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THE AFRICAN UNION HIGH LEVEL PANEL ON EMERGING TECHNOLOGIES

THE CALESTOUS JUMA EXECUTIVE DIALOGUE (CJED)

SHORT BLOGS

ON INNOVATION

AND EMERGING TECHNOLOGIES

Synopsis
The first Edition of the APET-CJED blogs (2020) focuses on the 2020 COVID-19 pandemic and the use of emerging technologies and innovations to mitigate the impact of the pandemic. It captures 10 contributions featuring the multi-faceted use of innovation and emerging technologies across Africa and the diaspora showcasing their usefulness, and impact on the continent

The APET-CJED blogs 2020 were developed by the Secretariat on behalf of the AU High Level Panel on Emerging Technologies (APET) and the Calestous Juma Executive Dialogues (CJED). The featured bloggers are:
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Blog # 1 Published on OCT 14, 2020

Towards Achieving the Science Technology and Innovation Strategy for Africa-2024

The Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024) places science, technology and innovation at the epicentre of Africa's socio-economic development and growth, and situates it as a multi-functional tool and enabler for achieving Africa's development goals. By adopting STISA-2024, African governments aim at lifting large sections of the African population out of poverty, addressing climate change, eliminating hunger, tackling terrorism, resolving local ethnic and religious conflicts, ending corruption and bribery and ending disease outbreaks.

As Africa seeks to harness and adopt innovations and emerging technologies to achieve social and economic development, several obstacles on the continent are threatening the aspirations of STISA-2024. Some issues which need to be addressed to support the development of Africa through STI include; bridging the technological divide through

access to technologies by promoting productive and absorptive capacities, sharing experiences and successes on the continent and promoting inclusive innovation within African countries. Secondly, African Union Member States are encouraged to reduce structural vulnerabilities through the financing of innovation and build a strong science culture which encourages collaboration within and between states in the area of science, technology and innovation

One thing is clear – despite the challenges the African continent is facing in adopting innovation and emerging technologies, the continent has the requisites to turn things around and capitalize on its potential to achieve STISA-2024. To achieve STISA-2024, African Governments, including policy and decision-makers must create a strong political will and trust in the intellectual capacity of the sons and daughters of the continent, revamp STI infrastructure in African countries, enhance technical and professional competencies, take measures to curb brain drain so that the limited means of the continent are not transformed to investment in other continents, achieve the necessary critical mass of human capital needed, provide enabling environments for STI, build a strong science culture and encourage collaboration within and between states in the area of innovation and entrepreneurship.

APET members believe that Africa's unexplored potential, fast-growing population and relatively low starting position present STISA-2024 with a solid foundation for soaring success. The continent's future seems brighter than ever as African countries have shown interest and willingness in developing their economies through an approach driven by science, technology, and innovation. In order for Africans to catch-up in terms of development, AU member states will need to embrace the on-going Technological Revolution, while ensuring that the net effect on the labour market and productivity is positive. This would significantly contribute to eradicating poverty and fostering economic growth in African countries.

Link: https://www.nepad.org/blog/towards-achieving-science-technology-and-innovation-strategy-africa-2024

Blog#2 Published on OCT 20, 2020

Compassion a Click Away: Fighting the COVID-19 Pandemic using Mobile Digital Technologies

As the COVID-19 pandemic's negative impact persists in numerous communities globally, several mobile digital technology applications are being utilized and/or developed by innovators to limit and monitor the spread of the virus. Notably, African innovators are a part of this global cadre of innovators developing mobile digital technology applications towards combating the COVID-19 spread across the continent. Consequently, African countries are rapidly harnessing these new digital technologies aimed at facilitating strategic planning, surveillance, testing, contact tracing, quarantine monitoring, and clinical management. This is enabling the continent to control and manage the spread of the pandemic.

Currently, several African governments are using digital mobile platforms to broadcast COVID-19 related information and services available to their citizens. This platform is also being used to debunk misinformation about the disease by fake information through the media. For example, in South Africa, the National Department of Health is utilising the WhatsApp platform to provide information to South Africans on how to identify COVID-19 related symptoms and effectively respond to such symptoms. These platforms also provide citizens with essential testing information such as contact information and nearby testing places available at their disposal. Most importantly, these digital platforms afford citizens with reliable and trustworthy information that dispels false claims about non-substantiated and scientifically proven "cures" such as eating garlic and beetroot or taking hot water baths as means to combat the COVID-19 symptoms. Additionally, these digital platforms are used to sensitise citizens against scammers looking to take advantage of, and benefit from peoples' fears.

In countries such as Nigeria, Malawi, Burkina Faso, and Zimbabwe, their health authorities have partnered with the Facebook social media platform to notify and broadcast information related to COVID-19 symptoms and on how to prevent infection. These countries are also using the Twitter social media platform to elevate and broadcast reliable medical information from health authoritative sources to their citizens. Additionally, other African countries have leveraged digital mobile money transfers to curb the spread of the COVID-19 pandemic. For instance, Kenyan digital mobile money companies have reduced their charging fees in order to promote the use of such services to transfer money across the country during the pandemic. This strategic approach reduced interaction and contact among the Kenyan citizens. In addition, African governments are embracing the digital agricultural initiatives meant to alleviate the COVID-19 pandemic impact on food security and agro-businesses across their countries. For example, farmers in structured markets have tracking-enabled applications following the sale of their agricultural produce without physically being at the market. Furthermore, contact tracing digital mobile applications are also being developed in an effort to restrict the spread of the virus. A good example of such a digital mobile technology application is a South African developed digital mobile applications known as the COVID Alert SA application. This application is being used to trace COVID-19 pandemic related cases in South Africa.

Notably, it is not all African countries that are harnessing these digital mobile technologies in fighting the COVID-19 pandemic. This is because African countries across the continent vary in capacity, digital technology infrastructure, and skilled human capital required for effectively utilising, implementing, and deploying these digital mobile technologies. However, for these African countries to effectively implement digital technology in their various countries, policy and decision-makers must ensure that interventions are appropriately tailored to target specific regions in these countries. These strategic interventions include increasing broadband access and public and private sector investments towards robust and reliable technology infrastructure.

