



# **HARNESSING THE APPLICATIONS OF SCIENCE TECHNOLOGY AND INNOVATION IN THE FIGHT AGAINST COVID-19: LESSONS FOR SCIENCE POLICY.**

**Insights from the Preparatory Seminar series towards the 2020 ARIN International  
Conference 'Africa in the Post-COVID-19 World: Lessons for Research and Policy**

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## About ARIN

[The African Research and Impact Network \(ARIN\)](#) is an impact platform that brings together a network of scholars and policymakers across Africa to leverage their knowledge and experiences in promoting research leadership, excellence, and impact pathways in the continent. Modeled as a network, ARIN seeks to foster connection and peer-learning amongst Researchers, Policymakers, and Practitioners who work in different fields within state and non-state organizations. The platform promotes sharing of transformative research and impact practices from different African contexts and beyond, enabling cross-disciplinary learning and sharing across contexts. ARIN work focuses on key sectors identified as critical for sustainable development of African Member States and as outlined in Africa's Agenda 2063. These include natural resource management, climate change, agriculture, forestry, energy, water, trade, gender, and cities.

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## **LIST OF ACRONYMS**

<b>ACTS</b>	Africa Centre of Technology Studies
<b>ARIN</b>	Africa Research and Impact Network
<b>COVID-19</b>	Coronavirus Disease 2019
<b>GDPg</b>	Gross Domestic Product
<b>GIS</b>	Geographic Information Systems
<b>KEMRI</b>	Kenya Medical Research Institute
<b>R&amp;D</b>	Research and Development
<b>STeAPP</b>	Science, Technology, Engineering, and Public Policy
<b>SDG</b>	Sustainable Development Goal
<b>STI</b>	Science, Technology, and Innovation
<b>STISA</b>	Science, Technology and Innovation Strategy for Africa
<b>TVET</b>	Technical and Vocational Educational and Training
<b>UCL</b>	University College London
<b>UK</b>	United Kingdom
<b>WHO</b>	World Health Organization

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## EXECUTIVE SUMMARY

Between April and December 2020, The African Research and Impact Network convened the *"Africa and COVID-19 dialogue Series"* bringing together key stakeholders drawn from academia, policy, and practice to generate insights and lessons for re-building Africa's research and policy towards supporting the COVID-19 response and post-COVID-19 recovery efforts and plans.

This technical report presents a summary of the 2<sup>nd</sup> ARIN preparatory seminar under the Science Technology Policy and COVID-19 thematic area, a build-up to the ARIN International Conference, *"Africa in the post-COVID-19 world: lessons for research and policy"*. The report presents insights shared by over 60 scholars, policymakers, and innovators drawing on their experiences across different African contexts and beyond.

Deliberations alluded that the COVID-19 statistics as presented by the World Health Organization (WHO), indicate that Africa has recorded relatively lower cases of infection and fatalities than had been anticipated. However, this perception remains clouded with a level of uncertainty due to the lack of holistic information on the interaction between COVID-19 and various sectors beyond health, in addition to the weak surveillance systems and weak testing and reporting capacity in the continent.

In the context of Science Technology and Innovation (STI), the pandemic has had its share of effects on Research and Development (R&D) investments and innovations both in the private and public sector. Research and innovation activities of STI actors have been disrupted by the lockdown measures. Major interruptions in the research on health and more broadly other research fields are slowing down activities that require clinical trials, research with human subjects, and field works. Notably, there has been a diversion of research efforts including funding priorities towards COVID-19 topics. The impacts are felt more broadly in the society beyond just health, but this is yet to be well understood.

Amidst this uncertainty, there is an opportunity for STI to strengthen the current response and support the re-building process including investments in capacities and lessons for the COVID-19 recovery.

Key advancements in STI policies have emerged to combat the pandemic and support the recovery efforts. Some of the key lessons and insights observed around STI and COVID-19, and how such can be harnessed for recovery and resilience-building post-COVID-19 include the following:

- 1) **Strengthened science-policy interface:** The COVID-19 experience has created a level of awareness and linkages between science and policy processes in most African countries in three main ways: 1) the promotion of science-policy dialogue and consensus; 2) the strengthening of science systems to generate pre-COVID-19 evidence, and 3) the revelation of key gaps in science-policy linkages.
- 2) **The emergence of opportunities for inclusive innovation:** Discussions noted that the pandemic has triggered collective action towards innovation where different age-sets and social groups are making innovative efforts to address the pandemic. Yet, it is not the emergence of these innovations that is important, but the opportunities and spaces for recognizing and legitimizing their existence, further opening up spaces for more development and support. Sustaining such actions and inclusive innovation and inclusive development is a key lesson even across the various sectors and the various challenges the African continent is struggling with now and beyond the COVID-19.
- 3) **Safeguarding innovations against opportunistic entrepreneurship:** Despite the recognition of various forms of innovations, the discussions raised caution on the need to be clear on what innovation entails. To this end, concerns have been raised that the COVID-19 has triggered a lot of opportunistic entrepreneurship where many interventions are emerging for profit-making purposes rather than innovation. Such opportunistic entrepreneurship posits a greater risk to the continent's innovation and ideas.
- 4) **Pro-societal and pro-active STI policies beyond competitiveness:** Discussions also noted that the COVID-19 has exposed some gaps in Africa's policy processes and framework in various sectors including health, education, and agriculture, among others. For a long time, STI policies have been designed to achieve competitiveness in science and business. Yet, the COVID-19 experience has shown that building equitable societal systems is critical for strengthening resilience. The need to design STI policies beyond competitiveness to advance societal goals is critical post-COVID-19.

