were the biggest **foreign inflow**

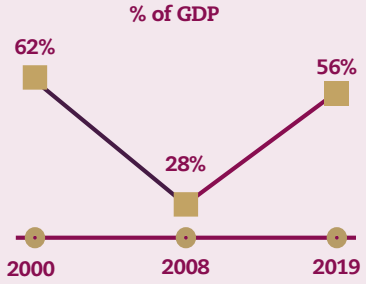


Foreign investments to Africa have shifted **from extractive sectors to services**



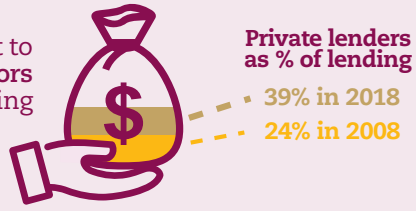
Sovereign debt

Africa's debt-to-GDP ratio has **doubled since 2008**



African governments **spend more on servicing debt** than on COVID-19

Africa's debt to **private creditors** is increasing



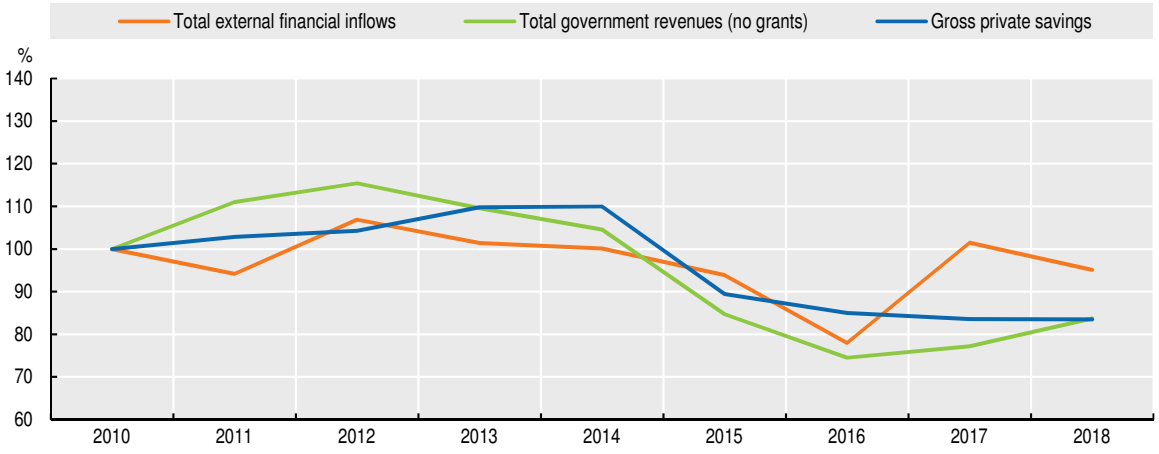
Indicators of financing development in Africa

Table 8.1. **Sources of finance for development in Africa**

Source of revenues	Financial flows by year									
	In billions of USD					As a percentage of GDP				
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
Inward foreign direct investment	53.9	56.9	46.5	41.4	45.9	2.1%	2.5%	2.1%	1.9%	2.0%
Portfolio investments	30.4	22.2	6.2	57.1	36.5	1.2%	1.0%	0.3%	2.6%	1.6%
Remittances	71.8	71.4	67.5	77.6	84.2	2.9%	3.2%	3.2%	3.6%	3.7%
Official development assistance (net total)	54.1	50.1	50.4	53.8	55.3	2.1%	2.2%	2.3%	2.4%	2.4%
Total foreign inflows	**210.1**	**200.5**	**170.5**	**229.8**	**221.8**	**8.4%**	**8.8%**	**7.9%**	**10.6%**	**9.7%**
Public revenues (no grants)	**524.7**	**438.2**	**394.2**	**425.9**	**483.6**	**20.7%**	**18.9%**	**18.0%**	**19.2%**	**20.7%**
Private savings	**507.0**	**419.6**	**408.2**	**415.6**	**427.8**	**20.4%**	**18.5%**	**19.1%**	**19.3%**	**18.9%**

Sources: Authors' calculations based on data from IMF (2020a), *World Economic Outlook* (database) www.imf.org/external/pubs/ft/weo/2020/01/weodata/index.aspx; OECD-DAC (2020a), *International Development Statistics* (database) www.oecd.org/dac/stats/idsonline.htm; OECD-DAC (2020b), *Country Programmable Aid* (database) www.oecd.org/dac/financing-sustainable-development/development-finance-standards/cpa.htm; UNCTAD (2020a), *World Investment Report 2020* and World Bank (2020a), *KNOMAD Remittances Data* (database) www.knomad.org/data/remittances.

Figure 8.1. **Real change in development financing per capita for Africa (2010 = 100)**



Sources: Authors' calculations based on data from IMF (2020a), *World Economic Outlook* (database) www.imf.org/external/pubs/ft/weo/2020/01/weodata/index.aspx; OECD-DAC (2020a), *International Development Statistics* (database) www.oecd.org/dac/stats/idsonline.htm; OECD-DAC (2020b), *Country Programmable Aid* (database) www.oecd.org/dac/financing-sustainable-development/development-finance-standards/cpa.htm; UNCTAD (2020a), *World Investment Report 2020* and World Bank (2020a), *KNOMAD Remittances Data* (database) www.knomad.org/data/remittances.

StatLink https://doi.org/10.1787/888934204137

African finances were already weakening before the health and economic crisis of 2020

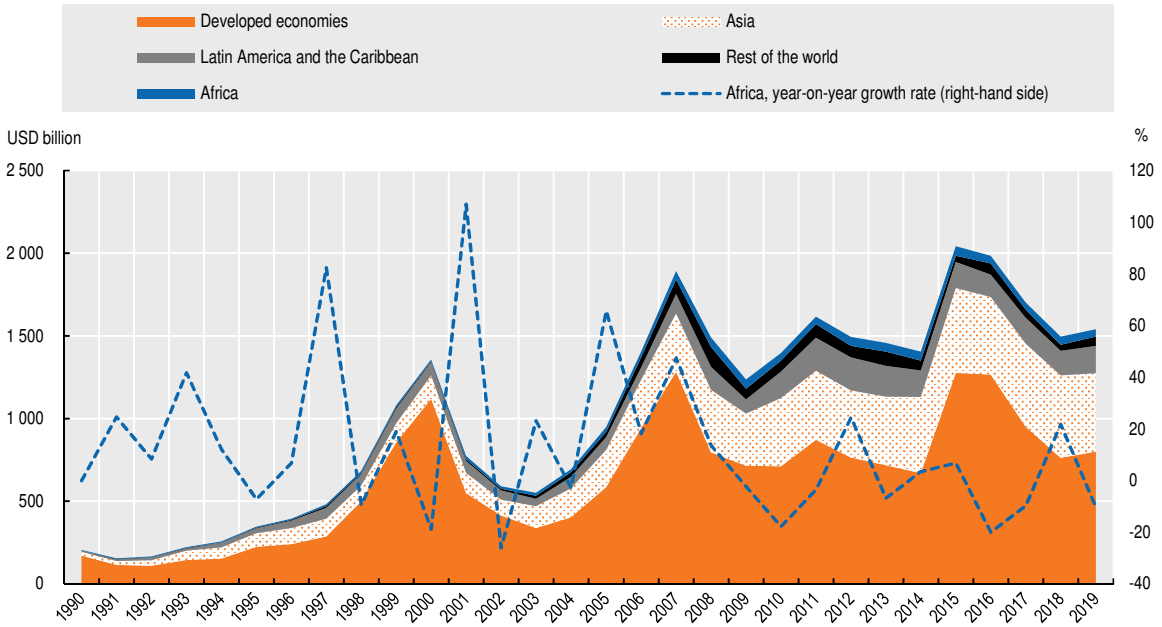
The financial resources available per capita for development in Africa have dropped since 2010 (Figure 8.1). The amount of financing per capita decreased during the period 2010-18 for both domestic revenues and external financial flows, by 18% and 5% respectively. Since 2016, when commodity prices dropped sharply and financing hit its lowest point, domestic revenues have remained stagnant, and only external inflows have recovered to previous levels. In 2018, African governments averaged revenues of USD 384 per capita, compared with USD 2 226 for Latin American and Caribbean countries, USD 1 314 for developing countries in Asia and over USD 15 000 for European and other high-income countries. Not only do Africans have fewer sources of financing, but these

sources are also volatile, often due to the dependence of many African economies on global commodity markets and external financial inflows.

Remittances have become the largest and most stable source of external financial flows to Africa. This money sent home by the African diaspora has increased almost every year since 2010, from USD 54.9 billion in 2010 to 84.2 billion in 2018. Egypt and Nigeria accounted for 60% of Africa's remittance inflows in 2019, while remittances as a share of gross domestic product (GDP) exceeded 5% in 15 countries. Remittances have often been counter-cyclical, playing a vital role in risk-mitigating and helping provide food security and other immediate livelihood needs to African households for which they served as a key source of income. According to the Afrobarometer (2019), about 22% of surveyed households in Africa declare being at least "a little bit" dependant on remittances from relatives or friends living in other countries. Remittances also serve as a macro-economic stabiliser, accounting for a significant fraction of foreign exchange in many African countries.

Before 2020, Africa was attracting increasing amounts of foreign direct investment (FDI), although overall FDI inflows remained much lower than in other world regions. Between 2000 and 2019, FDI flows to Africa increased fourfold, with a compound annual growth rate of 8.5%. This was due to growing demand for certain commodities, as well as sustained investments in services. In 2019, Africa received USD 45.4 billion of FDI flows. However, these amounts remained too small by international comparison. In 2017-19, Africa attracted only 2.9% of global FDI flows, compared to Asia (31.1%) and Latin America and the Caribbean (LAC) (9.9%) (Figure 8.2).

Figure 8.2. **Global foreign direct investment inflows by world region, 1990-2019 (USD billion)**



Source: Authors' calculations based on UNCTAD (2020a), *World Investment Report 2020*, Statistical annex tables, https://unctad.org/en/Pages/DIAE/World%20Investment%20Report/Annex-Tables.aspx.

