

AAPAM CONFERENCE, KSG MOMBASA

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**4R, DIGITAL TECHNOLOGIES, E-SERVICES FOR MODERNIZING
SERVICE DELIVERY**

**PRESENTATION DURING THE AAPAM CONFERENCE AT KSG,
MOMBASA, 15-19 NOVEMBER, 2021**

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16TH NOVEMBER, 2021

DEFINITION OF TERMS

1. **4IR** – The Fourth Industrial Revolution (4IR)— characterized by the fusion of the digital, biological, and physical worlds, as well as the growing utilization of new technologies such as artificial intelligence, cloud computing, robotics, 3D printing, the Internet of Things, and advanced wireless technologies, among others (Ndungu&Signe, 2020)
2. **Digital economy** refers to activities and transactions driven by the public and private sectors to produce, adopt, and innovate digital technologies and services to further enhance wealth creation, productivity, and quality of life (<http://mdec.my/about-mdec/what-is-digital-economy/>)
3. Blockchain is defined as a distributed (decentralised) database that acts as an open, shared, and trusted public ledger that is tamper-proof and can be inspected by everyone.

INTRODUCTION

“In a global economy, the government cannot give anybody a guaranteed success story, but you can give people the tools to make the most of their own lives”

—Philip Bobbitt, *The Shield of Achilles*

- Tooling and retooling the drive behind the 4IR, digitization and e-services to ensure improved and accessible service delivery to the citizenry. Period.
- Success in the 4IR characterized by digitization and e-services anchors on involvement of people, they in whom sovereignty is vested in democratic leadership and governance, in the design and implementation of customer responsive service delivery programmes enabled by technology

INTRODUCTION

- ✓ first industrial revolution, 1760 - the invention of the steam engine which birthed the transition from farming and feudal society to the new manufacturing process using coal as the main energy trains as the main means of transportation.
 - ▶ changed people's lives and economy from an agrarian and handicraft economy to one dominated by industry and machine manufacturing.
- ✓ Second industrial revolution, 1900 - the invention of the internal combustion engine - led to an era of rapid industrialization using oil and electricity to power mass production.
- ✓ third industrial revolution, 1960 – implementation of electronics and information technology to automate production – the computer or digital revolution because it was catalysed by the development of semiconductors, mainframe computing (1960s), personal computing (1970s and 80s) and the internet (1990s).

4IR – WHAT IS IT?

- ✓ The fourth industrial revolution (4IR), a term coined by ⁵ Klaus Schwab, founder and executive chairman of the World Economic Forum, describes a world where individuals move between digital domains and offline (physical) reality with the use of connected technology to enable and manage their lives
- ✓ **new technology which is a transformation of mankind;** a revolution that is fundamentally changing the way we live, work, and relate to one another whose scale, scope and complexity is unlike anything humankind has experienced before – reason it is called a revolution (**Klaus Shwaub, 2016**)
 - ✓ billions of people connected by mobile devices, giving rise to unprecedented processing power, storage capabilities and knowledge access
 - ✓ the staggering confluence of emerging technology breakthroughs, covering wide-ranging fields such as artificial intelligence (AI), robotics, the internet of things (IoT), autonomous vehicles, 3D printing, nanotechnology, biotechnology, materials science, energy storage and quantum computing, etc (Klaus Schwab, 2016, p. 7) - a fusion of technologies across the physical, digital and biological worlds.

4IR – WHAT IS IT?

- ▶ Characterized by:
 - ▶ velocity, scope, and systems impact evolving at an exponential rather than a linear pace, disrupting almost every industry in every country
 - ▶ profound shifts across all industries, marked by the emergence of new business models, the disruption of incumbents and the reshaping of production, consumption, transportation and delivery systems.
 - ▶ a paradigm shift in how we work and communicate, express, inform and entertain ourselves.
 - ▶ governments and institutions are being reshaped, as are systems of education, healthcare and transportation, etc.

4IR – WHAT IS IT?