Overall, the COVID-19 is a global tragedy whose consequences and sufferings cannot be ignored due to the distress it has put on local livelihoods and economies. Despite this, it has opened a vital space for rethinking science and innovation policy not only for research excellence and economic growth but towards more responsiveness to the real societal needs.

## ACKNOWLEDGEMENTS

This report is a product of the 2<sup>nd</sup> preparatory seminar series held on the 25<sup>th</sup> of September 2020, designed to stimulate discussions and debates towards the ARIN International Conference titled *Africa in the Post-COVID-19 World: Lessons for Research and Policy* that was held on 18<sup>th</sup> – 20<sup>th</sup> November 2020. The organization and execution of the seminar were overseen by the ARIN Secretariat, the ARIN focal points from across the four African regions, and the 1<sup>st</sup> cohort of the ARIN fellows. Insights were also drawn from specific partner projects including the Knowledge Systems Innovations<sup>1</sup> and the Assessment of the Science Technology and Innovation Metrics in Africa<sup>2</sup>, supported by the Foreign Commonwealth Development Office, and the Tomorrow's Cities Nairobi Risk Hub<sup>3</sup> supported by the United Kingdom Research and Innovation. Special acknowledgment goes to the over 60 participants who actively engaged in the discussion providing thought-provoking questions and insights.

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<sup>1</sup> <https://acts-net.org/ksi/>

<sup>2</sup> <https://www.arin-africa.org/2020/07/16/science-technology-and-innovation-sti-metrics/>

<sup>3</sup> <https://www.tomorrowcities.org/city/nairobi>



## 1. Introduction

### 1.1 Background and rationale

The COVID-19 presents a greater global challenge with detrimental health and socioeconomic impacts. Throughout the fight against the COVID-19, the world has relied on Science, Technology, and Innovation (ST&I) as a frontline source of ideas and actions (Paunov and Planes-satorra, 2020). Science, Technology, and Innovation and their key facets have been applied in different ways to combat COVID-19. The pandemic has led to a proliferation of innovations and accelerated the applications of technologies including digitization in ways that we never imagined.

Various arguments have been presented on the role of STI policies, including possible shifts in STI policies to support post-recovery efforts. STI policies that address trade e.g., procurement, policies that are inclusive, policies for economic growth and competitiveness, policies for environmental sustainability, as well as policies that support resilience are needed. All these policy goals as echoed by various experts and various upcoming strands of evidence are needed and as such the key question and concern is how to arrive at such holistic and inclusive policies (Frost *et al.*, 2019).

Various complementarities and trade-offs are key to supporting STI policies that meet these varied ambitions. Experts have called for countries to re-evaluate and design their STI policies to support post-recovery efforts. Already, shifts in funding allocations have been observed, including the development of new data and tools, new governance models, and systems of transformations where civil societies, science, and research informs response efforts. As such, these examples offer opportunities on the various approaches for strengthening STI capacities for post-recovery. For example, one aspect that requires governments to rethink is technology. Some of the technologies whereas useful, are far from being evenly distributed across the world and might leave African countries leapfrogging and catching up.

As African countries re-focus attention to economic recovery, incentivized by substantial stimuli packages, there is a need to safeguard and consolidate the resultant lessons to inform the management and repositioning of resources, not only for development but also as a cushion against future pandemics, disasters, and other shocks.

To this end, ARIN organized a series of monthly research seminars to discuss how various stakeholders can collectively build Africa's resilience in the post-COVID-19 world. The preparatory seminars were aimed at stimulating discussions and debates to inform the ARIN International Conference titled *Africa in the Post-COVID-19 World: Lessons for Research and Policy* which took place on the 18<sup>th</sup> – 20<sup>th</sup> November 2020.

The preparatory seminars were organized around three main themes: Cities and Resilience; Science Technology and Innovation; Climate Action and Sustainable Energy. These are critical areas for Africa's transition to sustainable developed economies in line with the Sustainable Development Goals (SDGs). The overall output of the preparatory seminars and the main conference will be a book volume titled 'Africa in the Post-COVID-19 World: Lessons for Research and Policy' edited by Prof. Mark Pelling & Dr. Joanes Atela<sup>4</sup>. This technical report, therefore, highlights some of the key insights that emerged from the preparatory seminar convened virtually on the 25<sup>th</sup> September 2020, focusing on the role of STI in informing post-COVID-19 development and pandemic management plans.