StatLink https://doi.org/10.1787/888934204156

Official development assistance (ODA) to Africa has increased in recent years but has not met international commitments. ODA inflows to Africa saw massive spikes in the early 2000s through the Heavily Indebted Poor Countries

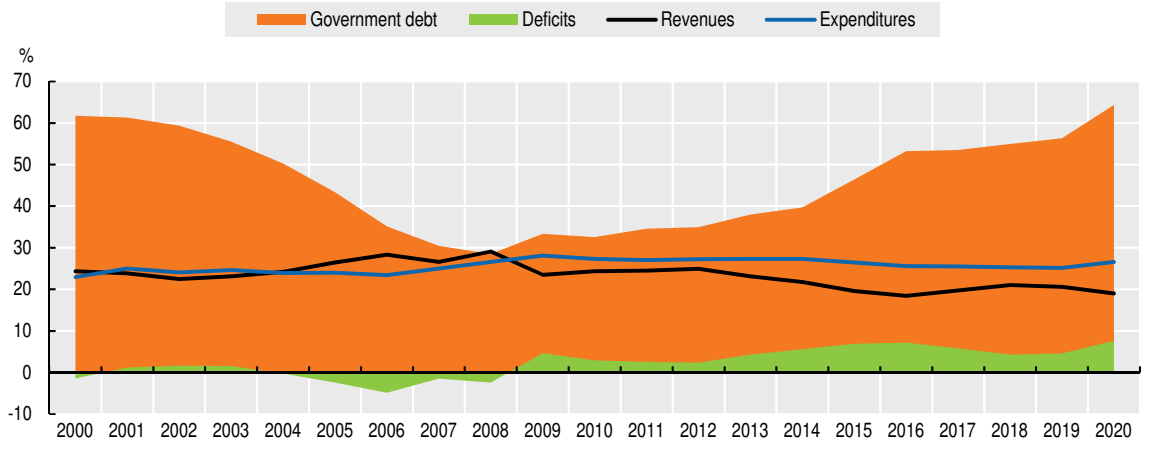
(HIPC) initiative and stabilised at around USD 53 billion per year between 2014 and 2018. With the growing African population, however, ODA inflows per capita dropped from USD 52 in 2013 to USD 44 in 2018. In addition, most donors of the OECD Development Assistance Committee (DAC), with the exception of Denmark, Luxembourg, Norway, Sweden and the United Kingdom (UK), failed to match the collective ambition of 0.7% ODA to gross national income (GNI) set by the 2030 Agenda for Sustainable Development and reiterated in the 2015 Addis Ababa Action Agenda (OECD, 2020a).

Africa is facing the COVID-19 pandemic with a limited fiscal space

Going into 2020, African governments had increased their debt level to the highest since 2002. In 2008, Africa's sovereign debt, public debt and debt publicly guaranteed by national governments reached a low of 28% of GDP, after declining in the early 2000s due to a combination of high GDP growth, debt relief and restraint on borrowing. By 2019, the sovereign debt had doubled to 56% of GDP, following a period in which total general government debt nearly tripled. Thus, in 2019, the total African debt as a percentage of Africa's GDP approached that of 2000 (Figure 8.3). Today, annual revenues, which before 2008 exceeded expenditures, now regularly fall short of them.

The increased debt level since 2008 reflects both greater confidence in African economies and favourable global conditions. Africa's sovereign debt markets gained the confidence of investors thanks to their relatively high yields, improved macroeconomic management and larger fiscal space following the HIPC Initiative. At the same time, global conditions for international bond issuances have been positive: there has been a strong demand from investors and a lower gap in perceived risks between emerging and developed markets, indicating their "search for yield" (Calderón and Zeufack, 2020). The acceleration in debt accumulation since 2015 reflects this favourable context for borrowers, as well as the growing fiscal deficit in oil-rich countries due to the sustained low prices for hydrocarbons. Total expenditures in oil-rich countries exceeded revenues by 8.7 percentage points of GDP in 2016, a reversal of ten years earlier when revenues exceeded expenditures by 13 percentage points of GDP.

Figure 8.3. **African total general government debt, deficits, revenues and expenditures as a percentage of gross domestic product, 2000-20**



Source: Authors' calculations based on data from IMF (2020a), *World Economic Outlook* (database), www.imf.org/external/pubs/ft/weo/2020/01/weodata/index.aspx.

StatLink https://doi.org/10.1787/888934204175

A number of middle-income African countries issued debts denominated in a foreign currency. The total amount of foreign currency-denominated debt nearly doubled between 2008 and 2018, from 11% of GDP to 20%, introducing new risks. Over the past few years, Eurobonds have risen in importance in Africa, surpassing USD 100 billion in value in 2019 after increasing by USD 27.1 billion in the previous year. Some countries are borrowing syndicated loans. However, borrowing in foreign currency debts places the exchange rate risks with the debtor countries – which requires sound monetary and fiscal policy frameworks to prevent the feedback loop between currency devaluations and capital outflows during a financial downturn.

Several African countries were already having difficulty in meeting their debt commitments prior to the COVID-19 crisis. As of 30 November 2019, according to the International Monetary Fund (IMF), 8 African countries were in debt distress, and 11 were at high risk of being in debt distress. In March 2020, after South Africa's credit rating was downgraded at the end of 2019, only Botswana, Mauritius and Morocco had investment-grade credit ratings (Reuters, 2020). African governments have also been drawing from their reserve assets, which dropped from a high of 22% of GDP in 2009 to 14% in 2018.

African countries are mobilising fewer domestic resources, yet the digital transformation accelerated by COVID-19 offers new opportunities to increase tax revenues

Domestic resource mobilisation is likely to suffer due to less economic activity and lower commodity prices

The COVID-19 pandemic has been highly disruptive to domestic tax revenues in Africa since the beginning of 2020. According to the IMF (2020b), tax revenues in 22 sub-Saharan African countries are projected to decrease on average by 1.3 percentage points of GDP, or 10%, between 2019 and 2020. By comparison, between 2007 and 2010 due to the global financial crisis, the average tax-to-GDP ratio dropped by 0.8 percentage points, or 5%, in the 26 African countries where data is available (OECD, 2020b).

The plunge in domestic economic activity and international trade and the halt on tourism are suppressing major sources of tax revenues for the majority of African countries. In June 2020, the IMF (2020c) forecast that real GDP will contract by 3.2% in sub-Saharan Africa in 2020. Global trade is projected to drop between 12.9% and 31.9%, according to the World Trade Organization (WTO, 2020), and thus reduce customs and import duties for African governments, which accounted for 10.7% of public revenues in 2018. The International Air Transport Association (IATA, 2020) estimates that Africa's air transport industry normally contributes USD 55.8 billion to the economy, or 2.6% of the continent's GDP, supporting 6.2 million jobs. However, in the first three months of 2020, African airlines lost USD 4.4 billion in revenue due to reduced international flights and tourism.

The crisis is also having an impact on non-tax revenues by lowering demand for commodities, which translates into lower rents for resource-exporting countries. In a continent where oil rents were 4.5% of GDP in 2017, the oil price shock in the first half of 2020 is affecting the fiscal position of oil exporters. The United Nations Economic Commission for Africa estimates the losses linked to the collapse of oil prices at USD 65 billion for Africa as a whole (UNECA, 2020a). The previous time when commodity prices fell so quickly, in 2014 and 2015, 26 African countries recorded a decrease in their non-tax revenues equivalent to an average of 1.4 percentage points of GDP (OECD/ATAF/AUC, 2019). While lower prices for oil can be positive for net oil-importing African countries by reducing the import bill, these countries are harmed by lower prices on other commodities, and the overall global economic plunge.

African governments also actively deployed fiscal measures to encourage economic recovery at the expense of lower public revenues and higher spending. The OECD Centre for Tax Policy and Administration tracked 58 short-term fiscal policy measures in response to COVID-19 in 13 African countries, nearly all of them involving policies such as decreases in tax rates or delayed tax payments (see Table 8.2). However, due to the uncertainty around the depth and persistence of the COVID-19-related economic downturn, there is a high risk that both the amount of tax forgone and the cost of COVID-19 expenditures to African public finances will be higher than anticipated.

Table 8.2. **Numbers of tax-related policy measures in response to the COVID-19 pandemic, 2020**

Tax policy measures	March	April	May
Change in value-added tax rate	1	0	0
Tax waiver	1	0	1
Personal income tax rate reduction	1	0	0
Corporate income tax rate reduction	2	0	0
Tax payment deferral	4	7	6
Tax filing extension	0	1	0
Tax filing extension combined with tax payment deferral	0	1	0
More flexible tax debt repayments	1	2	0
Enhanced or extended eligibility for unemployment benefits	0	1	0
Enhanced tax refunds	2	1	0
Cash transfers for households	1	2	0
Wage subsidy paid to employers	2	1	0
Loan or guarantee scheme	0	1	0
Other	6	8	5
Total measures	21	25	12

Source: OECD-CTP (2020), *Overview of Country Tax Policy Measures in Response to COVID-19 Crisis* (database), www.oecd.org/tax/covid-19-tax-policy-and-other-measures.xlsm.

The COVID-19 pandemic is disrupting private savings in Africa. In the short run, existing evidence suggests that the decreases in African incomes will be severe enough to force Africans to dip into their savings (Jordà, Singh and Taylor, 2020). In April 2020, the IMF forecast that total national savings for African countries would drop 17.8% between 2019 and 2020, after having previously forecast an increase of 7.7%. In the longer run, however, exogenous shocks such as this pandemic could increase household savings due to precautionary savings behaviour.

Box 8.1. **The African Union's leadership in combatting illicit financial flows in Africa**

Illicit financial flows (IFFs) continue to drain large amounts of financial resources from the continent, with severe impacts on Africa's development agenda. As a result, Africa is unable to recover or repatriate assets consigned to foreign jurisdictions.