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- ▶ 4IR must be viewed as an investment in creating new opportunities for Service Delivery and Productivity
- ▶ Govts. have become increasingly reliant on technology to deliver essential governmental services to citizens - increased efficiency and quality
 - ✓ Awareness about 4IR and the increased efficiency and quality associated with it led to increased Citizens expectations as to how digitization of government service/e-Services can help them access governmental services
 - ✓ Awareness puts pressure on governments to respond to citizen expectations more promptly
 - ✓ 4IR characterized by fusion of technologies frees leaders and managers to concentrate on strategic issues affecting government agencies
 - ✓ breadth and depth of the changes herald the transformation of entire systems of production, management, and governance.” (Min Xu , Jeanne M. David & Suk Hi Kim 2018; Schwab 2015)

4IR – WHAT DOES IT MEAN TO DIFFERENT PLAYERS?

- ▶ **For governments**, the advent of the 4IR requires a paradigm shift in policy and regulatory responses, governance, financing, capability development, and infrastructure investment.
- ▶ **For business**, the 4IR presents opportunities to increase productivity, reduce labour costs, and introduce new business and market opportunities
- ▶ **To workers**, the 4IR offers a better experience by saving time, improving their organisational skills and productivity, and providing a better work-life balance.
- ▶ **For societies**, the 4IR requires enhanced skillsets, trustworthy digital content, and up-to-date social welfare guidelines to ensure people's inclusion in the digital space, while providing opportunities to offer improved tools and solutions in different Sectors and societal spaces.

DIGITAL SKILLS AND THE FUTURE OF WORK IN AFRICA

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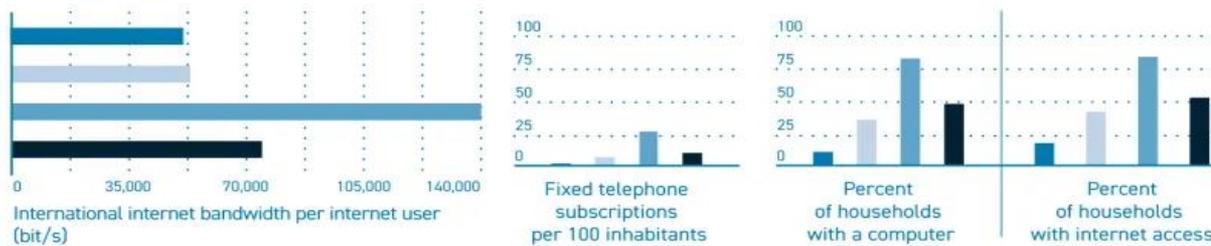
- ▶ 4IR has uncertain socio-economic consequences for Africa.
- ▶ The availability of digital skills in sub-Saharan African countries varies widely (World Bank, 2020. Future of Work in Africa)
- ▶ some skills such as social media, graphic design, and graphic literacy found in almost all countries in the region
- ▶ skills like cloud computing and game development are prevalent in only a few.
- ▶ Improvements in Africa's ICT sector have been largely driven by expanding mobile digital financial services - region had nearly half of global mobile money accounts in 2018 and will see the fastest growth in mobile money through 2025 (Ndung'u & Signe, 2020)

Figure 5.1

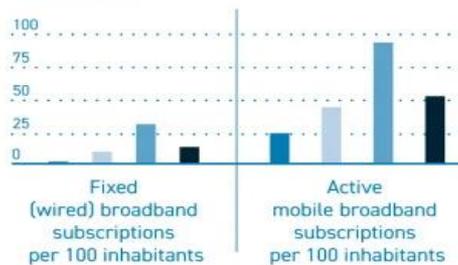
Africa's ICT development indicators

Africa still lags behind both developed and other developing countries in several indicators essential for the Fourth Industrial Revolution, especially in infrastructure, technology access, and education.

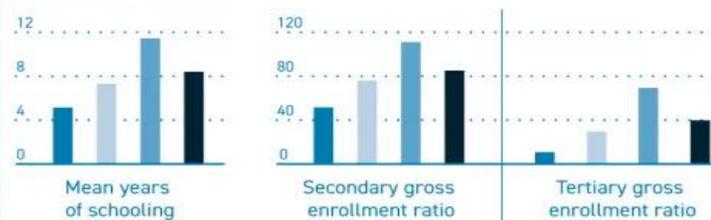
Technology access



Technology use



Technology preparedness



Legend: Africa (dark blue), All developing countries (light blue), Developed countries (medium blue), World (black).

