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## Issues paper

## Sustainable industrialization and diversification of Africa in the digital era in the context of COVID-19

# I. Key messages

1. Key messages include:

(a) The coronavirus disease (COVID-19) pandemic has severely affected the economy of Africa, pushing it into contraction for the first time in more than 20 years, by an estimated 2 to 5.4 per cent of gross domestic product (GDP) in 2020;

(b) Rapid and equitable access to COVID-19 vaccines for emerging market and developing economies would see their GDP growth recovery accelerated by about 1.5 per cent in 2021 and 2022;

(c) In just a few months, COVID-19 accelerated digitalization rapidly; in Africa, 61 per cent of a sample of firms surveyed by the Economic Commission for Africa (ECA) reported an increase in online sales since the start of COVID-19, while in another ECA survey, 75 per cent of businesses in the goods sector and 61 percent of micro-sized enterprises identified online selling as a top new opportunity in reaction to the crisis;

(d) Digitalization is eroding the traditional virility of manufacturing in creating jobs, value and exports. The share of total global jobs that are in industrial manufacturing has been slowly falling, from 15.3 per cent in 2000 to 14.2 per cent in 2018, and is predicted to fall to 13.2 per cent in 2022;

(e) Digitally deliverable services from Africa are currently limited, but have grown two-and-a-half-fold since 2005, while digital technology solutions in agriculture have been found to increase yields by 20 per cent from

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advisory services, 70 per cent from market linkage services and 40 per cent from digital financial services;

(f) If emerging digitalization can be scaled, it could be transformational, helping Africa to sustainably industrialize and diversify within a global digital economy estimated to be worth more than $11.5 trillion in 2019;

(g) African countries are already losing 3–5 per cent of GDP due to climate change, and by 2050 these losses could climb to 15 per cent in West and East Africa, 10 per cent in North and Southern Africa, and 5 per cent in Central Africa;

(h) Renewable energy potential in the continent is estimated at 350 GW for hydroelectric, 110 GW for wind, 15 GW for geothermal and 1,000 GW for solar, cumulatively 8.8 times the total installed generation capacity of Africa in 2016. African industrialization can be fuelled with clean energy;

(i) Africa must embrace environmentally sustainable industrialization and diversification as a pathway to creating decent jobs for the 170 million African young people set to enter the job market between 2020 and 2030, building forward better from COVID-19 and ensuring resilience to future shocks.

# II. Introduction: sustainable industrialization and diversification in the COVID-19 recovery of Africa

2. COVID-19 is a health crisis compounded by an economic crisis: it has undermined the economic growth of Africa, eroded its fiscus and bloated its debt. Africa needs a growth engine to build back better from COVID-19.

3. Industrialization has been the proven engine for economic development. Its contribution to one of the most remarkable episodes of growth in history, in which growth rates in excess of 6 per cent were sustained for 30 years, is still hailed as the growth “miracle” of East Asia. It has also historically led to a large and economically secure middle income population, broader tax base, and diversified export basket.

4. Nevertheless, few African economies have fully industrialized and diversified. The share of African employment in industry has remained stubbornly low, at around 10 per cent for 30 years (figure I). Manufacturing value added in the GDP of Africa has in fact fallen slightly, from 16 per cent in the 1970s to 11 per cent in the 2010s (figure II). Although services have grown in importance for African jobs and wealth, just under 60 per cent of Africans continue to work in agriculture, mostly in basic subsistence farming.

5. Old pathways to industrialization are also no longer an option. When Europe and North America industrialized during the eighteenth and nineteenth centuries, and with the Asian growth miracles and China during the twentieth and early twenty-first centuries, the intensive use of carbon powered those economic transformations. Doing so increased atmospheric concentrations of carbon dioxide by 50 per cent, contributing to environmental degradation and global warming, the consequences of which fall disproportionately on the shoulders of Africa, despite its negligible culpability.

Figure I
**Employment in Africa by sector, 1991–2018**

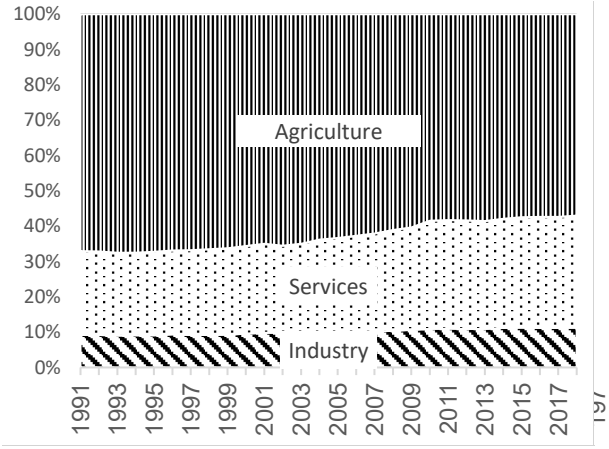
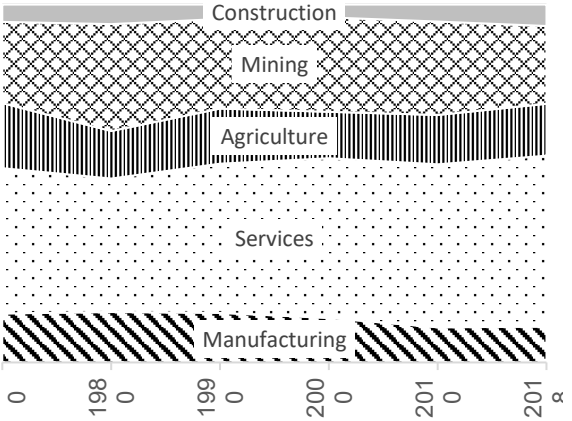



Figure II
**Value added to the gross domestic product of Africa, by sector, 2017–2018**




*Source*: ECA calculations using World Bank (2019a) and United Nations Statistics Division (2020) data.