The Africa Union (AU) has played an important role in the fight against financial corruption and stem IFFs from Africa. For example, it adopted (i) the recommendations of the *Report of the High-Level Panel on Illicit Financial Flows*, (ii) the outcomes of its 2018 theme "Winning the Fight Against Corruption – A Sustainable Path to Africa's Transformation" and (iii) the Nouakchott Declaration on Anti-Corruption taken at the 31st Ordinary Session of the African Union, 1-2 July 2018 (African Union, 2018). In February 2020, the African Union Advisory Board on Corruption and other partners developed the Common African Position on Asset Recovery to tackle internal and external obstacles to recovering stolen assets.

Box 8.1. **The African Union's leadership in combatting illicit financial flows in Africa** *(continued)*

With contributions from member states and other international actors such as the OECD Development Centre and the IMF, the African Union Commission (AUC) published a report on domestic resource mobilisation and the fight against IFFs and corruption (AUC, 2019). The report provides recommendations for a continental strategy, with guidelines for developing and enhancing national strategies. The AUC also works closely with the African Tax Administration Forum (ATAF) in building and strengthening the capacities of AU member states, especially in the area of reforming tax policies, digitalising the tax systems and exchanging information for tax purposes.

Furthermore, the AUC produces an annual publication with the Global Forum for Tax Transparency to combat corruption, tax evasion, money laundering, fraud, and illicit enrichment. The 2020 edition of "Tax Transparency in Africa" shows that progress has been made through the exchange of cross-border information via bilateral relationships between African countries. The number of these relationships has expanded to 3 263, compared to 2 523 in 2018. This increase has translated into significant additional tax revenues for countries. More African countries can now use the cross-border exchange of information in their tax investigations.

African governments can improve tax revenues by adapting to the digital transformation

The digital transformation has accelerated during the pandemic, offering new opportunities to mobilise public revenues in Africa in the medium and long terms. Chapter 1 provides an in-depth discussion on the various ways that digitalisation is improving the resilience of countries. Digital technologies both allow for social distancing, limiting the spread of COVID-19, and permit some workers to remain productive and to bank online, reducing the economic costs of containment. Many young and entrepreneurial Africans are ready to adopt opportunities arising from the digital transformation. Digitalisation is changing African tax bases and changing how taxes are collected and administered. However, taxing the profits of the digital economy is more challenging than taxing digital consumption and requires international co-operation.

Digitalisation is changing African tax bases and tax collection

Digitalisation offers both opportunities and challenges for public finances in Africa. The opportunities are most obvious in tax administration, where digitalisation can potentially improve both compliance and enforcement as well as reduce burdens. Digitalisation can also increase transparency and accountability of the tax system, which can help build trust in the system and hence compliance. At the same time, there are a number of challenges related to tax policy. Governments need to adapt their tax bases to economies where an increasing number of goods and services are bought and/or consumed virtually and where companies no longer have to be physically present in a country to be part of the local market.

Addressing these opportunities and challenges will require a combination of responses at both the domestic and international levels. Taxes are largely a domestic matter, and putting in place effective domestic laws and capacity will remain a cornerstone of taxation in the digital age. The laws must also promote human rights, including the freedom of speech, in line with the African Charter on Human and Peoples' Rights. The international

dimension of taxes will increase, however; in tax administration, sharing experiences and best practices can help ensure that the gains of digitalisation are realised quickly. International co-operation is vital in tax policy to efficiently tax highly digitalised companies.

Rapidly expanding e-commerce is a significant potential base for value added taxes (VAT). VAT is the largest single source of tax revenue in Africa, providing 29.4% of revenues in 2017 (OECD/ATAF/AUC, 2019). Effective VAT collection on e-commerce will be important to ensuring the competitiveness of the VAT system and the sustainability of VAT revenues. The African e-commerce market is already worth USD 27 billion and is expected to grow by over 14% a year, to reach USD 47 billion by 2024 (Statista, 2020). While much of this will be new consumption from Africa's growing middle class, there will also be a shift from physical commerce to e-commerce as seen elsewhere in the world. Collecting VAT on online sales is therefore important to generate revenues from the new activity and to preserve revenues from current activity that will move online in the future. African countries can learn from recent international experiences on tax collection on e-commerce to compensate for lost VAT revenues.

There are a number of challenges to securing VAT on e-commerce, especially when the supplier is based in another jurisdiction. Traditional VAT rules make it difficult and complex to organise, administer and enforce VAT on online sales of digital products and services (e.g. applications, on-demand television), particularly to private consumers from suppliers abroad. In many countries, the laws and procedures are not in place to collect VAT on sales made by suppliers that are not physically present in the consumer's country. The volume of imports of low-value goods purchased online continues to rise. This presents VAT collection challenges under the traditional customs procedures and can lead to considerable VAT revenue losses. It can also create unfair competitive pressure on domestic businesses that are required to charge VAT on their sales, while low-value imports are often exempt from VAT. In addition, higher value items are vulnerable to fraudulent undervaluation and miscategorisation by foreign suppliers.

Internationally agreed OECD standards provide examples of solutions for African countries for the effective collection of VAT on e-commerce. The OECD Global Forum on VAT (comprising over 100 countries) has developed standards to address the VAT challenges linked to the digitalisation of the economy; they have been implemented or are being implemented worldwide (OECD, 2019a; OECD, 2017a).[1] South Africa is one of over 50 countries that have implemented the standards on cross-border supplies of digital services, raising significant revenues (South Africa raised over ZAR 5 billion – approximately USD 276 million – between June 2014 and September 2019). Recognising that online marketplace platforms facilitate a large proportion of online sales, the OECD recommends involving them in the VAT collection process. African countries can benefit from others' experiences in implementing these standards. Most of the major platforms (responsible for the majority of online sales) have already developed systems and processes to comply with the standards.

The digital economy in Africa demands new tax policies and international co-operation

Taxing the profits of the digital economy is complex and requires international co-operation. As the global economy has become digitalised, some people have raised concerns that the traditional rules do not adequately reflect substance and value-creation. These rules base taxing rights on physical presence in a jurisdiction and allocate profits according to the "arm's length principle". Highly digitalised businesses that can operate remotely and those which rely heavily on interactions with markets or with users and their data are therefore not affected by traditional rules. Addressing these concerns will

require significant changes to the existing approach to taxing multinational enterprises. International agreements will be necessary to avoid a proliferation of unilateral measures that would inevitably lead to an increase in disputes, double taxation and a lack of certainty for businesses.

The Inclusive Framework on Base Erosion and Profit Shifting (BEPS) is bringing together over 135 countries and jurisdictions, including 23 African countries, to develop solutions on taxing the digitalising economy. Negotiations, with all members on an equal footing, are ongoing in 2020. These negotiations focus on two pillars. The first would create a new taxing right for market jurisdictions, while simplifying the taxation of the profits from certain routine functions of multinational enterprises (OECD, 2020c). The second pillar would ensure the profits on multinational enterprises are subject to a minimum rate of tax to reduce the incentive for companies to adopt aggressive tax avoidance strategies. Both of these pillars offer potential gains for Africa. While the impacts are difficult to predict accurately before the exact policies are known, early estimates suggest that, in relative terms, low-income countries would benefit from both pillars (OECD, 2020d).

Some African countries are experimenting with other approaches to taxing key parts of the digital economy. For instance, as mobile money and mobile communications have expanded dramatically in Africa, a number of countries have proposed or implemented specific taxes to attempt to capture some of the value. Examples include taxes on mobile money transactions and on the use of specific Internet communication applications. On average, sub-Saharan Africa has the highest sector-specific taxes and fees in the mobile telecoms sector (ODI, 2020). Some of these taxes have been controversial. Taxes on mobile money have been accused of slowing progress on financial inclusion, and taxes on Internet communication have been suspected of being a cover for restrictions on free speech (Brookings, 2019; Ratcliffe and Samuel, 2019). Moreover, these taxes often end up falling on consumers, rather than digital companies, which can make them politically unpopular and prevent them from achieving their stated policy objectives.

African countries will have to balance the trade-offs in tax policy between raising revenues for short-term benefits and encouraging faster and broader digitalisation for longer-term benefits. African governments will need to tax the digital economy for several reasons: (i) from a financial perspective, to mobilise much needed domestic resources, as an ever-increasing part of the economy becomes digitalised; (ii) from an equity perspective, to ensure a level playing field between businesses; and (iii) from a political perspective, to respond to citizens' questions over foreign companies making profits from their personal data. However, governments need to carefully consider how to impose taxes so as not to negatively affect consumers, particularly the poorest, or to risk impeding innovation or the spread of the benefits of digitalisation. While these trade-offs are universal, they could be more keenly felt in Africa. It will be important to identify the new sectors of the digital economy where the highest profits are being made, competition being distorted, or loopholes in the existing tax system are being exploited and to target these. Continued engagement at the international level can help African countries both learn from others and ensure that new international standards reflect the needs of African countries.

Digital technologies are bringing improvements to tax collection and administration

While digitalisation poses a number of challenges to tax policy, it offers significant opportunities in tax administration. Many tax administrations are increasing their efficiency and effectiveness by moving to e-administration and using new technology tools both to enhance compliance and to reduce burdens for taxpayers by improving services (OECD, 2019b) The new digital options and the availability of off-the-shelf software can offer African countries opportunities to make swift gains.

Some African countries are making significant advances in digitalising their tax administrations, though many others have yet to realise the full benefits. Online return filing is fast becoming the norm in countries across the globe, including in some African countries. For the 2017 fiscal year, the International Survey on Revenue Administration showed six African countries reporting online filing rates of 70% and above for corporate income tax and VAT and five reporting online filing rates above 50% for personal income tax.[2] The data indicated that most African countries had some provision for e-filing but that around 25% had none. More broadly, most African countries have yet to make full use of digital tools to help with tax compliance, with only half providing online tools and calculators and 20% offering mobile applications (OECD, 2019b).

A number of challenges can prevent African governments from making the most of the digital transformation in tax administration. These include the reliability of the Internet, the availability of resources for investing in information and communications technology (ICT) in tax administration, and taxpayers' understanding of and access to e-services (especially in rural areas with skills shortages) (Wilton Park, 2017). Providing access to reliable Internet connections requires a broad response, while other challenges ultimately relate to strategy and the management of digitalisation.

