Social Informatics and Use of ICT-Based Applications in the COVID-19 Era

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Abstract

The COVID-19 pandemic has changed the lives of people all over the world. This paper discusses some ICT initiatives by African governments in coping with the pandemic, specifically in the areas of work, entertainment, banking, health, education and judiciary. It also examines the considerable digital divide that still exists in access to ICT infrastructure in Africa as revealed by the pandemic and the implications of this for recovery and resilience. The paper concludes with the need for African governments to take innovative steps in strengthening the ICT sector and ultimately making broadband infrastructure accessible and affordable for use.

Keywords: COVID-19, Sub-Saharan Africa, ICT applications, Recovery, Resilience

Introduction

Social informatics is the study of the social aspects of computerization. According to Kling (1999:1), social informatics is "the interdisciplinary study of the design, uses and consequences of ICTs that takes into account their interaction with institutional and cultural contexts". Simply put, social

informatics examines the influence of information and communication technology (ICT) use in social settings. The key point emphasised in the definition of social informatics is the fact that institutional and cultural contexts influence the way ICTs are used and the consequences arising from their use. In this paper, ICT is broadly defined as a set of technological tools which enable information to be created, stored, shared or transmitted (UNESCO Institute for Statistics, 2009). Such tools or applications include computers; the internet; broadcasting technologies such as radio, television, audio and video players; and telephony.

The ubiquitousness of the World Wide Web has made it difficult to escape the influence of ICT-based applications in social settings, as they have become integral to almost every aspect of human life including work, education, health, banking, entertainment among others. They continue to shape individuals', households', organisations' and countries' access to information, people, services and technology. ICT is regarded as a dependable vehicle for achieving many of the 2030 Sustainable Development agenda. However, the global COVID-19 pandemic has presented an enormous challenge for reaching these goals. Notwithstanding the disruption in almost every aspect of life arising from the COVID-19 pandemic, the reliance on ICT-based applications has increased. ICT-based applications have been the focus of several business sectors and services as many technologies have emerged making the world more interconnected than it ever was and creating new ways to live, learn, teach, work and communicate.

Within the context of the COVID-19 era, this paper discusses the influence of ICT-based applications on the social life of Africans generally, using indicators in the Africa Agenda 2063 and the United Nations Sustainable Development Goals. Specifically, the paper focuses on the impact of these ICT-based applications on work, entertainment, health, banking, education and governance, relying on existing data from national, sub-regional, regional or continental levels. It also reviews the implication for recovery and resilience.

Work

The SDG 8 aims to promote decent work and productive employment for all. One of the targets of this goal is to make working environments secure as well as safe for all workers. However, according to the International

Labour Organization (ILO)(2020a), today's world of work is characterized by widespread deficits in decent work, and tackling this problem by workers, employers and governments continues to be a formidable task in many countries. The COVID-19 pandemic compounded this problem as many workers were exposed to the virus at their workplaces. Social distancing was one of the immediate responses to inhibit the spread of COVID-19. This led to most governments instructing the closure of all offices while employees and self-employed individuals work from home. Hence, many people for the first time had to rely on ICTs to support remote working or telecommuting.

Telecommuting (Telework)

Telecommuting is an employment arrangement where an employee works remotely outside of a traditional office with the aid of ICT (Eurofound and ILO, 2017). The prevalence of tablet computers and smart phones has enabled working from home and working on the move (ICT-mobile work). According to Barbuto*et al.* (2020) and Thulin*et al.* (2020), the benefits of telecommuting to both workers and organizations include performance enhancements, reduction in the costs of home-work commuting, higher employee satisfaction and saving time and organizational resources.

Telecommuting in the COVID-19 era

The COVID-19 pandemic restricted a large part of the working population to work from home and this led to an exponential rise in video and phone calls and demand for video conferencing. Many people organize meetings through online apps and collaboration platforms such as Zoom, Google Meet, Skype, WhatsApp, Microsoft Teams and FaceTime. For example, prior to the COVID-19 pandemic, full-time telework was not the norm among American workers even though 40% of the workforce held jobs that could be teleworked (Dingel and Neiman, 2020; Kochhar and Passel, 2020). However, the landscape of telecommuting changed abruptly with the onset of the pandemic as almost half of workers were expected to telework some duties at home (Guyot and Sawhill, 2020). Globally, this has led to an increase in the use of ICT-based applications. For example, Microsoft Teams had a 200 per cent increase in meeting minutes from 900 million in March 16, 2020 to 2.7 billion in April (Spataro, 2020). Eric Yuan, Zoom founder and CEO also reported that Zoom meeting participants increased from about 10

million as at December 2019 to over 300million daily in April 2020 (Zoom, 2020).