6. Nor are the *means* of industrialization the same. Digital technologies are transforming industry in what is now regarded as the Fourth Industrial Revolution, changing where value is created and how it is captured, and necessitating new strategies for industrialization.

7. COVID-19 provides an opportunity to change gears and build back better through an industrialization pathway that is environmentally sustainable and digitally charged. Only through doing so can the continent achieve the Sustainable Development Goals and the aspirations contained in Agenda 2063: The Africa We Want, of the African Union.

8. This paper surveys the impact of COVID-19 on growth horizons in Africa. It then assesses how COVID-19 has accelerated digitalization and the implications for industrialization and growth. Finally, it considers the context of green growth and climate-conscious industrialization, before examining policy responses. In doing so, it shows that the traditional route to development is not an option; Africa must proactively prepare for the new future ahead of it.

# III. COVID-19 impact, response and implications

9. The COVID-19 pandemic has severely hit Africa, while affecting countries differently given their varied strengths and vulnerabilities. As of November 2020, 2 million people were infected, with 48,400 deaths reported in Africa – notably lower than most early estimates. However, more than 50 African countries are now easing from the world's strictest lockdowns, which have caused severe deterioration in economic activities and socioeconomic conditions. ECA estimated that a one-month full lockdown across Africa would cost the continent about 2.5 per cent of its annual GDP, equivalent to about $65.7 billion per month.

10. ECA estimates that growth in Africa could contract for the first time in more than 20 years, by between 2 and 5.4 per cent in 2020, with a mild recovery in 2021. This contraction is driven by relatively low economic activity, commodity prices, remittances and overall global demand. Oil-exporting countries and tourism-dependent economies are the most affected, because of relatively low oil prices and demand, respectively, due to travel restrictions as

a result of COVID-19. All African subregions are projected to experience a decline in GDP, with large contractions in Southern Africa and Central Africa, followed by North, West and East Africa.

11. The shape of the recovery will depend on downside risks, including the potential emergence of financial crises and debt instability as a result of weakened economies, or unrelated compounding threats, such as natural disasters. There are also upside opportunities to greatly accelerate the recovery of Africa through vaccine deployment and effective transmission management efforts. Ensuring global equitable access to COVID-19 vaccines is estimated to be worth more than $460 billion in economic benefits to 10 major economies alone (WHO, 2021).

12. In many African countries, fiscal policies and debt levels came under severe pressure due to limited policy space as well as domestic and external macroeconomic vulnerabilities. Increased health expenditures and the need to provide fiscal stimulus, combined with revenue loss, have exerted strong budgetary pressures on government financing, with the total fiscal deficit of Africa rising from 4.7 per cent of GDP in 2019 to 8.7 per cent in 2020, according to ECA estimates. The increase in the fiscal deficit is most severe in the Southern and North Africa regions, as well as in oil-exporting and mineral-rich countries in particular, and least severe in East Africa. As a result, the overall debt level of Africa is expected to rise from 57 per cent of GDP in 2019 to an estimated 66 per cent in 2021.

13. The current account deficit of Africa is expected to have worsened in 2020 as a result of disruptions in the global value chains, fall in global commodity demand and prices, the collapse of tourism, sharp decline in foreign direct investment and remittances, as well as increasing capital outflows. This will put many domestic currencies under pressure with increasing external vulnerabilities.

14. The expected African economic downturn will have major impacts on development in the continent. Estimates from the International Labour Organization (ILO) show a decline in labour force and an increase in unemployment rates in the continent, leading to lower demand and loss of income for the households, thereby plunging millions of people into poverty and increasing inequality. The pandemic is having a devastating impact on all Sustainable Development Goals and posing risks on the achievement of the Agenda 2030 goals in the continent.

15. The African Union – jointly with African Governments, ECA, regional institutions and development partners – acted swiftly and actively to address the pandemic, building on the comparative advantage gained from the previous experiences of health pandemics in the continent, such as Ebola. The African Union endorsed a joint continental strategy for the COVID-19 outbreak in order to coordinate and ensure synergy of efforts. ECA is supporting countries with cutting-edge policy advisory and resource mobilization, as many countries amid limited policy space are implementing unprecedented monetary and fiscal stimulus strategies to support the slowing domestic economic activities, contain inflationary pressures and preserve financial stability.

16. Equitable access to COVID-19 vaccines will greatly influence the shape and speed with which Africa recovers from COVID-19. Failures in vaccine deployment could, on the other hand, risk a protracted economic slump. Growth in emerging market and developing economies is expected to average about 4.5 per cent in 2021 and 2022, but could rise to 6 per cent if the pandemic is effectively stymied with vaccines and transmission management measures (World Bank, 2021).

17. Besides the current efforts to contain and address the adverse impacts of the pandemic, bold actions need to be taken to address the development

challenges in Africa. Among others, stimulating a sustainable industrialization process would contribute to diversifying economies, increasing value added, creating more jobs and raising productivity, as well as ensuring the continent's resilience to future shocks.