## 1.2 Objectives

The seminar focused on drawing lessons along with the following objectives:

- 1) Present emerging contextual evidence on the role of technologies and innovations in addressing emerging risks such as COVID-19.
- 2) Discuss the role of STI in solving and managing the current COVID-19 pandemic as well as future pandemics.
- 3) Explore how STI can be harnessed post-COVID-19 rebuilding process.

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<sup>4</sup> (<https://www.arin-africa.org/category/publications/books/>).

## 2. Approach to the Seminar

This seminar was convened on 25<sup>th</sup> September 2020 as a preparatory dialogue to spur discussions towards informing the broader ARIN International Conference themed ‘*Africa in the Post Covid-19 World: Lessons for Research and Policy*’. This seminar, alongside two others: Cities and COVID-19; Climate Action and COVID-19<sup>5</sup>, was aimed at convening dialogues among different stakeholders to share and generate knowledge that can inform future research and policy actions. Besides the seminar deliberation, ARIN convened weekly dialogues between April and August 2020 at the on-set of the COVID-19 pandemic, where contextual discussions were held with researchers, practitioners, and policymakers across the world with a focus on STI and other disciplines<sup>6</sup>.

The seminar involved a brief background presentation on how the various elements of STI interact with the COVID-19 emergence, response, and recovery experiences across various African contexts and sectors, followed by a reflection by a panel of experts drawn from the academia, government, private sector, civil society, and innovators. Plenary discussions from a wider range of over 60 participants drawn from the different African countries also added evidence and examples on the key messages based on their contextual experiences. For specific details of the activities, please see the program and the wider seminar background presentation appended as Annex 1. The proceedings were recorded and qualitatively analyzed using the grounded theory approach with perspectives, and further strengthened through secondary data and literature.

## 3. Understanding the Impacts of COVID-19 and Intersection with STI Processes

An introductory presentation sought to provide a basis on how STI interacts with COVID-19, reflecting on the various facets of STI and the intersection with COVID-19 in terms of impacts and response. Science Technology and Innovation in its basic form comprise three interconnected elements; Science, Technology, and Innovation (UNCTAD, 2020). Science is about producing evidence and looking at a subject matter and coming up with decisions that are informed by evidence to support progressive action.

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<sup>5</sup> For details of the covid-19 seminar series, see here: <https://www.arin-africa.org/past-events/>

<sup>6</sup> See here <https://www.arin-africa.org/category/news-blogs/>.

Investments in scientific research have been heralded as means to support more evidence and guarantee the welfare and progress of people (Arnout, 2020). Technology is the tool or the various processes and capabilities that are applied. Innovation implies the application of science and technology to support the transformation of ideas, new products, and processes to create value and purpose. Innovation supported by “intellectual property rights for human health and well-being” is a key fundamental mechanism of dealing and supporting crisis’ (Arnout, 2020). These three facets, although presented in a very simple way yet complex in their applications and interactions, have been frontline sources of ideas and action in the continent.

The interaction between the COVID-19 on STI can be seen from a wider economic sense. Beyond health risks, the pandemic has affected Africa’s trade and the socio-economic front, including the provision of various needs in the services sector (OECD, 2020). The crisis has and will affect Africa’s growth in various ways. Already, the 2020 economic growth projections are far from being realized as provided by the African Development Bank (AfDB). The 2021 projection seems worse, and such declining growth rates have also been reported by the World Bank, African Union Commission, McKinsey, UNECA, and Brookings Institute (OECD, 2020). Consequently, the well-being of the poor people who are already vulnerable is a key concern. According to the United Nations (UN) estimates, nearly 30million more people could fall into poverty and experience food insecurity (OECD, 2020).

Most African governments have continued to depend on emergency directives informed by observed infection trends, and these have reinforced existing vulnerabilities. Some of the measures adopted by governments to control the spread largely relate to the measures adopted elsewhere: isolation, lockdowns, and closure of schools and businesses, among others. These measures have generated significant setbacks for African economies, straining almost all key growth-enhancing sectors (Grace, 2020). The health sector has been directly affected but there are multiple impacts across other sectors of the economy/society including agriculture, tourism, and social amenities.

Significantly impacted is the education sector where 1.6 billion children across the globe have been affected. Major disruptions in the already vulnerable agri-food systems have been experienced coupled with other pre-COVID challenges such as locust swarms and floods (Morsy, Salami, and Mukasa, 2020).

Statistics from the African economic outlook shows a negative value in the adjusted Gross Domestic Product (GDP) growth projection for 2021. (see case examples of South Africa, Zambia, Nigeria, Democratic Republic of Congo) (AfDB, 2020). There is however an opportunity to recover due to the mixed impacts the pandemic has brought. Sectors such as the manufacturing industry have been bolstered to meet local and resilience demands of goods even in terms of food and health products.