Sources: Hebatallah Adam, "The Digital Revolution in Africa: Opportunities and Hurdles," Proceedings of the 10th International Conference on Digital Strategies for Organizational Success (2019) and International Telecommunication Union, Measuring the Information Society Report: Volume 1 (Geneva: International Telecommunication Union, 2018).

What needs to be done

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- ▶ a key issue for African policymakers is to position their economies to benefit from the 4IR while also managing the challenges that it presents.
- ▶ all stakeholders in the region will need to work to develop and implement 4IR initiatives in a coordinated way
- ▶ develop the visions of these initiatives to present a unified outlook and direction to form the foundation of a Digital African Community
- ▶ Consolidated Strategy on the 4IR for Africa to provide policy guidance in building the Africa Digital Community across the Political-Security, Economic and the Socio-Cultural spheres

What needs to be done

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- ▶ Accordingly, the Africa Digital Community should envision the following:
 - ▶ A digital Africa that is open, secure, transparent, and connected while respecting privacy and ethics in line with international best practices;
 - ▶ A digital Africa that harnesses technologies to build a resilient, inclusive, integrated, and globally competitive economy; and
 - ▶ A digital Africa that embraces innovation in transforming society and in contributing to social progress and sustainable development (Adapted from ASEAN, October 2021)

What needs to be done

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- ▶ three strategies that leaders should prioritize in order to capitalize on the Fourth Industrial Revolution:
 - African governments invest in education and reskilling programs to ensure that new technologies supplement, rather than replace, labor.
 - state and institutional capacity, including in cybersecurity, regional cooperation, and service delivery, must be reinforced to drive and support innovation and create an enabling business environment.
 - African countries must improve access to physical and digital infrastructure that supports advanced technology, such as electricity and broadband internet (ASEAN Secretariat, October 2021; Ndung'u & Signe, (2020))



Consolidated 4IR Strategic Framework

for a Digital ASEAN Community



ASEAN's 4IR Vision

A digital ASEAN that:

1. Is open, secure, transparent, and connected while respecting privacy and ethics in line with international best practices
2. harnesses technologies to build a resilient, inclusive, integrated, and globally competitive economy
3. embraces innovation in transforming society and contributing to social progress and sustainable development

Focus Areas and Strategic Priorities

Technological Governance and Cybersecurity



- 1. Mainstreaming good governance including through public service delivery digitalisation and e-government initiatives
- 2. Promoting technological governance taking account of global best practices
- 3. Observing data governance that respects privacy and security
- 4. Fostering cooperation and harmonisation in efforts to combat cybercrime and address cybersecurity

Digital Economy



- 1. Maximising the potential of digital trade
- 2. Embracing digital technologies towards Industry 4.0
- 3. Enhancing service sector competitiveness in the new economy
- 4. Special focus 1: Stimulating the adoption of smart agriculture
- 5. Special focus 2: Digitally enabling MSMEs to be globally competitive

Digital Transformation of Society



- 1. Promoting forward-looking HR development through formal and continuing education as well as workers upskilling and reskilling
- 2. Establishing digital inclusion for youths, women, senior citizens, disabled, informal or gig economy workers, and other marginalised
- 3. Fostering cultural development, especially on digital content, sports, and culture and arts
- 4. Improving well-being through the digitalisation of social welfare and protection
- 5. Accelerating innovation that contributes to environmental sustainability

Enablers \ Digital Infrastructure \ Capability Building \ Cooperation and Collaboration
 \ Institutions and Governance \ Resource Mobilisation \ Effective Monitoring

4IR - OPPORTUNITIES

- Opportunities entail:
 - ✓ opportunity to grow better connected
 - ✓ helps economies grow and become more competitive
 - ✓ empowers citizens and improves their livelihoods through digitalising the provision of basic social services
 - ✓ helps society decarbonise to meet sustainable development challenges confronting the region.

Turning these opportunities into reality requires that stakeholders work to develop and implement coordinated initiatives to embrace fully the 4IR while addressing potential risks that might arise.

4IR - OPPORTUNITIES

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- lower barriers between inventors and markets due to new technologies such as 3D printing for prototyping - allows entrepreneurs with new ideas to establish small companies with lower start-up costs - The entrepreneur can bring the product 'to reality' with 3D printing, without the traditional time constraints often encountered with traditional prototyping methods; thus removing the typical barriers to entry from the marketing equation
- more active role for the artificial intelligence (AI) – emergence of artificial systems that rationally solve complex problems offering new avenues to economic growth while at the same time pose a threat to many kinds of employment
- integration of different technics and domains (fusion) -innovative technologies will integrate different scientific and technical disciplines, creating new markets and new growth opportunities for each participant in the innovation. It blends incremental improvements from several (often previously separated) fields to create a product.