Peer learning across tax administrations can help address some of these challenges. Learning from other countries' successes and failures can provide valuable assistance in areas such as matching digital solutions to the digital maturity of taxpayers, ensuring budgets are set for the medium term, providing for technology maintenance and upgrades, and undertaking cost-benefit analyses to determine whether to develop solutions in-house or to outsource tax software development. The ATAF provides a regional network for 38 African tax administrations, offering training, guidance and research on all aspects of tax administration, including digitalisation. African countries can also learn from countries on other continents that have already digitalised, to help increase the speed and effectiveness of digitalising their own tax administrations.

Public policies and international co-operation can help mitigate the expected drop in external financial inflows due to COVID-19

Reducing the cost of sending remittances is vital at a time when remittances inflows to Africa are set to plunge

Remittances to Africa may not prove as resilient during the COVID-19 crisis as in past crises. Africans who work on other continents have been particularly vulnerable to a loss of income. Due to the confinement policies related to COVID-19 (Guermond and Kavita, 2020; Morris, 2020), income available for remittances has been limited. For example, 36% of remittances to Africa in 2017 came from the European Union, where many countries were locked down for part of 2020. Furthermore, North Africa receives a large share of remittances from the Middle East, which was severely hit by the slump in oil prices. The World Bank (2020b) expects remittances inflows to sub-Saharan Africa to drop by 23.1%, to USD 37 billion, in 2020 – the lowest level since 2016.

Reducing the costs of sending remittances will be crucial both during the COVID crisis and after it. In the first quarter of 2020, sending a remittance of USD 200 to sub-Saharan Africa cost on average 8.9% of the remittance amount, compared to 5% for South Asia and 6% for LAC. For some intra-African corridors, the transaction cost was 20%, the highest in the world (World Bank, 2020b). By contrast, Sustainable Development Goal 10.c calls for reducing remittance costs to below 3% and eliminating remittance corridors with costs above 5%. Reducing the costs could increase remittance flows to recipient countries and

save around USD 14 billion a year (Ratha et al., 2016). The World Bank estimates that, in the next decade, the amount of money that Africa's diaspora sends home could grow to USD 200 billion a year, if remittance costs decrease.

Greater competition between money transfer operators (MTOs) could reduce remittance costs. Three MTOs – MoneyGram, Ria and Western Union – make up 25% of the global market and much more of some bilateral remittance flows (IFAD, 2017). Regulators can increase market competition by discouraging exclusivity conditions and promoting fair and equitable access to the market infrastructure. Likewise, non-discriminatory access for MTOs to infrastructure for payment systems, as well as to mobile network platforms, can improve the efficiency of money transfers and result in better quality services available to consumers (World Bank, 2018). After Ghana and Morocco encouraged banks, foreign exchange markets and post offices to partner with more than one MTO, remittance costs declined, and consumers in both the sending and receiving countries benefited from increased service options.

New digital technologies, such as mobile money and blockchain, are lowering the costs of sending remittances. According to the World Bank, digitalised transactions had already reduced the global average cost of sending remittances to 3.3%, and the GSMA expects the average cost to reach as low as 1.7% thanks to mobile money (World Bank, 2020c; GSMA, 2018). Numerous financial technology (fintech) models now provide remittance services on the continent. In Ghana, Zeepay aims to reach more than 150 million mobile money users across 20 African countries and recently began collaborating with MoneyGram. In Nigeria, Sure Remit charges 0-2% for non-cash remittances. In place of cash, recipients are given blockchain-based tokens. These can be used for a variety of purposes, such as to purchase and send vouchers, acquire airtime, pay bills and buy groceries.

Channelling remittances towards longer-term productive investments is also essential. As remittances come from individual savings, the recipients tend to use the money more for household consumption than to invest it. But remittances could become a source of capital for small and home-based businesses or serve as seed money for start-ups, if African governments create policies that encourage African diaspora to support them. Evidence from a 2017 OECD survey shows that remittance recipients in Côte d'Ivoire and Morocco were significantly more likely to invest in agricultural assets and to own an off-farm business (OECD, 2017b). In Senegal, the probability of a household having a loan increased by 11.8 percentage points when it received remittances (Mbaye, 2015). Increasing financial literacy and entrepreneurial skills, especially for women in communities with high emigration rates, will be important to ensure that these remittances can be used in the most efficient way. In Morocco, for instance, 42% of households receiving remittances are female-headed compared to 12% for non-recipient households (OECD, 2017b).

Diaspora bonds can create a pool of funds to finance major projects, but their issuance requires careful design to attract investors. Since 2000, only five countries – Ethiopia, Ghana, Kenya, Nigeria and Rwanda – representing 12% of total African migrants, have issued diaspora bonds, i.e. bonds specifically targeting untapped savings from their diaspora, with mostly disappointing results.[3] Going forward, the persistently low interest rates in high-income markets could increase the attractiveness of such products. To successfully issue diaspora bonds requires careful planning, regulatory approval in key high-income jurisdictions where large migrant populations live and competitive pricing. Following these principles, Nigeria managed to raise USD 300 million in 2017 to finance a range of infrastructure projects. Investor's confidence in Nigeria's economy and the innovative structure of its five-year bond, which targeted both diaspora and non-diaspora investors, led to its oversubscription, by 130%, despite a low interest rate of 5.6%. To encourage African diaspora to purchase the bond, the government designed it as

a retail instrument denominated in United States (US) dollars to avoid concerns related to exchange rate risks. Nigeria also registered the bond in the UK and US jurisdictions (Rustomjee, 2018). International institutions could support African countries' issuance of diaspora bonds by helping to assess diaspora savings and investment potential and developing new risk-mitigating instruments (Rustomjee, 2018).

The global investment slowdown is affecting Africa's economies, but the reorganisation of value chains offers new opportunities

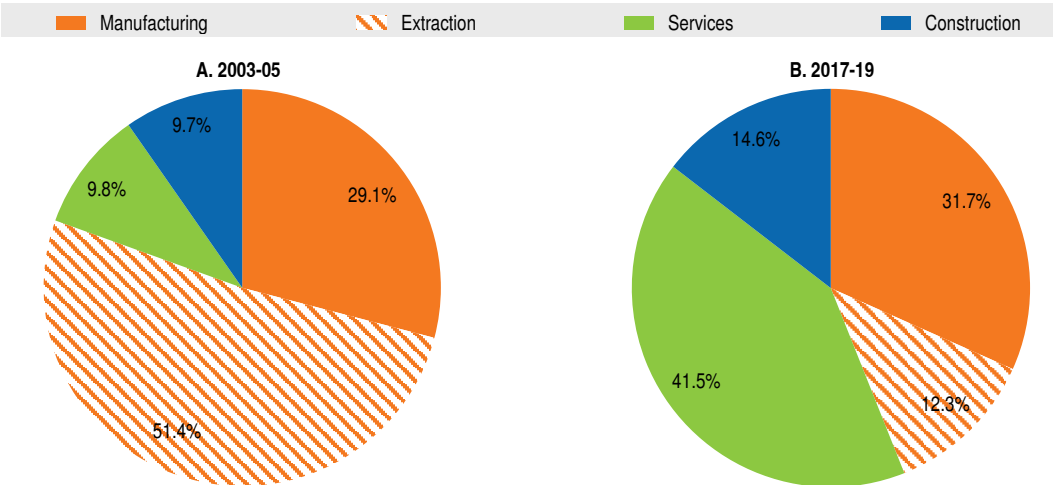
Africa's least diversified economies will be hit the hardest by the global investment slowdown caused by COVID-19

The decline in global FDI flows due to the COVID-19 pandemic will have the most adverse effects on Africa's least diversified economies. FDI flows to Africa are expected to drop by 25% to 40% in 2020 due to the COVID-19 global crisis. A similar decline is projected in Asia, while investment flows to Latin America and the Caribbean are expected to halve in 2020 (UNCTAD, 2020b). The three largest African economies (Egypt, Nigeria and South Africa) were among Africa's top five recipients of FDI in 2017-19, at 18%, 10% and 9% respectively. A low sectoral diversification of FDI exposes countries to declining investment flows. For example, in Egypt, FDI flows registered the largest drop in Africa[4] between 2007 and 2009, during the global financial crisis (UNCTAD, 2020a). On the other hand, FDI in South Africa is more diversified than in Egypt, with about two-thirds in manufacturing and services (e.g. finance and transportation services) at the end of 2018, and could thus rebound more quickly from the downturn caused by COVID-19 (South African Reserve Bank, 2020). The Republic of the Congo and Mozambique depend on FDI for more than 20% of their GDPs[5] mainly invested in oil and mining and are thus among the most vulnerable African countries to a sharp decline in oil prices and a prolonged halt on investment activity.

Investment support and trade facilitation policies can help mitigate the investment slowdown brought about by the 2020 global recession. Priorities for the short term should be mitigating supply chain disruptions with financial or fiscal support for domestic suppliers, ensuring investment aftercare that supports existing investors during the crisis and facilitating industrial reconversions.[6] Trade facilitation policies are also important because foreign companies could be affected by export bans that many countries adopt for public health and national security reasons. The Southern African Development Community has proposed a number of trade facilitation initiatives, including prioritising the clearance and transportation of essential goods and services, automating the submission and approval of trade documents, and accelerating the use of online platforms for the submission of applications, renewals for licences, etc. (World Bank, 2020c).

FDI in Africa is shifting from the extractive sector to services, while the share in manufacturing generally has remained stable. FDI in the extractive sectors decreased from 51.4% in 2003-05 to 12.3% in 2017-19. It increased in the services sectors from 9.8% to 41.5% over the same period (Figure 8.4). In recent years, the emergence of new technologies and the booming domestic consumption markets attracted new market-seeking FDI in Africa in retail, ICT, financial services and other consumer services. An increasing numbers of investors wished to gain proximity to growing African markets and to relocate their activities to increase efficiency in these sectors. In contrast, investment in manufacturing failed to take off, mainly due to high tariffs and costs of doing business and production as well as insufficient business infrastructure (UNCTAD, 2016a). A noteworthy exception remains Ethiopia, where FDI has been increasingly concentrated in manufacturing sectors, such as textiles, largely due to investment attracted by the country's industrial parks (EIC, 2019).

