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Digital Disruption in Africa: Mapping Innovations for the AfCFTA in Post-COVID Times

MICHELLE CHIVUNGA & ALISTAIR TEMPEST

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Abstract

This paper looks at the development of the Fourth Industrial Revolution (4IR) in Africa against the backdrop of the African Continental Free Trade Area (AfCFTA), and makes proposals for policymakers. The COVID-19 pandemic has demonstrated how digital innovations can help resolve some of the most serious challenges facing the world today. Digital solutions have helped many businesses and economies stay afloat in this crisis. In Africa the use of digital solutions is nothing new – indeed, the continent is recognised for its use of mobile-based payment systems such as M-Pesa, and many other innovations, including cashless payments. Digital solutions have also been hailed by the AU and other international bodies as critical for Africa's development and growth. Trends show that digital innovations will continue to play a key role in supporting not only recovery but also sustainable growth and prosperity, benefiting Africa and contributing to the implementation of the AfCFTA.

In many African economies digitisation has been used to leapfrog traditional banking and telecommunications infrastructure, helping businesses to innovate and scale up operations. As highlighted in this paper, the rise in ecommerce, particularly with the onset of COVID-19, signals that there is a strong foundation from which the 4IR can be leveraged to support digitised interregional trade, large-scale industrialisation and the creation of a vibrant African economy.

Technological developments in the 4IR are evolving rapidly, particularly in artificial intelligence, blockchain and machine learning, among others. How can these innovations integrate with and become relevant to the African context? How can they support the renaissance of African business, intraregional trade and economic development in the implementation of the AfCFTA? This paper makes various recommendations on how emerging technology and data-driven innovations can be used to address these challenges. Greater understanding of blockchain is needed to take full advantage of its benefits, especially the critical role it can play in facilitating seamless and transparent interregional trade. This is particularly key for Africa's dynamic and expanding micro, small and medium-sized enterprises.

The AfCFTA has massive transformative potential. It will enable 55 African countries with a combined gross domestic product of $3.5 trillion to boost continental integration and cross-border trade. Taking advantage of the data revolution, building data capital and using emergent technologies (with caution) can be hugely beneficial to tackle barriers to cross-border trade; open market access; strengthen regulatory frameworks; and build the capacity of Africa's youthful population. Business can benefit from economies of scale when marketing beyond the safe haven of national marketplaces. AfCFTA's objective is to grow intra-African trade, which in turn will encourage the industrialisation of Africa, pave the way for economic diversification, and boost the manufacturing and agricultural sectors. As we embrace an ecommerce-driven Africa, it is essential to ensure that these digital platforms

operate within high security parameters, ensuring the protection of consumers. This includes having in place robust consumer and data protection measures and harmonised common rules that do not restrict or hinder innovation and the free flow of data.

Trade can be stimulated by adopting digital applications throughout the value chain. This can lead to greater productivity, particularly if end-to-end digitisation is ensured across the value chain. This paper examines the benefits and challenges of online business and sheds light on some of the digital solutions that can help to deliver Africa's AfCFTA ambitions. A major concern is the infrastructure and Internet connectivity gaps on the continent, which add additional pressures and widen the digital divide, with many of the most vulnerable falling into a cycle of continuous poverty. Women, youth, rural communities and informal workers are often on the wrong side of this digital divide, with about a quarter of Africans having no access to data or telecommunications. While new technology solutions are helping to address this challenge, these technologies need to be properly understood. An Africa-wide emerging technology education programme and capacity-building programme around digital trade and trade facilitation would help to equip Africans with the skills needed for the digital era.

This paper is a snapshot in time of a fast-changing environment where many African entrepreneurs, academics and government bodies are seeking African solutions to African challenges. The winning ticket is a combination of digitisation, people-centric policies, and functioning and interoperable digital financing systems that will close the digital divide and create a more connected Africa. In addition, African ambassadors are needed to raise the continent's profile and establish the quality of the 'Made in Africa' brand.

Introduction

What are the main innovations that will impact Africa in the foreseeable future? A number of African countries have commissioned research on or set up committees to explore the impact of the Fourth Industrial Revolution (4IR).[1] Some useful guides do exist,[2] but the COVID-19 pandemic has upended previous forecasts and seen a plethora of new developments stimulated by the challenges thrown up by the lockdown. It is therefore essential to reconsider the major innovations that will benefit Africa.

In 2017 Thomas Friedman wrote:[3]

> What makes today's pace of technological change so extraordinary is this: it's not only the computational speed of microchips that's been in steady nonlinear acceleration: it's all the other components of the computer, too. Every computing device today has five basic components: (1) the integrated circuits that do the computing; (2) the memory units that store and retrieve information; (3) the networking systems that enable communications within and across computers; (4) the software applications that enable different computers to perform myriad tasks individually and collectively; and (5) the sensors – cameras and other miniature devices that can detect movement, language, light, heat, moisture, and sound and transform any of them into digitized data that can be mined for insights. Amazingly, Moore's law has many cousins.

Since Friedman wrote these words, we have seen the rapid continuation of that nonlinear acceleration. The new innovations defined as part of the 4IR fall under the headings of artificial intelligence (AI), machine learning, cloud computing, robotics and blockchain. Each of these technologies continue to evolve rapidly. While machine learning, for example, can do 80 calculations per second, 'deep learning' has already increased to 200 000 calculations per second.[4]

We can already see the benefits of the disruptive solutions introduced by fintechs that are reaching the previously unbanked. Blockchain famously is founded on its first-use case, ie, cryptocurrency (Bitcoin being one of the most successful and popular cryptocurrencies), but the underlying technology has many advantages (and some disadvantages). This

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1 South African President Cyril Ramaphosa set up a commission in 2019 to study 4IR application in South Africa. Unfortunately, at the time of writing that commission's report had not been published yet. Other African countries include Morocco, which prepared a report on "Industrie 4.0". See Karine Kouassi Lou, Francie Sadeski and Matthieu Lacave, "Unlocking the Potential of the Fourth Industrial Revolution in Africa: Country Case – Morocco", Technopolis Group, August 2019, https://4irpotential.africa/wp-content/uploads/2019/10/Morocco-Case-study-Temp.pdf.

2 Santhosh Gandhi, "Boost Your Career by Understanding Fourth Industrial Revolution! (Industry 4.0)", Deus Vadivamaipu, May 5, 2020, https://medium.com/@deusvadivamaipu/boost-your-career-by-understanding-fourth-industrial-revolution-industry-4-0-86bf4c0930f7.

3 Thomas L Friedman, *Thank You for Being Late: An Optimist's Guide to Thriving in the Age of Accelerations* (New York: Penguin Books, 2017), 39.

4 Tomasz Wnuk, "Artificial Intelligence Beyond Digital Marketing" (Presentation, The Kineticevent Ecom2020 conference, August 4–6, 2020).

includes issues around speed, energy utilisation, regulation, technical interoperability, quality data access, governance structures and adoption challenges.

> We can already see the benefits of the disruptive solutions introduced by fintechs that are reaching the previously unbanked. Blockchain famously is founded on its first-use case, ie, cryptocurrency

Blockchain is not a magic wand – if poorly understood and used for the wrong purposes it can be ineffective and costly. A major challenge with blockchain is lack of understanding about the technology. Even more concerning is the lack of clarity and awareness of how and where blockchain can be used, and how it can be interconnected with existing business model innovations.[5] This paper focuses on blockchain's applications for potential scalable impacts. Developing countries should prioritise education on and training in blockchain and other emergent technologies that can play a role in transformational growth.

Machine learning for example, can help with translation, which is a major advantage for businesses operating in Africa's multilingual environments. E-learning provides options for both public and private education and training, which is crucial to boosting the skills required. Three-dimensional (3D) printing has been hailed as a manufacturing solution for Africa – bringing manufacturing centres back to localities. E-government can use 4IR technologies to cut red tape for both citizens and companies. Data analytics (the process of turning raw data into useful insights, usually by applying an algorithm in order to identify meaningful correlations between different data sets) can assist African governments and businesses make more informed decisions.

The mobile market in Africa is growing, with smartphone connections set to almost double to 678 million by the end of 2025, with an adoption rate of 65% in sub-Saharan Africa.[6] Although this adoption rate is a positive shift, the mobile Internet penetration rate remains low, limiting connection for many. It is crucial that investment in broadband and other forms of infrastructure is prioritised to maximise and leverage better connectivity and access to data through mobile channels.

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5 Rakesh Kumar et al., *Challenges in Adoption of Blockchain in Developing Countries* (Paper, Fourth International Conference on Emerging Trends in Engineering, Science and Technology, Karachi, 2019), https://www.researchgate.net/publication/337925935_Challenges_in_Adoption_of_Blockchain_in_Developing_Countries. While there has been an increase in knowledge and awareness of blockchain technologies in developing countries, progress in developing products and adapting systems to existing businesses has been slow due to a lack of skilled labour. Further, adopting a technology without really understanding it may lead to financial losses and data security risks.

6 GMSA, *The Mobile Economy Sub-Saharan Africa 2020* (London: GMSA, 2020), https://www.gsma.com/mobileeconomy/sub-saharan-africa/.

There is no doubt that the COVID-19 pandemic has forced governments and businesses globally to adapt operating models based on information and communications technology (ICT) faster than ever before. Companies have had to pivot and introduce new business models or digital solutions to survive. The large-scale adoption of work-from-home technologies, increased use of cloud services and explosion in online conferencing systems have allowed companies to continue their operations uninterrupted even during lockdown.[7]

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The digital economy in Africa is beginning to expand rapidly and more widely across various economies. *Forbes* magazine had this to say on African innovations stimulated by COVID-19:[8]

> The new wave of innovations on the continent has seen governments, universities, corporates and small business rally together to come up with rejigged solutions and find effective ways to combat the crisis … a raft of new ideas are emerging, from clever face masks to ventilator machines, and food delivery apps to contact tracing apps and robots.

The use of digital applications and tools has become more accepted by businesses and customers amid the ongoing COVID-19 restrictions – including cashless payments and online shopping. For instance, at the largest African ecommerce platform, Jumia, there was a peak in demand for and supply of essential goods at the start of 2020, realising a four-fold profit compared to the previous year.[9] More businesses are also incorporating digital strategies and leveraging their expertise to make ecommerce offers. In Nigeria, for example, Jobberman is an online platform that provides training and placement for job seekers; W3tutor offers digital training; Traindemy gives people access to online courses by vocational and technical schools; and the Eko Hotel now has an online food service.

7 For example, the University of Johannesburg's Cloudebate or the video conferencing application Gumzo ("chatting" in Swahili) which was created in eight weeks by Usiku Games, a Nairobi company that had previously focused on making video games for the African market.

8 "What's New and Exciting in the Land of a Thousand Ideas?", *Forbes Africa*, August 13, 2020, https://www.forbesafrica.com/entrepreneurs/2020/08/13/whats-new-and-exciting-in-the-land-of-a-thousand-ideas/.

9 Yomi Kazeem, "Africa's E-Commerce Boosted by Coronavirus Lockdowns", *Quartz Africa*, May 23, 2020, https://qz.com/africa/1855227/africas-e-commerce-boosted-by-coronavirus-lockdowns/.

The University of Johannesburg put it nicely:[10]

> We are living in a world beyond [what] we ever thought possible – a world *Beyond Imagining*. Everything that once felt certain has been destabilised: how we move about our communities, cities and the world; how we work; how we educate our children; and how we plan for the future. In our new world, nothing is as it was. In times like these, the creativity and innovation that defines the Fourth Industrial Revolution (4IR) is more critical than ever before. We need new solutions to solve unprecedented problems, and we need them to help make our world sustainable in the long term.

This new shift and rise in ecommerce has eased supply chains and introduced entrepreneurs to a new way of doing business, which they can adopt for the long term now that they have gained new customers. It has not been easy for all businesses to introduce digital solutions – some smaller companies have failed to do so and require targeted support. McKinsey & Company recently mapped potential COVID-19 implications and highlighted that Africa's economies could experience a loss of between $90 billion and $200 billion in gross domestic product (GDP) growth, with impacts varying by country.[11]

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The digital economy and ecommerce are considered key to the future of the continent and its rapid population growth.[12] The World Economic Forum estimates that 133 million jobs will be created globally by the digital economy, while 75 million will disappear as the result of the 4IR by 2022. In Africa it is forecasts that ecommerce has the potential to create 3 million new jobs by 2025.[13] The International Financial Corporation and Google predict that Internet connectivity in Africa will grow by 11% over the next decade, with the potential for the creation of 44 million jobs if Internet penetration is increased to 75% from the present 40% of the population (522.8 million). For each 10% increase in connectivity, Africa's

10 *Beyond Imagining* 3, https://universityofjohannesburg.us/4ir/beyond-imagining-issue-3/.

11 François Jurd De Girancourt et al., "How the Covid-19 Crisis May Affect Electronic Payments in Africa", Mckinsey & Company, June 4, 2020, https://www.mckinsey.com/industries/financial-services/our-insights/how-the-covid-19-crisis-may-affect-electronic-payments-in-africa.

12 AU, "The Digital Transformation Strategy for Africa 2020–2030", May 18, 2020, https://au.int/en/documents/20200518/digital-transformation-strategy-africa-2020-2030.

13 Kimberley Botwright and Matthew Wilson, "8 Ways to Help African Ecommerce Fulfil Its Potential", World Economic Forum, September 3, 2019, https://www.weforum.org/agenda/2019/09/8-ways-to-help-african-e-commerce-fulfil-its-potential/.