At the regional level, strategically subsidising and investing towards mobile cellular phone infrastructure and devices such as free Wi-Fi hotspots and related facilities, as well as training programmes could provide short-term to-mid-term solutions towards these observed disparities across the continent. Furthermore, in African regions that do not have reliable infrastructure as well as sufficient funds to support cellular and data coverage, considerations must be made towards automated applications and devices that do not require continuous network access. Finally, it must be noted that the African continent will increasingly rely on mobile digital technologies to fight the COVID-19 pandemic in the foreseeable future. Digital platforms will therefore, help African countries build more resilient strategic solutions against the pandemic. Digital mobile applications are the way to go!

Link

https://www.nepad.org/blog/compassion-click-away-fighting-covid-19-pandemic-using-mobile-digital-technologies

Blog# 3 Published on 27 OCT, 2020

Do the Math: Bridging the Gap through Gender Equity in Science, Technology and Innovation in Africa

There is a universal recognition and acceptant that the optimal participation of youth and women in Science, Technology, and Innovation (STI) endeavours within African countries is pivotal in improving the continent's socio-economic development as well as inclusion in the 4th Industrial Revolution. The role of women and their untapped potential in STI and has been greatly highlighted during this COVID 19 pandemic.

While there have been significant strides by numerous African public and private institutions to improve the role and number of women in STI, several countries still trail

behind in implementation. Women account for more than half of the population in Africa and the untapped potential of qualified female scientists, researchers and innovators and/or leaders represents an important missing opportunity for inclusiveness of their knowledge, skills and competencies in this important sector. Consequently, in recognition of this missing link, the continent has embarked on addressing this important issue through relevant policy instruments and programmes.

Underpinned by the continental development blueprint, Agenda 2063, the Science, Technology, and Innovation Strategy for Africa (STISA-2024), the Continental Education Strategy for Africa 2016-2025 (CESA 16 - 25), the AU Gender Policy and the African Youth Charter, among others, African countries have implemented different empowerment strategies and programmes for the youth and women in Science, Technology, Engineering and Mathematics (STEM), science, technology and innovation. STISA-2024 aims at addressing historical and societal disadvantages towards girls and women in science, in order to promote better opportunities for women as well as all actors involved towards a mutually beneficial socio-economic development within Africa's institutions. However, despite these efforts by Member States, persistent gender gaps remain in STI.

From an education, research and development point of view, the involvement of women in STI can effectively bridge the STI implementation gap and increase immensely the role of African countries in harnessing innovation and emerging technologies as well as increase the GDP of these countries. This is because STI is recognized as a major driver for socio-economic transformation in creating wealth through an equitable distribution of resources and the sustainable socio-economic and cultural development of Africa's citizens. Consequently, Africa is now tracking and monitoring countries' performance in STI inclusive policies against international standards, and technical backstopping is provided where required. This is aimed at achieving the socio-economic and cultural development goals of Member States as well as AU's Agenda 2063 and STISA-2024.

With a historical meritocratic set-up in academia, promoting greater participation by women is imperative in education systems and academia to foster inclusiveness and

gender equality across board. This can include considerations on maternal responsibilities and addressing stereotypes and cultural and social norms that negatively impact the participation of women in STI education and career choices. Hence girls and women must be empowered to play a central role in the harnessing of innovation and emerging technologies in Africa.

To this end it is recommended that African countries promote increased participation of girls and women in STEM education, research and development, and innovation at all levels in compliance with the relevant national, regional and institutional STI instruments and provisions. Furthermore, African Union Member States are encouraged to increase the implementation of focused collaborative networks and mentorship programmes for girls and women so as to improve opportunities for recruitment, retention, and career advancement. Interestingly, several African countries have been instrumental in supporting the implementation of such policies. These enabling policies have included institutional awards for gender issues, fostering opportunities for women in relevant training and interventions, as well as balancing family and professional responsibilities for women. However, there is still a lot more work to be done!

In conclusion, there is a call for African countries to address the cultural values and practices that hinder progress for young girls and women participation in STI education and career. The starting point is sharing the best practices on empowering both girls and women in scientific, technological, and innovation activities. There is overwhelming evidence that vividly demonstrates that young girls and women are more than capable to lead in STI fields such as manufacturing and industrialization, natural sciences, engineering and technologies, medicine and health sciences, agricultural and veterinary sciences, social science, and humanities, and arts. Hence let us do the math: by allowing and empowering African girls and women to rise and increase their role in STI, they will significantly contribute to addressing global challenges, most particularly in Africa.

Links

https://www.nepad.org/blog/do-math-bridging-gap-through-gender-equity-science-technology-and-innovation-africa

Blog #4 Published on NOV 02, 2020

You've got Cash? Digital Mobile Financial Inclusion in the COVID-19 era in Africa

Drastic measures have been taken by African countries towards protecting their citizens against the spread of the severe and acute respiratory syndrome known as the Coronavirus Disease (COVID-19). However, in doing so, unintended negative economic consequences related to the COVID-19 pandemic are being witnessed and felt by African countries across the continent. Public and private sectors of AU Member States are struggling to survive due to the impact of mass economic and social disruption brought about by the pandemic. This is because most African countries have imposed strict lockdown restrictions since the advent of the pandemic, resulting in shutting down the movement of goods and people. The exception to this rule are a few goods and services

that are considered essential. The pandemic, however, is far from over because a second or third wave of infections is mushrooming in numerous countries around the world. As the temperatures decline, probably because of the approaching winter season in the northern hemisphere, there have been increasing cases of COVID-19; forcing several European countries to embrace new restrictions including national lockdowns. Consequently, the negative ripple effect on Africa's economy remains grave mainly due to trade partnerships.

When considering the low income per capita observed in some, if not most African countries, the reduced economic activity has exacerbated their economic challenges. This is because these African countries have limited strategic financial reserves to fall back on during such difficult times. Therefore, it becomes imperative to mitigate the worst-case scenario of economic struggles. This can be achieved by minimizing the impact of the pandemic on the financial sector but at the individual, national and regional levels. The minimization can be achieved by adopting digital mobile money transactions as they have proven to be an effective tool for moving money within African countries under restrictions. Incredibly, lockdowns and social distancing have accelerated the utilization of digital financial services in Africa. There is some evidence that the spread of COVID-19 can occur through the exchange of monetary notes surfaces. Interestingly, China, for example, banned the use of monetary notes in regions most affected by the pandemic. Because of these surface transmission threats, the entire world, including Africa, was persuaded to increase digital money transfer processes such as mobile money transfer and other financial services. This advent of financial digitization such as money transfer took advantage of the internet of things and artificial intelligence technologies.