From the African economic outlook, the 2021 forecast appears far from meeting the 2019 growth as depicted in Figure 1.

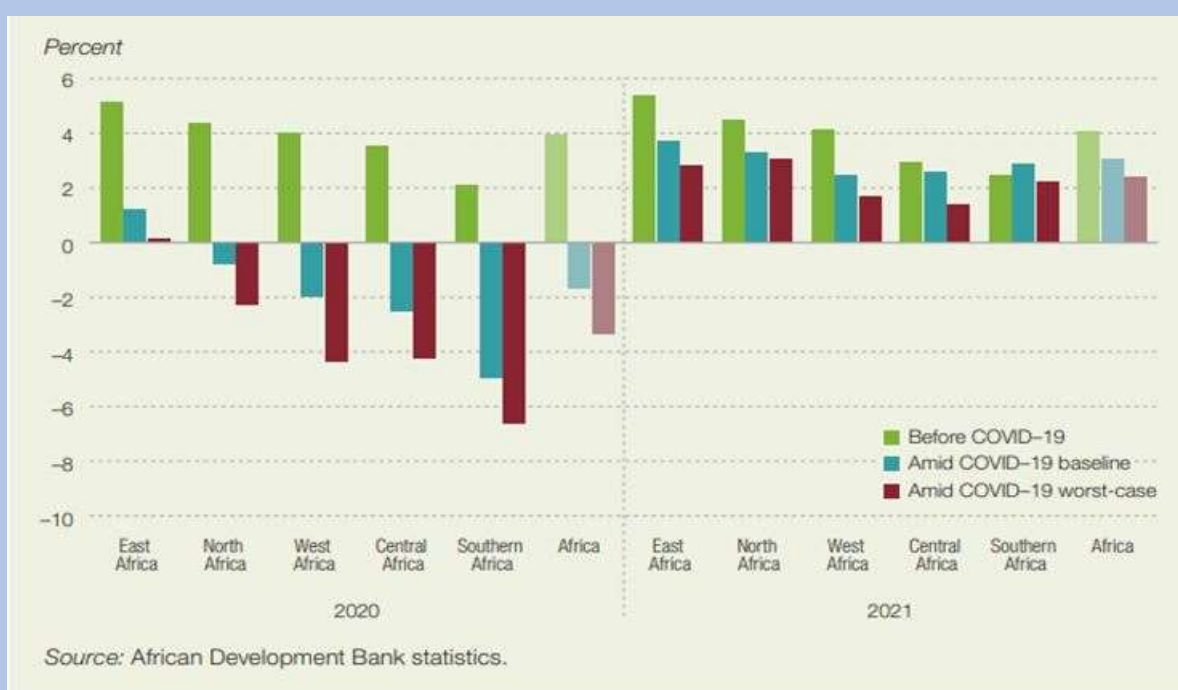


Figure 1: Africa's economic performance and outlook amid COVID-19  
 Source: African Development Bank (2020)

Overall, the COVID-19 statistics as presented by WHO, indicate that Africa has recorded relatively lower cases of infection and fatalities than had been anticipated (Grace, 2020). This perception is however still clouded by a level of uncertainty on the extent to which the pandemic has impacted the continent. The uncertainty is mainly due to the lack of holistic information on the interaction between COVID-19 and various sectors beyond health, in addition to weak surveillance systems in the continent. Besides, the weak testing and reporting capacity, weak travel connections, and lack of effective border controls explain the low COVID-19 numbers across the African continent (Otu *et al.*, 2020).

In the context of STI, the pandemic has had its share of effects on R&D investments and innovation, both in the private and public sectors. Research and innovation activities of STI actors have been disrupted by the lockdown measures. Major interruptions in the research on health and more broadly other research fields are slowing down activities that require clinical trials, research with human subjects, and field works. Notably, there has been the diversion of research efforts including funding priorities towards COVID-19 topics (Paunov and Planes-satorra, 2020).

While it may be argued that various funding opportunities are now supporting more research on COVID-19, on the contrary, non-state STI actors such as private firms have decreased investments in Research and Innovation (R&I) due to uncertainties and slowed investor funding. The new normal for STI in the immediate post-lockdown period is still unknown but there are calls to interrogate more the various management efforts that include:

- i. Quick and rapid funding mechanisms and how such processes are conducted, who is left out, and who is included.
- ii. How the resources are spent.
- iii. STI policies that guide investments in research.
- iv. Nature of the various STI collaborations and distill further the reconfiguration of STI policies to guide and contribute to a stable recovery.

Amidst this uncertainty, there is an opportunity for STI to strengthen the current response and support the re-building process including investments in capacities and lessons for the COVID-19 recovery (UNCTAD, 2020). Key advancements in STI- including policies have emerged to combat the pandemic and support the recovery efforts.