# IV. Accelerated digitalization: industrializing and diversifying in the new digital era

18. In just a few months, COVID-19 accelerated digitalization by an estimated seven years globally (McKinsey, 2020). Big tech stocks are up 50 per cent – an increase of $2.5 trillion – since December 2019.[1] In Africa, 61 per cent of a sample of firms surveyed by ECA reported an increase in online sales since the start of COVID-19 (ECA, 2021a) while in another ECA survey, 75 per cent of businesses in the goods sector and 61 per cent of micro-sized enterprises identified online selling as a top new opportunity in reaction to the crisis (ECA, 2020).

19. The impact is starting to bear through in African business statistics. Jumia, the leading e-commerce platform of Africa, reported package orders up 30.4 per cent year-on-year in the first half of 2020, while Paystack, an African financial payments company with more than 60,000 merchants across Africa, reported to ECA that transactions on the platform were up five-fold compared with pre-pandemic levels (ECA, 2021b). MTN Communications, Nigeria's largest telecommunications operator, reported in its financial statements that revenue from Nigerian data consumption soared by 33 per cent year-on-year in 2020.

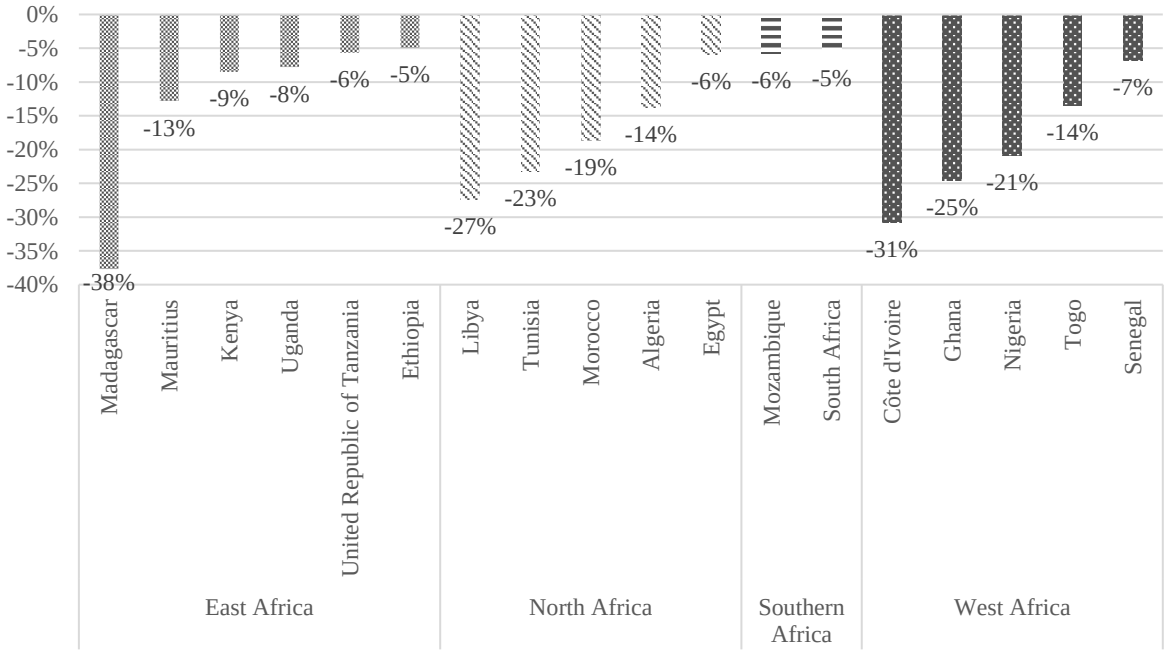
20. In several African countries, policy has been accommodative: reduced fees and higher fee ceilings on mobile money payments supported a five-fold increase in mobile money transactions in Rwanda, with similar policies enabling a 12.4 per cent increase in M-Pesa customers in Kenya (ECA, 2021b).

21. Before the pandemic, digitalization was poised to change the world. COVID-19 marks the historic tipping point into the digital era.

22. Yet COVID-19 has also exposed the digital deficiencies of Africa. Internet infrastructure buckled under the pressure of new digital teleworking and living habits, causing the median Internet speed in Africa to fall 13 per cent – twice as much as the world average (figure III). Even under normal circumstances, Internet coverage and cost are unconducive, with only an estimated 28 per cent of Africans using the Internet in 2019 (ITU, 2020). Persistent electricity challenges still left 31 African countries among the bottom 50 in the "Getting electricity" subcategory of the World Bank Doing Business index as of 2019.

[1] Calculation as of 6 November, 2020. Big tech here refers to Apple, Amazon, Tesla, Microsoft, Alphabet, Facebook and Netflix.

Figure III
**African broadband speed changes during COVID-19 lockdown periods, countries with data available**




*Source*: ECA calculations using Oxford Coronavirus Government Response Tracker data (2020).
*Note*: Angola (a remarkable outlier for which speeds doubled) was excluded.

23. Digital regulatory frameworks are an incomplete patchwork, creating uncertainty for business and investors: just 61 per cent of African countries have electronic transactions legislation, 46 per cent have digital consumer protection, 50 per cent have privacy and data protection and 72 per cent have cybercrime (UNCTAD, 2020). Where this legislation is in place, it is usually designed and implemented differentially across countries, frustrating cross-border scale and expansion.