Figure 8.4. **Foreign direct investment capital expenditures in Africa by economic activity**



Note: Percentage of total FDI capital expenditures; average over the period.
Source: Authors' calculations based on FDI Markets (2020), *fDi Markets* (database), www.fdimarkets.com.
StatLink https://doi.org/10.1787/888934204194

New investment opportunities could arise from the reorganisation of global value chains

Multinational enterprises are likely to adjust the geographic and sectoral allocation of their foreign operations following the COVID-19 pandemic. The COVID-19 crisis has pushed companies to give more consideration to resilience with respect to global and local shocks (e.g. pandemics, climate change) in their decisions about production locations (Seric et al., 2020). In a recent World Economic Forum survey of senior supply executives of global multinational enterprises across all industries, "increasing visibility", "improving risk assessments" and "increasing flexibility to a changing demand" were consistently ranked as the top three priorities once the crisis is over (WEF, 2020). Meanwhile, leading government politicians in advanced economies have called for companies to consider moving certain production activities in key sectors back to home countries.[7]

African economies could benefit from attracting new FDI following the reorganisation of global value chain structures. Coming out of the supply shock induced by the coronavirus, some multinational enterprises may wish to diversify their global supplier networks to increase resilience to location-specific shocks. At the same time, the reorganisation of global production networks, induced by the COVID-19 pandemic, could lead multinationals to shorten supply chains in developing economies, adversely affecting the industrialisation of least developed countries. The creation of a single African market, cost competitiveness and a growing working-age population could potentially make Africa an attractive investment destination for multinationals looking to diversify away from China-centric production chains (Paterson, 2020). However, local suppliers in Africa will need support to upgrade their productivity and capability in order to make meaningful linkages with the lead multinationals and facilitate the transfer of technology.

The growing momentum in the health and fintech sectors could make Africa more appealing to FDI. Africa relies on external suppliers for more than 90% of its medications. Manufacturing pharmaceuticals locally and improving healthcare could attract new market-seeking foreign investors who may be more likely to integrate into domestic economies. For example, in Senegal, DiaTropix is rapidly developing COVID-19 diagnostic kits with the support of a UK firm (Mologic); their joint manufacturing process could be

scaled up to meet demand from the entire continent (UNCTAD, 2020c). Africa's e-commerce giant, Jumia, declared a surge in the demand for medical supplies due to COVID-19 restrictions and has offered for African governments to use its last-mile delivery network for distribution to healthcare facilities and workers (Bright, 2020). The health crisis is likely to accelerate the trend to invest in fintech as more people stay at home and manage their finances digitally (African Business, 2020).

Implementing complementary policies can help to guide post-COVID foreign direct investment towards development goals

African governments, development partners and multinationals can co-ordinate an investment policy response to the crisis. The response should focus on the most strategic sectors for building future resilience (e.g. healthcare, pharmaceuticals, education, ICT) as well as industries with a strong export potential (e.g. agri-business, automotives, textiles). Developing multi-stakeholder platforms involving the private sector, African governments, civil society and international partners could contribute to co-ordinating FDI and other financial flows across sectors and African countries.

The African Union and its member states could immediately introduce trade facilitation measures on essential goods in reaction to the pandemic while accelerating the African Continental Free Trade Agreement (AfCFTA). The Brookings Institution (Brookings, 2020) estimates that the immediate implementation of the AfCFTA (i.e. the removal of 90% of intra-African tariffs) coupled with a 10% reduction in trade costs among African countries would reduce the anticipated decline in GDP during the COVID-19 crisis by 3.6 percentage points. The elimination of tariffs under the Agreement could support market-seeking FDI, as foreign investors tap into a larger and increasingly integrated market. In particular, higher trade integration could boost intra-regional greenfield FDI, currently at only 7% of investment flows to Africa compared to 50% in Asia and 14% in LAC (AUC/OECD, 2019).

The COVID-19 crisis has accelerated initiatives in certain sectors such as those related to mobile payments, digital health and e-education. Central banks have allowed zero fees on digital payments to encourage the use of mobile money over cash, while free e-learning platforms have surged across Africa with the support of governments working with telecom companies (Reiter, 2020).[8] Public-private partnerships and new investment opportunities should now be established to scale up these initiatives and increase digital inclusion in essential services.

Stronger international co-operation will be crucial to maintain official development assistance

Safeguarding ODA will be vital to weather the challenges presented by the COVID-19 crisis. In the past, ODA budgets have proven resilient in the face of recessions; for example, they increased in 2009 and 2010 despite the global financial crisis of 2008. Bilateral ODA to Africa reached USD 27 billion in 2009 (29.3 billion in 2010), representing an increase of 3% in real terms over 2008 (and 3.6% over 2009) (OECD, 2010; OECD, 2011). In April 2020, the OECD-DAC members pledged to protect ODA budgets, to promote other financial flows to support governments and communities in partner countries, and to invite development co-operation partners to do the same (OECD-DAC, 2020b). The pandemic's negative effect of donors' budget constraints on ODA could be postponed since many 2020 budgets were already finalised before the crisis hit (OECD, 2020b).

ODA represents a crucial source of finance for many African countries, especially the least developed. Indeed, the least developed countries (LDCs) have few financing alternatives to ODA. In 2018, for instance, ODA represented 52.6% of total external

financial inflows for all of Africa's LDCs and more than 10% of GDP for 13 of them. For countries in fragile contexts, like the Central African Republic, Somalia and South Sudan, ODA represented over 25% of their GDPs the same year. In contrast, ODA accounted for only 11% of total financial inflows for middle-income countries, yet 41% of total net ODA inflow targeted these countries. In light of the COVID-19 crisis, donors will need to ensure that ODA reaches the neediest countries.

In light of the current crisis, development finance institutions (DFIs) could provide alternative strategies to reducing the perceived riskiness of private investment in Africa. For instance, blended concessional finance (i.e. combining concessional funds from DFIs with commercial financing from the private sector) could be used to attract investments to the hardest-hit sectors, such as agriculture, health, water and sanitation, or to projects with strong developmental impacts, such as infrastructure. In 2018, DFIs used USD 1.1 billion in concessional funds to unlock more than USD 8.7 billion of private sector projects in developing countries (IFC, 2019). In the medium to long term, reassessing existing blended finance models will be key to increasing support for sustainable development, given the large pool of private finance that could be leveraged. Enabling financial regulations could unlock an estimated USD 12 trillion of commercially viable market opportunities and significantly contribute to achieving the Sustainable Development Goals (Business and Sustainable Development Commission, 2017).

Co-operation with new donors could change considerably following the COVID-19 crisis. Certain new donors such as the Gulf states and India could face budget difficulties due to the impact of low commodity prices and the COVID-19 pandemic. In recent years, China's role, in particular in Africa, has increased. China's global Belt and Road Initiative (BRI) involves no less than 44 African states. The country's foreign direct investments in Africa reached a high of USD 5.4 billion in 2018, surpassing its investments in LAC (USD 1.9 billion) and the Middle East (USD 2 billion) (The Economist, 2020). Along with this increase, criticism arose in the international community. Lin and Wang (2017), for instance, cited lack of transparency, wide use of tied aid, few local employment opportunities created, and weak labour and environmental standards surrounding China's investments. In the future, using these financing opportunities to their full potential will require strategic planning and a co-ordinated approach from African governments to ensure that Africans are not bound to long-term commitments that run against their national interests (Calabrese, 2019; Calabrese and Xiaoyang, 2020).

Debt restructuring and reforms are necessary to free up critical development financing in the short term and ensure future debt sustainability

Debt restructuring is needed to allow the fiscal space for African governments to respond to the health and economic impacts of COVID-19

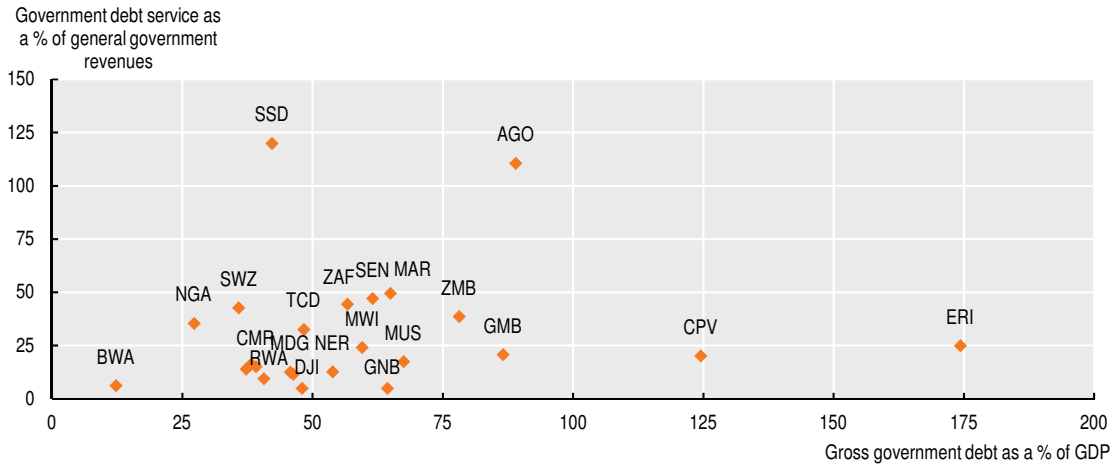
African governments face an immediate twin challenge of financing the health policy responses to the COVID-19 pandemic and of mitigating the economic crisis and supporting people's livelihoods. The recovery may take years, given the global scope and long duration of the pandemic; the resulting dislocation of people, capital and supply chains; and the potential for international travel and other trade restrictions to remain in place for long periods (Hughes, 2020).

Deteriorating financial conditions, reduced fiscal space and lower external demand following the COVID-19 crisis will constrain governments' ability to mitigate the economic impact of the crisis. The IMF projects that the fiscal deficit in sub-Saharan Africa will almost double from 4.4% of GDP in 2019 to 7.6% of GDP in 2020, because of lower tax revenues combined with new public spending to face the effects of the crisis. Both

oil-exporting and oil-importing countries will suffer from this widening fiscal deficit (IMF, 2020c). In addition, the pandemic brought external private demand for African debt to a halt. Private investments stopped, certain foreign investors withdrew their investments at the beginning of 2020 and yields on African bonds rose. Lockdowns in major economies halted activity in global value chains, eliminating the demand for African raw materials and putting major investment projects on hold.