These policies have particularly fostered regional collaborations among key research players such as the Africa Centre for Disease Control, the African Union Commission, the Africa Taskforce for Coronavirus Preparedness and Response (AFTCOR), national public health institutes in the Member States, and the private sector and local businesses (Otu *et al.*, 2020). Moreover, these measures have been anchored on science and innovation to facilitate rapid surveillance and communication, linking the local experiences in terms of impacts and response and infection trends. The section below outlines some key lessons and insights on STI and COVID-19 that emerged from the discussions, and how much can be harnessed for recovery and resilience-building post-COVID-19.

## 4. Key insights from the discussions and deliberations

The discussions and arguments highlighted four key areas and lessons on how the COVID-19 experiences are revealing weaknesses in Africa's STI pursuit, but also creating opportunities for the same. The experts provided key entry points for a stable recovery as follows.

### 4.1 Strengthened science-policy interface

The COVID-19 experience has created a level of awareness and linkages between science and policy processes in most African countries in three main ways: 1) the promotion of science-policy dialogue and consensus; 2) the strengthening of science systems to generate pre-COVID-19 evidence, and 3) the revelation of key gaps in science-policy linkages. In terms of dialogues, discussions noted that the pandemic has strengthened the establishment of dialogue platforms such as the COVID-19 Expert Advisory Panels that bring together researchers and policymakers to provide periodic scientific advice on COVID-19. At the regional level, for example, the African Union (AU) has established specialized Committees on Education, Science, and Technology, which have come up with very good recommendations for African member States including options for investment in data science, and the use of technologies such as the Geographic Information System to support tracking efforts.

A diversity of R&D funding schemes have also been developed to support quick response (Brown and Head, 2020). These include funding schemes for research and knowledge sharing, virtual hackathons, open competition for ideas, and funding for research infrastructures. The regional efforts also corroborate with national efforts by the various African Member States:

***'The science community should then focus on all the dimensions of the pandemic (the medical, the biological sciences, the social sciences and the financial'***

*[Dr. Roy Mugiira, Director, Scheduled Science at the National Commission for Science Technology Innovation Centre, Kenya]*

Specific African countries such as Kenya and Ghana have established National COVID-19 Expert groups comprising of researchers from different national and international agencies. In Kenya, a National Expert Committee comprises various actors in the science field and advises the government on COVID-19

actions. Even though the relationship between these expert groups and the political processes is not a straightforward one, indeed marred by various political influences, there are certainly some opportunities emerging to promote research dialogues and strike consensus between the research/evidence and political processes. The outcomes of such dialogues are however subject to power relations including questions around whose opinions counts and the wider politicization of the science advisory.

In terms of strengthening science systems to generate pre-COVID-19 evidence, discussions noted that there has been direct reliance on science systems, including research agencies, to generate evidence for COVID-19 response and surveillance. For example, the Kenyan Medical Research Institute (KEMRI) has been central to coordinating epidemiological research and conveying data and synthesis to the national government. Several non-state agencies are pursuing COVID-19 related research and linking these to policy processes accordingly.

Additionally, research collaborations towards generating evidence to inform COVID-19 have been observed. These collaborations have been geared towards supporting science, research, and development (R&D) around medicine, epidemiology, and a lot more around clinical treatment and drug screening including vaccine development and even centers of excellence in health research in the continent.

The need to use science-based decisions is further underscored by the deliberate efforts to strengthen science systems in various African countries. For instance, in Nigeria, there has been an approval of around 66 laboratories owned by the government and 15 laboratories that are privately owned (NCDC, 2020). In other countries like Kenya, policies have been revised to support the generation of more evidence to respond to COVID-19.

***‘Nationally, Kenya, just before the pandemic, launched the “National Research Priorities” that respond to the global priorities in the areas of economic development and Science Technology, and Innovation mirroring the Africa Union priorities under the Science, Technology, and Innovation Strategy for Africa (STISA) 2024. The National Research Priorities document was also aligned to the “Big 4 Agenda”, the national government’s 4-point development priorities in the sectors of Food and Nutrition Security, Affordable Housing,***



***Manufacturing, and Health. However, in the advent of the COVID-19, the priorities were realigned to the health priorities which had been pitched on the Universal Health Coverage to respond more specifically to the pandemic. The National Research Foundation of Kenya made a very specific call for research geared towards addressing COVID-19’***

*[Dr. Roy Mugiira, Director, Scheduled Science at the National Commission for Science Technology and Innovation (NACOSTI), Kenya]*

In terms of revealing gaps in the science-policy interface, discussions noted that the COVID-19 has shown that there exists valuable research knowledge in Africa as in the rest of the world. However, the need to raise the profile of the application of science and data to inform COVID-19 response in Africa has been reported to be relatively low despite the existing evidence drawn from various contexts (Umviligihozo *et al.*, 2020). A key limitation is the lack of adequate systems to put existing evidence into practice including weak political goodwill as well as lacking coordination.