The use of ICT-based applications for telecommuting was also reported in Africa as seen by initiatives in some African countries. For example, in Cameroon, new modems, USB keys and software were provided by the Ministry of Forestry and Fauna, while a video-conferencing platform was set up by the Ministry of Postal Services and Telecommunications (ILO, 2020b). In South Africa, the Johannesburg Stock Exchange expressed its support for virtual Annual General Meetings to enable companies listed on the JSE to engage with shareholders during the pandemic (Atkins *et al.*, 2020). The Corporate Affairs Commission (CAC) in Nigeria agreed that companies could hold their AGMs by taking advantage of Section 230 of the Companies and Allied Matters Act on the use of proxies. This led to many companies successfully conducting their AGMs through proxy (Corporate Affairs Commission, 2020). Also, Ringier One Africa Media, operator of leading digital marketplaces in sub-Saharan Africa empowered and trained their employees on how to use video conferencing tools such as Zoom, Skype and WhatsApp, to enable them to work remotely (ILO, 2020b).

Implications for recovery and resilience

In a survey conducted in March 2020, 40 per cent of Americans reported working from home (Pew Research Centre, 2020), which coincidentally represents the percentage of Americans who held jobs that could be remotely worked. Evidently, the percentage of jobs that can be teleworked determines the population of people that can work remotely and thus cut down community transmission of the COVID-19 virus. This observation which was noted in other countries has been reported to be due to the very low level of jobs conducive to telecommuting in these economies (Dingel and Neiman, 2020). However, in Africa, the population of people that can work remotely is extremely low. According to ILO (2020c), only 6 per cent of Sub-Saharan Africans have occupations that can be teleworked. Determinants of telecommuting according to Hatayama *et al.* (2020) and ILO (2020c) include - economic and occupational structure, internet access, and likelihood of owning a personal computer. Based on these three determinants, Africa faces a serious challenge with telecommuting in the COVID-19 era and beyond as discussed below:

Economic and occupational structure: ILO (2020a) reported that about 55% of workers in Africa live in poverty. However, with the COVID-19 pandemic, an additional 60 million Africans could become poor (Africa, 2020). Moreover, countries where most available jobs are in ICT, insurance, finance, public administration and professional services sectors can have more employees telecommuting. This is however not the case in most African countries where employees are largely in the construction, manufacturing, tourism and agriculture sectors and are less able to work remotely (Moya, 2020).

*Internet access and likelihood of owning a personal computer.*These two determinants have been combined because according to International Telecommunications Union (ITU) (2019), in all regions of the world, internet access in households exceeds computers. The reason is that owning a computer is no longer a requirement for internet connection as access is also possible through other devices such as smart phones. The global digital divide leaves Africa struggling with inadequate internet access and available ICT applications to enable teleworking. Globally, internet access in Africa is the lowest at only about 30% (ITU, 2019), with just 25% of Sub-Saharan Africans having access to the internet, compared to 80% in Europe (Moya, 2020). Hence, for workers in many African countries, teleworking has been a challenge especially during the pandemic except for employees who work for organisations that specifically support them by providing the necessary hardware and internet access for telecommuting.

Despite this situation, Africa has the potential to improve on the SDG 8 (decent work) as according to Africa (2020), majority of countries (57%) are registering moderate improvements in the provision of decent work for the population. Moreover, the future of increased teleworking is bright in Africa especially in the face of a pandemic as experienced during the COVID-19 pandemic. As reports have shown, there is visible increase in tech-enabled businesses in Africa. PwC (2017) reports that between 2007 and 2016, mobile phone usage in Africa increased by 344%.

The entertainment industry

The entertainment industry consists of films and music. It is an industry which largely generates income through physical attendance of people at events. It is common to see people attend concerts and movie theatres which are the major sources of income for most actors and musicians (Das, 2020), and at the same time contribute to the national income of many

countries. For example, in Nigeria, the industry was a significant part of the Arts, Entertainment and Recreation Sector which contributed ₦291 billion (0.2%) to the country's Gross Domestic Product in 2019 (National Bureau of Statistics, 2020) and it is estimated that South Africa's music industry will hit $178m in revenue by the end of 2020 (Hruby, 2020). Little wonder the Federal Government of Nigeria included the entertainment sector as one of the priority sectors in the country's Economic Recovery and Growth plan with an estimated $1billion in export revenue by 2020 (PWC, 2017).