24. Africa also lacks the digital middle layer (or "middleware") between infrastructural hardware and policy: businesses complain about a lack of digital payments services, digital identification and a shortage of digital skills in the workforce.

## A. Industrialization in a digitalizing world

25. Digital technologies are transforming industry in what is now regarded as the Fourth Industrial Revolution. This includes the adoption of technologies such as industrial robots and three-dimensional (3D) printing in manufacturing, and the use of big data and artificial intelligence in product development and e-commerce in marketing and sales.

26. As a result, industrialization is not what it used to be: changes in where value is created, and how it is captured, are reducing the share of value that was traditionally accounted for by manufacturing production (Mayer, 2018). A greater share of the value of manufacturing is shifting to pre- and post-production services. In pre-production, data-driven and computer-aided design is attracting more value. In post-production, services embedded in software and enhanced after-sales services account for more value.

27. These technologies offer new opportunities. 3D printing is already enabling smaller African businesses and entrepreneurs to participate in manufacturing in ways once unique to large, State-backed enterprises. For

instance, Kijenzi uses 3D printing to provide medical components for rural clinics in Kenya, while Akhani 3D printing uses a range of technologies in South Africa.

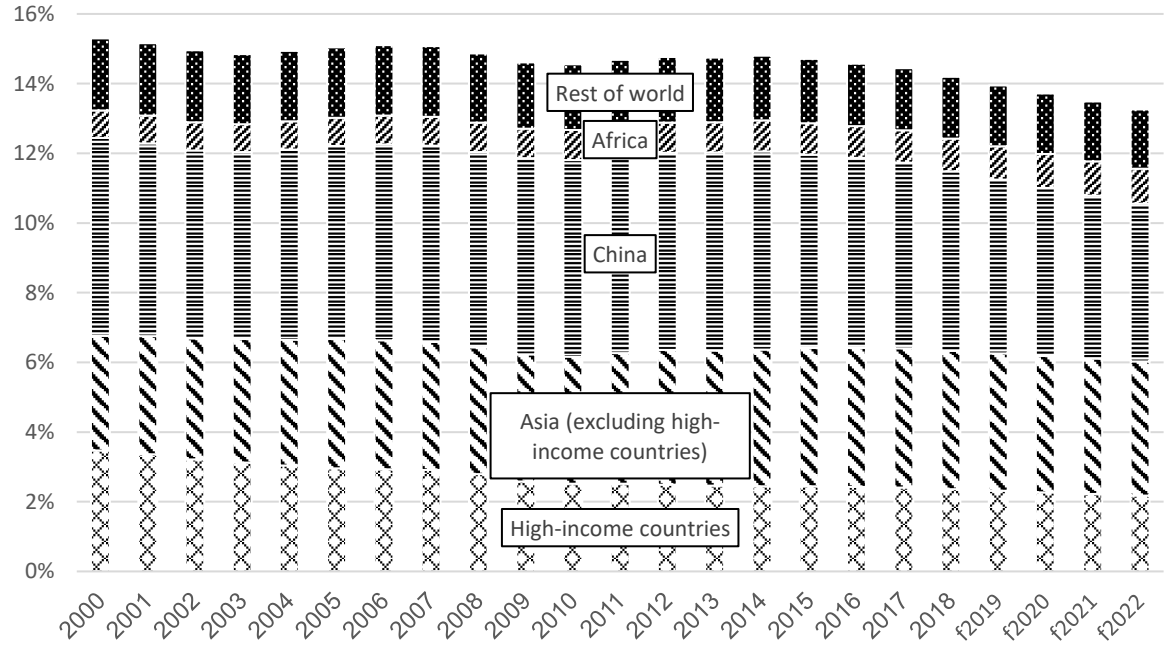
28. But if African countries fall behind in the adoption of these new technologies, they risk losing out. For instance, rather than locate a shoe factory in Africa to benefit from lower wages for labour, a manufacturer may instead set up a 3D printing plant in Germany. And, even if manufacturing moves to Africa, the valuable parts of pre- and post-production may remain elsewhere.

29. With 10 million–12 million African youth entering the workforce each year, the other big implication for Africa is employment.

30. Just as artisanal weavers were displaced by the weaving loom in the First Industrial Revolution, so too is the Digital Revolution automating and displacing today's routine tasks and jobs. The estimated potential of this displacement varies widely by study, from as little as 6 per cent to as much as 77 per cent of all jobs around today (Frey and Osborne, 2017; Oxford Martin School, 2018; Bowles, 2014; Arntz, Gregory and Zierahn, 2016; Manyika and others, 2017).

31. These forecasts are tentatively emerging in the data. The share of total jobs that are in industrial manufacturing has been slowly falling, from 15.3 per cent in 2000 to 14.2 per cent in 2018, and is predicted to fall to 13.2 per cent in 2022, according to ILO projections (figure IV).

Figure IV
**Share of total world jobs in manufacturing, by region**




f = International Labour Organization (ILO) forecast.
*Source*: ECA calculation using ILO data (2019).

32. So far, much of this decline has been in high-income countries, which have shed just over 13 million manufacturing jobs since 2000 (a decline of 17 per cent), although China – which hosts 36 per cent of the world's manufacturing jobs – has also lost over 9 million manufacturing jobs since their peak in China in 2014.