***‘African countries lack the equipment to put the applications into motion. African countries need to find out how to bring on board the private sectors that have the financing capacity because African countries have researches and theories in their universities, and they cannot be put into motion because of lack of required financing’***

*[Antonne Faye- ARIN Focal Point, Central, and Francophone Africa].*

Limitations were also noted in the context of poor transdisciplinary in responding to the COVID-19 pandemic. For instance, Dr. Roy Mugiira, the Scheduled Science Director at NACOSTI, Kenya, stated that there is good research support in response to COVID-19 mainly through medical sciences, including an epidemiological understanding of the virus behaviors and the collaborative vaccine development. However, there is a weak appreciation of the entire knowledge sphere in this response.

The approach has narrowly focused on medical/health research and has left out the social sciences that could further promote a holistic understanding of the impacts of the virus beyond health in the wider social sciences. Yet, a lot of responses that have been put in place in response to COVID-19 are social e.g., social distancing, public health initiatives. In addition to social science, other social aspects that have been sidelined include human behavior, psychology,

psychological support, philosophy, and religious components that come to help in response to the pandemic and future pandemics.

Overall, the emerging potential niches for strengthening the science-policy interface provides an opportunity for African countries to strengthen their science capability and make sure that a good application of science to societal solutions.

#### **4.2. Emergence of opportunities for inclusive innovation**

Inclusive innovation, synonymous with inclusive development (Mwambi, Bijman, and Mshenga, 2020) has been underscored in many studies as critical to responding to societal problems (Heeks, Foster, and Nugroho, 2014; Chataway, Hanlin and Kaplinsky, 2014). Operationalizing inclusive innovation requires paying more attention to the inclusion of marginalized groups and creating opportunities for them (Heeks, Foster, and Nugroho, 2014); engaging diverse actors in innovation activities; and supporting the socio-economic outcomes of the diverse actors and marginalized groups. In the event of the COVID-19, African countries have witnessed a proliferation of innovations in various places by various people. Discussions noted that the pandemic has triggered collective action towards innovation, where different age-sets, social groups, are making efforts to innovate to address the pandemic. In other words, the pandemic has led to the proliferation of innovation and its applications at various levels including community level, national and regional level, and with contributions from various groups.

On one hand, there have been national-led and private sector-led innovations especially around digital technologies such as *MPESA*<sup>7</sup> money transfer in Kenya, digital early warning systems, among others. On the other hand, there are emerging innovations driven by different social groups and communities. Yet, it is not the emergence of these innovations that is important, but the opportunities and spaces for recognizing and legitimizing their existence, thus opening up spaces for more development and support. Sustaining such actions and inclusive innovation, as well as inclusive development is a key lesson even in the various sectors and the various challenges Africa is struggling with now and beyond the COVID-19.

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<sup>7</sup> <https://www.safaricom.co.ke/personal/m-pesa>

While some African countries have thrived in the digital innovation driven by the national sectors, international agencies, and established private sector companies, the emergence and recognition of local innovations such as local entrepreneurship, new social innovations, indigenous and informal knowledge systems (indigenous medicine), local manufacturing enterprises and information management has added value to widening the innovation space.

**Table 1:** *Some examples of locally emerging innovations*

***Box 1: Examples of local Innovations developed to support covid-19 response – case studies from Kenya: Source: Video footage by ARIN***

***Prototype Ventilator:*** A prototype ventilator was developed by 16 Kenyatta University students under the guidance of Dr. Shadrack Mambo, Dean, School of Engineering and Prof Nicholas Gikonyo, Chairman of Chandaria Business Innovation and Incubation Centre. All the materials used for the prototype were locally sourced. This has encouraged mass production. Features of the prototype: it can run continuously on a 12-voltage battery; it runs on electricity and solar; they are portable and light in weight so they can easily be transported and used at any point of need; user friendly.

***Wooden hand washing station:*** This innovation was developed by a 9-year-old boy. It has a pedal that when stepped on tilts the bucket of water at an angle that lets it dispense water thereby minimizing human contact with the surface of the container.

***Solar automatic hand washing system:*** This was designed by 5 research students from Pan Africa University’s Institute for Basic Sciences. The machine has a sensor that detects movements below the tap when one wants to wash his/her hand. The machine also dispenses soap and allows the user up to 15 seconds to scrub their hands before it releases water for rinsing one’s hand.

***Contact tracing application:*** The application is capable of identifying who, where and when a person gets into contact with a COVID-19 positive person. The app includes triaging and case management functions that solve the cumbersome need of manual records witnessed in most hospitals across the country.

Most of these local innovations are now gaining international recognition in the phase of COVID-19 (Ndege, Atela, and Mbeva, 2020). The recognition of the significance of locally embedded and contextual innovations in responding to pandemics resonates well with the aspirations of many policymakers and experts across Africa and elsewhere. This recognition is likely to open new opportunities and consciousness about the need to support and promote such innovations as key facets of societal resilience. Such opportunities are critical in safeguarding the potential of promising innovations that have manifested in different local settings but are still relatively immature.