Mobile financial services were already facilitating African institutions as a means of financial inclusion even before onset of the pandemic. Mobile money improved financial operations for numerous financial institutions in the banking and financial sectors. Thus, numerous customers of these institutions benefited tremendously. This trend was particularly observed in low-income households. Furthermore, this opened avenues of business for small financial institutions, typically with limited access to a customer base before the advent of mobile services such as money transfer.

Mobile money is increasingly being employed daily to conduct transactions for essential goods and services across the continent. This includes the payment of basic needs such as utilities, food, and clothes. Moreover, there has been a growing call to encourage companies to pay salaries to their workers through mobile money platforms. In addition, mobile financial services enabled financial products such as payment of loans, savings, and insurance are gaining momentum across the continent.

Most importantly, the ongoing COVID-19 pandemic has demonstrated that digital mobile financial services can also efficiently facilitate government's service delivery when providing rapid and secure financial support to previously hard-to-reach people and businesses across the continent. For example, African governments such as Burkina Faso, Kenya, Malawi and Morocco are using the mobile money platforms to disburse these funds such as grants to their citizens. Thus, mobile money has been an innovative means in supporting the allocation of grants to secure survival for low-income families across the continent during the pandemic.

Innovatively harnessing mobile money platforms by financial entities and individuals have, therefore, significantly supported numerous African countries to combat challenges of social distancing and lockdowns resulting from the pandemic. These mobile financial services demonstrate the usefulness, resilience and convenience afforded to consumers in harnessing these innovative financial services, especially in rural areas of Africa. Thus, this further validates the view that Africa can realize the much-needed opportunities and solutions through science, technology and innovation generated products and services.

There is a call to decision-makers and policymakers as well as private sector to support equal access to digital infrastructure and energy for all African citizens. All Africans, either urban, semi-urban, and/or rural Africa must have access to reliable electricity, mobile and Internet coverage, digitization and digital literacy. Furthermore, reducing operational costs will support an inclusive recovery on the continent. This is because lower service costs for mobile financial technologies will enhance African countries in building more robust financial infrastructure.

In conclusion, as Africa moves forward towards a post-pandemic era, digital technologies such as mobile money platforms remain key to Africa's socio-economic recovery plan. Thus, the continent cannot afford to be left behind when harnessing innovation and emerging technologies such as digital mobile financial services. The time is now for Africa to get ahead of the curve and secure a viable digital future of its citizens. Lastly, Africa must take advantage of its information and digital technologically savvy youth resource.

Link

https://www.nepad.org/blog/youve-got-cash-digital-mobile-financial-inclusion-covid-19-era-africa

Blog # 5 Published on Nov 09, 2020

In the Wings of Hope: Combating COVID-19 through Drone Technology Applications in Africa

Life, as we know it in our societies, have changed since the advent of the Coronavirus (COVID-19) pandemic; the world is now in the dispensation of a "new normal". Consequently, this has significantly impacted the way of life and culture of Africans, like the rest of the world. For example, activities such as travelling, going to work or school daily, going to restaurants and places of entertainment, or simply hanging out with friends have been tremendously regulated by governments around the continent, in taking unprecedented quick actions to curb the spread of COVID-19. However, by so doing, some challenges have become opportunities towards harnessing emerging technologies to directly fight the pandemic and to improve on our way of life. The continent has had to speedily catch up with the fourth industrial revolution culture with the increased utilization of innovation and emerging technologies such as drones in addressing impact of the COVID-19 pandemic.

Figure 1: Drones are the safest and fastest means of delivering medical supplies (personal protective equipment, COVID-19 test kits, test results), but also samples from hospitals to laboratories with minimal personal contact to prevent viral transmission. Samples of COVID-19 flown 45 miles away for analysis in hospital SOURCE: <u>APET White Paper on Harnessing Innovation and Emerging Technologies to Address the Impact of COVID-19 in Africa</u>

Healthcare practitioners and facilities are increasingly overstretched due to the pandemic and African countries are in dire need of medical supplies and access to laboratory testing facilities more than ever. To address these challenges, drones have proven to be the most reliable, safest and fastest means of delivering medical supplies to remote clinics and samples from hospitals to laboratories. Drones (also known as unmanned aerial vehicles, UAVs) are playing a crucial role in enabling African governments and institutions to prevent the further spread of the corona virus. Most specifically, technologically sophisticated drones are providing reliable, fast, and remote medical delivery services in Africa. In countries such as Ghana and Rwanda, this technology provides healthcare facilities, particularly in rural and remote areas, with much-needed medical supplies, medical equipment and consumables, urgently needed blood samples and testing devices, among others. These transportation and delivery services are efficiently executed and accomplished through the use of all types of drones in the midst of the coronavirus pandemic.

Besides the delivery services that drones provide, other applications of drones include disease surveillance as a strategy to fight against the spread of COVID-19 pandemic. For example, it was observed in several African countries such as Egypt, Ethiopia, the Democratic Republic of Congo and Uganda that drone-enabled surveillance can be used

to contain the spread of the virus. Additionally, drones have also been effective in measuring temperatures of individuals under surveillance with infrared temperature detecting cameras installed in them. To improve efforts of protecting workers, several African countries' private and public institutions have replicated this technology towards monitoring their workforce for symptoms. In some of these African countries, drone-enabled technologies focused primarily on disinfecting streets after the outbreak.