4IR - OPPORTUNITIES

- ▶ improved quality of our lives (robotics) - robots have the potential to improve the quality of our lives at home, work, and many other places. Customized robots will create new jobs, improve the quality of existing jobs, and give people more time to focus on what they want to do. They cook food, play our music, record our shows, and even run our cars.
- ▶ the connected life (Internet) - the Internetworking of physical devices. Typically, the IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine (M2M) communications and covers a variety of protocols, domains, and applications. (Min, et al 2018; Holler, et al. 2014)
 - The interconnection of these embedded devices is expected to usher in automation in nearly all fields, while also enabling advanced applications like a smart grid, and expanding to areas such as smart cities.

4IR – OPPORTUNITIES

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- ▶ Encouraging economic growth and structural transformation
 - ▶ the ICT sector in Africa has continued to grow- mobile technologies and services have generated 1.7 million direct jobs (both formal and informal), contributed to \$144 billion of economic value (8.5 percent of the GDP of sub-Saharan Africa), and contributed \$15.6 billion to the public sector through taxation (GSM Association, 2019; Ndung'u & Signe, 2020)
 - ▶ Digitization resolved information asymmetry problems in the financial system and labor market; thus, increasing efficiency, certainty, and security in an environment where information flow is critical for economic growth and job creation (Ndung'u & Signe, 2020).

4IR – OPPORTUNITIES

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- ▶ Fighting poverty and inequality:
 - ▶ The spread of digital technologies can empower the poor with access to information, job opportunities, and services that improve their standard of living. AI, the Internet of Things (IoT), and blockchain can enhance opportunities for data gathering and analysis for more targeted and effective poverty reduction strategies, e.g. mobile phone financial services like M-Pesa, reaching the underserved, including women, who are important drivers for sustainable poverty eradication. This has enabled households to save in secure instruments to enlarge their asset base and escape cycles of poverty.
- ▶ Reinventing labor, skills, and production:
 - ▶ Africa's potential workforce will be among the world's largest by 2030 and so, if paired with the needed infrastructure and skills for innovation and technology use, the 4IR represents a massive opportunity for growth. (Nsengimana, 2018; Ndung'u & Signe, 2020)

4IR – OPPORTUNITIES

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- ▶ Increasing financial services and investment:
 - ▶ Digitization impacted economic growth through inclusive finance, enabling the unbanked to enter formality through retail electronic payments platforms and virtual savings and credit supply technological platforms, e.g. Virtual savings products and short-term credit platforms include M-Shwari, KCB M-Pesa, and Equitel in Kenya; M-Pawa in Tanzania; and Mokash in Uganda and Rwanda, which has been extended to Côte d'Ivoire as MoMoKash (Ndung'u&Signe, 2020).
 - ▶ digitization enabling entrepreneurs and businesses to rethink business models that are more impactful, sustainable, and connected to other sectors of the economy- immense opportunities for job creation in Africa.
 - ▶ in West Africa and Kenya, blockchain has enabled efficient verification of property records and transactions, and expanded access to credit in some previously informal sectors of the economy..

4IR - OPPORTUNITIES

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- ▶ Modernizing agriculture and agro-industries:
 - ▶ Africa has yet to harness the full potential of its agricultural sector, and 4IR technologies provide an opportunity to do so
 - ▶ 60 percent of total employment in sub-Saharan Africa from Agriculture, and the food system is projected to add more jobs than the rest of the economy between 2010 and 2025 (Ehui, 2018).
 - ▶ Information on competitive pricing, monitored crop information, disease prevention tips, and disaster mitigation support has the potential to transform the agriculture sector to improve income, production, and demand throughout the continent.
 - ▶ Ghana-based companies Farmerline and Agrocenta offer farmers mobile and web technology for agricultural advice, weather information, and financial tips. Zenvus, a Nigerian startup, measures and analyzes soil data to help farmers apply the right fertilizer and optimally irrigate farms