GDP will grow by 2.5% – higher than the 2% global projection.[14] If there is wider upskilling and training in areas such as AI, blockchain, ecommerce and cybersecurity, new types of jobs will be created.

This raises a general question about education, training and up-skilling, all of which are essential for the future. In particular, exposure to the digital economy and the 4IR needs to start at secondary level at the latest.[15] Some countries in Africa have already embraced this and introduced the 4IR into their secondary school curricula. Yet other education ministries have not adapted their curricula or only focus on teaching coding to students with advanced mathematics backgrounds. Coding is an element of the 4IR, but only tangentially.[16] A broader approach would be advisable, followed by courses on the digital economy at tertiary level (university and technical colleges) and specific training opportunities.

The African Continental Free Trade Area (AfCFTA) is designed to create a single market on the continent by removing tariff and non-tariff barriers (NTBs) to intra-African trade. Manufacturing in Africa has slowly decreased over the last decade, according to the UN Economic Commission for Africa (UNECA). One of the objectives of the AfCFTA is to reverse this worrying trend and develop a strong manufacturing base across the continent.[17] The AfCFTA is an opportunity to enable a single market of 55 African countries with a combined GDP of $3.5 trillion:[18]

> According to UNCTAD [UN Conference on Trade and Development], the initial reduction in tariffs should boost intra-African trade by 52.3%. Once countries drop the remaining 10% of tariffs (which they can maintain for 10 years to protect key industries) UNCTAD forecasts that intra-African trade will double. UNECA estimates that by 2040 intra-African trade in agricultural and food exports will increase by $16.8 billion, energy and mining exports by $9 billion and industrial exports by $43.3 billion. The main industrial sectors to benefit will be textile, wearing apparel, leather, wood and paper, vehicle and transport, and electronic (all increasing by over 25%).

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14 Google and International Financial Corporation, *e-Conomy Africa 2020: Africa's $180 Billion Internet Economy Future* (Washington DC: IFC, 2020), https://www.ifc.org/wps/wcm/connect/publications_ext_content/ifc_external_publication_site/publications_listing_page/google-e-conomy.

15 The AU Commissioner for Human Resources, Science and Technology, Prof. Sarah Agbor, during a webinar on International Literacy Day, September 8, 2020, called for the development of digital skills for teachers across Africa, especially post-COVID-19, to ensure dynamism in learning at all levels.

16 It is fully recognised that programming is essential. There are 690 000 programmers in Africa, mainly based in Egypt, Kenya, Morocco, Nigeria and South Africa. See Google and IFC, *e-Conomy Africa 2020*.

17 Yasmin Ismail, *Mobilising E-Commerce in Africa through AfCFTA* (Geneva: CUTS International, June 2020), http://www.cuts-geneva.org/pdf/eAfCFTA-Study-E-Commerce_in_the_AfCFTA.pdf; Landry Signé and Chelsea Johnson, The Potential of Manufacturing and Industrialization in Africa: Trends, Opportunities, and Strategies (Washington DC: Brookings Institute Africa Growth Initiative, 2018), https://www.brookings.edu/wp-content/uploads/2018/09/Manufacturing-and-Industrialization-in-Africa-Signe-20180921.pdf.

18 Lily Sommer, "Bridging the Policy-Dialogue for Digital Transformation in Africa" (UNECA and EFA Working Session, WTO Public Forum, Geneva, October 10, 2019), quoted in Alastair Tempest, *The Digital Economy and Ecommerce in Africa: Drivers for the African Free Trade Area*, Special Report (Johannesburg: SAIIA, June 2020), https://saiia.org.za/research/the-digital-economy-and-e-commerce-in-africa-drivers-for-the-african-free-trade-area/. UNCTAD, *Economic Development in Africa Report 2019* (Geneva: UNCTAD, 2019), https://unctad.org/webflyer/economic-development-africa-report-2019 estimated that trade would increase by 52.3% or $34.6 billion in 2022 if the AfCFTA was implemented: "The simulations also indicate that the real wages of unskilled workers may rise, accompanied by a slight shift in employment from the non-industrial to the industrial sector."

However, barriers to trade are not only caused by tariffs and NTBs. Africa lacks robust telecommunications and transport infrastructure, as well as skills. The challenges encountered in online payments and engendered by currency fluctuations reduce the attractiveness of cross-border trade, while electrical power is both expensive and unstable in many African countries. But the COVID-19 pandemic has stimulated development through rapid technical innovations and the means to sell at a distance – ecommerce.

CNN reported:[19]

> Lockdowns are also driving a move to online shopping in a continent where it has been slow to take off. The whole of Africa had only around 21 million online shoppers in 2017 – about the same number as Spain. That's less than 2% of the world's total, according to the latest UN data. Starting from a low base, e-commerce in Africa was on the rise before the pandemic. According to the UN Conference on Trade and Development, the number of online shoppers on the continent has grown by 21% annually since 2014, higher than the world's average growth rate of 12%. The launch of new platforms in response to Covid-19 has accelerated this growth, says head of e-commerce and digital economy at UNCTAD, Torbjörn Fredriksson. A recent study from market research firm Nielsen found that around 30% of online consumers in Nigeria, South Africa and Kenya shopped more online during the lockdown period.

Ecommerce, as one of the driving forces of the digital economy, prompts a series of other developments that reduce reluctance to sell online, including:

- ways to overcome infrastructural inadequacies (for example, by using drone deliveries);
- the introduction of online payment systems that reduce banking commissions and reach the unbanked;
- address solutions that ensure delivery and address the unaddressed; and
- the use of social media that allows cheap and effective marketing solutions for start-ups and other online businesses.

COVID-19 the disruptor has ushered in 'the new normal', and highlighted the significance of digitisation. This paper provides a synopsis of and insight into how COVID-19 has given focus to digital solutions and paved the way for innovation

19 Neil Lewis, "The Pandemic Could Be a Turning Point for Online Shopping in Africa", *CNN Business*, June 18, 2020, https://edition.cnn.com/2020/06/18/tech/africa-ecommerce-covid-spc-intl/index.html.

COVID-19 the disruptor has ushered in 'the new normal', and highlighted the significance of digitisation. This paper provides a synopsis of and insight into how COVID-19 has given focus to digital solutions and paved the way for innovation. It shows the potential role of emerging technologies to support new African business models and propel Africans to exploit digital tools and become leaders in production, trade and invention. This could end the long era of emulation of the developed world and start to provide 'African solutions for global challenges that benefit all'.

Following SAIIA's publication of *The Digital Economy and Ecommerce in Africa: Drivers for the African Free Trade Area?*[20] a number of people asked how all the innovations that constitute the 4IR interrelate to create the digital economy, and how they can integrate and become relevant in the African context. Inevitably, this paper is only a snapshot in time of African industrialisation and the AfCFTA, which is being put in place at the time of writing. Further research and work in related areas will follow this review to provide deeper insights into some of the areas discussed here.

Mapping digital solutions: The cousins of Moore's Law

Digital solutions have taken centre stage in the fight against COVID-19, a pandemic that most did not foresee or predict and the magnitude of which has impacted economics around the world. The world has pivoted into a technology-driven environment that is bringing to the fore groundbreaking digital solutions. Even a sector like tourism, which has been decimated by COVID-19, the introduction of 'virtual tourism' can capture tourists' interests until international travel starts again.

Data[21] is at the core of these emergent technologies. As we prepare to move into a post-COVID-19 world, reliance on strong data infrastructures will grow and become the source of many more digital solutions. With the world gearing up to embracing this data revolution, emerging technologies will play an increasingly prominent role in addressing global challenges, ranging from climate change and shortages in financing to unemployment. This will enable many decentralised platforms to emerge.

These digital advancements also support African economies, with virtual reality, AI and blockchain solutions now prevalent in the fast-expanding and thriving fintech ecosystem on the continent. Africa's most populous nation, Nigeria, has 60 million citizens without bank accounts. This number will rise among the country's population of 200 million if

20 Tempest, *The Digital Economy*.

21 The term "data" covers business data, including IP, finance, banking, manufacturing processes; government data, including all aspects of national activity, from national security and economic indicators to schools' curricula; and personal data, which is covered by privacy, and includes sensitive data, eg, religious/political affiliation, etc.

solutions are not found.[22] A plethora of start-ups are producing innovative products to fill the gap, including financing packages to address needs not met by traditional financial institutions. Post-COVID-19 African economies will be able to leverage the opportunities coming from thriving digital ecosystems, which will continue to expand over time.

Deep dive into some emergent digital solutions

Digital innovations, data and technology are playing a significant role in changing our way of life. The birth of the searchable Internet in the 1990s was a major aspect of this shift and has helped power the world's economy. It shapes businesses, education, transportation and communication for billions of people. From the smallest trade activity to the largest contracts being transacted online via digital platforms, mobile technology is being used by more than 3.5 billion people globally. However, Africa lags behind the rest of the world in terms of Internet usage, with only 40% of the population having access in 2019, compared to 60% for the rest of the world.[23] This is owing to well-recognised barriers, such as the high cost of Internet services, including data affordability; unavailability of services; high cost of internet devices; and poor IT literacy.

> COVID-19 containment measures have prompted businesses to explore digital ways to provide their services, adopting digital technologies and platforms to boost productivity and sales

COVID-19 containment measures, such as the lockdowns put in place to stop the spread of the pandemic, have prompted businesses to explore digital ways to provide their services, adopting digital technologies and platforms to boost productivity and sales. For example, Jumia reported rising sales during March and April 2020 in Tunisia and Morocco, when lockdown measures forced many consumers to turn to online shopping.[24] In another example, in Kenya, Twiga Foods, a marketplace that supplies retailers with fresh produce, partnered with Jumia to widen its reach, allowing households to order fresh foodstuff without having to visit supermarkets.

22 Eyitope Topsy Kola-Oyeneyin, Mayowa Kuyoro and Tunde Olanrewaju, "Harnessing Nigeria's Fintech Potential", McKinsey & Company, September 23, 2020, https://www.mckinsey.com/featured-insights/middle-east-and-africa/harnessing-nigerias-fintech-potential#.

23 Internet World Stats, "Africa: 2019", https://www.internetworldstats.com/stats1.htm.

24 Yomi Kazeem, "Jumia Is Selling More Groceries and Digital Services – but Revenue Fell in the First Quarter", *Quartz Africa*, May 13, 2020, https://qz.com/africa/1856896/africas-jumia-e-commerce-up-in-tunisia-morocco-with-covid-19/. Jumia operates in 11 countries. Those countries that imposed the strictest lockdowns saw the largest increases in online sales, while those countries with the least strict policies saw the lowest increases in online sales – or no increase at all.

Mobile money technology has grown quickly in Africa, and COVID-19 has encouraged people to use more cashless payments. In Rwanda, for example, the weekly volume of mobile money transfers shot up fivefold during the lockdown, according to data collected in April by the telecoms regulator and analysed by Cenfri, a South African think tank.[25] In Kenya, the central bank measured a 10% rise in the number of such transfers.[26] Policymakers in both countries had ordered a temporary cut in transaction fees to discourage physical cash transfers.

Governments have also turned to automated financial services as part of the response to COVID-19, while many are considering the potential of new financing models and ways to enhance the development of their financial systems. For example, many central banks are now evaluating the introduction of Central Bank Digital Currencies (CBDC), an area that has taken centre stage in global discussions on the future of money, exploring the potential impact of using digital currency for financial inclusion, monetary policy and financial stability.[27] The CBDC phenomenon needs closer investigation in the African context – particularly its relevance in addressing the issue of financial inclusion. CBDC has been signalled as the next innovation to spur electronic payments for goods and services using programmable digital cash supported by central banks.

Governments are also investing strategically and systematically in developing digital infrastructure, services and skills. COVID-19 has created a digitised economy in some regions of Africa and provided opportunities across the continent that would not have occurred had it not been for the pandemic. It is forecast that the Internet economy will increase by over $300 billion by 2025 owing to the penetration of mobile and other technologies, with ecommerce expanding at a rate of 40% annually.[28]

With the digital economy booming in Africa, governments are looking to digital innovations to support their offerings to citizens. Many governments are turning to digitised methods to deliver services, a trend that has grown during the pandemic. Countries such as Ghana, Tanzania and Rwanda are using drones and other technologies to deliver food, medication and other materials to rural communities. Governments are starting to focus on and invest in digitisation and emerging technology solutions to support e-government services, with some being advised by Western countries such as Estonia, which has a mature e-government ecosystem.

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25 Isabelle Carboni and Hennie Bester, "When Digital Payment Goes Viral: Lessons from COVID-19's Impact on Mobile Money in Rwanda:, CENFRI, May 19, 2020, https://cenfri.org/articles/covid-19s-impact-on-mobile-money-in-rwanda/. The Rwandan government also provided cashless payment systems for all taxis operating in the country to help reduce the spread of the pandemic.

26 The COVID-19 Crisis Is Boosting Mobile Money, *The Economist*, May 30, 2020.

27 The Central Bank Digital Currency Summit was held for the first time online from Nigeria on October 8, 2020. The summit attracted attendees and speakers from all corners of the world and had over 800 delegates.

28 According to the EFSA, the Mauritius Commercial Bank started an SME banking platform and mobile app, JuicePro, using the Backbase platform in September 2020. The mobile platform provides a bespoke banking experience, and will be replicated across all business lines using the Backbase Omni-channel banking platform. Data Integrated, a Kenyan tech firm, has developed a passenger counting, booking and cashless payment system that will reduce overcrowding and the need to use cash when using public transport in Kenya. Its innovation won second prize at the 2020 Brilliant African Innovations. See Ecommerce Forum South Africa, *Monthly Newsletter*, September 2020.