33. Although Africa has so far weathered this trend – African manufacturing jobs have increased by 820,000 on average in each of the past five years (ILO, 2019) – the world's share of jobs in manufacturing may continue its

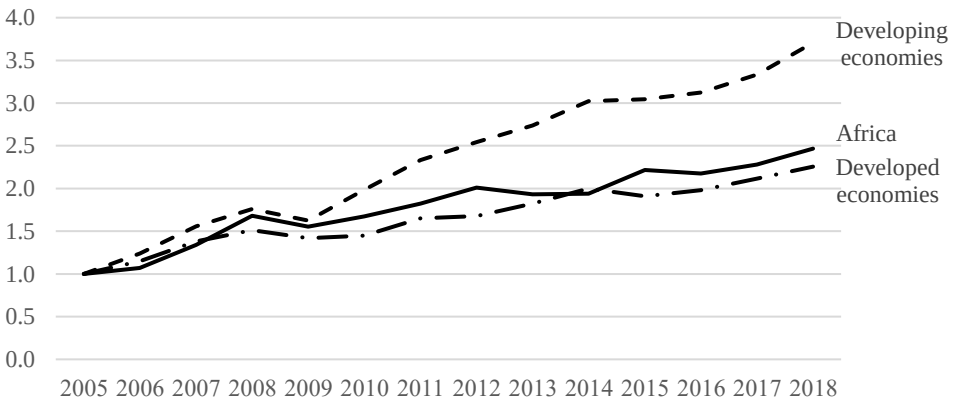
decline as a result of digital automation, reducing the number of "could-have-been" manufacturing jobs available to relocate to Africa.

34. With 160 million African young people entering the workforce between 2020 and 2030, policymakers must look into new ways to diversify their economies and create decent jobs. The old pathways to industrialization are no longer an option.

## B. Opportunities for diversifying through digital services

35. Digitalization is changing services. Traditionally, the services sector concerned non-tradables: manufactures could be sold for foreign exchange; haircuts could not. Digital channels of service supply are enabling services to be delivered beyond local labour markets. As of 2018, digitally deliverable services amounted to $2.9 trillion globally (UNCTAD, 2019). While such exports from Africa are currently small, they have doubled since 2005 (figure V).

Figure V
**Exports of digitally deliverable services, 2005–2018 (index, 2005=1)**




*Source*: ECA calculations using United Nations Statistics Division data (2019).

36. According to Heek (2017), there are about 70 million digitally-enabled registered platform workers globally in the market for work that the World Bank estimates will grow to be worth $15 billion–$20 billion by 2020 (Kuek and others, 2015).

37. The presence of online workers is, however, currently concentrated in India, the Philippines and the United States. With the exception of Egypt, Ghana, Kenya, Morocco, Nigeria and South Africa, online platforms currently provide negligible work in Africa. The quality and conditions of this work can also be poor if labour rights are not protected (Shah, 2018).

38. To take advantage of these opportunities, African policymakers must sow the seeds of a firm foundation for the digital era by investing in Internet and digital infrastructure and digital middleware – such as payments solutions and digital ID – as well as by improving digital literacy skills and labour conditions.

## C. Opportunities from diversifying through digital agriculture

39. Digitalization is also changing agriculture. This includes the application of digital technologies to enable precision agriculture, the digital dissemination of advisory services, the connection of market linkages, digital financial service intermediation and supply chain management solutions.

40. In Senegal, Daral Technologies is using digital technology to ensure the identification and security of livestock. In the Niger, ITechCentre is using digital solutions to disseminate business information to farmers. In Kenya, Musoni uses fintech methods to provide loans to a large number of rural smallholder farmers. TechnoServe's use of satellite imaging helps improve coffee production processes in South Sudan (Murray, 2016).

41. According to a study by the Technical Centre for Agricultural and Rural Cooperation in 2019, from a sample of 50 impact study data points, digital technology solutions were found to increase average agricultural yields by roughly 20 per cent from advisory services, 70 per cent from market linkage services and 40 per cent from digital financial services. They can also contribute to climate resilience, by better designing and disseminating crop insurance products and improving yields.

42. Scaling up the adoption of digital technologies in African agriculture could have a transformational impact. Just under 60 per cent of the African workforce is currently in agriculture, and this is where the incidence of poverty in Africa is greatest (World Bank, 2019a).

43. Mechanization and technology adoption in the agricultural sector of Africa has in the past been poor. Some fear that digital technologies may suffer a similar fate (World Bank, 2019b); others see the falling price of smartphones and smart technologies adapted to analogue systems as offering new opportunities for African farmers. African countries need to increase smartphone access and connectivity in rural areas, improve rural digital literacy, invest in "middleware" infrastructure such as agronomy maps and shift financing for agricultural digitalization from being primarily donor-funded to privately funded (Tsan and others, 2019).

# V. Industrializing and diversifying in the new climate economy

44. Climate change and COVID-19 have significant implications for the industrialization path of Africa. Global warming has already reached 1.1°C above pre-industrial levels and reduced the GDP of Africa by an estimated 3–5 per cent on average, and up to 10 per cent for the most vulnerable (ECA, AfDB and UNEP, 2019).