Figure 2: Drones equipped with loudspeakers were used to broadcast messages, encouraging citizens to respect confinement measures, social distancing, wearing a mask and follow good respiratory hygiene. It's also a way to keep an eye on the streets and control crowds. SOURCE: APET White Paper on: Harnessing Innovation and Emerging Technologies to Address the Impact of COVID-19 in Africa

Beyond health facilities and disease surveillance, drones are being utilized to curb misinformation on the pandemic through communication on measures taken by governments and recommendations of health experts to support communities in remote areas lacking proper channels of communication. This is done through the mounting of speakers on the drones and playing of recorded messages. In addition, local police officers have been using drones to monitor people's movement and break up social gatherings that could pose a risk to society. Furthermore, the application of drones has enabled the monitoring of vast areas without physical engagement or confrontation, in keeping with the WHO social distancing protocols. Thus, the introduction of drone technologies at this time of crisis has greatly assisted some African countries to reduce the risk of spreading the infection.

In addressing increasing food insecurity on the continent, precision agriculture drones are being used to disinfect fields with pesticides, monitor plant growth and soil viability in countries like Ghana and Nigeria. These drones are also enabled through artificial intelligence technologies to detect crop stresses such as water shortages and diseases. This means farmers can analyze stressed crops and seek solutions to address strains in their crops more conveniently and efficiently to sustain food production, especially during these unprecedented times.

Even though African countries are embracing drones in combating the COVID-19 pandemic, several hurdles are preventing the harnessing of its full potential. As a result there is a need to enact enabling policies that can guard regulatory frameworks, investment and business opportunities, and awareness of the drone technology at national, regional, continental levels. Additionally, there is a need to address privacy and security breaches that may result from the widespread use of drone technology.

The African Union High Level Panel on Emerging Technologies (APET), in its report: "*Drones on the Horizon: Transforming Africa's Agriculture*" highlighted critical areas that need intervention. The panel calls for the development of a continental regulatory framework for the use of drones or UAVs in Africa, and to harmonize policies across countries and regions (regional economic communities). The panel further calls for enhancing South-South and regional collaborations, partnerships, networks and knowledge-exchanges to facilitate the upscaling and use of drone technology. A widespread adaptation and robust awareness programmes of drone technology will also address misinformation that portrays the drone technology as witchcraft and/or magical planes.

Figure 3: Drones were used to spray disinfectants on hard-to-reach areas. The drone carries around 15 litres of disinfectant and could cover a 1.5 km section in 15 minutes. This technique is very similar to what is done in the field

of Agriculture to fight against crop and plant diseases. SOURCE: <u>APET White Paper on:</u>
<u>Harnessing Innovation and Emerging Technologies to Address the Impact of COVID-19</u>
<u>in Africa</u>

In conclusion, despite the larger absence of regulatory and policy frameworks pertaining to drone technology across the continent, their widespread use during the COVID-19 pandemic demonstrates its potential utilization by decision-makers and policymakers. The call is for African Union Member States, and other national, regional and continental developmental agencies to work towards enacting conducive and enabling policy and legislative frameworks that can unlock the full potential of drones during COVID-19 and post-COVID-19 era. There is also a call to strengthen skills and capacity that can drive the operational aspects of the drone technologies. Evidently, this crisis offers a great opportunity to increase the deployment of drone technologies to combat COVID-19 and address other health issues in Africa during the pandemic and beyond.

Link

https://www.nepad.org/blog/wings-of-hope-combating-covid-19-through-drone-technology-applications-africa

Education during a Pandemic: Accessing Education through technological innovations in Africa

The Coronavirus Disease (COVID-19) pandemic has affected almost every aspect of human endeavour, including the education sector. An upsurge in drop-out students has been observed across the globe. This can be attributed to the massive disruption towards education access because of the pandemic and the lack of resources. Countless communities across the continent have unreliable internet, access to electricity, and expensive broadband. Notably, Africa has been negatively affected by the pandemic; thus, derailing the entire education system. Most significantly, these disruptions constitute a "global education emergency," threatening to disorganise at least 24 million students, according to the United Nations Children's Fund. This is because 192 countries around the world have shuttered schools, leaving 1.6 billion students without in-person learning. Currently, more than 870 million students (half the world's student population in 51

countries) are still unable to return to school. Unfortunately, the longer children remain out of school, the less likely they are to return to school when the time comes.

To address these challenges, the most important question that African governments ought to answer is: do students wait until the pandemic is over to return to school or can governments offer students alternative means to continue learning whilst confined at home by the pandemic? The answer is that governments need to consider upscaling digital technologies that could allow students to continue learning whilst confined by the pandemic. Therefore, in order to mitigate the effects of the pandemic, African countries have to adapt in the "new normal" by harnessing technological innovations relevant for the education sector. This can significantly improve the medium through which students can learn under pandemic constraints. It can also significantly advance technological products available in the market and that can drastically alter the way education is conducted across the continent.

African countries are encouraged to improve internet access for easier utilization of digital technologies suitable for online learning. Additionally, African countries can increase the variety of resources that can adequately support students' distance learning. These resources can be instructional packages such as radio education, educational television, and online instructional resources.

Online platforms such as WhatsApp, Zoom, CISCO WebEx, Blackboard, YouTube, Google Meet, and Microsoft Teams have been the most commonly used digital technologies during school closures. However, numerous students have had challenges accessing these online platforms because of unreliable electricity, limited broadband, and internet connection challenges. But these online learning tools have options of allowing access to recorded educational content at students' own time. Thus, students could explore the recorded information at their own discretionary time. In this way, the formalized learning programmes can conduct educational teaching based on real-time lessons led by their teachers using virtual meeting platforms.

Many African governments have responded to online learning by providing free access to the internet and to various learning digital platforms. There are cases where a telephone line known as *"Your Teacher Online"* has been activated to offer mentoring to students. These new digital technologies have presented entirely new solutions to the challenges confronting students during virtual learning. In addition, these technologies have enabled teachers and students to access specialized materials well beyond textbooks. These materials allow access in multiple formats in ways that bridge time and space. Subsequently, these technologies will be utilized beyond the COVID-19 and post-COVID-19 era timelines.

Another popular learning arrangement in several African countries has been television and radio broadcasts which provide educational content to enable continuous students' learning. Television and radio programmes have mostly catered for younger children in primary schools who may have had difficulty using online learning platforms and conducting self-directed learning. Additionally, these platforms have also been utilised to reach students without adequate resources for online instructions. However, these platforms have had to deal with programming constraints to accommodate the educational programmes. Consequently, there has been insufficient time to cover the syllabi for all students across primary and high schools per day or per week, address the plethora of variable challenges of education inaccessibility for different communities, and reach a sizable proportion of students possible.