Many governments are turning to digitised methods to deliver services, a trend that has grown during the pandemic

With the basic infrastructure settings in place, innovations and converged emergent technology solutions including AI, the Internet of Things (IoT), blockchain and big data will play a significant role in reshaping the future. Countries such as Nigeria are bringing forward national blockchain strategies,[29] which signals high-level interest in these emergent solutions.

Cloud computing, meanwhile, allows the user to access big data, unlocks the IoT, and greatly increases data storage.

In the context of the digital economy it is important to point out how storing data on 'the cloud' works. Reputable cloud service providers offer their customers ownership and control of their content. This gives customers their own secure data storage environment and removes any potential hurdles in reaching a foreign entity. In addition, customers maintain full control of their content and responsibility for configuring access to the cloud services and resources. Cloud service providers typically provide customers with an advanced set of access, encryption and log-in features to help them do this effectively. They also provide application programming interfaces (APIs) to let customers configure access control permissions for any of the services they develop or deploy in a cloud environment. This provides far greater protection for businesses, consumers or governments than the use of local servers.[30]

Artificial intelligence and machine learning

AI is being used in a wide variety of ways to help make predictions, analyse data, and use big data and the IoT to make evidence-based decisions. The main goal of AI is to train machines to act in a particular way, as McCarthy said in 1995: 'Develop machines that behave as if they were intelligent.'[31] Tomasz Wnuk of RTB House added: 'AI will recognize us even if we don't recognise it!'[32] For example, in the marketing sphere AI and machine learning have brought about 'bots' that are used in customer relations to answer questions or provide product recommendations; AI orders our social media views and acts as a news aggregator based on our previous sentiments. For advertisers, machine learning provides

29 Nigeria, Federal Ministry of Communications and Digital Economy, "National Blockchain Adoption Strategy", https://bitcoinke.io/wp-content/uploads/2020/10/DRAFT-NATIONAL-BLOCKCHAIN-ADOPTION-STRATEGY.pdf?x46620.

30 EFSA response to the South African Competition Commission's discussion paper on Competition and the Digital Economy, October 5, 2020.

31 Andy Peart, "Homage to John McCarthy, the Father of Artificial Intelligence (AI)", Artificial Solutions (blog), October 29, 2020, https://www.artificial-solutions.com/blog/homage-to-john-mccarthy-the-father-of-artificial-intelligence.

32 Wnuk, "Artificial Intelligence Beyond Marketing".

the algorithms that ensure 'brand safety' by checking that the marketer's advertisement is not displayed close to that of a competitor or to programming that could be unacceptable to the advertiser's intended audience. Although AI has not reached its peak, with a global market cap of roughly $15 trillion by 2030,[33] it will evolve through technical improvements. Importantly, it relies fundamentally on the quality of data used in developing the algorithms that support AI deployment.

Machine learning provides us with translations and language recognition. Smart assistants like Siri and Alexa answer our questions, Shazam recognises music, and text generation can copy an author's style, while computer vision, image caption generation and computer-generated images provide us with entertainment and education. Face recognition and biometrics provide security. We have autonomous vehicles, drones, Google maps, 3D printers, and healthcare and medical diagnosis. AI can draft contracts and many other legal documents in a fraction of the time and with far greater accuracy than a physical lawyer.[34]

Another important use of machine learning and AI for Africa is programming designed to improve farming practices. As climate change creates greater challenges for farmers, programmes designed to assist in crop and livestock production are essential

Another important use of machine learning and AI for Africa is programming designed to improve farming practices. As climate change creates greater challenges for farmers, programmes designed to assist in crop and livestock production or provide data on weather patterns are essential. Some digital economy innovations bring farm produce to retailers in the cities, and help farmers to improve their production. For example, Twiga has cut out the traditional middlemen between the farmer and the city markets, and assists its farmers' production.[35] In another case, Acquahmeyer, a Ghanaian company, rents out drones that help small-scale farmers check the health of crops and use pesticides only where needed, reducing pollution and health risks. As a result of the reduced use of chemicals the produce meets EU requirements for organic food imports.[36]

33 pwc, *Sizing the Prize: What's the Real Value of AI for Your Business and How Can You Capitalise?*, https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html.

34 W H Gravett, "Is the Dawn of the Robot Lawyer Upon Us? The Fourth Industrial Revolution and the Future of Lawyers" (University of Pretoria, June 9, 2020).

35 International Trade Centre, "Making B2B e-Commerce Work for Africa: Introducing a Series of Case Studies on Business-to-Business E-Commerce Opportunities in Africa", May 13, 2020, https://www.intracen.org/news/Making-B2B-e-commerce-work-for-Africa/. There are a number of other businesses that follow the Twiga business model, including MaxAB in Egypt, Agriple in Nigeria (see Tom Jackson, "How Nigeria's Agriple Is Increasing Farmer Margins through Greater Market Access", *Disrupt Africa* August 7, 2020) and Tanzania's Kilimo Fresh, https://kilimofresh.co.tz/.

36 Emma Reynolds, "Innovate Africa: How Technology Is Helping African Farms to Flourish", *CNN Business*, October 18, 2019, https://edition.cnn.com/2019/10/18/business/smart-farming-africa-tech-intl/index.html.

There are many smart products and smart applications, and yet 'smartness' is still limited and relies on heavy computerisation, fed with accurate data to be effective. Insufficient or inaccurate data results in ineffective interpretations.

Many global innovative companies are using African talent to build AI and blockchain programmes.[37] For example, the Global Policy House invests in training and building a pipeline of African digital talent to strengthen capacity so skills can be developed to benefit Africa. This has resulted in more knowledge and talent evaluating new technologies that can help stimulate new thinking, new products, new jobs and a new breed of digital leaders and innovators. If other international organisations were to invest more in training and supporting the development of the talent pipeline, or if governments were to make this a requirement for foreign companies, it would help to anchor innovation in Africa.[38] The expanding digital talent pool on the continent must be leveraged and retained to service the African market.

Blockchain

The 'blockchain' buzzword has been used to refer to many things, from Bitcoin cryptocurrency to distributed ledger technology (DLT). This has led to confusion about what exactly is meant by blockchain. Blockchain is an innovative secure technology that comes from the family of DLT, which consists of various technologies with different capabilities. The advantage of DLT applications is they can help to eliminate many of the steps needed in a verification process. In simple terms, blockchain technology refers to a shared digital database or digital book of records. The shared database is often referred to as a ledger that contains 'blocks' of interconnected data (each 'block' links to the previous block, making up a chain of blocks of data). The blocks of data represent records or transactions, or one can think of them as elements of value (eg, money, property rights, votes, music royalties, etc.) that can be digitised and recorded onto the shared database or digital book of records and tracked in real time. Transactions are authenticated using digital signatures. The digital book of records is not controlled by a single entity; instead control is decentralised to a network of users who verify and agree to transactions. The digital book of records is shared and visible to all network users in real time. These network users might never have met in person but can transact without the need for middlemen and with greater levels of transparency and trust. Blockchains can be private, public or consortia networks. Blockchain is immutable and consensus-driven, making it an engine of trust and transparency that many can access. It has many uses and drives inclusivity, particularly for the marginalised and excluded.

37 For example, the Global Policy House, a global fintech and investment company, has been working with young talented people from Africa and elsewhere to design both AI and blockchain-based products and services. This helps to build skills and knowledge necessary for the future digital economy.

38 Sibahle Malinga, "African States Remain Tech Colonies, Says 4IR Commissioner", *ITWeb*, October 20, 2020, https://www.itweb.co.za/content/RgeVDqPYpV1vKJN3?utm_source=dailyEnews_link&utm_medium=email; Accenture, "Pivoting with AI", 2019, https://www.accenture.com/za-en/_acnmedia/PDF-85/Accenture-Pivoting-With-AI-POV-Brochure.pdf.

Blockchain is often dubbed the 'trust machine' as it enables trust in trust-less networks. This form of decentralised decision-making among peers makes it an attractive alternative to a traditional database controlled by a single entity, which is more prone to fraud, hacking and errors, and presents single points of failure

Blockchain is often dubbed the 'trust machine' as it enables trust in trust-less networks. This form of decentralised decision-making among peers makes it an attractive alternative to a traditional database controlled by a single entity, which is more prone to fraud, hacking and errors, and presents single points of failure. The data on the blockchain is further secured by cryptography and encryption, making it harder to tamper with. This budding technology is leading some of the most transformative digital applications in the world. Blockchain's first successful use case or application was Bitcoin, which is one of the most successful cryptocurrencies and secured through cryptography.

Developments in the use of blockchain and other emergent technologies are central to the success of the 4IR. Much has been said about the use of blockchain as the basis of cryptocurrencies and fintech, but it can be applied in numerous other industries. Blockchain technologies also allow the verification of companies or bodies. This enables individuals, businesses or governments to ensure that organisations are who they claim to be, building trust in cross-border business transactions.

Yet blockchain is not a magic wand. There are some challenges, as Chivunga points out: '[T]here are a number of challenges standing in the way of innovation, including digital connectivity, infrastructure issues, access to affordable data, greater education and awareness.'[39] In particular, unreliable and low-quality data will only produce poor and meaningless results. The technology on its own will not resolve every problem. For example, in the trade supply chain, blockchain can help digitise documentation, automate processes and authorise certain functions using smart contracts, but if these smart contracts are written badly or based on poor quality data, the results could be counter-productive and even harmful. The same is true for AI/machine-learning systems that are designed with poor quality data or badly managed. In short, a blockchain is only as reliable as its source data. The input will determine the quality of output.

39 Gareth Jenkinson, "Can Blockchain Make a Difference? Africa Sees Vast Monetary Potential", Cointelegram, November 15, 2020, https://cointelegraph.com/news/can-blockchain-make-a-difference-africa-sees-vast-monetary-potential. Here Michelle Chivunga states, "As the foundations are strengthened, I think Africa will see more solutions developed not only with blockchain but a convergence or mix of technologies. Africa can actually drive greater adoption, avoiding the legacy challenges, and designing solutions that are homegrown [and] could benefit Africa significantly."

Another technical advantage that blockchain has is its use of smart contracts: self-executing code that allow for the execution of agreed terms or transactions at a future date when initial terms are met. For example, smart contracts can be written to give automated instruction to execute a payment if goods are received from a cross-border transaction. Smart contracts can also be used to instruct the real-time sharing of personalised data among governments and stakeholders where relevant within a private blockchain network, for example. This can mitigate data abuse and ensure adherence to privacy rules around data. Much more work is needed not just on the technical developments of the technology but also on the other factors surrounding these innovations. Technology alone cannot change the mindsets of actors or cultures within institutions, so a combination of capacity building and education is also needed if adoption in this area is to grow.

Blockchain-to-blockchain system interoperability is key. There are various types of block-chains designed with different underlining protocols, which means that some blockchain systems cannot talk to each other. There can even be cases where smart contract-to-smart contract interoperability fails, adding to the scalability difficulties faced by some blockchains, although progress has been made with higher transaction outputs. These challenges underline the need for harmonised industry standards, as well as quality governance and regulatory models appropriate to the complexity of digitised innovations.

A key question is how much data institutions hold and how that data is ‘cleaned’, updated, managed and utilised to give meaningful insights or indeed help to build new African technology solutions

In the African context a key question is how much data institutions hold and how that data is ‘cleaned’, updated, managed and utilised to give meaningful insights or indeed help to build new African technology solutions. The quality of shared data will affect how these systems are developed, which underlines the importance for Africa to build its own data capital. Africa-based data centres should be governed by sound regulatory/governance policies to support the flow of data from these centres.

Blockchain can be an important catalyst for many industries and can help transform a number of areas, including land/property registry, identity, pharmaceuticals/healthcare, remittances and regional supply chains.

Chivunga recently highlighted the upcoming implementation of the AfCFTA as an opportunity for blockchain to play a ‘major catalytic role’ in supporting greater transparency, visibility and inclusivity across supply chains. She also hopes to see blockchain disrupt

wealth inequality across the continent and provide greater access to transparent and accountable financing:[40]

> An area I am passionate about is the opportunity blockchain presents to decentralize access to wealth to support greater financial inclusion and support especially for micro, small and medium enterprises; they make up at least 80% of businesses in Africa yet so under-resourced.

Having been engaged in the blockchain arena since 2010, Chivunga highlighted the importance of this industry, emphasising:[41]

> Take Africa, for example, we want to encourage a lot more interregional trade … We can try and look at doing that by tapping on blockchain again because blockchain allows that opportunity for transparency and opportunities to have a more cost effective way of trading and doing business between different markets. So there's massive potential there.

Finance application

Blockchain is an exciting alternative to traditional currency, centralised banking and traditional finance methods, changing the way we handle financial transactions and offering alternative uses that will change the world. In banking and finance, transactions can be processed in the quickest possible time with the integration of blockchain and digitised processes. Customers do not need to wait for days to verify accounts. In addition, private blockchains enable banks to conduct more secure inter-bank transactions.

As we have seen, blockchain is the bedrock of cryptocurrencies like Bitcoin. Traditional cash notes are regulated and verified by a central authority, usually a bank or government, and the value of the currency may be at risk if that central authority collapses. By leveraging the operations of blockchain, Bitcoin and other cryptocurrencies not only operate without the need for a central authority but also eliminate many of the transaction and processing fees. It also gives businesses and consumers in countries with unstable currencies an alternative with more applications and a wider network of individuals and institutions they can do business with, both domestically and internationally. Presently, the global payments sector is error-prone, costly and open to money laundering. It takes days if not longer for money to move across the world. With blockchain, customers can make cross-border payments easily and securely.