However, the COVID-19 pandemic changed the entertainment industry globally. Governments of many countries placed restrictions on movements and public gatherings in order to curtail the spread of the virus. Hence, physical attendance at concerts and movie theatres have been suspended, leading to industry players creating alternative pathways for their acts. This was possible due to the change in strategy witnessed in the entertainment industry some years prior to the pandemic.

The entertainment industry in the pre-COVID-19 era

A fundamental change had been made globally in the entertainment industry few years before the pandemic. The industry, which for many years competed based on content and distribution, began to focus more on user experience. Most players in the industry began to see the need to focus not just on the content of their productions but depending on digital technology and the internet to create an engaging user experience for their fans (PWC, 2017), and ultimately creating an industry which has become a single marketplace through ICT-based applications. Large companies such as Facebook, Google and Netflix embraced emerging technologies to create value and deliver contents directly to end-users without the traditional broadcasters, cable and satellite operators. Users also have access to music and films through ICT-based applications on mobile phones. Moreover, most African entertainers started promoting their contents on social media platforms especially Twitter and Instagram. It should however be noted that in addition to this use of ICT-based applications to drive content, many players in the industry especially those in the music category still relied on physical attendance in concerts to drive their major income. This however changed with the pandemic.

The entertainment industry in COVID-19 era

The entertainment industry has experienced a major downturn due to the pandemic. The restriction in movement and gathering of people, has led to

huge revenue loss for the industry. However, the pandemic led to an acceleration in the rate of digital adoption in the entertainment industry (Das, 2020; Okwumbu, 2020), in many ways including the use of mobile media such as TikTok and Instagram for online productions; a change from the cinema attendance to video-on-demand and applications such as YouTube, Netflix and Amazon Prime, and; digital concerts (music, stand-up-comedy) performed live on Instagram, YouTube and Zoom applications. Using these ICT-based applications, players in the entertainment industry have been able to showcase their talents without any interference from the traditional gatekeepers in the industry.

Implications for recovery and resilience

Similar to every other sector, use of ICT-based applications during and post pandemic to meet recreational needs has its challenges. For example, while the rate of global access to electricity is 87 percent, the rate in Africa is just 43 percent as most residents in African countries like Chad, Mozambique, Rwanda, Tanzania and Uganda suffer epileptic power supplies (World Bank, 2019a). Moreover, access to entertainment online is challenging considering the fact that only 30% of Africans are connected to the internet (ITU, 2019), and this is further complicated by poor networks and expensive internet costs. According to the World Bank (2019b), about 1.1 billion additional Africans would have to be connected to the internet for the continent to achieve universal broadband access, a requirement that is unarguably challenging for many African countries.

Banking

A twine exists among Sustainable Development Goals (SDGs) 8, 9, and 16 going by their focus on decent work and economic growth; building infrastructure that is resilient; and institutional development and peace promotion respectively (Africa, 2020). This twine is about increased social protection for global citizenship through Advanced Financial Inclusion (AFI) - a policy that makes financial services available to meet specific financing needs (Salami, 2019). Some level of leapfrogging, at times in unquantifiable quantity has been evident in the digital agenda of transformation in the banking sector the world over through the use of technology. Therefore, investments in ICT-based solutions have become critical in improving growth and innovation as enshrined in SDGs 8, 9, and 16.

The banking industry in the COVID-19 era

The use of ICT made the crisis caused by the pandemic bearable in developed countries. To curb the spread of the virus, digital banking solutions were sought. They quickly promoted contactless banking and reduced in-person transactions and exchanges using front-end digital platforms (Melamedov, 2020a). In the UK, banks offered peer-to-peer solution called "pay people nearby." This solution uses the bluetooth technology to make payments to users in their neighborhoods (Melamedov, 2020b). In other parts of Europe, digital channels(terminals) for self-service, call centers, mobile and Internet banking platforms were all ramped up to provide customer services with strict safety guidelines. Due to several safety and health requirements, the behaviour of bank customers changed swiftly overnight. This saw a rise in the usage of mobile banking applications and contactless payments up to over 80% and 30% respectively (Oertli, 2020). A rethinking of banking solution was therefore necessary, particularly in critical areas. Some of the critical areas and the Digital Innovative Solutions (DIS) relied on during the pandemic as stated by (Oertli, 2020) are discussed subsequently.