The reopening of schools and universities using modern digital technologies have brought unquestionable benefits to students and the wider economy. However, the main challenges facing the continent in harnessing these technologies include the lack of Information Communication Technology infrastructure and the use of old facilities that barely complement the digital technology requirements across the continent. Remarkably, income inequality and unequal distribution of wealth are the reasons for challenges experienced by marginalized groups towards access to these technologies. Incredibly, the prices of internet data are still extraordinarily high across the continent. Additionally, computer illiteracy among teachers is very low, thereby remaining a challenge and threatening to prevent effective digitization of the education sector.

Therefore, by addressing these challenges, African governments will be able to harness digital technologies to ensure uniform education benefits across the continent.

In conclusion, when the dust settles, Africa is bound to adopt a revised educational landscape, which will be impacted and reshaped by the "new normal." African leaders are therefore, encouraged to mitigate the risk of the continent's education regression caused by the COVID-19 pandemic. Finally, African countries ought to engage with stakeholders through Public-Private-Partnerships and formulate mitigation measures that appropriate for their specific context and adequately address education access challenges caused by the pandemic at address national, regional, and continental levels.

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https://www.nepad.org/blog/education-during-pandemic-accessing-education-through-technological-innovations-africa

Blog # 7 Published on NOV 23, 2020

Let there be Light - Harnessing Microgrid Energy in Africa

Recently, there has been significant progress made by innovators towards cost reductions of modern electricity generation. The focus on cost reductions has been aimed at energy storage and control technologies. Consequently, this has enabled the development of microgrids that can incorporate renewable energy sources. Simultaneously, novel business models were also being developed to enable disadvantaged consumers to access electricity. One of those innovations has been the utilization of mobile smartphone-based payments. However, the fact remains that over 640 million Africans, which is equivalent to two-thirds of the continent's population, still lack access to reliable electricity. Unfortunately, energy poverty continues to undermine Africa's socio-economic growth. Ultimately, this hinders the development of self-sufficient

local communities. Thereby, threatening Africa's stability and security. Furthermore, there is an enormous urban-rural divide, with about 60% of the urban population having access to reliable electricity, compared to only 15% of the rural population. Therefore, microgrids are emerging as an effective off-grid solution that can close the energy poverty gap and supplement the existing electrification programmes in Africa.

The Agenda 2063, which summarizes Africa's development aspirations over a 50-year period, is pioneering for a 50% increase access towards electricity and 50% increase of electricity generation and distribution. Africa also aspires for 70% of Africans having access to electricity by 2023 as well as 30% improvements in energy efficiency. Notably, Africa's low electrification rates are attributed to inadequate infrastructure. Moreover, the cases where the infrastructure exists, cost of access to electricity remains extremely high. Therefore, expanding the national microgrid networks and quantity so to reach the unconnected population remains the most logical and viable option towards achieving the "Africa We Want".

Nonetheless, when dealing with rural communities that are far from the grid, sparsely populated, and in remote areas, the grid expansion becomes uneconomically expensive. To address this challenge, several African countries are investing significantly towards microgrid infrastructure for energy generation so to transform and achieve their national socio-economic development aspirations. To this end, the positive impact that these microgrids bring to the development plans of the continent cannot be overemphasized. For instance, microgrid generated electricity has been vitally instrumental in keeping delicate vaccines and medicines frozen in rural clinics and hospitals. Furthermore, microgrid generated electricity has greatly powered the mushrooming small businesses across the continent such as barbershops, bars and grocery shops. Consequently, this has tremendously improved the economic well-being of local communities. In addition, off-grid electricity has ensured that leaners without reliable electricity can be able to study at night. Notably, through microgrid generated energy, several rural communities are able to operate flour grinding mills, which has been impossible in the past. Most importantly, a widespread adaptation and adoption of renewable energy mini-grid electricity generation in Africa will help conserve the environment.

The African High-Level Panel on Emerging Technologies (APET) has recommended that Africa's Member States harness microgrid technology for their socio-economic transformation of the continent.[4] APET further suggested that policymakers and decision-makers in governments and the private sector adapt and contextualize microgrids implementation for Africa's realities. This should take into account factors such as site selection, the expected number of connections per site, and both the demand and willingness to pay. Furthermore, it remains crucial to consider additional factors such as the expected return per connection and the development of skills and capacities that addresses the under-served communities. Most particularly, this capacity strengthening should address the role of the "informal sector" in supporting microgrid implementation. The above-mentioned elements could mitigate against cases reported in some countries where microgrid installations have suffered from improper operation and maintenance. This will, therefore, help communities that can barely realize the intended benefits of microgrids.

To achieve these aspirations of microgrids, it is important for Africa's Member States to secure harmonized regulatory frameworks for microgrid development. These frameworks could focus, among other things, on investment laws, public-private partnerships, sustainable tariff structures, and cross-border interconnection. Moreover, microgrid implementation should be based on multi-sectoral collaborations. This is because sectors such as agriculture, health, education, water and sanitation, and social welfare are directly and significantly impacted by energy, most particularly, in Africa's rural areas. Therefore, there is a need to devise a holistic approach and stimulate bankability of microgrid projects, through robust frameworks of incentives that can potentially enhance private sector investment. Additionally, energy projects should also increase women's participation through the acquisition of enabling policies that promote the employment of women in technical aspects of microgrid energy operations and maintenance. Finally, higher education and research institutions should also be supported towards research, development and innovation programmes that focus specifically on renewable energy, microgrids and associated generation, energy storage (next generation batteries) and distribution technologies.

In conclusion, numerous African countries have observed rapid and meaningful economic growth in the last decade. Therefore, to ensure the sustainability of this growth, these economies should develop accessible, affordable, and efficient energy. Thus, there is a need for urgent investment and research that are required to increase the scalability of microgrids in rural and highly dense areas. This will significantly help prevent mass power outages such as the ongoing load shedding in most African countries. Ultimately, it is now or never for the continent to completely harness this emerging technology. Hence, Africa should not miss this fantastic opportunity for robust socio-economic development

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https://www.nepad.org/blog/let-there-be-light-harnessing-microgrid-energy-africa

Blog # 8 Published on Dec 1, 2020

Doctors without Borders: Can Telemedicine help Africans access proper healthcare?