Cryptocurrencies are also an attractive way to overcome the challenges of currency fluctuations, particularly in cross-border business-to-business trade. As noted previously,

40 Jenkinson, "Can Blockchain Make a Difference?

41 Nasdaq, "How Blockchain Promotes International Trade, Identity and Financial Inclusion", *Bitcoin Magazine*, July 30, 2018, https://www.nasdaq.com/articles/how-blockchain-promotes-international-trade-identity-and-financial-inclusion-2018-07-30.

African countries have adopted different approaches, and some do not welcome cryptocurrencies.[42] However, South Africa has embraced cryptocurrencies[43] and Nigeria has recently classified cryptocurrencies as securities. The Central Bank of Zimbabwe, which in 2018 closed the country's cryptocurrency exchange, Golix, and warned against the use of cryptocurrencies, has now indicated that, subject to the agreement of the Securities and Exchange Commission of Zimbabwe, the Victoria Falls Stock Exchange (a subsidiary of the Zimbabwe Stock Exchange) will be open to listing Bitcoin and other cryptocurrencies.[44]

Chainalysis, a US research company, reported that monthly cryptocurrency transfers to and from Africa of under $10,000 (usually indicating micro, small and medium-sized enterprises [MSMEs] or personal transfers) increased by more than 55% to $316 million in the 12 months to June 2020. There were 600 700 transfers during that time. Nigeria, South Africa and Kenya led this increase. Bitcoin users told Chainalysis the cryptocurrency made their businesses nimbler and more profitable, and also ensured that the diaspora in Europe and North America could remit earnings without incurring punitive bank commissions.[45]

Cybersecurity

Blockchain is also becoming increasingly important in the development of cybersecurity systems. Globally, cybersecurity has become one of the top concerns for businesses and is one of the most sought-after new skills, with experts in short supply. For example, public sector services such as hospitals have been hit particularly hard by new types of ransomware aimed at disrupting connectivity, and by denial-of-service attacks during the pandemic. Inevitably, businesses and governments have also been challenged by employees' working from home. In offices, servers are regularly checked by IT staff and security operations centres are designed to look for anomalous behaviour, but once staff is removed from that controlled environment security becomes a major concern. The security and privacy flaws discovered on the popular Zoom video conferencing application are a reminder that innovative solutions using blockchain are needed to reduce exposure to cyberattacks.[46]

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42 There are bans or restrictions in Algeria, Burundi, Libya, Morocco, Namibia and Zambia. See Baker McKenzie, "Blockchain and Cryptocurrency Regulation in Africa", February 2018, https://www.bakermckenzie.com/en/insight/publications/2019/02/blockchain-and-cryptocurrency-in-africa.

43 For an excellent study of South Africa's approach to cryptocurrencies, see S Eiselen, "What to Do with Bitcoin and Blockchain", *Tydskrif van Hedendaagse Romeins-Hollandse Reg* 82, 2019.

44 Terence Zimwara, "Zimbabwe's Stock Exchange Open to Crypto Listing Subject to 'Regulatory Approval'", *Bitcoin.com News*, October 3, 2020, https://news.bitcoin.com/zimbabwes-stock-exchange-open-to-crypto-listing-subject-to-regulatory-approval/.

45 Chainalysis, *The 2020 Geography of Cryptocurrency Report: Analysis of Geographic Trends in Cryptocurrency Adoption, Usage and Regulation* (Chainalysis, September 2020), https://go.chainalysis.com/2020-geography-of-crypto-report.html.

46 Rae Hodge, "Using Zoom While Working from Home? Here Are the Privacy Risks to Watch Out for", C/Net, April 2, 2020, https://www.cnet.com/news/using-zoom-while-working-from-home-here-are-the-privacy-risks-to-watch-out-for/. Global cybersecurity company Kaspersky reported 28 million cyberattacks and 102 million detections of potentially unwanted applications – such as pornware and adware – in sub-Saharan Africa in 2020. See Ajifowoke Michael Gbenga, "Millions of Cyber Attacks Reported in sub-Saharan Africa this Year", *Ventures*, September 24, 2020, http://venturesafrica.com/millions-cyber-attacks-reported-sub-saharan-africa-year/?utm_source=Africa.com.

Healthcare

The healthcare sector can exploit blockchain technology to store patients' medical records securely. When a medical record is generated and signed it can be written into the blockchain, which gives patients proof that their data is secure and ensures that healthcare operators have a robust data management system. These personal health records could be encoded and stored on the blockchain with a private key, so that only authorised health personnel can access them, ensuring greater privacy and a secure way of sharing only necessary data.[47]

Empowering micro, small and medium-sized enterprises through blockchain

In trading, blockchain can be useful in recording transactions, which can be complex with processes susceptible to human error, fraud and misinterpretation. Blockchain's immutable ledger makes it suited to tasks such as the real-time tracking of goods along the supply chain, eliminating vulnerabilities and presenting a clean and transparent transaction. Through this digitisation, ecommerce can be conducted more efficiently, offering greater support particularly for MSMEs. MSMEs can gain access to wider domestic and international markets through more transparent digital platforms and global trading value chains, which increases competitiveness.

MSMEs face many challenges, including inaccessible and expensive financing; tariff-related barriers; lack of visibility within supply chains; difficulty in accessing value networks; and disjointed access to international markets. Blockchain can lower these barriers to entry

MSMEs face many challenges, including inaccessible and expensive financing; tariff-related barriers; lack of visibility within supply chains; difficulty in accessing value networks; and disjointed access to international markets. Blockchain can lower these barriers to entry and help MSMEs create new business models that allow them to grasp a greater share of the market in which they operate.[48] MSMEs can diversify their product offerings and secure more contracts when, for example, government procurement systems become

47 In general terms, COVID-19 has driven a large number of e-health related innovations – see Gabriella Mulligan, "The High Tech Health: Exploring the E-health Startup Ecosystem 2020", *Disrupt Africa*, June 26, 2020. According to the article, the number of start-ups active in the health-tech space in Africa has grown by 56.5% over the last three years, with 180 ventures currently in operation.

48 Michelle Chivunga, "Digital Assets and Financing for Sustainable Development" (Paper, World Economic Forum Conference, Davos, 2020).

more transparent and secure through blockchain technology. In addition, Blockchain can help provide a better audit trail of MSMEs' financial history, which in turn can help them achieve more accurate credit worthiness records needed by many lenders to analysis their suitability for financing.

Blockchain in Africa

The use of blockchain solutions across Africa is still mainly untapped. Few countries are implementing blockchain solutions, while there is wider adoption of AI and IoT solutions. This is not unusual, as most of the world has struggled to get a grasp on the concept of blockchain and the relevant applications. Many countries are still conducting pilots. Below we highlight a case where blockchain technology is being used to solve a practical land problem. According to Emmanuel Noah, the CEO of BenBen Ghana,[49]

> Accounting for up to 20% of the world's land-based assets, Africa represents an enormous wealth of economic opportunity. However, the presence of a system that offers secure, and trusted access to land markets that stem from these assets continues to elude many African economies. This is largely due to the lack of transparency and access to reliable land market data – a consequence of weak overburdened public sector registries and conflicting land tenure systems. Furthermore, it is estimated that only 20% of property transactions occur in the official domain. As a result, 80% of land market activity remains unknown and uncaptured.

BOX 1 THE CASE OF GHANA

Securing a property in Ghana comes with a host of problems, from red tape in the property registration process to someone unexpectedly claiming that the land you bought has since been sold to multiple individuals. Most instances lead to conflicts and disagreements. However, blockchain is now offering people a far more secure way to access and secure land.

BenBen is a Ghanaian-based land tenure and property tech start-up. It leverages DLT in building digital platforms for securing land-based assets and financial transactions in land markets. BenBen uses blockchain to ensure transparency and immutability in transactions via the platform. Since data and transactions are decentralised, each party in the chain is provided with equitable access, visibility and control of data based on present rules and conditions within the transaction process.

49 Jaclyn Bolt, "BenBen Ghana: Empowering Citizens by Providing Land Security", CTA (blog), https://www.cta.int/en/blog/all/article/benben-ghana-empowering-citizens-by-providing-land-security-sid0ff22d6c6-ddf1-400c-a6cb-395c42d4e468.

While this paper gives a snapshot of ways in which blockchain can be used, the technology is still poorly understood. There is a need for greater education on the role it can play. Blockchain's ability to create trust and transparency in systems could be of immense value to the AfCFTA, facilitating the flow of intraregional trade across African value chains. Greater transparency – be it more visibility in customs, shipping or government services – will lead to seamless end-to-end trade across the whole supply chain. Trade will flow much more fluidly and small-scale players will be able to interact if these technologies are used in the right way at the right time.

The opportunities to transform trade using blockchain have been well documented, and thought leaders in blockchain have highlighted the numerous benefits, to quote Michelle Chivunga Nsanzumuco:[50]

> I'm a big promoter of international trade and opportunities for countries to export and interact. Take Africa, for example, we want to encourage a lot more inter-regional trade. We can try and look at doing that by tapping on blockchain again because blockchain allows that opportunity for transparency and opportunities to have a more cost-effective way of trading and doing business between different markets. So there's massive potential there. Adding blockchain to the trading process has proven to reduce time spent completing trade-finance deals. What can now take a week to 10 days to complete could take just a couple of hours using blockchain technology, driving efficiencies that stand to transform not only emerging markets such as Africa but global markets as well.

In short, Blockchain is not only a trust machine but also an engine for data aggregation, transparency and inclusion to enable sustainable development and growth in Africa. The Global Policy House blockchain report, which is planned for 2021, will provide greater insight into how blockchain and CBDC architecture can help support financially excluded communities and transformation in Africa.

Re-industrialising Africa and growing pan-African trade

The African continental economy has been severely strained by the COVID-19 pandemic, which has taken a heavy toll on African economies, negatively affecting businesses, creating serious unemployment and putting considerable pressure on healthcare systems. The economic and social impacts are immense, costing the region between $37 and $79 billion in estimated output losses in 2020. The pandemic has limited trade operations, reduced agricultural produce and decimated job prospects. With such formidable challenges,

50 Nasdaq, "How Blockchain Promotes".

economic growth was expected to contract from 2.4% in 2019 to between -2.1 and -5.1% in 2020, sparking the region's first recession in 25 years.[51]

However, Africa shows great potential for trade and investment. Five of the top 10 growing economies of the world in 2018 were African, namely Ethiopia, Rwanda, Ghana, Côte d'Ivoire and Senegal.[52] With the AfCFTA at hand, there will be an increase in intra-African investment, which will spark a need for favourable conditions for the enforcement of property rights, as well as the removal of tariffs and other barriers to trade – facilitated under the AfCFTA. In Africa, approximately 80% of rural land is unregistered, which poses a threat to the enforcement of property rights. As shown above, blockchain technology used in land title-keeping systems can help to mitigate cases of land grabbing by dishonest individuals or officials and will give investors and citizens access to land records. These can then be used as collateral to secure capital.

Industrialisation is essential for the future of employment on the continent. Some commentators have suggested that the digital economy will reduce employment by removing both unskilled and some skilled jobs through the adoption of, among others, machine learning. This argument has been explored in terms of ecommerce and found to be incorrect. However, the debate is likely to continue until Africa has compatible and reliable data. Yet the link between industrialisation and the improved wellbeing of the population is not in question. Over the last few decades, industrialisation in China and India has reduced poverty significantly. Companies have been able to scale, and skills have been developed to respond to need.[53]

Digitalisation can accelerate the AfCFTA agenda, boosting intra-African trade by facilitating economic integration and inclusive trade, encouraging economies of scale through ecommerce channels, and leveraging the emerging technology solutions outlined earlier. For example, if electronic identity documents are adopted, Africans who are at present officially unrecognised will be able to participate in the digital economy and gain trade or employment opportunities.[54] In addition, digital tools such as blockchain can usher in greater inclusivity by ensuring more unrecognised people are introduced into the

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51 World Bank, *The African Continental Free Trade Area: Economic and Distributional Effects*, Report (Washington DC: International Bank for Reconstruction and Development and World Bank, 2020), https://openknowledge.worldbank.org/bitstream/handle/10986/34139/9781464815591.pdf.

52 Yinka Adegoke, "African Economies to Watch in 2019, and Looming Debt", *Quartz Africa*, January 14, 2019, https://qz.com/africa/1522126/african-economies-to-watch-in-2019-and-looming-debt/#:%7E:text=The%20good%20news%20is%20,that,remain%20in%20the%20top%2010. It should also be noted that from 2010 to 2019 Africa's total GDP grew by 4%.

53 See, for example, Matleena Kniivilä, "Industrial Development and Economic Growth: Implications for Poverty Reduction and Income Inequality", in *Industrial Development for the 21st Century*, eds. David O'Connor and Monica Kjöllerström (New York: UNECA, 2008), https://www.un.org/esa/sustdev/publications/industrial_development/3_1.pdf.