Clients' protection from deceitful transactions

Artificial Intelligence (AI) was channeled through Machine Learning (ML) for early warning system to curb Credit Card (CC) transactions with real-time data and adaptive analytics. Compared to the pre-COVID-19 period, Credit Card fraud reduced by over 40%.

Legal and regulatory requirements were fully supported

The technique of ML **t**hrough robust smart data analytics was applied to regulate and uphold legal requirements. Deviations in transactions and client profiles can be risky. With this technique, this risk in client transactions was averted with increased speed and quality during the pandemic.

Increased operational efficiency

ICT application drives automation. With data analytics, improved financial services were provided to clients. Robotics played a major role in this. They handled large documentation packages for clients with short archiving

time. In the Swiss banking sector, robots processed requests for credit facilities and data screening were done from incoming physical mails.

Better clients' services using data analytics

Efficient and relevant financial services, adequately tailored to meet clients' needs, were provided through digital solutions that relied on data and analytics. Some level of Neobanking thrived during the pandemic in France beyond the level of using mobile application. Digital fingerprinting served as a means of authenticating cardholders instead of signature or PIN code for mobile payments and biometric cards and as such, consumers avoided physical contact with terminals in the bank, shopping mall, among others (Gelze, 2020).

Implications for recovery and resilience

Given the peculiarity of Africa regarding ICT savviness, it will be true to say that customers are willing and ready to adjust themselves to digital banking solution. Presently, most banks in the continent have embraced the use of mobile applications and some level of online Internet banking. This is because of the growing level of Internet penetration and use of smart phones in the continent. The future of banking may well be Neobanking due to advancements in digital technology (Gomber*et al.,* 2018). With digital technology, which depends on ICT infrastructure Neobanks will use disruptive technologies that include big-data analytics, AI, block chain (or digital ledger) technology and cloud computing to dominate the traditional banking that rely on physical presence. The dire consequences of the current pandemic and the fear of being infected with the virus has made it imperative to look the way of Neobanking, which operates solely online using the Internet. However, poverty, lack of adequate ICT infrastructure, epileptic electric power supply, lack of quality education, are some of the challenges Africa as a continent will need to overcome. Though technology has so much to offer in the delivery of the SDGs, the onus lies on political leaders, policy makers and other stakeholders to use the right technology without abusing and using it to infringe on civic freedoms and other privacy concerns (World Bank, 2016; Khemani, 2020: 4).

Health

The health sector during the COVID-19 pandemic

The Sustainable Development Goal 3 (SDG3) target is achieving Good Health and Wellbeing (GH&W) for all global citizens irrespective of where they reside and their financial status (Cerf, 2018:1). Access to GH&W significantly reduces poor health and its negative effect on the wealth of individuals, a nation and cumulatively a continent. In most African countries, the weaknesses of existing health institutions were unveiled by the COVID-19 pandemic. However, though the health institutions are fragile, complex and tricky to manage, they are highly adaptive. The shortage of Health Workers (H-Ws) further worsened this challenge. As it stands, there are 1.30 H-Ws per 1000 population, which is far below the WHO-SDG required demand and supply threshold of 4.45 H-Ws per 1000 population to meet the SDG3 agenda (Liu *et al.,* 2017). As if these weak-spots were not enough odds against the vision of universal access to healthcare by 2030 (Africa, 2020); then came the pandemic with unprecedented vulnerabilities, thus warranting a rethinking of the healthcare systems globally. Some of these vulnerabilities are the risks of the pandemic to the health of H-Ws, the inability of H-Ws to remotely work from home, and the failure to strategically deploy early viral testing. In Africa, the shortages of sundry equipment for H-Ws, ICU ventilators and beds were abysmally high, and in most cases these materials were not even available (Nicola *et al.,* 2020). These challenges often left hospitals in chaos.