45. Although Africa is responsible for an historically negligible share of global carbon emissions – only 3.8 per cent – it disproportionately shoulders the consequences. A 2019 study by ECA, the African Development Bank (AfDB) and the United Nations Environment Programme (UNEP) estimated that, with climate change, West and East Africa could lose up to 15 per cent of their GDP by 2050. North and Southern Africa could lose as much as 10 per cent of GDP, and Central Africa 5 per cent.

46. In a high-warming scenario estimate, the Sudan and the United Republic of Tanzania would both lose an estimated 18.6 per cent of their GDP by 2050. Guinea-Bissau, Liberia and Mauritania would all lose more than 16 per cent of their GDP by that point. The Niger could lose as much as 19.8 per cent of its GDP (AfDB, ECA and UNEP, 2019). The combined effects of climate change and insufficient growth had already left Africa off track for achieving the Sustainable Development Goals before the onset of COVID-19.

47. Climate change would also undermine enablers for industrialization in Africa, including infrastructure, energy, water and raw materials.

48. In 2019, cyclones Idai and Kenneth wiped out roads, bridges and crops as they swept through South-East Africa, causing economic damage estimated at $2 billion and slowing Mozambican GDP growth by as much as 2 percentage

points (Nhamire, 12 April 2019). And since 2015, droughts have plagued hydropower production from the Kariba dam, which supplies most of the electricity consumed in Zambia and Zimbabwe. Failure to integrate climate change into the planning and design of power and water infrastructure could entail losses of hydropower revenues of 5–60 per cent, depending on the basin (Kuek and others, 2015).

49. Shifts in demand towards clean energy elsewhere in the world could also risk Africa being stranded with devalued fossil fuel assets. In limiting global warming to 2°C, as much as 26 per cent, 34 per cent and 90 per cent of the gas, oil and coal reserves, respectively, of Africa may be left unused (Bos and Gupta, 2019).

50. Africa can fuel its industrialization with clean energy. Renewable energy potential on the continent is estimated at 350 GW for hydroelectric, 110 GW for wind, 15 GW for geothermal and 1,000 GW for solar: cumulatively 8.8 times the total installed generation capacity of Africa in 2016 (International Renewable Energy Agency, 2018).

51. There are opportunities, too, in the green economy. The Democratic Republic of the Congo holds 47 per cent of the world's cobalt (which is needed for batteries), while Namibia and Zimbabwe have 100 per cent of the world's caesium reserves and 89 per cent of the world's rubidium reserves. (Both are used in mobile–cellular global positioning systems). In fact, 42 of the 63 elements used by low-carbon technologies and the Fourth Industrial Revolution are found in Africa (United Nations University – Institute for Natural Resources in Africa, 2019). Harnessing these resources must be coupled with forward-looking strategies for value addition, to avert the export of lower-value raw products that have been witnessed in other minerals.

52. Digitalization can open up some new opportunities. Data-driven water management technologies, such as water-efficient crops and remote sensors, conserve water better. Smart grids and smart cities allow more efficient management of energy distribution, reducing costs. For example, in Kenya and Nigeria, M-Kopa Solar and Lumos, respectively, are using fintech and mobile technologies for decentralized renewable energy investments.

53. In fact, action on climate change could deliver economic benefits estimated to be as much as $26 trillion by 2030, as well as more jobs, health benefits through reduced air pollution and better opportunities for women and young people (New Climate Economy, 2018). Studies have shown that building clean energy infrastructure is particularly labour-intensive and can lead to double the job creation of fossil fuel projects (Barbier, 2010; Hepburn and others, 2020). The long-term social and financial benefit of climate-resilient industrialization is clear.

54. Green financing should be sourced from a wide variety of public and private sources. They should include innovative green and blue bonds, and properly applied carbon credits and carbon taxes, that have revealed the potential to conserve ecosystems, address climate change mitigation and adaptation, and increase revenues to the public and private sectors.

55. Manufacturing must increasingly be fuelled by access to clean and renewable energy sources. This is a growth story agenda and opportunity that Africa cannot afford to miss, and that will prove vital for its COVID-19 rebound and the meeting of development aspirations, as encapsulated in the 2030 Agenda for Sustainable Development and Agenda 2063: The Africa We Want, of the African Union.

# VI. COVID-19 recovery: building forward with climate-conscious industrialization and diversification in the digital era

56. Old pathways to industrialization are no longer an option. Carbon-intensive growth must be replaced and COVID-19 has accelerated the commencement of the digital era. These phenomena require policymakers to reconsider both the role and form of industrialization in their growth strategies.

57. Traditional manufacturing-led industrialization is perhaps less the singular silver bullet it once was for development, but it will still remain important. To compete, Africa must catch up in digital technologies, skills and connectivity.

58. African agriculture and services must leverage the incredible new opportunities for digital value generation and meaningful jobs in high-tech agriculture and services exports.

59. Growth must be increasingly climate-conscious. Data-driven water management technologies – such as water-efficient crops and remote sensors, smart grids and smart cities – allow more efficient management of resources. Fintech, satellite technologies and mobile-based information systems improve climate resilience. Africa can fuel its industrialization with clean energy. There are also opportunities in green economy minerals, such as cobalt, used by digital technologies.

60. To achieve this, policymakers need to update their policymaking toolkits for the digital era, while upgrading the digital economy foundations of Africa.