54 For example, the UNHCR's #iBelong campaign estimates that 136 million people in Southern Africa lack identification and/or are stateless (Facebook, "UNHRC Southern Africa", https://www.facebook.com/UNHCRSouthernAfrica/). Also see Geneva Internet Platform, "Digitalisation and the Realisation of the African Continental Free Trade Area (AfCFTA) for Africa's Digital Transformation", Digital Watch, April 3, 2019, https://dig.watch/sessions/digitalisation-and-realisation-african-continental-free-trade-area-afcfta-africas-digital. It is argued that some financial regulators impose unnecessary restrictions on those wishing to open bank accounts: Barry Cooper et al., "Identity Proofing for COVID-19 Recovery: Guidance for Regulators, FSPs and Market Facilitators" (Cenfri, Cape Town, August 2020), https://cenfri.org/wp-content/uploads/Identity-proofing-for-COVID-19-recovery.pdf.

> Digitalisation can accelerate the AfCFTA agenda, boosting intra-African trade by facilitating economic integration and inclusive trade, encouraging economies of scale through ecommerce channels, and leveraging the emerging technology solutions

economic and financial system, leading to financial inclusion and opportunities for these groups to create more secure and sustainable economic prospects.[55]

The use of Google Maps, for example, can provide precise addresses to 'address the unaddressed'. Ensuring accurate addresses not only is essential for ecommerce delivery but also stimulates financial and economic inclusion.[56]

The growth of online platforms has led to an increasing number of both established bricks-and-mortar retailers and new entrants using ecommerce. In addition, more small businesses have started to look at cross-border sales. They are supported by bodies such as Trademark East Africa or the Common Market for Eastern and Southern Africa's (COMESA) Virtual Trade Facilitation System, described as 'an electronic trade facilitation initiative developed to monitor consignments along different transport corridors across the region'.[57]

> The growth of online platforms has led to an increasing number of both established bricks-and-mortar retailers and new entrants using ecommerce. In addition, more small businesses have started to look at cross-border sales

Most ecommerce will remain national, or at best regional. In Africa, social media provides most opportunities for individuals or MSMEs to sell goods and services online. There is little data on ecommerce in Africa at present, but the Ecommerce Forum South Africa (EFSA), for example, estimates that there are about 8 500 e-shops in the country using systems such as Woo Commerce or Shopify, which provide e-merchants with a menu of services, from web design to payment systems. One study identified 106 e-marketplaces in South Africa, mainly specialising in one sector (eg, second-hand cars). Some marketplaces, such

55 Nasdaq, "How Blockchain Promotes".

56 Tempest, *The Digital Economy*. In some cases, ecommerce companies report that up to 30% of deliveries fail due to faulty addresses. This significantly increases costs for operators and reduces trust for consumers.

57 See COMESA, "Programme Activities: Trade Facilitation", https://www.comesa.int/programme-activities-trade-facilitation/. Ismail, *Mobilising E-Commerce*, 34–38, considers the promotion of ecommerce by RECs.

as Jumia, Takealot or Amazon, allow e-shops to use their platforms and benefit from their online payment and delivery services, etc. At the same time, the EFSA estimates that between 80 000 and 100 000 MSMEs and sole traders are using Facebook, Instagram, TikTok, YouTube and other social media tools to sell their goods and services online in South Africa.[58] While this is usually categorised as consumer-to-consumer marketing, such a designation can be misleading. There are also many companies that use mobile phone apps either in coordination with their websites or as a stand-alone tool to market online. Some of these are called 'super-apps' because they offer a wide range of services.

It is essential that the disadvantaged sectors of the African population are able to reap the benefits of the 4IR industrialisation process. Women, youth and rural communities traditionally miss out on such employment opportunities

It is essential that the disadvantaged sectors of the African population are able to reap the benefits of the 4IR industrialisation process. Women, youth and rural communities traditionally miss out on such employment opportunities. In particular, policymakers must take steps to address young people's needs. A study by the University of Washington (which questions the UN's population forecasts) estimates that the sub-Saharan African population will triple over the next 80 years. It projects that China's working-age population will decline from 950 million in 2017 to about 360 million in 2100, while India's will drop from 762 million to about 580 million. At the same time Africa's working-age population will increase rapidly. For example, in Nigeria the working-age population is forecast to increase from 86 million in 2017 to 460 million in 2100.[59]

Finding employment opportunities for this vast influx of young work seekers over the coming decades is a global issue. Large numbers of unemployed – or underemployed – are likely to destabilise the region and lead to further migration pressures. Other factors, such as the exhaustion of mineral resources and climate change, also come into play. It is therefore essential to introduce more opportunities for African industrialisation.

There are a number of solutions – one trend that can already be seen is the transfer of assembly plants for non-African produced goods. This policy has been followed for decades by many multinationals – the assembly of international automobile brands in South Africa

58 International Trade Centre, "Africa Marketplace Explorer", https://ecomconnect.org/page/african-marketplace-explorer. One of the most successful South African platforms, BrownSense, estimates that one-third of its 200 000 registered users sell via its Facebook-based platform.

59 The Lancet, "World Population Likely to Shrink after Mid-Century, Forecasting Major Shifts in Global Population and Economic Power", *ScienceDaily*, July 15, 2020, https://www.sciencedaily.com/releases/2020/07/200715150444.htm.

is one example. Chinese-owned electronics manufacturers have also recently established operations in Africa.[60] However, some opinion leaders feel that much more needs to be done to ensure that not just the assembly of pre-made parts but also full manufacturing processes are established in Africa. A powerful tool in this debate is the setting down of rules of origin under the AfCFTA. As AU Commissioner Albert Muchanga said, 'There is a need for a "Made in Africa" label.'[61] This would require that all or at least most of a product is manufactured in Africa by Africans.

When 3D printing was launched many welcomed it as a way to let small manufacturing centres in Africa to produce, under licence, specific products such as machinery spare parts. The argument goes that if spare parts could be 'printed' on site this would reduce transport costs and provide local employment. It could also address the present practice whereby raw materials are exported from Africa, processed abroad and then re-imported. Arguments over licensing rules (intellectual property [IP]) and responsibility for faults, together with the high outlay, slowed acceptance on the continent, but there are excellent examples of 3D printers being used in Africa to produce essential personal protective equipment and other medical goods during the pandemic.

The AfCFTA's potential and scalability

As many observers have pointed out, African industry lacks economies of scale, unless trade barriers can be dismantled and greater intra-African trade developed. Importantly, the vision of the AU Digital Transformation Strategy 2020–2030 (AUDTS) calls for [62]

> (a) reducing barriers to cross-border trade and market access by supporting Africa's efforts to establish a continental digital single market in line with the AfCFTA that aims at removing legal and technical barriers to trade;
>
> (b) developing an enabling regulatory framework for ecommerce at the continental level, including common rules for consumer protection;
>
> (c) allowing regional and continental integration of African data markets though open standards, while taking into account that security and regular upgrading of these tools must be guaranteed;
>
> (d) developing and improving the regulatory environment for financial and payment services, including support [for] mobile money; [and]

60 There is considerable debate over the transfer of jobs – inter alia, Yunnan Chen, "Africa's China: Chinese Manufacturing Investment in Nigeria in the Post-Oil Boom Era and Channels for Technology Transfer" (Working Paper 2020/36, China Africa Research Initiative, School of Advanced International Studies, Johns Hopkins University, Washington DC, April 2020), https://static1.squarespace.com/static/5652847de4b033f56d2bdc29/t/5ea7317f6ed4781cebc9c0ce/1588015487828/WP+36+-+Chen+-+Manufacturing+Nigeria.pdf; Jevans Nyabiage, "China Finds Manufacturing Opportunities in Africa", *Belt & Road News*, June 2, 2020, https://www.beltandroad.news/2020/06/02/china-finds-manufacturing-opportunities-in-africa/.

61 Albert Muchanga, "AU Africa Integration Day", AU, July 7, 2020, https://au.int/en/newsevents/20200701/africa-integration-day-2020

62 AU, "Digital Transformation Strategy".

(e) addressing issues relating to parcel delivery and propose solutions based on regional cooperation and supporting eco-system initiatives that tackle the issue of lack of physical addresses.

One of the central objectives is trade facilitation. Despite the AfCFTA's institutional goodwill, trade transactions are bureaucratic processes involving numerous actors, multiple interactions and piles of paper. Cross-border traders require documentation related to the commercial transaction, trade financing, transport and customs regulations. This demands increased coordination and creates administrative costs. Blockchain technology could promote efficiency in cross-border trade by easing supply chain financing, facilitating customs procedures, mitigating fraud and lowering costs in the long run.

Blockchain technology could promote efficiency in cross-border trade by easing supply chain financing, facilitating customs procedures, mitigating fraud and lowering costs in the long run

When it comes to the monitoring and implementation of the AfCFTA, blockchain can be used to track data on tariffs once goods arrive at customs. This would enhance transparency and accountability, especially for product- or country-specific tariff commitments. As discussed earlier, blockchain, through carefully designed smart contracts, for example, could help facilitate the successful delivery of goods via enhanced traceability and automated trade functions, complying with requirements on rules of origin and safety, and transparency in terms of customs duties.

The use of a combination of technologies such as blockchain and AI, or what is referred to as converged technologies, will also provide better data on Africa's trade.[63] At present, as an UNCTAD report points out, 'Africa loses at least $40 billion each year from the under invoicing of commodity exports from the continent, according to the latest comprehensive data available.'[64] The use of blockchain techniques will provide the information necessary to prevent this and other illegal outflows of capital from the continent. The UNCTAD report concludes:[65]

63 For example, there is a growing debate on the quality of economic data in Africa, which has led to criticism of the decisions of credit ratings agencies – see Misheck Mutize, "African Countries Need Reliable and Accessible Economic Data: Recent Ratings Show Why", *The Conversation*, October 20, 2020. Some RECs provide good statistics – for example COMESA, https://comstat.comesa.int/, which has a "Made in COMESA" section.

64 UNCTAD, *Tackling Illicit Financial Flows for Sustainable Development in Africa*, Economic Development in Africa Report 2020 (Geneva: UN, 2020), https://unctad.org/webflyer/economic-development-africa-report-2020.

65 UNCTAD, *Tackling Illicit Financial Flows*.

> These outflows represent a considerable opportunity cost to development in Africa, draining the capital available to invest and create jobs, and reducing the potential tax revenues governments could use to spend on infrastructure and social programmes. By some estimates, improving tax collection, along with curbing capital fight and IFFs, could raise tax revenue in Africa by an additional 3.9% of GDP, or $110 billion a year.

Digital developments such as blockchain also increase Africa's connectivity to the world, allowing MSMEs to access foreign markets, promoting their competitiveness and bringing about economic growth. With reduced trade transactions, African governments would be able to focus their resources on manufacturing and exporting high-value products.

A free trade agreement that prioritises digitisation enables the cross-border flow of data, therefore securing the transaction process while providing time-saving, seamless processes through trade finance documentation and allowing for geo-locating devices. The East African Community is the leading regional economic community (REC) in terms of cross-border trade facilitation. COMESA also has a free trade agreement that promotes the digitisation of customs and border procedures, validating eSignatures and eCertificates of origin and enhancing trade within the bloc, while the AfCFTA has introduced a system that allows businesses to identify trade barriers.[66]

Drawing the threads together: Africa 4IR industrialisation

The 4IR and the AfCFTA are designed to aid rapid digitisation and regional integration if the technologies outlined above can be utilised in the appropriate segments and industries. This will ease trade between African countries and so grow the market for digital products and services, and encourage industrialisation. Digital financing vehicles such as blockchain can help ensure that this happens more seamlessly. In order to leverage these technologies, it is key that the fundamentals and basic infrastructure are available. Because the successful implementation of many of the technologies outlined will rely on quality data, it is essential that African economies invest more in data collection, secure local data centres and implement clear data regulations. Africa faces challenges in terms of data access and affordability whose solution is paramount for the digital future we face. A lack of connectivity continues to threaten the growth of African economies. In order to bring the threads together we must tackle the issues around connectivity and access to data on the continent.

66 African Continental Free Trade Area, https://tradebarriers.africa/about.

Connectivity

In Africa one major challenge has been the lack of accessible, reliable and affordable Internet connections, and in some countries the high costs of data. This has encouraged Big Tech companies such as Facebook and Google to work with telecommunications firms to increase the undersea cables connecting the continent to North America, Asia, the Middle East and Europe.[67] However, these developments still require robust national coverage.

In July 2020 Alphabet's Loon project in partnership with Telkom Kenya started providing Internet services to a 50 000km^2 area across central and western Kenya, including Nairobi. The project uses 35 balloons stationed in the stratosphere, well above the range of a commercial airplane and offers a 4G LTE network connection. This is the first major use of balloons for Internet connection.[68] Another innovative Internet provider is Telelift, which has developed large tethered drones. These drones were originally designed as 'flying watchtowers' to protect game against poachers. They can hover for a month before they need recharging.[69]

Another system for improved connectivity is 'white space broadband', which can travel up to 10km through vegetation, buildings and other obstacles and is used to improve e-services (e-health, e-education, ecommerce) to increase access to mobility and for service delivery. The technology uses a spectrum of unused broadcast frequencies that it converts to wireless network use.[70]

It is important to bear in mind that Africa is the continent of the mobile phone. The Global System for Mobile Communications Association's 2020 report on sub-Saharan Africa points out that the mobile sector generated 9% of GDP in sub-Saharan Africa in 2019, with operator revenues accounting for $44.3 billion. It predicts that there will be just under 30 million mobile 5G connections in sub-Saharan Africa within five years, with unused 4G capacity likely to be the main area of focus among telecoms companies. By 2025, the

67 For example, Facebook's initiative, 2AFRICA, will connect 23 countries with 37 000km of cable. The International Telecommunication Union, "Connecting Humanity – Assessing Investment Needs of Connecting Humanity to the Internet by 2030" (ITU, Geneva, August 2020) estimates that nearly $428 billion is required globally to connect the remaining 3 billion people aged 10 years and above to broadband Internet by 2030.