4IR - OPPORTUNITIES

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- ▶ African entrepreneurs and startups are also using the Internet of Things to help farmers optimize productivity and reduce waste through data “precision farming” techniques.
- ▶ Improving health care and human capital:
 - ▶ 4IR technology can help mitigate numerous health challenges exacerbated by climate change, limited physical infrastructure, and a lack of qualified professionals in Africa and help build sustainable health care systems, especially in fragile states.
 - ▶ Mobile technology a platform for improving medical data and service delivery: e.g. mTrac – a mobile system used by about 27,000 public health workers in Uganda to report medicine stocks.
 - ▶ The SMS for Life program, a public-private partnership, reduces medicine shortages in primary health care facilities by using mobile phones to track and manage stocks levels of malaria treatments and other essential drugs.

4IR - OPPORTUNITIES

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care

- ▶ Rwanda was first country to incorporate drones into its health system, using autonomous air vehicles to deliver blood transfusions to remote regions.
- ▶ Technology also improved disaster response e.g. during the West African Ebola outbreak in 2014, WhatsApp became an easy method of dispersing information, checking symptoms, and communicating under quarantine (Atieno, 2017; Ndung'u & Signe, 2020)
- ▶ AI is being slowly implemented in Ethiopia to help medical professionals correctly diagnose cervical cancer and other abnormalities
- ▶ IBM Research Africa is also using AI to determine the optimal methods for eradicating malaria in specific locations and using game theory and deep learning data analytics to diagnose pathological diseases and birth asphyxia (Akinwande, 2018)

4IR – CHALLENGES

- 1) The breadth and depth in scale, scope, and complexity requires clear frameworks to facilitate integrated and comprehensive response, involving all stakeholders of the global polity, from the public and private sectors to academic and civil society (Schwab 2015)
- 2) the required levels of leadership and understanding of the changes underway, across all sectors, are low; yet expected to rethink our economic, social and political systems to respond to the fourth industrial revolution.
 - ▶ As a result, both at the national and global levels, the requisite institutional framework to govern the diffusion of innovation and mitigate the disruption is inadequate at best and, at worst, absent altogether (Schwab, 2016).
 - ▶ decision-makers are too often caught in traditional, linear (and non-disruptive) thinking or too absorbed by immediate concerns to think strategically about the forces of disruption and innovation shaping our future

4IR – CHALLENGES

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- ▶ the world lacks a consistent, positive and common narrative that outlines the opportunities and challenges of the fourth industrial revolution, a narrative that is essential if we are to empower a diverse set of individuals and communities and avoid a popular backlash against the fundamental changes underway.
- ▶ the revolution could yield greater inequality, particularly in its potential to disrupt labour markets - automation substituting labor across the entire economy - quest for new talent giving rise to a job market that may become increasingly segregated leading to massive job loses especially to the low skilled and low wage jobs – can lead to social tensions
- ▶ cybersecurity, hacking, risk assessment, and others.
(Lambert 2017)

4IR - CHALLENGES

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- 3) A higher level of alertness is raised up when our lives become extensively connected to various devices, from our cell phones, cars, and light switches to our home security cameras, and smart speakers
- Increased vulnerabilities owing to having everything attached to everything else in the IoT in any given network - burden of connectivity - systems will need to be more secure.
 - Public service institutions/Companies will need to map their networks, assessing the risk and critical factors relating to security and determine if these risks will be accepted, reduced, shared via insurance or other vehicles, or rejected
 - Individuals too should assess their risks – danger of the Internet having more information about individuals than is desirable. This underscores the need to examine the value of processes and assets, from machinery to intellectual property, ensuring that there is insurance, security measures and that any vulnerability is sufficiently identified.

CHALLENGES

- ▶ disruptive innovation impacting core industries and sectors, such as education, health and business.
- ▶ Disruptive innovation in higher education redefined the conventional ways universities delivered their content to students; new modes of curriculum and teaching have arisen, and the focus is changing from modes of teaching to modes of learning.
- ▶ Disruptive innovation reshaping how businesses operate: Thinking outside/without the box.
 - ▶ New markets being created and new products defined. [Netflix vs traditional TV, taxis vs uber and lyft, Airbnb vs traditional hotels]