ICT use cases across the globe

The application of ICT has led to interesting results especially in the reduction of direct person-to-person transmission of COVID-19 virus. Generally, there has been reported cases of the use of ICT applications. Some of these instances of ICT use are presented as follows based on reports from (e.g. Boulos and Geraghty, 2020; CIPESA, 2020; EIB, 2020; HSRC, 2020; Nicola *et al.,* 2020; UN-DESA, 2020);

Telehealth/Telemedicine: This ICT use was visible in constrained environments that were created by the pandemic and was effective since it reduced personal contacts between the sick and the physician. Wearable IoT devices were used to track patients' vital signs remotely. Using the 5G wireless networks, Web robots assisted H-Ws in communicating and

monitoring patients. Personal diagnoses were also possible for patients through the use of Chatbots.

Drones: These unmanned aerial vehicles helped in minimizing human contact and interaction, and crowd surveillance. Equipped with aerial spectrum, sky speakers and cameras, they were deployed to make public announcements, manage the lockdown, and monitor sensitive places within cities. Crowed screening, the spraying of disinfectants, and delivery of medical supplies and other essentials were achieved with speed compared to the manual method.

Treatment modalities for mental health: Mental health spiked during COVID-19 and digital prevention and treatment were deployed virtually. In China, social media platforms were used to communicate and foster mental health education. From social media posts through Artificial Intelligence (AI), potential crisis and the likelihood of suicide attempt were identified and proactively addressed. In Singapore, online psychotherapy were provided using videoconferencing via mobile apps.

Treatment through the enforcement of quarantines: Self-quarantine was also initiated during the pandemic to continuously track patients via smart phones. Location data was used in tracking the movements of individuals on self-quarantine. Both background and identity parameters of carriers were published to alert others within the same circle of settlement to self-isolate and show the level of geographic risk and the progress of the virus.

Digital dashboard: Disease cases and their prevalence were easily mapped using geographic Information Systems and other online real or near-real-time ICT techniques. Predictive risk analysis with population travel data were done and shown on map-centric dashboards during the outbreak. The one in the John Hopkins Center for Systems Science and Engineering dashboard is a typical example. These dashboards inform health professionals and the public about an outbreak and gives early warning alert. It greatly reduced exposure among officials.

Medical supply chains: ICT was also used to provide elastic and more robust medical supply chains. This became useful in the management and coordination of the shortages of personal protection equipment that was massive during the pandemic.

ICT Use Cases in Africa

In Africa, the containment of COVID-19 was attributed largely to the strict adoption of WHO's health and safety guidelines, and other initiatives that include testing (on small scale), isolation, a little bit of contact tracing, physical/social distancing, treatment, restrictions of travels and public gatherings, lockdowns, improved hygiene and the use of face masks. The use of local approaches that rely on local herbal medicines has also been reported (Iwuoha*et al.,* 2020). In some African countries, digital and online platforms played significant role in the containment of the virus (Semo and Frissa, 2020). Presently, about 100 innovative digital solutions at different stages of testing and implementation have been reported in the continent (EIB, 2020). Some of these solutions include the use of robots that are remotely controlled to broadcast safety instructions, minimise bodily contacts, and ensure lockdown compliance in Tunisia. Drones are currently being used in Ivory Coast, Uganda and Senegal to inform citizens about the virus, sanitise vast areas (CIPESA, 2020), collect test samples in the rural areas to medical labs, and transfer blood between healthcare facilities in Rwanda and Ghana. Websites in local languages are hosted to inform locals about prevention in Cameroon, while people can self-diagnose themselves in Nigeria, South Africa and Sierra Leone using mobile apps. This COVID-19 app rely on users' exposure history and symptoms to help users assess their category of coronavirus risk by themselves. This has helped in reducing the pressure on healthcare workers and care centres. Currently, in Morocco digital healthcare apps are used to monitor patient's situation, drug stocks, and the distribution of equipment through real-time dashboard (EIB, 2020).

Implications for recovery and resilience

Some disruptive digital technologies will hold sway in the healthcare industry worldwide (e.g. drones, IoMT - Internet of Medical Things, which is a type of Internet of things, Machine Learning, Big data, Block chain, and 5G technologies) to sustain and improve on the management of the current pandemic. These technologies will improve especially with data availability. However, the continuous use of these technologies in Africa will depend on improved Internet access and increased use of smart phones due to citizens' purchasing power, and other factors. Digital literacy is another factor that is already limiting the use of these technologies. Benefiting optimally from using these technologies in the continent will

need a balance of privacy concerns and health imperatives, the right policy and political will.