68 Abdi Latif Dahir, "A Bird? A Plane? No, It's a Google Balloon Beaming the Internet", *The New York Times*, July 7, 2020, https://www.nytimes.com/2020/07/07/world/africa/google-loon-balloon-kenya.html.

69 Emma Reynolds, "Innovate Africa: Flying Cell Phone Towers: Could Drones Bring Internet Coverage to Remote Areas?", *CNN Business*, February 19, 2020, https://edition.cnn.com/2020/02/19/tech/tethered-drones-internet-africa-intl/index.html.

70 The technology was first tested in 2013 in Malawi in a partnership between the University of Malawi and the International Centre for Theoretical Physics (ICTP) in Italy. Another innovative solution is the Namibian "Citizen Connect", a collaboration between the Microsoft 4Afrika Initiative, the MyDigitalBridge Foundation and the Millennium Challenge Account Namibia, which delivers broadband Internet to remote areas to ensure that schools can communicate with other schools, businesses and government. In Kenya, a pilot project by Indigo Telecom/Microsoft and the government is delivering bandwidth speeds of up to 16 Mbit/s to three rural communities that lack electricity. Many other innovative examples exist in Africa.

report forecasts, 5G will account for just 3% of total mobile connections, compared to 58% for 3G, 27% for 4G and 12% for 2G.[71]

Investment

Another issue is investment in new technologies in Africa, but this has improved somewhat in the last few years. Venture capital (VC) reached $493.5 million in the first half of 2020. Most VC funding in 2019 (54%) went to fin techs, while ecommerce companies received an estimated $134 million.[72] Other estimates suggest that Nigerian ICT companies raised $747 million in VC in 2019; Kenya, $564 million; Egypt, $211 million; and South Africa, $205 million. In French-speaking Africa, Senegal led with $16 million raised in six deals.[73] VC has been augmented by crowdfunding and angel funding: in 2019 ABAN, one of the largest African angel funds, made an agreement with AfriLabs (the innovation hub organisation) to help fund suitable start-ups.[74] Some ICT leaders have also committed funding to African start-ups – in 2019 Amazon Web Services' Equivalent Investment Programme committed over ZAR[75] 365 million ($22.34 million) to the development of small black-owned South African businesses in the ICT sector over the next few years.[76]

However, there are serious barriers:[77]

> North America-headquartered investors accounted for 42% of all African venture capital deals in the last five years, according to the African Private Equity and Venture Capital Association. Only 20% of venture cash came from Africa-based investors, forcing the continent's entrepreneurs to seek support from westerners. While many were wary of speaking publicly, African entrepreneurs told *The Guardian* about humiliation, discrimination, stereotyping and sometimes racism that they endure in interactions with some of the world's most prominent investors.

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71 GMSA, "The Mobile Economy Sub-Saharan Africa 2020", https://www.gsma.com/mobileeconomy/sub-saharan-africa/. Even entertainment streaming providers like Netflix are adapting their systems to provide audio-visual programmes for mobile phones. The Netflix Mobile plan will allow users a simultaneous stream on a smartphone or tablet, while its Mobile+ plan includes the option of watching on a laptop.

72 Google and IFC, *e-Conomy Africa 2020*.

73 Partech Africa Team, *2019 Africa Tech Venture Capital Report* (San Francisco: Partechpartners.com, January 29, 2020), https://partechpartners.com/news/2019-partech-africa-report-here-and-its-best-yet-us-2-02-b-raised/. The report only focuses on African start-ups – companies with their primary market in Africa in terms of operations and revenues – and includes both disclosed and undisclosed deals. Two other reports on investments are WeeTracker and Briter Bridges. It is estimated that 90% of investment in Nigerian start-ups comes from non-Nigerian sources, which illustrates the challenges faced by start-ups trying to attract funding.

74 AfriLabs is a network organisation of 202 innovation centres in 46 African countries. According to *Disrupt Africa*, there were 640 innovation hubs in Africa in 2019, which between them raised almost $500 million in funding – showing year-on-year growth of almost 50%. See Tom Jackson, "There Are Not Enough Women-Led Tech Startups – and It's Costing Us All", *Disrupt Africa*, January 22, 2020, https://disrupt-africa.com/2020/01/22/there-are-not-enough-women-led-tech-startups-and-its-costing-us-all/.

75 Currency code for the South African rand.

76 "Finnovating for Africa 2019: Reimagining the African Financial Services Landscape", *Disrupt Africa*, June 20, 2019, https://disrupt-africa.com/finnovating-for-africa/.

77 Larry Madowo, "Silicon Valley Has Deep Pockets for African Startups – If You're not African", *The Guardian*, July 17, 2020, https://amp.theguardian.com/business/2020/jul/17/african-businesses-black-entrepreneurs-us-investors. A Google/Accenture survey – Africa Technology Ecosystem of April 2019 – confirms the difficulties African start-ups face, with 82% reporting problems to access funding. See Google and IFC, *e-Conomy Africa 2020*.

Of the top 10 African-based start-ups that received the most VC in Africa last year, eight were led by foreigners. In Kenya, for instance, only 6% of start-ups that received more than $1 million in 2019 were led by locals, a Viktorian Ventures analysis found. In Nigeria, 55% of the big money deals went to local founders, while in South Africa it was 56%. At the same time, Global heavyweights such as Goldman Sachs, Stanford University, the Chan Zuckerberg Initiative, Andreessen Horowitz and Sequoia Capital have all invested in start-ups started by white founders in Africa more frequently than they have invested in firms led by black Africans.

COVID-19 has reduced global investment in general, with African start-up ecosystems occupying the bottom half of rankings – South Africa at 52, Kenya at 62 and Rwanda displacing Nigeria as Africa's third-best start-up ecosystem at 65. In terms of city start-up ecosystems, no African cities were ranked in the top 100.[78] Startup Blink's 2020 report also suggests that owing to the COVID-19 economic collapse, 56% of Africa's start-ups are threatened with bankruptcy.[79]

Regulation

Regulation of fintech

An important aspect of both the 4IR and the AfCFTA is regulation. Traditional regulation can strangle innovation in the cradle. This is particularly true of fintech, where regulations designed for bricks-and-mortar banking are ill equipped to foster innovations in mobile money or cryptocurrencies. The regulatory environment needs to be revisited with regard to regulation and the digital economy. The digital economy is dynamic in nature and relates to more than just cryptocurrency, which is only a subset or one of the uses resulting from blockchain. Policymakers need to have a clearer understanding of the complexity of the sector before introducing regulations in this market. It is important to foster the 'sandbox' culture, where innovators and policymakers can work together to explore what recipe of

Traditional regulation can strangle innovation in the cradle. This is particularly true of fintech, where regulations designed for bricks-and-mortar banking are ill equipped to foster innovations in mobile money or cryptocurrencies

78 Tage Kene-Okafor, "According to StartupBlink, Rwanda Overtakes Nigeria as Africa's Third-Ranked Startup Ecosystem, SA Maintains Lead", *Techpoint.Africa*, June 8, 2020, https://techpoint.africa/2020/06/08/nigeria-drops-as-rwanda-rises-in-africas-startup-ecosystem-rankings-says-report/.

79 Kene-Okafor, "According to StartupBlink".

regulation – for example, regulation, self-regulation or co-regulation – is best for the market, taking into consideration the complexities of each African economy.

Africa has seen established interests use regulation to prevent innovation, particularly in the fintech sector. An example of this is the failure to establish effective mobile money in South Africa.[80] In order to meet future innovation in the financial sector more positively, the main regulatory bodies in South Africa – the Financial Intelligence Centre, Financial Services Conduct Authority, National Treasury, South African Reserve Bank, National Credit Regulator and South African Revenue Service – have formed the Intergovernmental Fintech Working Group (IFWG), which aims to encourage regulators and business to work together. The IFWG has an innovation hub, a regulatory sandbox (which started in September 2020), an innovation accelerator and a fintech digital platform, which are undertaking research on and debating potential regulatory approaches. This allows broad and inclusive discussion.

Intellectual property regulation

An open approach to copyright (IP) regulation is also essential. Most IP legislation in Africa is based on pre-digital technology. Applying such regulations to the 4IR poses serious problems for innovators. This has led some entrepreneurs to register their companies in countries with technology-friendly IP regimes, such as Mauritius. IP could be strengthened if countries leverage blockchain technology. Once ownership/IP rights are recorded onto the blockchain, fewer disputes and greater protection of inventers will result.

The use of blockchain to record inventions, copyrights and trademarks should be supported by a regulatory initiative at the pan-African level. This paper recommends that the AU launches a convention or similar initiative that addresses the issue of IP in the digital economy, as proposed in Phase 3 of the AfCFTA. This will be a challenge, particularly with regard to existing international agreements such as the Agreement on Trade-Related Aspects of Intellectual Property Rights (which limits the innovation member states can apply to issues).[81] The EU has spent years trying to find a suitable solution. However, the lack of an effective set of IP regulations at present encourages a brain drain of African innovative talent to the developed world.

Consumer protection

Aspects of the digital economy that affect individual consumers, such as ecommerce, must build trust to encourage online shopping. Trust is built not only on the individual reputation of the e-merchant but also on the underpinning legal backstop of regulations that ensure

80 South African Competition Commission, "Competition in the Digital Economy" (Discussion Paper, SA Competition Commission, Pretoria, September 7, 2020). This paper points out (page 55) that South Africa missed out on the benefits of mobile money due to rules that favour established interests.

81 Overseas Development Institute, Ec*ommerce in Preferential Trade Agreements: Implications for African Firms and the AfCFTA*, Draft Report for UNECA (London: ODI, October 29, 2020). This report also points out the restrictions created by US and EU regulations on source-code sharing and tech transfer.

that the consumer is protected. There are many aspects to this, including guarantees and warranties on products sold; prevention of misleading offers; clearly written contracts particularly for credit agreements; the right to return goods bought online within a specified time period; the clear labelling of products, including the details of the producer, and so on. Unfortunately, many African countries do not have consumer protection legislation, or only partially cover these issues under national competition regulations.

The AUDTS calls for a regulatory framework for ecommerce in Phase 3 of the AfCFTA negotiations, 'including consumer protection'.[82] This may be more important to the orderly development of the digital economy, and in particular the growth of cross-border ecommerce, than almost any other legal instrument to establish trust in online selling. African consumers deserve effective consumer protection that prevents fraud, shoddy and dangerous goods, misleading offers, etc.

It is crucial that one or more African ecommerce trustmarks are developed. Trustmarks are a proven way to build trust so long as they are based on the law and on established sector associations. These trustmarks should be supported by dispute resolution mechanisms that deal with cases where an ecommerce merchant has a disagreement with a customer about a purchase. Automated systems, such as machine-learning bots, can greatly assist in providing alternative online dispute resolution systems.

Related to consumer protection and privacy is competition regulation. The combined application of all these forms of regulation will provide a level playing field that allows businesses to operate fairly and consumers to shop with trust within the AfCFTA.

Competition regulation

A balanced competition environment is vital for 4IR innovations to flourish. In 2019 Ecommerce Forum Africa stressed the need for proactive anti-trust regulation in Africa:[83]

> We draw attention to the importance of having strong national competition authorities that can tackle abuses by dominant undertakings, where they occur. Without robust, cutting-edge enforcement, the African ecommerce market is vulnerable to exploitative practices that can harm African businesses and consumers alike. Competition regulators need to have a strong legal mandate and sufficient financial and human resources to invest in the data-intensive investigations that characterize modern digital antitrust enforcement.

This raises an essential issue, namely, how best to apply proactive and positive competition regulations that will promote consumer wellbeing, business effectiveness and innovation. UNCTAD has been providing technical assistance to develop competition policies

82 AU, "Digital Transformation Strategy".

83 EFA, "Principles for the Future" (White Paper for the AU Commission, EFA, Johannesburg, March 2019).

and regulations in developing countries for many years. In its new five-year plan it has announced a strategy focused on addressing competition, consumer protection policies and regulations impacting the development of the digital economy.[84]

In 2020 the South African Competition Commission stressed the need for a level playing field. At the same time, it is also vital that digital innovations are not compared like-for-like with pre-digital technologies, specifically in the communications and entertainment sectors. Regulators elsewhere have tried to compare apples with pears, forcing digital innovations into regulatory moulds created for analogue technologies – with disastrous results.[85]

Closer cooperation both at the AU level and internationally will ensure that competition authorities benefit from actions against cartels or abuses of dominant positions but avoid distortions to fair competition

Closer cooperation both at the AU level and internationally will ensure that competition authorities benefit from actions against cartels or abuses of dominant positions but avoid distortions to fair competition. Competition regulation, it should be remembered, can also be used to introduce unwelcome protectionism.[86]

Privacy in the digital economy

Innovations in personal data – whether in terms of function (eg, AI facial recognition) or as a by-product of the innovation (eg, personal financial data processed by fintechs) – raise major questions for data privacy. How does the human right to privacy, enshrined in many national constitutions and data privacy laws, square with the innovations at the heart of the 4IR? Algorithms, for example, use anonymised data to provide solutions for companies or governments to interrelate with individuals. Profiling in itself does not undermine privacy rights, but privacy advocates point out that it can be manipulated in ways that affect the individual without any recourse. It is thus important to recognise the limits of the 4IR in terms of privacy.