The utilization of information and communication technologies (ICT) as a tool to improve the efficiency of healthcare service delivery is increasingly being considered in Africa. Applications such as telemedicine, tele-education, and health informatics are fast becoming part of essential services and considerations towards their utmost assimilation in Africa's infrastructural systems needs to be considered.

Understandably, the COVID-19 pandemic has necessitated the need for African countries to explore harnessing emerging technologies to connect patients with qualified and easily accessible healthcare practitioners, without necessarily being in physical contact. It is reported that during the COVID-19 pandemic, nearly 7,000 frontline healthcare workers lost their lives due to infections emanating from infected patients.[1] Furthermore, the continent has limited doctors per thousand inhabitants[2] due to limited human capital and resources across the continent. For example, it was reported that given the different mix of health worker cadres (doctors, nurses, and midwives), most African countries had a uniquely low average of 1.3 health workers per 1,000 people as of 2012 (*see* Figure 1*).*[3] This was typical across African countries with respect to the different health systems available around the continent. Unfortunately, this barely compared to the average of 12.5 per 1,000 and 15.2 per 1,000 people in the United States of America and Sweden, respectively. With such continental limitations, harnessing innovations such as telemedicine can enable efficient digital communication and sharing of medical information between healthcare workers and their respective patients.

Telemedicine becomes very useful in cases of pandemics such as COVID-19, H1N1, and Ebola, as telemedicine consultations can prevent infection of healthcare workers through physical contact with infectious and carrier patients of such diseases. To achieve this, telemedicine involves a network of service providers who work with remote clinics through information and digital technologies to connect patients with healthcare workers. In this way, telemedicine provides access to tailored-made and on-demand healthcare services with mutual financial benefits to both the service providers and the patients.

Significantly, the role of telemedicine became more apparent and vital during the COVID-19 pandemic when people were restricted to freely move about because of lockdowns imposed by numerous countries globally. Consequently, medical consultations were executed through telemedicine in some countries and there was an incremental use of medical information from digital libraries. Remote access to healthcare services increased the level of service delivery to disadvantaged and vulnerable communities across the world.
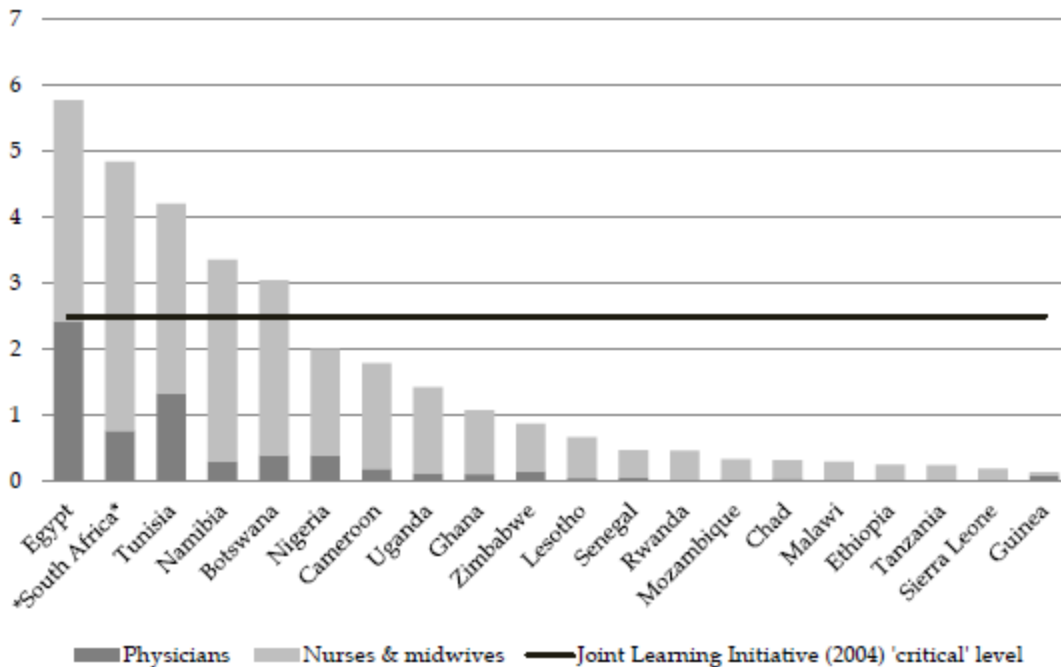
1: Doctors, nurses and midwives per 1,000 people, in a range of African countries: Source: Source: WHO Global Atlas data. Most recent figures available presented, ranging from 1999 – 2008.

Thankfully, Africa is catching up on telemedicine services, as in some parts of the continent. For instance, the ECHO Clinics model being developed across the world is being replicated in African countries such as South Africa, Malawi and Kenya; a form of advanced telemedicine. Such a model democratizes medical knowledge through intersecting experts and conveners on one hand and beneficiaries on the other hand.

Notably, such expansions of telemedicine were organically increasing because of the pandemic, across the continent. There was limited participation and involvement of Africa's policymakers however in this expansion, as this was more private-sector-driven. Therefore, it becomes necessary that policy and regulatory frameworks are enacted by policymakers and decision-makers in collaboration with all stakeholders towards effectively utilizing telemedicine. To speed up the domestication of telemedicine as process innovation, it remains crucial to pay attention to regulatory framework considerations at national, regional, and continental levels across the continent. Policymakers are additionally encouraged to adequately address the challenges related

to human skills capacity, unreliable energy, ethical, privacy, and policy challenges that telemedicine may potentially pose to Africans.

Investments in ICT has become necessary to advance digital technologies such as telemedicine in Africa's healthcare systems to enable rural Africa to acquire adequate internet and broadband coverage and access. Efficient and reliable ICT, internet and broadband infrastructure can significantly enhance the dynamic digital technology environment in Africa and ease the adoption and adaptation of the 4th Industrial Revolution technologies for the African citizenry.

In conclusion, telemedicine can be utilised as a mechanism that can allow for efficiently promoting access to healthcare for all Africans, irrespective of their geographical location. Telemedicine is the future of medicine and is worth harnessing by Africa.