Education

The largest disruption to education systems in history was created by the COVID-19 pandemic (United Nations, 2020). These disruptions are worsened in parts of Africa that lie south of the Sahara, where, prior to the pandemic, 47% of the world's 258 million out-of-school children live, 30%due to conflict and emergency (UNESCO Institute for Statistics, 2019). Education became an important factor to keep in mind during COVID-19 pandemic lockdown ordered by the governments of most countries as one of the measures to curtail the spread of the virus. Education is beneficial to all, it primarily drives progress across all the Sustainable Development Goals (SDG)(United Nations, 2020). The focus of SDG4 is to promote an all-encompassing, equitable quality education and lifelong learning opportunities for everyone. For schools to operate beyond a physical classroom environment that shelters students from outside distractions, during the lockdowns, many governments and educational institutions have turned to Information Technology (IT) for learning continuity (eLearning Africa, 2020). Digital technologies have been utilised to create alternative pathways to learning. There has been a massive exposure of computer-based and online applications following the pandemic. Coursera declared a free access to their catalogue till July 2020, through an initiative termed "Coursera for Campus" but later extended till September 2020. It was meant to impact the education world in the COVID-19 era. The University of Ibadan, Nigeria, among other universities around the world, benefited from this initiative coming from a giant online training company. In India, Byju's[1] and some others have opened access to live classes for students to continue their learning from home. Director and Co-founder of Byju's, GokulnathDivya, said in a statement that the number of new students using his company App to learn from home daily, has increased by 60 per cent in a week (Raad and Khan, 2020).

Rising Academics is providing SMS-based curriculum to learners in Nigeria, Sierra Leone and The Gambia, while Eneza[2] Education is providing similar services in Cote D'Ivoire and Ghana. Radio and television

[1]https://byjus.com/
[2]https://enezaeducation.com/

have served as educational tools across West Africa (Ajadi, 2020). Some of the States in Nigeria have used radio and television-based educational solutions. They launched programmes on their local stations to teach primary and secondary school students. Generally, many schools engaged their students using the WhatsApp platform to share video recordings of subjects and assignments with their students while the students turned in their work using the same platform. Some schools were able to conduct online examinations using Learning Management System (LMS) quiz tool and other exam software. Zoom, Google Classroom, WhatsApp and YouTube are among other tools that are currently used for online teaching. During stay-at-home orders, a virtual class was successfully held in the University of Ibadan, Nigeria with 940 participants in attendance using the combination of Zoom, Telegram and Google form. The form was used to collect the students' details, Telegram was used for class administration, while Zoom served as the virtual platform. It had its attendant challenges but was adjudged effective and efficient overall.

The COVID-19 pandemic experience has equally allowed us see the impact of the digital divide. According to the International Telecommunication Union (ITU) estimates, 21 percent of learners in Africa have no access to the 3G mobile networks, while 82.2 percent of homes lack internet access (Silvia, 2020). African leaders are expected to reflect on the indispensable role of ICT in education and build partnerships with private technology companies to bridge the divide to allow for implementation of a robust digital learning strategy. This is required to address the loss of learning that has happened during school closures and to prepare for any similar occurrence in the future. School closures especially during this pandemic, have led to loss of learning. According to a joint UNESCO-UNICEF-World Bank survey, in some selected low-and-middle-income countries, at least 31% of total students in the countries surveyed were not reached through digital learning at all. The reach was about 62% of learners in the case of television and 24% in online delivery (UNICEF, 2020). Despite the fact that COVID-19 shock on education was unprecedented, the swiftness and immense efforts made in a short time with capacity to mobilise alternative modes of delivery of education is a proof of resilience. Subsequent to the growing consensus that education is one activity that must resume, many governments took the risks and reopened schools. This came with considerable financial and organizational costs attached to safe and effective reopening (e.g. modification of structure for physical distancing, installation of infrastructure and supplies to ensure basic hygiene). It was

an additional challenge to contend with many countries in Africa, where a funding gap already exists in their efforts to achieve SDG 4 (UNICEF, 2020).