84 UNCTAD, "Review of Capacity-Building in and Technical Assistance on Competition and Consumer Protection Law and Policy" (TD/RBF/CONF.9/6, UNCTAD, Geneva, August 10, 2020), https://unctad.org/system/files/official-document/tdrbpconf9d6_en.pdf.

85 SA Competition Commission, *Competition in the Digital Economy*. The paper asks if on-demand communications services such as Netflix should apply the "must carry" content required of television broadcasters.

86 SA Competition Commission, *Competition in the Digital Economy*, 52. "In recent years, countries have taken protectionist policy decisions to protect their domestic markets from foreign competition." The paper goes on to ask if these policies are effective in a digital environment since data is intangible and highly tradeable.

As political commentator Lionel Stanbrook wrote, 'Facebook currently relies heavily on artificial intelligence to flag content that violates its policies – this is of course a lot cheaper than employing people.'[87] The author makes the point that while using AI to 'edit' Facebook content for unacceptable material is cheaper, it is still far less effective at removing hate speech, racism or false news than humans. AI can also be used to profile individuals detrimentally, preventing them from finding employment or accessing insurance, or classifying them according to race, religion, gender, etc., without recourse to appeal – often because individuals are not even aware that they have been profiled, or what algorithms have been applied.

The debate over privacy in the digital age is set to continue for many years. At present, national laws struggle to balance the rights of citizens and control global data processors such as Facebook, Google, Microsoft, Apple, Amazon, Tencent and Alibaba. Heavy fines for ignoring privacy laws seem to have become the norm in the EU and North America. So far there have been no similar cases in Africa, but doubtless these will come as data privacy regulators are better established. Most high-profile cases have centred on the misuse of personal data without individuals' knowledge or consent.

The case of Cambridge Analytica using data from Facebook users to influence election results is a classic example.[88] There are some important lessons to be learned from this. Even though Cambridge Analytica did not use complex data science methods, it was able to deploy commonly used data science techniques to target voters, as well as data-driven methodologies aimed at influencing people's political decisions through fake news and appeals to xenophobia, etc. The reality is that in the digital economy, the holders of large amounts of data ('Big Data') will increasingly take advantage. This is why it is important that there are clear data laws with enforcement guidelines in place to mitigate abuse.

The digital economy and data science are evolving rapidly. Inevitably, risks will increase as more complex technology methodologies are developed and deployed. It is becoming the norm for large institutions with data capital to target people through advertising based on online behaviour patterns. Regulators, governments and technology companies need to ensure there is sufficient protection for consumers.

On the other hand, technologies such as blockchain are being used to share and protect data, and decentralised data management systems that link into APIs are increasingly being explored. These advances include self-sovereign identity systems that are being

87 Lionel Stanbrook, "Facebook Is Becoming Hatebook. Should We Care?", Clement Write Right (blog), August 12, 2020, https://clement.co.uk/facebook-is-becoming-hatebook-should-we-care/. There is increasing concern about the role of social media in society and democracy. Netflix's *The Social Dilemma* is an excellent exposé of the issue from the Western point of view. See, for example, Belinda Barnet and Diana Bossio, "Netflix's The Social Dilemma Highlights the Problem with Social Media, but What's the Solution?", *The Conversation*, October 6, 2020, https://theconversation.com/netflixs-the-social-dilemma-highlights-the-problem-with-social-media-but-whats-the-solution-147351. More debate would be welcomed from an African viewpoint.

88 The two notorious cases – both in 2016 – were the UK's Brexit vote and the US elections. However, previously Cambridge Analytica had experimented on South African, Kenyan and Nigerian elections. Salem Solomon, "Cambridge Analytica Played Roles in Multiple African Elections", *VOA News*, March 22, 2018, https://www.voanews.com/africa/cambridge-analytica-played-roles-multiple-african-elections.

developed utilising blockchain solutions, allowing data protection to be amplified through options to share only the required information and permissions given to appropriate groups. Such solutions must be secure, practical and in alignment with regulatory policies.

Cyber security

It is misleading to call data 'the new currency'. This implies a stable, long-term value while data has a transitory worth. The more personal or detailed it is the greater its worth for a limited period of time. Cybercrime is extremely profitable, whether that is ransomware, phishing attacks, scams or spyware. Cybersecurity is therefore a new and vital skill. The AU Commission (AUC) prepared the AU Convention on Cyber Security and Personal Data Protection (Malabo Convention) in 2014 in an attempt to harmonise member states' approaches to these two interconnected issues.[89] Unfortunately, too few member states have ratified the convention.

Inevitably, as the amount of data multiplies, so too do opportunities for it to be compromised by data breaches. Credit bureaus, for example, build up detailed profiles of individuals through data supplied to them by banks, insurance companies and other financial entities, and by trawling the IoT.[90] The combination of many different sources of data and algorithms creates extremely detailed profiles, which may or may not be accurate. An example of the dangers of leaving AI to set profiles based on deep searches through IoT was highlighted in an investigative programme by Al Jazeera on Thomson Reuters, which had mistakenly labelled various organisations and people as terrorists and advised banks to close their accounts.[91] Stolen identities can similarly create serious problems for innocent citizens and be difficult to rectify.

> The greatest economic and political damage inflicted by cybercrime is when it targets both business and government data in order to steal or subvert IP or business plans, or infiltrate sensitive government data in areas such as security, taxation, economic plans, etc

The greatest economic and political damage inflicted by cybercrime is when it targets both business and government data in order to steal or subvert IP or business plans, or infiltrate

89 AU, "Convention on Cyber Security and Personal Data Protection", June 27, 2014, https://au.int/en/treaties/african-union-convention-cyber-security-and-personal-data-protection.

90 A case in point is that of Experian, a credit bureau, which allegedly handed over the data of 23 million South Africans to a third party between May and July 2020. Potentially, this data was far from harmless.

91 "The Database: Collecting the World's Financial Data", *Al Jazeera*, September 2, 2020, https://www.aljazeera.com/programmes/aljazeeraworld/2020/09/database-collecting-world-financial-data-200902090254832.html.

sensitive government data in areas such as security, taxation, economic plans, etc. This makes it increasingly important that governments cooperate to protect citizens, economies and administrations against cybersecurity threats.

Taxation

There are also some taxation issues in the digital economy. These fall into three main categories: the taxation of goods and services bought online; the taxation of digital economy players (particularly Big Tech companies); and the imposition of customs duties on cross-border electronic transmissions (known as the World Trade Organization [WTO] 'moratorium').[92]

The taxation of products sold online cross-border is covered by national customs and sales tax (VAT) rules. A major issue in Africa is the failure of customs nomenclatures to be clear and concise. A carrier can complete pre-clearance in the place of origin only to have a customs official contradict the classification and demand extra fees. In addition, the transport (eg, truck) may face delays of several days at the border, adding to costs. Ecommerce fulfilment is particularly susceptible to this treatment because the container may contain many different items (rather than a delivery of one product or type of product). The interpretation of customs duties is an issue for the AfCFTA. However, as explored above, blockchain can ensure that customs procedures are applied correctly throughout the process. Once the good has arrived, it is relatively easy to add local sales tax. But problems arise if customers believe that they have paid sales tax in both the exporting and the importing country. The imposition of either customs duties or sales tax on the cross-border sale of services creates other challenges.

Corporation tax is a separate issue and the taxing of digital economy players, particularly of Big Tech, has attracted a lot of international interest. The Organisation for Economic Co-operation and Development's *Inclusive Framework on BEPS*[93] estimates that tax evasion results in annual revenue losses of $100–240 billion globally. A report by the South African Parliamentary Budget Office highlighted this issue for the South African fiscus.[94]

Data localisation and data sovereignty

Much debate has recently centred on 'data sovereignty' (the legal ownership of data created, based on the physical place where it is held) and 'data localisation' (which requires

92 See, for example, Organisation for Economic Co-operation and Development, "Electronic Transmissions And International Trade – Shedding New Light on the Moratorium Debate" (Trade Policy Paper 233, OECD, Washington DC, November 13, 2019), https://www.oecd-ilibrary.org/trade/electronic-transmissions-and-international-trade-shedding-new-light-on-the-moratorium-debate_57b50a4b-en. This contentious issue is before the WTO Ecommerce Committee.

93 The OECD's Base Erosion and Profit Shifting guidelines address tax strategies used by multinational enterprises that exploit gaps and mismatches in tax rules to avoid paying tax. Developing countries' higher reliance on corporate income tax means they suffer from BEPS disproportionately. A total of 135 countries follow the OECD/G20 Inclusive Framework. See OECD, *OECD/G20 Inclusive Framework on BEPS*, Report (Washington DC: OECD, July 18, 2020), https://www.oecd.org/tax/beps/oecd-g20-inclusive-framework-on-beps-progress-report-july-2019-july-2020.htm.

94 Parliamentary Budget Office, "Digital Economy and Taxation Policy Considerations" (Taxation Brief, PBO, Pretoria, June 26, 2020).

that data created within a country's borders stays in that country). In both cases 'data' covers personal, business and government data.[95]

Data sovereignty can be partially solved by applying national privacy or data protection laws extra-territorially. The EU's General Data Protection Regulation, for example, covers the personal data of EU citizens worldwide. The South African Protection of Personal Information Act has a similar extra-territorial clause, but goes further by defining 'personal data' to include companies. It is essential that African nations take steps to protect data and consumers through robust data laws that clearly outline how data can be collected, shared and stored without heavy restrictions on data flows, which could prevent countries from capitalising on data for the benefit of Africans. Devising systems to ensure data sovereignty based on laws that are not restrictive can be beneficial for cyber protection around data and leave flexibility for Africans to build data capital.

The ongoing WTO discussions on ecommerce have tried to cover the concept of data localisation. Some countries have adopted regulations to ensure that data generated within their borders is stored in local servers. Russia and China are keen supporters of this, as are some African countries, including South Africa.[96] Data localisation, also referred to as 'data residency', can require that data generated on a nation's citizens, businesses or government is collected, processed and/or stored within national boundaries.[97] At times this data can be moved to international jurisdictions, if in compliance with set regulations and local privacy or data protection laws. At the core of this is seeking consent and finding clarity on how data will be used.

Data localisation laws are not a clear-cut choice between storage in local servers or in the cloud. In some cases, the rule only applies to government data, or has exceptions.[98] Some supporters believe that requiring local storage encourages local skills transfers and expertise. We suggest that while data sovereignty should be strongly promoted, data localisation needs careful consideration. Individual national servers where data is stored may have security vulnerabilities or be prone to cyberattacks, as opposed to more secure cloud-based data storage systems. Currently, South Africa has three core national servers that are used by neighbouring countries, while many countries in Africa have no data centres and smaller countries do not have the resources to set up costly infrastructure (it is important to note that large cloud-based storage can also be expensive). It would benefit the whole of Africa to have common data localisation rules in place, particularly as the AfCFTA's single market was scheduled to start operating from January 2021. Common laws that are carefully drafted, inclusive and enabling of the easy flow of data between

95 See, for example, Julian Box, "Data Sovereignty vs Data Residency vs Data Localization", Insights for Professionals, March 12, 2019, https://www.insightsforprofessionals.com/it/storage/data-sovereignty-data-residency-data-localization.

96 See ODI, *Ecommerce in Preferential Trade*, which covers this issue extensively.

97 Wikipedia, "Data Localization", https://en.wikipedia.org/wiki/Data_localization. In some cases, data on a nation's citizens or residents must also be deleted from foreign systems before being removed from systems in the data subject's country.

98 For example, Turkey has a data localisation law that covers all financial data, but an exception is made for financial data related to overseas trade. It is understood that India supports the concept mainly to ensure the protection of foreign data processed by Indian call centres.

borders could be advantageous to the whole of Africa rather than individual countries. Building data capital is paramount for Africa's growth.

Building the African renaissance and resilience

Necessity, proverbially, is the mother of invention. On the continent we see that playing out in terms of the innovative digital response to the COVID-19 crisis. This paper has reviewed the many technical advances being leveraged on the continent – 'African solutions to African challenges'. However, it is necessary to go beyond that to change the narrative of Africa on the global stage, with the slogan 'African solutions to global challenges'.

Initiatives such as Smart Africa, and its Transform Africa annual summits, have brought ICT ministers from 30 countries together to drive change through the digital economy. Countries take ownership of a Smart Africa project and roll out the solution on behalf of the group. For example, at present Smart Africa is looking at Smart villages (Niger), Smart towns and cities (Rwanda), e-payments (Ghana) and cybersecurity (Côte d'Ivoire). Eighteen other projects are underway.[99] While this initiative will produce concrete solutions to real issues, it goes further by changing the narrative that African countries do not easily cooperate on innovation within Africa. Smart Africa is building trust between countries.

The eight RECs, together with the AU, have worked for decades to ensure cooperation on the continent. Some projects have worked well, while others are still a work in progress. The AfCFTA will draw together the strings of much of this cooperation over the coming years to create the largest free trade area in the world, boosting intra-regional trade and paving the way for industrialisation, economic diversification and competitiveness.

There will be challenges – internally within African countries, and externally from trade partners – but these can be overcome by exploiting the tools available, some of which have been outlined in this paper. Paramount are the harmonisation of policies and an integrated approach to several areas, including but not limited to:

- instituting clear regulatory structures;
- leveraging the 4IR and digitisation;
- building capacity and training for reskilling;
- investing in interoperable digital systems, data strategies and infrastructure;
- equipping Africa's most valuable resources – youth and women;

99 As President Paul Kagane of Rwanda, the chair of Smart Africa, explained: "The creation of Smart Africa is a testimony of our resolve to put in place the right policy and regulatory environment that will encourage partnerships, entrepreneurship, job creation and knowledge sharing. Our move towards an ICT and knowledge driven economy together intends to increase Africa's competitiveness in the global economy. ICTs have the ability to level the global playing field, unlock human capital and harness its full potential." See Smart Africa, https://smartafrica.org/.