## A. Update policymaking for the digital era

61. The following three policymaking processes can help policy react more nimbly, intelligently and effectively as the digital era unfolds:

(a) Adaptive policymaking: Adaptive policymaking is an “experiment and learn” approach. It humbly appreciates that the digital era is new and unsettled, and that policy responses will need to react nimbly. It can involve policy “sandboxes”: dedicated zones in which different policy levers and laws are tested out from the rest of a country (Porteous, 2019). This is analogous to the use of special economic zones, popularized in the promotion of traditional manufacturing. In doing so, it is important to foster a policy-learning ecosystem to absorb experimentation and learning. Policymakers must not just “test” their ideas, but closely monitor and evaluate effects. According to some, China’s success in industrialization was due as much to such adaptive policymaking as it was to a focus on export-oriented manufacturing (Ang, 2016);

(b) Consultative policymaking: This involves plugging policymaking into entrepreneurial tech ecosystems to foster collaboration between policymakers and the emerging tech businesses they seek to support or regulate. Doing so can help identify local solutions to particular local challenges, identify cases of under regulation or potential overregulation, and speed up the pace at which policy can catch up with practice. Good examples include collaboration between tech industries and government over social distancing through mobile money and e-commerce in several African countries (ECA, 2020c). This is especially important for policies that are not easily reversible or adjustable, which would be unsuited to the above-mentioned “test and learn” approach, and instead require more careful deliberation with the inputs of stakeholders;

(c) Collaborative policymaking: The Fourth Industrial Revolution is far more transboundary than those it supersedes. So too must be its governance. Global governance frameworks for the digital era are emerging in areas such as taxation, labour rights and trade. But the influence of individual African countries here can be limited. To use the language of Agenda 2063, Africa can achieve more if it will "speak with one voice and act collectively to promote our common interests and positions in the international arena". The African Union Digital Transformation Strategy provides an excellent platform for coordinated African positions on the transboundary policy issues of the digital era. African countries should consider using this as a springboard for a digital single market as part of the protocol on e-commerce to be negotiated in the African Continental Free Trade Area (ECA, African Union Commission, AfDB and UNCTAD, 2019). By harmonizing digital market regulations, such as over data access and portability, such an African digital single market can help overcome the small market sizes that currently constrain the growth of African tech businesses.

## B. Upgrade the digital economy foundations of Africa

62. To leverage the digital economy, the digital foundations of Africa need strengthening:

(a) Levelling up the workforce: Greater consideration needs to be given to identifying exactly which digital skills should be invested in, and how. Priorities include: (i) core job-neutral digital skills, such as basic computing; (ii) job-specific digital skills, such as computer programming, data analytics, coding and network management; and (iii) job-neutral soft skills, such as communication, management, analytical and critical thinking, and creativity;

(b) Upgrading digital hardware: Simply ensuring access to fast Internet is found to have a large positive effect on African employment rates, including for less educated worker groups (Hjort and Poulsen, 2019). Improved digital connectivity must also include improved Internet coverage, to help spread digitalization, particularly in rural agriculture, as well as the lowering of costs, to help the competitiveness of African digitally enabled service suppliers. More basic enabling infrastructure must also be improved, including electricity reliability and cost: of the bottom 50 countries in the "Getting Electricity" subcategory of the World Bank Doing Business index, 31 are African;

(c) Upgrading digital middleware: Upgrades must also be made to the middle layer between infrastructure and technology businesses, such as digital payment solutions and digital ID. These create a bridge with digital hardware to create a conducive ecosystem for African tech to flourish. For this, governments need to adopt appropriate regulation for the development of private sector payment solutions, such as mobile money, while (i) nurturing the adoption of application programme interfaces in government services, to help tech businesses integrate with government provisions; and (ii) establishing digital ID systems to create trust and help fintechs satisfy "know-your-customers" regulations;

(d) Fostering African smart cities: Digitalization can redefine how cities are planned, designed and managed. Smart cities use digital technology to improve efficiency, competitiveness, productivity, liveability and sustainability through intelligent infrastructure and services. For example, Smart Village, established in 2001 in Egypt, boosted the information and communications technology sector, creating more than 50,000 jobs (BearingPoint Institute, n.d.).

# VII. Policy issues and key questions

63. The following topics are to be considered for discussion:

(a) How can African countries collaborate to ensure the global equitable deployment of COVID-19 vaccines to bring forward the COVID-19 recovery?

(b) How can the digital technologies of the Fourth Industrial Revolution be harnessed to mitigate the effects of climate change, while creating new pathways for jobs creation and recovering from COVID-19?

(c) How must policymaking respond to the emergence of the digital era and what are the priorities for a conducive African digital economy?

(d) How should Africa prepare to avert the threats and risks imposed upon it by climate change, including those of weather-related shocks, damaged infrastructure and stranded fossil fuel assets?

(e) How might Africa follow an environmentally sustainable industrialization pathway to take advantage of the economics of climate change, including green mineral assets and clean energy potential, to generate inclusive and sustainable growth, create jobs and build forward better from COVID-19?

(f) With 170 million African young people set to enter the workforce between 2019 and 2030, how should African economies diversify to create decent jobs in a greener economy?

(g) Can the African Continental Free Trade Area contribute to the development of the digital economy and e-commerce in Africa? How can the African “digital single market” envisaged by the African Union Digital Transformation Strategy 2020-2030 be achieved through the e-commerce protocol to the African Continental Free Trade Area?

# References

African Development Bank, Economic Commission for Africa and United Nations Environment Programme (2019). *Climate Change Impacts on Africa's Economic Growth*. Addis Ababa: ECA.