The COVID-19 pandemic has brought new opportunities for the education systems, it has boosted the use of technology in education, but also confronted Africa on an issue of how much, what, where, we use the Information Technology in Education. The countries will need to take responsibility for facilitating IT enabled schools, as well as access in the home of the learners, if this technology trends must lead to enduring social and behavioural change across Africa. Also, there is a need for innovative remote teaching modalities that blend with the concept of traditional students in a classroom to ensure our preparedness for future similar incidences. Now is the time to realign the commitment of Africa to speed up action on plan to embrace digital transformation in education and skill acquisition in order to build knowledge, human capital, and capabilities to drive innovations (AU, 2015) as necessitated by COVID-19 pandemic.

Judiciary

The Sustainable Development Goal (SDG)-16 focuses on governance. One of its targets is to promote the rule of law and guarantee equal access to justice for all, at both national and global levels. Similarly, a related Africa goals 11 of Africa Agenda 2063, aims to promote universal principles of justice, human rights, the rule of law and democratic values (AU, 2015). The Judiciary as an institution of governance is important for promoting the creation of conducive environments for the rule of law to thrive for the economic, political and social transformation in any country (Maseh and Katuu, 2017). Its mandate of adjudication and resolution of disputes between parties and protecting the rights of individuals is carried out through the court sittings. The governments' efforts to curtail the spread of the COVID-19 have a serious impact on the functioning of the justice system and as part of the emergency measures, many courts across the world have been forced to close down or to devise alternative ways of working. In Nigeria for example, the courts were ordered to suspend all sittings across the country, except for the hearing of cases that are urgent, essential, or time-bound in accordance with existing laws (Rule-of-Law-and-Empowerment Initiative, 2020). It became a challenge to make sure that judicial cases are not deferred or paralysed as justice delayed, is justice denied.

To ensure a proper administration of justice, while still adhering to the prescriptions that would limit the spread of the virus, technology, including electronic trials has been used to replace traditional court hearings, across many countries. Indonesia had launched the electronic Court (e-Court) application on Friday, July 13, 2018, to modernize the justice administration. Through this e-Court application, cases can be registered electronically (e-filling), payment of case down payments electronically (e-payment), summons and notices to parties who litigate electronically (e-summons) (Pratiwi*et al.*, 2020). Saman and Heider (2012) also reported the implementation of electronic court applications in United States, Australia, Singapore, Canada, United Kingdom, and India. Prior to the pandemic, Kenyan judiciary had put in place guidelines that allow for digital proceedings. In July 2020, the Kenyan judiciary launched a system which enables petitioners to do an online filing and tracking of their cases. Matters such as plea and bail taking were easily attended to. It was also possible for clerks in the court to send Skype, Microsoft Teams, and Zoom links to the parties involved to join court sessions (Muendo, 2020). However, the utilisation of technological advancements to conduct court proceedings is dependent on the existence of necessary infrastructure including, but not limited to computer hardware, internet bandwidth, software, power supply and human capital to deploy and implement the solutions (Rule-of-Law-and-Empowerment Initiative, 2020). In Nigeria, the Ministry of Justice established ICT Studios with dedicated lines to facilitate the prosecution of civil and criminal cases virtually (Omohomhion, 2020).

However, the constitutionality of such virtual court hearings remains an issue. The Nigerian Attorney-General has emphasized the urgent need for a paradigm shift to adjust the judicial process and called for the implementation of the Judiciary Information Technology Policy adopted in 2012 to enable remote hearings. Generally in Africa, the challenge still remains the absence of necessary technological infrastructure and the policy framework.

It is noteworthy that the COVID-19 pandemic has compelled some institutions to fully adopt digital technologies due to social distancing norms and nationwide shutdowns (Olugasa, 2020). The use of technology in courts is becoming an inevitable solution to promote a more effective and timely administration of justice, to serve the means of avoiding gaps in the trial case flow, if there arise a similar circumstance, in the future. In order to fully utilise the existing technology in judiciary activities during and post

COVID-19 pandemic, governments should adopt multi-stakeholder partnership in governance; partnerships with national and international organisations, social entrepreneurs and technology companies.

Conclusion and Recommendations

This paper has shown that Africa is making some progress in the use of ICT-based applications in meeting the Sustainable Development and Africa Agenda 2063 goals especially during the COVID-19 pandemic. However, the pandemic has revealed the considerable digital divide that still exists in access to ICT infrastructure in Africa. African governments should realise that ICT is crucial to the continent's recovery and resilience during and post COVID-19 pandemic. Hence, innovative steps need to be taken to strengthen the ICT sector and ultimately make broadband infrastructure accessible and affordable for use.

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