- creating clear dispute resolution mechanisms; and
- building on regional and international collaboration.

Perceptions of Africa both within and without will change slowly at many different levels. An example being encouraged by the South African Consumer Goods Council is the adoption of the GS1 system,[100] which uses data generated by barcodes/QR codes to allow retailers, logistics companies and the healthcare industry to track products and so guarantee more efficiencies. GS1 also helps prevent counterfeit goods from infiltrating the retail or healthcare sectors.[101] Counterfeit goods from the developing world are seen by some developed nations as a serious threat to IP, apart from any damage they may do to the environment and consumer well-being.

This paper does not aim to be polemic, but it is inevitable that it touches upon the high-level geopolitical aspects of the 4IR industrialisation of Africa. Africa's mineral and agricultural wealth is also needed by China, the US, Europe and India. The central question is who will control this natural wealth, the large labour force and the intellectual property generated by Africa's 4IR industrialisation. A strong Africa requires strong political will that does not waver in the face of economic challenge or other threats. This will be difficult to achieve from 55 sovereign states over the period needed to establish and solidify the AfCFTA.

In addition to the technical aspects of innovation – African solutions to global challenges – it is necessary to build 'brand Africa' – or, in Commissioner Muchanga's words, to create the 'Made in Africa' approach to Africa's industrialisation. Production of goods or services on the continent must go hand in hand with effective marketing that emphasises quality. A number of online African fashion platforms, led by Industrie Africa, have already found an enthusiastic clientele both on the continent and in the developed world. But we must also move into other areas of expertise. To some extent this is the old chicken and egg story – without the industry to produce, what products can Africa offer its trading partners? However, the success of the online African fashion industry should encourage other sectors to follow and explore ecommerce to develop and market goods and services globally.

In the previous SAIIA study on the digital economy as a driver of the AfCFTA, we looked at encouraging changes in the attitudes of youth.[102] There are youth ambassadors for renewal, for forests, for peace and for skills development, among other projects.[103] The authors proposed ambassadors for the digital economy to the AUC, including an ambassador dedicated to engaging the diaspora. Coordinating and building on the ambassador model

100 GS1, "What We Do", https://www.gs1.org/about/what-we-do.

101 Another example is Sproxil's mobile authentication technology "Defender", which helps consumers detect counterfeit medicines. Sproxil was developed in the US by a Ghanaian.

102 Tempest, *The Digital Economy*.

103 Africa Renewal, "Youth Ambassador", https://www.un.org/africarenewal/section/youth-ambassador; Afr100, "Who Are the AFR100 Youth Ambassadors?", https://afr100.org/content/who-are-afr100-youth-ambassadors; AU, Peace and Security Department, "Meet the African Youth Ambassadors for Peace", May 26, 2020, https://www.peaceau.org/en/article/meet-the-african-youth-ambassadors-for-peace; Africa Matters, "The Africa Matters Ambassador Program (AMAP)", https://www.africamattersinitiative.com/amap.

through a centralised system could strengthen the concept by interweaving commonly accepted pan-African messages, for example on the role of the AfCFTA.

Creating and marketing 'brand Africa' is an essential ingredient in the future success of the AfCFTA – and key to the economic revival of the continent. African entrepreneurs should be assisted with compelling arguments to look beyond their own national markets to sell finished products across borders, both within the AfCFTA and to the rest of the world. Providing those compelling arguments is the joint task of all the stakeholders – government, business and civic society. The digital disruptors discussed in this paper are some of the tools needed to spur African development forward.

Conclusion and recommendations

Together, disrupted international supply chains and domestic lockdowns during COVID-19 created a perfect storm in which income, goods and services stopped circulating as economies ground to a standstill. This resulted in no money, little movement, and a realisation that most African countries lack economic diversity and resilience. However, this is not an African problem alone. In addition, some African countries moved fast to put measures in place to manage the pandemic.

So, what is to be done? Simply put, there is a need to focus on fundamentals: producing more of what Africa consumes, and consuming more of what Africa produces. This does not mean cutting Africa off from the outside world. However, it does mean focusing first and foremost on the African market, and on other markets secondarily. It is necessary to think about Africa more as a single common market to facilitate scaling and growth. Producing and consuming locally will facilitate the development of local supply chains that will offer small companies and countries opportunities to leverage their strengths and specialisations and feed into large value chain networks that create more value through production, processing and distribution. And it means raising standards within African supply chains to enable African firms to produce world-class industrial products.[104]

It would be naïve to suggest that all African regions or countries will move forward in unison. Some countries are in a better position to benefit from the new 4IR innovations, either because their economies are stronger or because they are, for different reasons, more open to change or more entrepreneurial. The process of opening up internal trade on the continent must be proactive in meeting this challenge and finding political, social and economic solutions.

Despite the challenges of COVID-19, Africa is in a strong position to leverage the opportunities that the digital economy offers – if the continent can address some of the

104 Africa Press Office, "Regional Integration as a Tool for Wealth Creation in Africa", *CNBC Africa*, August 21, 2020, https://www.cnbcafrica.com/africa-press-office/2020/08/21/regional-integration-as-a-tool-for-wealth-creation-in-africa-by-khaled-sherif/.

challenges around infrastructure, connectivity, data and regulatory reform. These issues are usually interconnected. As the Google/FTC study points out:[105]

> Regulatory inconsistency can complicate or impact market access and limit investment opportunities for startups, impacting startup viability and investment decisions.

The world has pivoted into the digital revolution, mainly as result of the COVID-19 lockdowns. It is important that future crisis adaptation and preparation are better managed, and that scenario planning involves greater use of data and the digital tools available. In order to capitalise on the opportunities offered by the 4IR, it is paramount that regulators, policymakers and governments act on the following:

- All African economies should invest in scenario planning that takes into account impacts at national level, with a focus on evaluating the regulatory and business climate in countries to ensure the environment enables innovation.
- In particular, it is crucial to evaluate the existing rules and regulations to check how fit for purpose they are for a digital Africa. Clear data laws and clarity on regulation around the fintech ecosystem are necessary given the speed at which digital transformation is happening.
- It is important to develop more national data and statistics on the economy, including the digital economy, as this is essential for growth.
- Digitisation and ecommerce have been the silver lining in the COVID-19 clouds. That impetus must be sustained in order to encourage cross-border trade within the AfCFTA and to allow the use of many of the innovations this paper explored, including digital tools in the fintech ecosystem and emergent technologies such as blockchain, AI and cybersecurity.
- Education on the digital economy and the 4IR should start at least at secondary school level. The obsession with coding is outdated, and coding does not require that students have advanced mathematics.
- Investing in an Africa-wide education programme that focuses on re-skilling in the areas of emergent technology and digital transformation should be prioritised, as should long-term strategic plans for national governments to support economies post-COVID-19 to build lasting resilience and growth.
- There is a need to focus on training aspects that look at enhancing skills to enable digital trade, trade facilitation and preferential trade agreements that can help in negotiations in a post-COVID-19 environment.

105 Google and IFC, *e-Conomy Africa 2020*.

- In order to flourish, ecommerce needs robust and cheap Internet access/data. This is not just an ecommerce issue – it also speaks to the worrying digital divide in Africa. There are many signs that governments have heeded this challenge and launched various innovative solutions that can be used to strengthen Africa's positioning. More is needed.
- An even more challenging issue is transport infrastructure in much of Africa. Traditional approaches will take enormous investment and long timescales. Post-COVID-19 economic plans may be influenced by major infrastructure programmes, following the example of the New Deal economic recovery in the 1930s in the US. In the meantime, air transport, including heavy-load drones, is a partial solution.
- Digital packages and investment packages must be improved and diversified to assist more businesses across Africa to scale and grow, creating new pan-African business models and robust, secure and competitive local value chains. Such pan-African value chains will allow for the free flow of digital goods and services across the continent. We are already seeing this with the growth in ecommerce.
- Cross-border payment systems are urgently needed to solve a number of problems, including recognition of payment services (such as payment gateways) and restrictions on remittances in foreign currencies (and, as noted earlier, blockchain can be used to address money laundering and support more seamless and transparent financing).
- The most challenging issue for cross-border trade in Africa is fluctuations in currency exchange. Traders are forced to either accept these or use an international currency like the euro or dollar. Digital financing innovations can help to provide a solution for Africa. More attention should be paid to exploring new financing and payment phenomena, including CBDC.
- Cross-border trade facilitation for ecommerce is essential for any trade within the AfCFTA, whether on- or offline. Governments need to work with stakeholders to reduce barriers.
- All stakeholders – governments, business and civic society – should be encouraged to cooperate through common messages that promote the AfCFTA and its solutions. This feeds into the concepts of a new 'Brand Africa' and growing a pride in 'Made in Africa'.
- It is important to develop ambassadors to promote different aspects of African society, business and culture, while ensuring cooperation through a common set of messages on the renaissance of Africa and the AfCFTA.
- As the AU has recognised, national regulations can distort trade in many different ways. Crucially,[106]

  > Startups in many African countries must navigate complex regulatory environments with multiple regulators and agencies. As businesses move and grow into new countries and new markets, they need to scan each regulatory framework separately.

106 Google and IFC, *e-Conomy Africa 2020*.

- Much more needs to be done to ensure innovation-friendly IP regulation in Africa. This issue will be discussed under Phase 3 of the AfCFTA negotiations, and the AUC should prepare a convention as a model for member states.
- In a like manner, the AU Digital Transformation Strategy suggests a regulatory framework for ecommerce, including consumer protection principles. If this is not done consumers' trust in commerce, including ecommerce, will never be achieved. As far as ecommerce is concerned, trustmarks are a proven way to build trust so long as they are based on the law and on established sector associations.
- The South African model for preparing regulations on fintech through an inter-governmental body, the IFWG, is recommended as an effective approach towards innovation-friendly regulation. As highlighted in the paper, some countries in Africa are adopting a sandbox approach where governments, fintechs and other groups can meet to explore suitable regulatory models and developments in the industry. We propose other countries explore this collaborative approach to keep pace with fintech developments.
- Policymakers and decision makers should build a robust approach to data, explore data investment strategies and use the digital tools available to manage data securely. This is critical for the future deployment of core transparent and seamless trade supply chains.
- Data sovereignty should be supported. Data localisation needs to be carefully assessed. Pan-African approaches are recommended.
- An area of increasing concern is cybersecurity and cybercrime. Greater cooperation between AU member states to combat cybercriminals is essential, as is the skilling of cybersecurity experts.
- There should be greater investment in digital capacity building and trade facilitation to build up skills and re-skill Africa's expanding population, with an emphasis on youth, women and MSME training programmes.
- As the SA Competition Commission pointed out, the WTO should draft digital trade rules, since[107]

> [i]t will be a challenge to set international rules for or against digital protectionism in both large and developing economies because the competitive conditions in each economy are different. International rules and standards will need to be developed to enable the cross-border flow of data without compromising data protection rules, prevent a heavily restrictive localisation of data policy and facilitate flow and access to data.

107 SA Competition Commission, *Competition in the Digital Economy*, 52.

- AU member states should be encouraged support bodies like the African Development Bank, the ECA, RECs, Smart Africa, Tralec, Trademark East Africa and many others that work towards achieving a thriving African economy.
- Successful implementation of the AfCFTA resides predominantly in removing NTBs/ effective TFAs and using a range of digital tools to boost e-trade/ICT. It is recommended that working groups that include the main stakeholders are set up both at the AfCFTA Secretariat and at REC or national level to ensure a focus on these and the digital economy.

The Global Policy House and the Ecommerce Forum Africa have been working to support policymakers and many other partners internally across Africa and internationally to bring these recommendations to life.

Authors

Michelle Chivunga

is the founder and CEO of Global Policy House – a diaspora investment, digital economy and blockchain solution business exploring emerging technologies in the context of emerging markets, trade, enterprise and sustainable development. Michelle has been recognised as one of the 'Top 10 Women in Blockchain in Africa' and one of the 'Top 40 Global Fellows for Fintech4Good', working with the UN and others. She is a Senior Adviser to several governments and global institutions. In addition, Michelle is Ambassador for the World Union of Small Medium Enterprises.

Drs Alastair Tempest

is the CEO of Ecommerce Forum Africa and of the Ecommerce Forum South Africa. He has served as the President of the South African Institute of Interactive Marketing and COO of the Direct Marketing Association of South Africa. Previously he served as the Director-General of the European Advertising Tripartite; was a Director at Reader's Digest and Director-General of the Federation of European Direct & Interactive Marketing in Brussels. He has a BA (Hons) from the University of York, an MA from the College of Europe Bruges and read for his PhD at the University of Ghent.

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SAIIA is an independent, non-government think tank whose key strategic objectives are to make effective input into public policy, and to encourage wider and more informed debate on international affairs, with particular emphasis on African issues and concerns.

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Potential use of AI to analyse crop data (Igor Borisenko/iStock/Getty Images Plus)

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Jan Smuts House, East Campus, University of the Witwatersrand
PO Box 31596, Braamfontein 2017, Johannesburg, South Africa
Tel +27 (0)11 339-2021 • Fax +27 (0)11 339-2154
www.saiia.org.za • info@saiia.org.za