[1] Over 7,000 health frontliners dead from Covid-19 (Agence France Press edition of September 4, 2020) https://www.nst.com.my/world/world/2020/09/621811/over-7000-health-frontliners-dead-covid-19.
[2] World Health Organization's Global Health Workforce Statistics, OECD, supplemented by country data: http://data.worldbank.org/data-catalog/world-development-indicators.
[3] John Ashmore, Dual practice, and the availability of medical specialists in the public and private sector of South Africa, University of Cape Town, Health Economics Unit, School of Public Health and Family Medicine, South Africa.

Link: https://www.nepad.org/blog/doctors-without-borders-can-telemedicine-help-africans-access-proper-healthcare

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Can Africa Accelerate A Post COVID-19 Socio-Economic Transformation Through Artificial Intelligence-Enabled Technologies?

Effectively harnessing Science, Technology, and Innovation (STI) has been identified as an important component of socio-economic development for developed and developing countries across the world. Interestingly, numerous countries have recognized the significance of Research and Development (R&D) output and knowledge generation as vital tools towards achieving their development aspirations. This is because, through robust R&D, STI products can be translated into prototypes of novel or significantly

improved commercial products and services essential for transforming the socio-economic status of African communities.

Notably, some of these inventions such as digital technologies have significantly helped preserve governments, public sector institutions, and private sector companies afford and offer essential services throughout the pandemic period. Consequently, numerous institutions have been able to keep their business activities afloat during the pandemic. Unfortunately, several other business enterprises that did not utilise these technologies across the continent have struggled significantly; thus, were compelled to reduce or adjust their business activities. Such austerity measures have exacerbated poverty and increased inequality among humanity.

Without undermining the adverse effects experienced due to the pandemic around the world, the upside of this recently forced innovative technology advancements has demonstrated the futuristic possibilities for the continent as far as AI-linked innovation is concerned. Most importantly, it has given a glimpse to a brighter future, if and when, these innovative technologies are meticulously adopted for humanity, most particularly in Africa.

For the African population to remarkably benefit from such innovations in terms of generating wealth, improve job creation and employment, there is a need to leverage relevant skills suitable for emerging technologies. This can be accomplished by boosting skills sets for Africa's workforce and entrepreneurship with regards to technologies such as Artificial Intelligence (AI) inspired and supported technologies. AI-enabled technologies have applications in precision medicine and agriculture, data management, digital currencies and financial solutions enabled by AI-blockchain technologies, digital technologies, and the internet of things (IoT).

Notably, the COVID-19 pandemic has necessitated an accelerated innovative intervention of AI-enabled technologies across the world. For example, several high-technological industries have focused their efforts on AI applications that could heighten sustainable socio-economic development and growth prospects for the African continent. Furthermore, AI coupled with machine learning and blockchain technologies, acting as enabling technologies for other emerging technologies, are driving for more innovative advances in digital financial and banking technologies so to improve financial

services and solutions. This is enabled by reliable data processing and management capabilities: thus, helping African entrepreneurs access credit and micro-financing for their business activities.

By collecting and reconciling previously non-traditional data sourced from smartphone records, mobile money transaction data, digital receipt and invoice photographical capturing, text messages, geographical location, and address books, AI can consolidate this asymmetric data into reliable, reproducible, and useful information. As a result, this can create reliable financial trail and credit history for entrepreneurs that can then be utilised to access financial and loan application services by previously disadvantaged small-and-medium enterprises (SMEs). Therefore, AI-enabling policy and regulatory frameworks for Africa can enhance Member States' growth in productivity through lowering barriers of products and services from entering and expanding market value chain and output. Consequently, this can create and expand the uptake potential of these technologies across the continent. Moreover, creating and expanding AI markets can boost the creation of jobs and entrepreneurial opportunities so to benefit Africa's economy. For instance, Africa's e-commerce marketplaces enabled by AI technology solutions are envisaged to create nearly three (3) million jobs by 2025.[1] This will be accomplished through expanding the supply of goods and services; thus, enabling Africa's businesses to be more productive and access previously inaccessible markets. Consequently, this can effectively unlock the supply-chain demand in Africa's remote and rural locations.

AI-enabled technologies are therefore alleviating the constraints posed by the poor information and communication technology (ICT) infrastructure in emerging markets. Additionally, AI-enabled technologies are providing alternative cost-effective solutions that can deliver digital solutions for financial, health, educational, agro-business, and other social services to communities that need them the most. This is particularly crucial more especially in Africa's rural and remote communities that have inadequate ICT infrastructure. For instance, by capitalizing on the widespread coverage of mobile networks, AI-enabled technologies are increasingly being utilised for precision medicine for early diagnosis of diseases such as cervical cancer. Consequently, this drastically

reduces diagnostic equipment costs for struggling African communities. In addition, the incremental deployment of AI-enabled drone technologies and digitally controlled robotics for a myriad of purposes has greatly assisted Africa's businesses in manufacturing, agri-food processing, mining, among others.

The African Union High-Level Panel on Innovation and Emerging Technologies (APET), in its white paper on "*Harnessing Innovation and Emerging Technologies to address the Impact of COVID-19 in Africa*" enumerated AI applications on the continent which were being explored and utilised, before the COVID-19 pandemic occurred.[2],[3] The white paper further advocated for their expanded and continuous use in addressing multiple continental challenges, where identified. This is because AI-enabled technologies possess vast applications in socio-economic sectors such as finance, health, agriculture, and manufacturing, among others. The panel is further elucidating the need for harnessing AI on the continent, its upcoming report to be released in 2021.

To significantly enhance AI-enabled transformational socio-economic impact post-COVID-19 pandemic, African Member States are encouraged to formulate, enact, and strengthen the capacity of AI developmentally enabling policy and regulatory frameworks that are human-centric and respectful towards ethical, privacy, and safety standards. Furthermore, African science and technology innovators should lead the innovation and designing of AI-enabled technologies so they can adequately address relevant Africa's societal challenges with Africa's localized solutions. This is because African researchers and innovators can adequately capture the unique needs of their local communities. As a result, Africa's innovators can formulate relevant local solutions, in partnership with collaborators across the world. In addition, there is a need to improve the digital literacy barrier for Africa's AI technology users. Moreover, there is a need for stakeholder engagements consultations when developing AI applications for African communities. For instance, this stakeholder engagement-led innovation could create an inclusive environment where any illiterate farmer in a rural Africa can access digital and AI-enabled agro-food innovative solutions for their agro-related needs. On the other hand, local teachers through AI-enabled digital and educational solutions can enhance education and

teaching experience for their students anywhere in the continent, irrespective of their remoteness from urban areas.