In the short term, debt restructuring is critical because many countries are spending more on repaying their debt obligations (i.e. servicing their debts) than on mitigating the crisis. In June 2020, African governments announced fiscal packages with an average size of 3% of GDP, a quarter of which is dedicated to health spending. In contrast, African countries spent an average of 3.9% of GDP on debt services in 2018. In that year, at least 15 African countries had government debt service costs that amounted to over a quarter of their revenues (Figure 8.5). That same year, the governments of Angola and South Sudan paid more debt service costs than they received in revenues. Furthermore, recent currency devaluations in the wake of the COVID-19 crisis make servicing the foreign currency-denominated debts more difficult. International co-operation to relieve governments of such financial duties is critical to ensuring that they have the resources necessary to respond to the immediate health and economic crisis.

Figure 8.5. **General government gross debt as a percentage of gross domestic product and government debt service as a percentage of revenues, 2018**



Source: Authors' calculations based on data from IMF (2020a), *World Economic Outlook* (database) www.imf.org/external/pubs/ft/weo/2020/01/weodata/index.aspx.

StatLink https://doi.org/10.1787/888934204213

Timely debt restructuring is necessary to ensuring debt sustainability, i.e. the ability of African countries to meet their debt service obligations. The average debt-to-GDP ratio in sub-Saharan African countries is expected to increase by 7.3 percentage points in 2020, to reach 64.8% of GDP; this is due to the larger fiscal deficits, currency devaluations and GDP contractions in most countries (IMF, 2020c). If African countries were to implement the same fiscal policy measures that the largest economies in the European Union (EU) have applied in the crisis up until March 2020, "all other conditions remaining equal, Africa's government debt-to-GDP ratio would increase to about 85%" (OECD, 2020e). A swift restructuring could prevent debt-distressed countries from increasing their debts to the point of being unable to repay them due to disrupted access to finance and to capital flights. Furthermore, decisive and timely policy actions would help to contain the

impact of the health and economic crisis to enable a faster recovery – which would allow countries to repay the debts more quickly.

The nature of the COVID-19 crisis means that there is no risk of moral hazard for a debt restructuring. Through the Addis Ababa Action Agenda in 2015, Africa and its development partners committed to debt rescheduling, cancellation and other measures for debt restructuring following severe shocks such as pandemics and natural disasters. Due to the highly exceptional and exogenous nature of the COVID-19 pandemic, any debt restructuring does not constitute a moral hazard of African governments' not repaying their debts. This idea relates to the doctrine of necessity in international law that applies in very specific, extreme circumstances, where the urgent needs of the population may take precedence over certain legal obligations (Bolton et al., 2020).

Africa would benefit from presenting a unified voice in any debt restructuring. The smaller African countries have little economic clout in debt restructuring discussions, but at 2-3% of global GDP, Africa as a continent might. In April 2020, the African Union appointed five special envoys to negotiate debt cancellation with the G20, IMF, World Bank, EU and other international organisations in response to the pandemic. In a bid to relieve the pressure on the continent's fiscal and monetary authorities, African ministers of finance called for a waiver of interest payments on all public debt and sovereign bonds in 2020 (UNECA, 2020b). The complexity and high cost of sovereign debt restructuring contributed to the need for African countries to combine resources.[9] The important yet opaque role of legal and financial sovereign advisors calls for a careful selection process based on public procurement measures (UNCTAD, 2019). It also requires strengthening the capacity of African governments and organisations to develop their own legal and financial expertise to ensure competitive bidding.

Debt restructuring must include private and non-traditional creditors

Private creditors are behind an important share of Africa's sovereign debt, as several of the continent's middle-income countries have raised funds through the international commercial debt markets. Private lenders accounted for 39% of lending to African governments in 2018, up from 24% in 2008. Increased private credit has generally gone to middle-income countries. South Africa's total private external debt declined from a high of 57% in 2010 to 41% in 2018, as lower-middle-income countries such as Côte d'Ivoire, Senegal and Zambia increased their share of borrowing from private sources. In contrast, low-income countries continued to rely mostly on official and concessional loans (World Bank, 2020d).

All creditors, including private ones, need to be included in debt relief programmes in order to avoid free-riding and perverse incentives. Without private creditors' participation, this financial assistance could end up servicing sovereign government commercial debt, rather than social and medical needs, thus undermining the justification for the programmes. Private creditors would free-ride on the official creditors' support in this case. In addition, if some creditors do not participate in these programs, each debt relief measure provided by one participant could increase the ability of the debtor country to repay its remaining debts, thereby increasing the financial incentive for creditors to hold out for full repayment (the hold-out problem).

Obtaining private sector participation in restructuring debts depends on the veto power that individual or minority creditors have over proposed negotiations. In general, creditors tend to hold out longer for smaller outstanding amounts and when they hold bonds without collective action clauses (CACs) or older type of CACs [10] that are less favourable to the debtor country (Fang, Schumacher and Trebesch, 2020).

African governments can use the new CACs to avoid holdouts. Newer bonds tend to enable a qualified majority of holders of a specific bond issuance (typically 75%) to bind the minority to the terms of a restructuring. Of the USD 62.3 billion worth of international sovereign bond issued by African countries since October 2014, all but USD 1 billion worth (issued by Côte d'Ivoire) are covered by this kind of enhanced CAC (Fang, Schumacher and Trebesch, 2020). Countries should not be discouraged from activating this type of clause. Recent research highlights that private investors prefer the more orderly and efficient debt resolution process brought out about by CACs (IMF, 2019).

In addition, African countries have a number of instruments they can use to encourage creditor participation in debt restructuring. Table 8.3 highlights several incentives and threats that can serve this purpose. For example, Vallée and Pointier (2020) suggest that countries can offer for private debtors to exchange their existing shares for new credit at a lower rate and with a longer maturity period. The private debtors should be guaranteed by a highly esteemed development institution or group of institutions.

Table 8.3. **Examples of incentives and threats to encourage foreign creditor participation**

Instrument	Description	Example
Incentives		
Cash or equivalent	Cash or highly liquid assets used to pay down the outstanding principal, to reimburse accrued but unpaid interest, or to pay participation fees to the creditors joining the restructuring	**Russia (2000)**: Replaced debt owed by a state-owned bank with Eurobonds owed directly by the Russian government and issued under foreign law
Value recovery instruments	Instruments to recover some portion of the financial sacrifice that private creditors will have endured in the debt	**Nigeria (1980s)**: Offered warrants indexed on oil prices to creditors using Brady bonds to restructure their debts
Parity of treatment undertakings	A covenant promising that other lenders will not be given preferential treatment	**HIPC Initiative (1989-present)**: Required that the discount applied to commercial creditors be comparable to that offered by bilateral creditors (average discount price of 8.3 cents on the US dollar)
Principal reinstatement features	Features that allow lenders to renegotiate their original claims if a debtor country seeks another round of restructuring of the debts that led to the previous debt crisis	**Seychelles (2010)**: Agreed to restore the principal to its creditors if it failed to implement its IMF programme
Credit enhancement	An enhancement in the value of restructured bonds through a partial guarantee of amounts due under bonds or collateral securities issued by a creditworthy third party or the borrowing government	**Seychelles (2010)**: Provided a partial guarantee to its new restructured bonds issued by the African Development Bank
Contractual improvements	An instrument allowing the correction of legal protections attached to the original debt instrument that is being restructured	**Greece (2012)**: Offered participating holders new bonds governed by English law instead of local law
Threats		
Collective action clauses	Clauses that enable a qualified majority of bondholders of a specific bond issuance (typically 75%) to bind the minority of the same issuance to the terms of a restructuring	**Uruguay (2003)**: Permitted, through an aggregated CAC, all holders of all affected instruments to vote on a proposed restructuring, while preserving a vote in each bond issuance, albeit with a lower voting threshold (66.6% rather than 75%, provided that 85% of all affected issuances approved the exchange)
Trust structures	Centralisation of enforcement powers in the hands of a trustee	**Global**: Issuance of most international sovereign bonds under either fiscal agency agreements or trust structures
Protection of assets	Protection from the seizure of a country's assets by judgment creditors	**Iraq (2003)**: Benefitted from a UN Security Council resolution immunising all Iraqi oil sales, as well as the cash proceeds from the sale of that oil, from any form of attachment, garnishment or execution

Source: Adapted from Buchheit et al. (2019), "How to restructure sovereign debt: Lessons from four decades".

Non-traditional official creditors also must be involved in the negotiations. Lending from non-traditional creditors, such as China, India, Saudi Arabia, the Islamic Development Bank and other financial institutions in the Gulf, has increased sharply in recent years. According to data from the China Africa Research Initiative, China accounts for an estimated 22% of sovereign debt stock and 29% of debt service for 22 low-income African countries. In Angola, Cameroon, Djibouti, the Republic of the Congo, Ethiopia, Kenya and Zambia, lending from China represents more than a quarter of their publicly-guaranteed debt (CARI, 2020). Recent research demonstrates that China's loans tend to have shorter grace periods and maturities and higher interest rates than loans from the World Bank; this could make the borrowing countries more vulnerable to debt distress due to short-term economic volatility (Morris, Parks and Gardner, 2020). As of 10 July 2020, China agreed to take part in the G20 debt relief initiative, suspending debt service until the end of 2020. The country also pledged to provide USD 2 billion, mostly to developing countries and presumably in the form of foreign aid, over the next two years to help with the COVID-19 response and with economic and social development in the affected countries, especially developing countries (Brookings, 2020).