Ang, Y. (2016). How China Escaped the Poverty Trap. Cornell University Press.

Arntz, Melanie, Terry Gregory and Ulrich Zierahn (2016). The risk of automation for jobs in OECD countries: a comparative analysis. Social, Employment and Migration Working Paper, No. 189. Paris: Organisation for Economic Co-operation and Development.

Barbier, E. (2010). A Global Green New Deal: Rethinking the Economic Recovery.

BearingPoint Institute (n.d.). Smart cities: the key to Africa's third revolution.

Bos, Kyra, and Joyeeta Gupta (2019). Stranded assets and stranded resources: implications for climate change mitigation and global sustainable development. *Energy Research and Social Science*, vol. 56.

Bowles, Jeremy (2014). "The computerisation of European jobs". Brussels: Bruegel.

Economic Commission for Africa (2021a). E-commerce in Preferential Trade Agreements: Implications for African firms and the AfCFTA. Addis Ababa.

_____ (2020). Reactions and Outlook to COVID-19 in Africa, July 2020 African Business Survey Results. Addis Ababa.

_____ (2021b). Post-Pandemic COVID-19 Economic Recovery: Enabling Frontier Markets to Better Harness E-commerce and Digital Trade in Africa. Addis Ababa.

Frey, Carl Benedikt and Michael Osborne (2017).The future of employment: how susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, vol. 114, issue C, pp. 254–280.

Heek, R. (2017). Digital economy and digital labour terminology: making sense of the "gig economy", "online labour", "crowd work", "microwork", "platform labour", etc. Working Paper No. 70. Centre for Development Informatics, University of Manchester.

Hepburn, C., B. O'Callaghan, N. Stern, J. Stiglitz, and D. Zenghelis (2020). Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change? Smith School Working Paper 20-02. Oxford.

Hjort, Jonas and Jonas Poulsen (2019). The arrival of fast Internet and employment in Africa. *American Economic Review*, vol. 109, No. 3, pp. 1032-1079.

_____ (2019). Employment by sector: modelled estimates. Geneva.

International Renewable Energy Agency (2018). Renewable energy auctions: cases from sub-Saharan Africa. Abu Dhabi.

International Telecommunication Union (2020). Global and regional information and communications technology data set.

Kuek, Siou Chew, and others (2015). The global opportunity in online outsourcing. Washington, D.C.: World Bank.

Manyika, James and others (2017). A future that works: automation, employment, and productivity. McKinsey Global Institute.

Mayer, Jörg (2018). Digitalization and industrialization: friends or foes? United Nations Conference on Trade and Development research paper No. 25. Geneva.

McKinsey (2020). How COVID-19 has pushed companies over the technology tipping point – and transformed business forever (5 October).

Murray, Sarah (2016). Camera drones and cow fitness trackers help drive farm yields. *Financial Times*, 20 January.

New Climate Economy (2018). Unlocking the inclusive growth story of the 21st century: accelerating climate action in urgent times. Washington, D.C.: Global Commission on the Economy and Climate.

Nhamire, Borges (2019). Southern Africa cyclone damage cost seen topping $2 billion. Bloomberg, 12 April.

Oxford Coronavirus Government Response Tracker (2020). How global broadband speeds changed during COVID-19 lockdown periods. Available at www.cable.co.uk/broadband/speed/broadband-speeds-covid-19-lockdown/.

Oxford Martin School (2016). *Technology at Work v2.0: The Future is Not What It Used To Be.*

Porteous, D. (2019, July 17). Digital solutions are transforming informal workers into African iWorkers. Retrieved from ICTworks: https://www.ictworks.org/digital-solutions-informal-work-african-iworkers/#.Xa7xpugzaM8

Shah, Saurabh (2018). Nepali reality in the gig economy. *The Record*, 15 March.

Tsan, Michael and others (2019). *The Digitalisation of African Agriculture Report 2018–2019.* Technical Centre for Agricultural and Rural Cooperation.

United Nations Conference on Trade and Development (2019). *Digital Economy Report 2019: Value Creation and Capture – Implications for Developing Countries*. Sales No. E.19.II.D.17.

_____ 2020. Summary of Adoption of E-Commerce Legislation Worldwide. Available at https://unctad.org/topic/ecommerce-and-digital-economy/ecommerce-law-reform/summary-adoption-e-commerce-legislation-worldwide.

United Nations Statistics Division (2020). National accounts: analysis of main aggregates. Available at https://unstats.un.org/unsd/snaama/Basic. Accessed on 25 November 2020.

United Nations University – Institute for Natural Resources in Africa (2019). Africa's development in the age of stranded assets.

World Bank (2019a). World development indicators. Accessed on 25 November 2020.

World Bank (2019b). *World Development Report 2019: The Changing Nature of Work.* Washington, DC.

World Bank (2019b). *Different scenarios for global growth, in five charts*. Available at https://blogs.worldbank.org/developmenttalk/different-scenarios-global-growth-five-charts.

World Health Organization (2021). *Global equitable access to COVID-19 vaccines estimated to generate economic benefits of at least US$ 153 billion in 2020–21, and US$ 466 billion by 2025, in 10 major economies, according to new report by the Eurasia Group,* Joint News Release. Available at https://www.who.int/news/item/03-12-2020-global-access-to-covid-19-vaccines-estimated-to-generate-economic-benefits-of-at-least-153-billion-in-2020-21