CHALLENGES

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- ethical concerns emerging. Lots of debates have arisen in genetic engineering about the use of tools and research technologies - what guidelines, or regulation, or ethical boundaries we should establish in order to prevent the over manipulation genetics for desirable traits?
 - ✓ Infused with artificial intelligence and machine learning ability, robots have become smarter and more autonomous, but they still lack an essential feature - the capacity of moral reasoning - limits their ability to make good or ethical decisions in complex situations.
 - ✓ Differing moral values - Uncertainty over which moral framework to adopt underlies the difficulty and limitations to ascribing moral values to artificial systems. (Al-Rodhan 2015)

IMPLICATIONS FOR LEADERSHIP

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- ▶ Supportive governance structure to drive move from the existing models to allow an endogenous innovative environment.
- ▶ protection of the market by institutions through consumer protection laws and regulations that encourage competition.
- ▶ The profound uncertainty surrounding the development and adoption of emerging technologies emanating from their complexity and interconnectedness across sectors imply that all stakeholders of global society – governments, business, academia, and civil society – have a responsibility to work together to better understand the emerging trends

IMPLICATIONS FOR LEADERSHIP

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- ▶ multistakeholder cooperation across academic, social, political, national and industry boundaries. These interactions and collaborations are needed to create positive, common and hope-filled narratives, enabling individuals and groups from all parts of the world to participate in, and benefit from, the ongoing transformations.
- ▶ Why?
 - To develop a shared understanding which is particularly critical if we are to shape a collective future that reflects common objectives and values.
 - To fashion a comprehensive and nationally/continentally/globally shared view of how technology is changing our lives and those of future generations, and how it is reshaping the economic, social, cultural and human context in which we live.

IMPLICATIONS FOR LEADERSHIP

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- ▶ Changing Skills Demand - Global/national Leadership will need to make concerted effort to invest in skills development (see table on skills demand Schwab, 2016 p. 45)
- ▶ Gender gaps-Many of the traits and capabilities traditionally associated with women and female professions will be much more needed in the era of the fourth industrial revolution
 - ▶ need to redesign labour policies and business practices to ensure that both men and women are empowered to their full extent.

IMPLICATIONS FOR LEADERSHIP

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- ▶ The presentation has looked at the opportunities and challenges offered by the 4IR powered by emergence of complex new technologies and what needs to be done to ensure nations of Africa are not left behind.
- ▶ Designing consolidated frameworks for 4IR and reducing barriers to facilitate fast, efficient, effective and sustainable adoption of these technologies is the way to go for Africa and her nations.

Thank you.

References

- ▶ Consolidated Strategy on the Fourth Industrial Revolution for ASEAN Jakarta, ASEAN Secretariat, October 2021
- ▶ [World Bank, Future of Work in Africa 2020.](#)
- ▶ <https://www.brookings.edu/blog/africa-in-focus/2020/03/11/figures-of-the-week-africas-preparedness-for-the-fourth-industrial-revolution/>
- ▶ Victor Akinwande, "AI in health care: Where does Africa lie?" Techpoint Africa, March 26, 2018.
- ▶ Simeon Ehui, "Why technology will disrupt and transform Africa's agriculture sector in a good way," in Foresight Africa: Top Priorities for the Continent in 2018 (Washington, D.C.: Brookings Institution, 2018), 96-8
- ▶ Hebatallah Adam, "The Digital Revolution in Africa: Opportunities and Hurdles," Proceedings of the 10th International Conference on Digital Strategies for Organizational Success (2019) and International Telecommunication Union, Measuring the Information Society Report: Volume 1 (Geneva: International Telecommunication Union, 2018).
- ▶ GSM Association, The Mobile Economy: Sub-Saharan Africa 2019 (London: GSM Association, 2019)
- ▶ Jean Phibert Nsengimana, "How Africa Wins the 4th Industrial Revolution," Forbes, October 10, 2018.
- ▶ Ndung'u & Signe, (2020). Capturing The Fourth Industrial Revolution: A Regional And National Agenda
- ▶ Petre Prisecaru, "Challenges of the Fourth Industrial Revolution," Knowledge Horizons - Economics 8, no. 1 (2016): 57-62.
- ▶ Samuel Gebre, "Blockchain Opens Up Kenya's \$20 Billion Informal Economy," Bloomberg, June 13, 2018.
- ▶ World Bank, Can Africa Claim the 21st Century? (Washington, D.C.: World Bank, 2000).