Reforms in debt and public finance management are vital for long-term debt sustainability

African countries would benefit from improving their debt management and transparency

African governments need to strengthen their capacity to manage their debts. According to the World Bank's Debt Management Performance Assessment, less than half of the 22 African countries assessed fulfil the minimum requirements for sound international standards in the legal framework for debt management. So far, the lack of comparable data and transparency hinders the debt sustainability analysis and the assessment of fiscal risks, thus increasing the probability of debt vulnerability. In this context, international financial institutions such as the World Bank and the IMF could provide technical assistance and develop tools to build African countries' capacity to record, monitor and report their debts.

Debt transparency is necessary to reduce fraud and corruption, and help African authorities assess their debt sustainability. Recent cases of hidden debts in the Republic of the Congo, Mozambique and Togo highlight weaknesses in legal frameworks, debt reporting and monitoring processes. Horn, Reinhart and Trebesch (2020) estimate that certain African countries did not declare to the IMF or World Bank 50% of their debts to China. As the characteristics of debts are changing rapidly (e.g. non-Paris club official and private lenders are on the rise, and the use of complex collateralised loans is increasing), debt management authorities need to better assess the full costs and risks of debts.

Some countries, such as Chile in Latin America and Botswana, have implemented fiscal and debt rules that commit policy makers to work against the fluctuations of economic cycles, but the effectiveness of these rules depends on the context. Chile bases its spending decisions on smoothed revenue forecasts to avoid temporary commodity price shocks having an undue influence on its economy (Konuki and Villafuerte, 2016). Botswana adopted a rule stating that only non-mineral revenues can be used to fund current expenditures and that the more volatile mineral revenues fund investments go into a savings fund (called the Pula Fund) which the central bank manages. Such rules, however, require both political commitment by officials and buy-in from political factions and institutions, which depend on relationships of trust and the alignment of all parties' interests.

Over the longer term, African countries would benefit from moving from debt management to balance-sheet management of the public sector to monitor government assets and non-debt liabilities. Better management of public assets and non-debt liabilities (e.g. pensions) would have several advantages. First, it would significantly improve fiscal policy making and strengthen the efficiency of public investment, as countries could anticipate future fiscal pressures and risks. In the context of the COVID-19 crisis, for instance, financial obligations of state-owned enterprises could migrate to the central government balance sheets as contingent liabilities and add to the debt burden. Second, countries with stronger balance sheets would enjoy lower borrowing costs. Indeed, recent evidence demonstrates that financial markets consider government assets along with debt levels to determine borrowing costs (Hadzi-Vaskov and Ricci, 2016; Henao-Arbelaez and Sobrinho, 2017). Nonetheless, improving balance sheet management will only be possible if quality data and the right methodology to assess the value public asset are available and if governments accept the increased scrutiny of the value of public assets.

Maintaining access to the commercial debt market in the medium term requires a co-ordinated strategy

Access to international financial markets comes with several benefits to bond-issuing countries, especially when interest rates in high-income countries are expected to remain low in the medium term. For example, it increases their ability to raise large volumes of capital in a short time span and provides a diverse investor base. It also helps African economies build a credit history in international financial markets. Going forward, the search for yields in emerging markets is expected to continue, as high-income countries are likely to maintain low interest rates.

African countries need to address other structural factors that raise the risk premiums of African sovereign debts.[11] In addition to stronger debt management and transparency, African countries can maintain investor confidence post-COVID-19 in several ways:

- **Designing bonds with strong legal language, including enhanced collective action clauses, that sets out an orderly and efficient debt resolution process.** This will command higher prices on financial markets thanks to lower downside risks when the debtor's ability to pay sours deteriorates (Chung and Papaioannou, 2019).
- **Matching loan maturity dates to project life cycles** so that loans do not lead to cashflow problems when repayments are due.
- **Restricting loans to those for growth-enhancing investments,** such as in infrastructure, health and education, so that loans do not end up having a net-negative effect on the country's wealth over the long run.

Strengthening the management of infrastructure investments is important to ensuring the sustainability of infrastructure-linked debts. These debts account for a large share of commercial debt in Africa. Adopting the PIDA (Programme for Infrastructure Development in Africa) Model Law for Infrastructure Investment presented at the African Union Summit in January 2018 can help create a more favourable environment and policy certainty for private and institutional investors (Ashiagbor et al., 2018). Policy makers can further improve the quality of the investments by selecting a pipeline of growth-enhancing infrastructure projects and supporting public sector capacity in planning, allocating and implementing public infrastructure development.

African governments can work with credit rating agencies to better assess the continent's sovereign credit risks and protect investors. Countries can actively encourage ratings agencies to have a stronger field presence; Standard & Poor, for example, currently has only one office in Africa. Better credit assessments can help dissipate investors' negative biases associated with credit risks in the continent. In fact, the annual

assessment of project finance loans by Moody's Investors Service documents the superior performance of African project finance loans. African infrastructure projects from 1983 to 2017 averaged 5.5%, a lower default rate than Latin America (12.9%), Asia (8.8%), Eastern Europe (8.6%), North America (7.6%), and Western Europe (5.9%) (Moody's Investor Service, 2019; quoted in OECD/ACET, 2020, page 42). However, regulations might be necessary to increase the transparency of ratings, reduce conflicts of interests and improve the quality of the rating process. The financial crisis in 2008 highlighted how rating agencies can fail to correctly assess market risks. In 2011, in response to that crisis, the European Commission created its own regulatory framework through the European Securities and Markets Authority. The objective was to enhance the integrity and quality of credit rating activities by registering and monitoring all credit rating agencies operating within the European Union. Finally, measures such as assessing rating methodologies and reviewing complaints received from market participants can help to ensure high levels of investor protection in Africa.

African governments can gradually develop markets for local currency sovereign bonds

African countries would benefit from developing local currency bond markets. Local currency bonds would give countries a way to borrow that is protected from risks such as inflation, exchange rate shocks or currency depreciations. During the latter, debt-to-GDP ratios tend to grow less rapidly in countries with higher shares of domestic currency debt (Panizza and Taddei, 2020). Local currency bonds also mitigate currency mismatches for the borrowers. These bonds are critical for the development of a national financial system: they provide collateral for financial transactions and serve as a baseline for other financial instruments.

Establishing local currency debt markets may require proactive interventions by public actors. Countries wishing to attract foreign investors must maintain a stable macroeconomic environment and carefully liberalise capital accounts. To do so, governments need to pursue standard market practices, improve hard and soft market infrastructure, establish hedging markets, strengthen market liquidity and pursue inclusion of their bonds in global indices. Furthermore, a system for effectively monitoring foreign investor flows and holdings, including by amounts and maturity dates, is important (IMF and World Bank, 2020; UNCTAD, 2016b). International organisations can provide financial and technical assistance in the development of local domestic markets. For instance, the African Development Bank and MCB Capital Markets helped create the African Domestic Bond Fund in 2018, the first multijurisdictional sovereign fixed-income exchange-traded fund. This fund has increased price discovery (where buyers and sellers set their prices) and has enhanced transparency in several fixed-income markets in Africa (IMF/World Bank, 2020).

In recent years, Africa's local currency-denominated debt has increased rapidly. The median is now 29% of GDP. Local currency-denominated debt has risen at a faster pace than foreign currency-denominated debt (10 percentage points and 7 percentage points, respectively, for the 2013-18 period). Most of this increase can be attributed to middle-income and oil-producing countries tapping their local markets to offset the fiscal ramifications of the decline in oil prices (Calderón and Zeufack, 2020).

Borrowing in local currency has not completely insulated emerging market economies from the sharp currency depreciations and capital outflows caused by the COVID-19 crisis. As both domestic and external financial revenue sources dried up following the outbreak of the virus, government bond yields in both local and foreign currencies spiked in Egypt, Nigeria and South Africa. This rise in bond yields in secondary markets has not affected the cost of servicing existing debts, but it does indicate higher costs for governments to raise new funding in the current debt market.

Central banks may need to expand their range of instruments to rebalance the economy due to the unprecedented scale of COVID-19. African central banks may act as "lenders of last resort" to help offset the large stock adjustments needed in domestic bond markets. Beyond using conventional macroprudential tools and drawing from their exchange reserves, central banks can help inject targeted liquidity, intervene in the repo market or purchase domestic bonds (Hofmann, Shim and Shin, 2020). While the US Federal Reserve and the European Central Bank have successfully taken similar actions, the results could differ for countries with unstable currencies, small monetary bases, weak governance or strong dependence on the use of foreign currencies for domestic transactions. Nonetheless, the scale of the COVID-19 challenges has prompted central banks in developing countries such as Colombia, Indonesia, Philippines, and South Africa to launch bond purchase programmes. The Bank of Thailand also introduced a mutual fund liquidity facility. Depending on the specific local context, such a programme may not necessarily trigger a spike in inflation rates. However, a continued increase in money supply could lead to a higher inflation rate when growth resumes and therefore must be handled with care. Such instruments might be less available to low-income countries that would rely on international financial institutions to assist them if they are to shift a reasonable portion of their international borrowing to local currencies (ODI, 2020).

The participation of domestic pension funds and insurance in the local currency bond markets can be encouraged to increase the demands for such products. For example, non-banking domestic investors now account for 45% of the bonds in local currency in Kenya (UNCTAD, 2016b). However, the share of African assets under management by these institutions remains low, as shown by the 5% Agenda campaign. This campaign, initiated by the New Partnership for Africa's Development, aims to increase to 5% the allocations that African asset owners pay towards African infrastructure from its low base of approximately 1.5% (NEPAD, 2018; OECD/ACET, 2020).