In conclusion, AI-enabled technologies are rapidly granting developing countries with unprecedented digital solutions towards the urgent challenges in Africa's critical sectors such as health, energy, agri-food, manufacturing, education, mining, and financial services. Such AI solutions will significantly help African governments rebuild better economic activities post the COVID-19 pandemic. Such AI solutions and an AI-enabling environment will drive sustainable and inclusive socio-economic growth for African countries once the pandemic crisis subsides. Most importantly, AI-enabled technologies are posing as a vital building block in the socio-economic revitalization efforts of the African continent.

[1] https://www.news24.com/fin24/entrepreneurs/news/e-commerce-could-create-3-million-jobs-in-africa-in-next-6-years-report-20190409

[2] Preparing Africa for an Artificial Intelligence Future https://runmilainstitute.com

[3] African Union Development Agency - NEPAD. 2020. White Paper: Harnessing Innovation and Emerging Technologies to address the Impact of COVID-19 in Africa. AUDA-NEPAD, Midrand, South Africa

Can Africa address the digital technology divide during the COVID-19 pandemic?

Currently, numerous Africa countries are experiencing an escalating second wave of infections of the COVID-19 pandemic. As a result, most African countries have reinstalled lockdown restrictions to curb and deter the second wave of COVID-19. Just like in the first wave, the continent can leverage the benefit of using modern technologies to help mitigate the impact of the ongoing pandemic.

Notably, digital technologies have enabled the workforce and educational institutions to continue working and communicating during the COVID-19 pandemic. These include electronic devices, systems and related resources with information tools such as websites, smartphones, video streaming, e-books, online commerce, among others. Thus, several activities were carried starting from teaching to graduation and telecommuting or teleworking to food delivery. Digital technologies enabled and sustained the continuation of work, education and communication for millions of employees and students on the continent.

However, other millions of Africans are unable to connect to the internet, because of the high cost and infrastructural challenges. Consequently, most African communities have relied on the offline world which has proven to be economically and socially isolating.[1] Despite witnessing an incremental adoption and adaptation of modern digital technologies during the pandemic, there has been persistent uneven use of digital technologies that has remained a major hurdle towards socio-economic advancement across the African continent.

Adequately addressing and bridging the digital technological divide, more especially during the pandemic, in this 4th industrial revolution era, could potentially transform Africa's societies. This can lead to the creation of new jobs and wealth which could trickle down to several sectors of the economy such as healthcare, education, transportation, energy, and agriculture. These sectors have been significantly disturbed by the lockdown restrictions because of the pandemic. Thus, by addressing the limited internet penetration, broadband quality, and internet data affordability will help Africa catch up to the rest of the world.[2] Notably, internet connection prices are reported to be the highest in Africa when compared to the rest of the world.[3] Consequently, it becomes difficult for several African communities to access virtual educational activities and business meetings, as well as purchasing commodities and services available through online platforms.

The lack of adequate digital technology access has been continually experienced during the pandemic lockdown restrictions. One of the main reasons for such limited digital

technological exposure throughout the continent has been the limited access to compatible and ageing information technology infrastructure within most African countries. Furthermore, Africa still lacks the manpower and skillset required to manage these technologies. This is because most of the digital technology and infrastructure available on the continent continues to be developed from outside the continent. This makes it difficult to maintain and manage such imported technology.

Therefore, there is a call for African innovators and businesses to escalate the creation of localized technological solutions suitable for the African people's communities. Furthermore, African governments and the private sector are encouraged to cooperatively advance digital technological gains made in Africa. For example, African countries are encouraged to spend about 1.1% or more of their GDP on digital technology investment. However, this is still lower than the average 3.2% that advanced economies spend on digital technology investments[4]. As a result, this will stimulate more research and development of digital solutions. Thus, enabling digital technology innovation and investment across the continent. Furthermore, such efforts can be effectively facilitated by the participation of the private sector investments on affordable and accessible digital technology infrastructure. For example, internet access and mobile money service fees were significantly decreased during the beginning of the pandemic. Consequently, this increased Africa's population affordability. Several services pertaining to schooling platforms were availed freely in some African countries. This improved schooling access within high school and university students and enabled them to easily prepare and submit assignments online.

In conclusion, African governments and the private sector are encouraged to leverage the young and digital technology conversant population of the continent with access to digital technologies. This can be achieved through enabling policies that encourage the adoption and use of digital technologies. It can also be accomplished through the removal of restrictive regulatory frameworks pertaining to information, communication, and technology. Furthermore, as Africa is experiencing the second COVID-19 wave lockdown restrictions, it will be profitable for Africans to harness digital technologies essential to the sustainability of livelihoods and maintenance of social contact. Regrettably, the COVID-

19 global pandemic has significantly altered how the world functions and has illustrated the limitations of the current systems. Therefore, this is highlighting the need to reimagine the role of information technology through digital technologies so to leverage socio-economic productivity and growth for the African continent.[5]

[1] https://www.africaportal.org/features/covid-19-implications-of-the-pandemic-for-the-digital-divide-in-africa/

[2] https://www.brookings.edu/blog/africa-in-focus/2020/02/07/shooting-for-the-moon-an-agenda-to-bridge-africas-digital-divide/

[3] SA has some of Africa's most expensive data, a new report says – but it is better for the richer: https://www.businessinsider.co.za/how-sas-data-prices-compare-with-the-rest-of-the-world-2020-5

[4] https://www.brookings.edu/blog/africa-in-focus/2020/02/07/shooting-for-the-moon-an-agenda-to-bridge-africas-digital-divide/

[5] https://www.afdb.org/fr/news-and-events/relevance-digital-skills-covid-19-era-36244