*‘As an incubation hub accelerator what are some of the emerging innovations that have been developed and supported and how can we scale some of these technological innovations? Some of these technologies are far from evenly distributed across the world and might leave African countries leapfrogging’.*

*[Mr. Peter Kuria, Director Incubation and Innovation Management]*

*‘Looking at Innovation, Science, and Technology in Africa today, one of the things that come out is the inability to fund innovations. There is a lot of funding that come from other European countries, this is a missing gap in the youth space. African countries need to find a way to fund and support their innovations in terms of production, market linkages, and other facets that are missing within the African ecosystem without depending on external funding or support’.*

*[Miss Sara Kajuju, Life Purpose Youth Career, Lecture in St. Paul’s University, Kenya]*

Other than community-driven innovations, innovations have also emerged from different social groups including the youth and women. More specifically, the role of the youth in driving innovative ideas has become clearer and as an opportunity for the continent. This builds on the relatively high demographic dividend of the youth. Most youths have built on the existing opportunities such as the accelerators and hubs to harness ideas into business ventures and action within the value chains such as the distribution of equipment and products to a different area and opening market opportunities for these ideas.

Young people in most African countries have remained relatively energetic in the phase of the pandemic and have positioned themselves as information carriers and conveyors targeting behavior change, early warning systems, among others. For instance, the use of online engagement platforms, arts, social and mainstream media, community-based champions, and impact networks that are largely driven by young people have become powerful options for conveying knowledge to society. Such communications have triggered innovation and entrepreneurship in different African settings where people have begun developing locally-driven solutions including local knowledge dialogues on behavior change<sup>8</sup>.

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<sup>8</sup> <https://www.arin-africa.org/2020/08/05/covid-19-is-re-shaping-our-perspectives-of-africas-knowledge-systems/>

***“The COVID-19 has triggered many young people to think and to create platforms that share knowledge and virtual spaces that support young entrepreneurs to make an impact in the future. One thing that is missing is that Africans do not buy their own. There is a failure in owning African products. Most often, Africans go out to look for solutions that have been made elsewhere rather than buying their own”.***

*[Miss Sara Kajuju, Life Purpose Youth Career, Lecture in St. Paul’s University, Kenya]*

Despite the indicative potential for youth-led innovations, many challenges such as lack of proper mentorship and incubation of ideas remain. It was noted that many young people tend to possess a lot of information that has not been used to create solutions to the challenges that African countries face. There is a need for more innovation mentorship and platforms for linking young people to multiple opportunities and agencies that support young entrepreneurs to transform ideas into viable goods/services that are suitable for the market.

Supporting and sustaining emerging innovations during the COVID-19 remains key. One option discussed in the panel and plenary is the need for research evidence and policy frameworks to support such innovations. In Africa, the available evidence base/knowledge to support innovation is very disparate because of the continent’s relatively low investment in STI. Currently across Africa, very few countries can confidently finance research thinkers and research bodies, and this has a lot of implications on the kind of innovation produced and the agenda that goes into science and innovation. Currently, Africa contributes about 0.6% of the global investments in research and development, significantly lower than other regions. This weakens the knowledge base for innovations in the continent.

Long-term investment not only on politically visible physical infrastructure but also in critically needed knowledge infrastructure is required. In terms of policy support, frameworks that incentivize homegrown product development, and the establishment of standards that ensure legitimacy is critical. For instance, the COVID-19 experience shows that there is a huge underlying potential of Africa’s informal knowledge to support resilience. Moving forward, African countries may need to put in place food/drugs licensing and regulatory regimes that enjoy confidence beyond national borders, which can be deployed to test the efficacy and safety of indigenous products. Such globalization of indigenous knowledge will also require strong property rights protection regimes to ensure

that knowledge rights are protected against powerful political and business actors.

*‘As long as African countries are not putting mechanisms in place that can mobilize domestic resources, then get people to learn that they can invest in ideas in the young generation and the ideas are equally as good as the products, then African countries will remain to discuss these issues for a long time because right now there is a big opportunity for African countries to internalize the problems that have emerged out of COVID-19 and turn them around to be opportunities. [Mr. Peter Kuria, Director of Incubation Innovation Management]*

*‘All the innovations that are coming up, some of which are very brilliant, need a lot of support in terms of funding, market linkages, and production, especially for the young innovators that have come up with very brilliant innovation, particularly during this COVID-19 pandemic. Going forward, the innovators need to be proactive and not reactive as this may not be the last pandemic that strikes the world’. [Miss Sara Kajuju, Life Purpose Youth Career, Lecture in St. Paul’s University, Kenya]*

Additionally, as a way of enhancing preparedness, more futuristic policies are needed in responding to these kinds of calamities that may not be pandemics. Firstly, this will be possible by putting in place a robust policy foundation and responsive policy that will respond quickly, and secondly, bringing social science research at the center of what researchers do because the pandemic has something to do with human behavior as well.