Notes

1. The standards include the *International VAT Guidelines*, "Mechanisms for the effective collection of VAT/GST where the supplier is not located in the jurisdiction of taxation" and The Role of Digital Platforms in the Collection of VAT/GST on Online Sales.
2. The International Survey on Revenue Administration (ISORA) is a joint initiative of the Inter-American Center of Tax Administrations (CIAT), the Intra-European Organisation of Tax Administrations (IOTA), the IMF and OECD. It collects detailed data from the tax administrations of over 150 countries. The data from the 53 members of the OECD Forum on Tax Administration are available via www.oecd.org/tax/forum-on-tax-administration/database/.
3. For example, Ethiopia's first issuance in 2008 failed to attract sufficient diaspora investment, due to high minimum purchase thresholds and a lack of confidence in the government's ability to guarantee the investment. In addition, the offering was not registered through the American Securities and Exchange Commission, limiting its marketability and leading to the forced repayment of USD 6.5 million for violating American securities laws (African Arguments, 2019).
4. The FDI flows dropped by USD 4.8 billion, or 42% (UNCTAD, 2020a).
5. FDI flows in these countries accounted for more than 20% of GDP in 2014-18 (World Bank, 2019).
6. In South Africa, U-Mask has shifted from producing mining and agricultural masks to medical masks, and the Ghanaian government is collaborating with local manufacturing firms to scale up the production of personal protective equipment (Primi et al., 2020).
7. For example, the French Minister of Economy and Finance has called for EU governments to rethink their approach to value chains in order to assure "sovereign" and "independent" supplies.
8. For example, during the COVID-19 pandemic, Vodacom Tanzania has offered students free access to Shule Direct, an interactive online learning platform for secondary education (GSMA, 2020).
9. According to court records, attorney fees for sovereign debt disputes can reach millions of dollars for cases in the US courts. The average litigation takes four-and-a-half years (UNCTAD, 2019).

10. In 2014, the IMF endorsed contractual reforms in bonds issuances in order to facilitate potential sovereign debt restructuring actions and to limit the ability of holdouts to undermine them. This included a modified *pari passu* clause excluding the obligation from the issuer to pay on a rateable basis. It also incorporated an enhanced CAC providing different voting options to the debtor: (i) a "single-limb" aggregated voting procedure enabling bonds to be restructured through a single vote across all affected instruments; (ii) a "two-limb" aggregated voting procedure; and (iii) a series-by-series voting procedure.
11. Olabisi and Stein (2015) estimate that African governments pay coupon rates at 2.9 percentage points higher than standard risk factors would suggest during the 2006-14 period.

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Statistical annex

Data used in this edition of *Africa's Development Dynamics* have been compiled and presented in tables available for free download on the Development Centre's website (https://oe.cd/AFDD-2021) along with some additional social and economic indicators that add context to the report's analysis.

All indicators that were chosen for the annex provide national data figures for all or nearly all African countries, as well as most countries in the rest of the world. These choices were made in order to allow for both comparisons between African countries and comparisons with groups of similar countries outside of Africa that could serve as benchmarks. These data give context to the analyses presented in the report and allow readers to investigate the underlying data in more depth.

Data were obtained from various sources, including harmonised data sets of annual national data from reputable international institutions, as well as some indicators that were calculated by researchers working on the publication.

Figures will get updated as new data come available so that readers can always track the latest versions of key indicators. Therefore some differences between figures in the statistical annex and figures reported in the publication may reflect changes to the data tables made after the publication of the written report.

Access the online Africa's Development Dynamics Statistical Annex here: https://oe.cd/AFDD-2021

Data tables available for free download on line

Tables	*Titles*	*Download it here*
Table 1	Indicators of growth, employment and inequality	https://doi.org/10.1787/888934204232
Table 2	Annual real GDP growth rate, 1990-2025	https://doi.org/10.1787/888934204251
Table 3	Annual population growth rate, 1990-2025	https://doi.org/10.1787/888934204270
Table 4	Annual real GDP growth per capita, 1990-2025	https://doi.org/10.1787/888934204289
Table 5	Demographic estimates	https://doi.org/10.1787/888934204308
Table 6	Basic education indicators	https://doi.org/10.1787/888934204327
Table 7	Projected education profiles	https://doi.org/10.1787/888934204346
Table 8	Projected youth education profiles	https://doi.org/10.1787/888934204365
Table 9	Labour force characteristics	https://doi.org/10.1787/888934204384
Table 10	Sectoral breakdown of the economy	https://doi.org/10.1787/888934204403
Table 11	Indicators of inequality and poverty	https://doi.org/10.1787/888934204422
Table 12	Gender indicators	https://doi.org/10.1787/888934204441
Table 13	Communications infrastructure	https://doi.org/10.1787/888934204460
Table 14	Digitalisation	https://doi.org/10.1787/888934204479
Table 15	Basic health indicators	https://doi.org/10.1787/888934204498
Table 16	Subjective well-being	https://doi.org/10.1787/888934204517
Table 17	Growth decomposition by expenditure	https://doi.org/10.1787/888934204536
Table 18	Public finances	https://doi.org/10.1787/888934204555
Table 19	Trade by manufacturing intensity	https://doi.org/10.1787/888934204574
Table 20	Export diversification	https://doi.org/10.1787/888934204593
Table 21	Global and regional trade	https://doi.org/10.1787/888934204612
Table 22	External financial inflows	https://doi.org/10.1787/888934204631
Table 23	Ecological sustainability	https://doi.org/10.1787/888934204650
Countries	List of countries, and country groupings used for aggregating indicators	https://doi.org/10.1787/888934204669
Indicators	List of indicators, descriptions and details	https://doi.org/10.1787/888934204688
Tables	Statistical annex, all tables in one file	https://doi.org/10.1787/888934204707

More extensive data, including time series for all variables back to 2000, are also available on line

The figures presented in these statistical tables, with the exception of Tables 2-4, represent the most recent years for which data are available. However, a complete dataset containing all these indicators for the years 2000-present is also available to be downloaded in two flat files: https://bit.ly/2JcqRJQ and https://bit.ly/3h9WuQK. Otherwise, the same indicators can be found online through the OECD's online statistical portal at https://stats.oecd.org/ and clicking on "Development", followed by "Africa's Development Dynamics" on the menu.

The online statistical annex includes interactive data analysis

In addition to allowing users to download all data listed above, the online statistical annex at the Africa's Development Dynamics 2021 web page (https://oe.cd/AFDD-2021) features the interactive *Compare Your Country* data analysis tool. Users can use this tool to create visualisations of the full time series of certain key variables interactively, selecting which countries can be placed in comparison, the type of chart, and other parameters.

The data in the statistical annex are also available for key country groupings

The Statistical Annex reports statistics for nearly all world countries, and also aggregations of indicators over country groups developed for benchmarking and analysis. The table (https://doi.org/10.1787/888934204669) indicating the countries that belong to each group is among the files available in the statistical annex. The country groups featured in the analysis are the following:

- **The five regions of the African Union** (Central Africa, East Africa, North Africa, Southern Africa, and West Africa, as defined by the Abuja Treaty)
- **World regions** (Africa, Asia, Latin America and the Caribbean, and the World)
- **Resource-rich countries**

Countries that obtain a significant fraction of their GDP from underground natural-resource extraction are referred to as "resource-rich". These resource endowments can have major implications for economic, political, and social development. In this report, countries are identified as resource-rich based on whether, over the previous decade, the estimated contribution of the extraction of hydrocarbons, coal and minerals to economic output exceed 10% of GDP in at least five years.

- **Income level**

The World Bank divides the countries of the world into four categories based on GNI per capita, using their Atlas Method:[1] low-income countries, lower middle-income countries, upper middle-income countries, and high-income countries.

- **Geographic access**

The report provides a breakdown between countries that are landlocked, countries that have a portion of coastline, and island nations. Gaining access to world trade can be complicated by a country's access to the ocean or lack thereof, while island nations have been shown to have different development patterns than other coastal nations. In addition to this three-way breakdown of countries, this report provides data on countries deemed "Landlocked Developing Countries (LLDC)" and "Small Island Developing States (SIDS)" by the UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS).[2]

- **Least developed countries**[2]

The UN-OHRLLS classifies some countries as "Least Developed Countries (LDC)". This categorisation of countries was officially established in 1971, by the UN General Assembly, and represents countries that face low levels of socio-economic development. Countries are designated as LDC countries based on income criteria, the health and education of their populations, and their economic vulnerability.

- **Fragile states**[3]

The OECD studies fragility as a multi-dimensional concept of risks that could pose a critical challenge to the ability of countries to achieve their development aspirations, in particular the goals outlined by the UN's 2030 Agenda for Sustainable Development. Based on the results of this research, presented in the OECD *States of Fragility* report, countries are categorised as being "fragile" or "extremely fragile".

- **Regional Economic Communities and other intergovernmental organisations**[4]

Partnerships of countries formed for the purposes of regional integration or co-operation that have economic or political significance and that are particularly relevant to an analysis of African economic performance are included here. This includes the 8 Regional Economic Communities (REC) recognised by the African Union, as well as other regional and international organisations, such as the Association of Southeast Asian Nations (ASEAN), Mercado Común del Sur (MERCOSUR), the European Union (EU) and the OECD that serve as benchmarks.

Notes

1. Please see http://datahelpdesk.worldbank.org/knowledgebase/articles/378832-what-is-theworld-bank-atlas-method.
2. Please see www.un.org/ohrlls.
3. Please see www.oecd.org/dac/conflict-fragility-resilience/listofstateoffragilityreports.htm.
4. Please see https://au.int/en/organs/recs for more information.

Africa's Development Dynamics 2021

DIGITAL TRANSFORMATION FOR QUALITY JOBS

Africa's Development Dynamics uses lessons learned in the continent's five regions – Central, East, North, Southern and West Africa – to develop policy recommendations and share good practices. Drawing on the most recent statistics, this analysis of development dynamics attempts to help African leaders reach the targets of the African Union's Agenda 2063 at all levels: continental, regional, national and local.

The 2021 edition, now published at the beginning of the year, explores how digitalisation can create quality jobs and contribute to achieving Agenda 2063, thereby making African economies more resilient to the global recession triggered by the COVID-19 pandemic. The report targets four main policy areas for Africa's digital transformation: bridging the digital divide; supporting local innovation; empowering own-account workers; and harmonising, implementing and monitoring digital strategies. This edition includes a new chapter examining how to finance Africa's development despite the 2020 global economic crisis.

Africa's Development Dynamics feeds into a policy debate between the African Union's governments, citizens, entrepreneurs and researchers. It aims to be part of a new collaboration between countries and regions, which focuses on mutual learning and the preservation of common goods. This report results from a partnership between the African Union Commission and the OECD Development Centre.

Consult this publication on line at *https://au.int/afdd2021* and *https://doi.org/10.1787/0a5c9314-en*

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