#### **4.3. Safeguarding innovations against opportunistic entrepreneurship**

Despite the recognition of various forms of innovations, the discussions raised caution on the need to be clear on what innovation entails. To this end, concerns have been raised that the COVID-19 has triggered a lot of opportunistic entrepreneurship, where many interventions are emerging for profit-making purposes rather than innovation. Such opportunistic entrepreneurship posits a greater risk to the continent’s innovation and ideas. A key feature of innovation is that it happens every day.

Innovations need to be validated, protected, and ways to release them to the market as viable enterprises developed. Yet, in Africa, the uptake of innovation into the market is characterized by several challenges including a lack of adequate policy frameworks as well as a weak evidence base to support such innovations as discussed above. Such challenges subject the continent's innovative ideas to capture by opportunistic entrepreneurs who are well resourced and relatively powerful. For example, investments targeted in the development of incubation acceleration framework. There is a legitimate need to establish mechanisms that identify, protect, and promote emerging innovations. One option in this regard is to develop a better innovation policy that guides on what is expected out of innovation.

#### **4.4 Pro-societal and pro-active STI policies beyond competitiveness**

Discussions noted that the COVID-19 has exposed some gaps in Africa's policy processes and framework in various sectors including health, education, and agriculture, among others. For a long time, STI policies have been designed to achieve competitiveness in science and business. Yet, the COVID-19 experience has shown that building equitable societal systems is critical for strengthening resilience (Ndege, Atela, and Mbeva, 2020). The need to design STI policies beyond competitiveness to advance societal goals is critical post-COVID-19. There is an opportunity to look at how COVID-19 has brought in other issues in that space, and start thinking about how to address societal problems, ethics, wellbeing, and how that integrates with STI policy frameworks.

*‘Science and innovation policy tend to be focused largely on formal institutions e.g., universities. Innovation science can happen in a wide variety of civil society actors, different types of institutions, and schools. The potential to bring in different actors to discussions about science and innovation is a fascinating aspect of this conversation and that needs to be kept in mind as we think about science and innovation policy in the future’* [Prof. Joanna Chataway, University College London, UK]

## 5. Conclusion and Recommendations

COVID-19 is a global tragedy whose consequences and sufferings cannot be ignored due to the distress it has put on local livelihoods and economies. Despite this, it has opened a space vital for a rethinking of science and innovation policy, not only for economic growth but to responsiveness to other societal demands. The broken supply chain that was associated with COVID-19 has unleashed creativity and focused on certain problems that need to be addressed immediately and in doing that, it becomes obvious that science and innovation have huge potential to address immediate social and economic problems. Science, Technology, and Innovation can do so in the short term and lessons for long term opportunities harnessed.

The pandemic has also highlighted the role of various types of evidence and how different forms of knowledge are critical for solutions. The need to increase the capabilities and capacities to curate knowledge and put together different types of understanding of knowledge to address programs is critical.

What is urgent and has dominated the STI discourse currently including the seminar is the development of responsive policy and processes. Particularly re-configuration of policies that respond to the immediate social and economic crisis and further refocusing them to accelerate losses from the pandemic as well as support more balanced growth agendas. This comes back to the discussions again around curating knowledge around the various societal challenges and demands. Novel platforms and emerging investments in accelerators, innovation hubs, and incubation hubs can be re-configured and appropriately constructed to be more problem-focused and more solution-oriented. Learning from the current crisis, these platforms can be re-engineered to build back better.

### Recommendations

- African countries need to develop and leverage innovation and start-up policies to support the huge informal sector.
- Platforms such as the Technical and Vocational and Educational Training (TVET) institutions, and incubation hubs can take up the initiative of equipping innovators by preparing the young minds to see the challenges of the future and let them be well-positioned to put measures in place that can withstand the challenges that will emerge in the future and respond to them.



- Intra-African collaboration needs to be initiated and supported to not only learn from one another but to also avoid replication of innovations across the countries in Africa to ensure proper utilization of resources.
- There is a need to find ways to convince young entrepreneurs and investors that it is important to mobilize and use domestic resources and invest in great ideas whether they fail or not. There is also a need for capacity building in the innovation and entrepreneurship ecosystem on that innovation is beyond products and encourage actors to go beyond products.
- For a transformation to happen, science, scientists, and/or researchers need to work on a framework that supports both research and the incubation of their research outputs. They need if possible, to apportion some of their resources to bring on board innovators, incubators, and entrepreneurs to support their idea to market level, as well as spin-off support and management.
- Supporting access to innovations including technological innovations in general is key. Innovations developed elsewhere offer an opportunity to catapult the continent. Where scalable technological solutions and innovations exist, access to those without such technologies should be enhanced to support the collective development or at least help other countries be more prepared rather than be reactive.

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## 6. Annexes

Annex 1: [Concept Note](#)

[Seminar presentation](#)

## Partners



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