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Contribution by Kenya

to the CSTD 2021-2022 priority themes on "Industry 4.0 for inclusive development" and "Science, technology and innovation for sustainable urban development in a post-COVID world"

REPUBLIC OF KENYA

KENYA'S CONTRIBUTION TO ISSUES PAPER

PRIORITY THEME 1
Industry 4.0 for inclusive development

Submitted to the United Nations Commission on Science and Technology for Development (CSTD)

Introduction

Kenya is already getting prepared and is engaging building blocks towards "Industry 4.0 for inclusive development. The country is aware that the next generation workforce of Kenya will be taken up by those that will seize on opportunities provided by Frontier Technologies/ Digital Technologies in capacity building on health, agriculture, housing, manufacturing, and environmental issues at community level. Accordingly, training and mentoring a technology-savvy workforce will require a collaborative effort between training institutions and the industry aimed at exposing the next generation STI workforce on underlying principles of technology development as well ethical implications of frontier technologies such as artificial intelligence quantum computing 5G, machine learning and cybersecurity.

Questions and answers

1. **What are the national strategies, policies, laws, programmes and initiatives concerning Industry 4.0 in your country?**

   Answer:
   Capacity building through experiential learning

   Capacity building is being undertaken at all levels starting from basic education. Kenya is focusing on competency-based education and training (CBET) at pre-primary, primary, secondary, TVET and university levels. Students are being trained and manpower developed to thrive in the 4IR environment whose main platforms are Cloud Computing, Artificial Intelligence (AI), Internet of Things (IoT), Blockchain, Data Science (Big Data & Analytics) and Cybersecurity. Kenya is combining and integrating physical, digital and biological spheres and re-skilling and up-skilling in order to realize a "human-centred revolution'.

   Manufacturing

   Kenya is promoting manufacturing through increase of foreign direct investment, reduction of cost of doing business and improving the easy of doing business. The country is also leveraging on low hanging fruits by enhancing its global competitiveness on exports of processed agro-produce[i].

2. **What are the key industries that are pioneer Industry 4.0 innovation in the country? List the key actors in the national ecosystem of innovation related to Industry 4.0 in your country (firms, universities, financial institutions, regulators)? What are the key networks of the ecosystem in your country (including online networks, innovation hubs, forums, etc.)?**

   Answer
   In order to harness the national ecosystem of innovations related to industry, Kenya established the National University – Industry collaborations committee with the following terms of reference:

i. To assist public universities set up highly influential University-Industry partnerships to meet the challenges of a knowledge-based economy.

ii. To spearhead the development of policy issues of joint concern to Universities and Industry

iii. To help define the kind of skills needed by graduates, such as academic depth and critical ability, flexibility, high-level transferable skills, problem-solving skills, communication skills and the ability to quickly learn on job

iv. To ensure university facilities for production plants, workshops and laboratories generate income for universities;

v. To enhance quality and quantity of university research through grants or contract funding;

vi. To support initiatives for cooperation, business development and dissemination of scientific research results

vii. To promote commercialization of intellectual property including innovations.

3. **What are the challenges that your government have faced or may face for promoting Industry 4.0 in your country to contribute to national development priorities and accelerate the progress towards the SDGs?**

   Answer

i.   The manufacturing sector in Kenya has faced significant challenges in the last 15 years. This has seen its contribution to GDP drop significantly giving rise to fears of a premature de-industrialization phenomenon.

ii. The structure of the manufacturing sector has seen little change over the years despite targeted policy interventions attempting to adjust this.

iii. The manufacturing sector's share of GDP has remained stagnant with only limited increases in the last three decades, contributing an average of 10% from 1964-73 and rising marginally to 13.6% from 1990-2007 and averaging below 10% in recent years.

iv. Production in the manufacturing sector is predominantly geared towards consumer goods.

v.   Despite the static nature of the manufacturing sector with regards to its overall role in the economy, there have been significant shifts in the production levels of various manufacturing sub-sectors over the last ten years alone.

vi. This is an important consideration in any economic analysis of the manufacturing sector. Often, the sector tends to be homogenized as one unit of analysis, but the undercurrents of different sub-sectors must be dissected to develop a holistic view of its performance and role in the economy.

4. **What should governments, the private sector, labour unions and other stakeholders do so that developing countries can benefit from these technologies?**

   Answer

i. Undertake Skills Audit in the Industry/Manufacturing Sector is to determine the existing and required skills and skills shortages and develop specific and comprehensive strategies to close the identified gaps and shortages.
ii. Provide an enabling environment for markets for manufacturers and suppliers;
iii. Build capacities that can take advantage of emerging 4.0 technologies in order to;
     o Promote the establishment of small and medium enterprises (SMEs) in strategic areas
     o Establish industrial parks, special economic zones (SEZs) and related industrial hubs;
     o To establish and harness an innovation ecosystem of incubators and accelerators for the manufacture of key and strategic products

5. **What actions can the international community, including the CSTD, take to help your country take advantage of Industry 4.0 for inclusive and sustainable development?**

Answer

Policy direction
   i. Promote the development of infrastructure including 4.0 Technologies
   ii. Enhance key collaborations; including north-south in the utilization of emerging 4.0 Technologies
   iii. Engage developed countries to enhance the north-south collaborations in building capacities
   iv. Give guidance on how women and girls and those in marginalized communities can benefit from 4.0 Technologies
   v. Engage citizen Science in harnessing human potential for feedback in slums, refugee camps etc. on emerging 4.0 Technologies
   vi. Develop policies to guide Countries exploit the *Blue Economy* through Aquaculture by processing respective products

Specific STI interventions

   Provide guidance on how-
(i) Priority should be given to investments in STI capacity building and technology development/adaptation that address the challenges of, and tap into the opportunities afforded by Frontier Technologies such as the Big Data revolution, artificial intelligence (AI), Blockchain, Robotics, Internet of Things (IoT), Cloud computing, Synthetic Biology, Nano, 3-D printing, Digital Systems, Cybersecurity and. Biosecurity.
(ii) Universities and Research Institutions should seek deliberate funding or investments to develop and support interdisciplinary programs that facilitate faculty, researchers, trainees, and students to apply their technical knowledge to real-world problems. In Kenya this forms part of Problem Based Learning (PBL) under the Competency Based Curriculum (CBC) approach.

(iii)   There should be more deliberate investments in advanced communications, networking, and broadband access to ensure that citizens can continue to work and access education and medical services remotely[ii].

6. **Could you suggest some contact persons of the nodal agency responsible for projects/policies and international collaboration in this context as well as any experts (from academia, private sector, civil society or government) dealing with projects in this area? We might contact them directly for further inputs or invite some of them as speakers for the CSTD inter-sessional panel and annual session.**

Answer
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(Prof Kioni is managing the establishment of the first Kenyan Science and Technology Park (S&TP) at Dedan Kimathi University of Technology (DeKUT); in which an Anchor tenant is manufacturing ICT mother boards for the African market)

7. **Do you have any documentation, references, technological assessments, future studies or reports on the priority theme in your country or region?**

Answer
a) **Kenya's Industrial Transformation Programme.**

This was developed by the Ministry of Industrialization and Enterprise Development in July 2015. In the blue print, Kenya needed to overcome challenges in terms of;
  i.   Weak infrastructure and land availability
  ii.   Inadequate skills and capabilities in priority sectors
  iii. Quality of inputs,
  iv.   High cost of operation; especially due to available electricity tariffs
  v.   Poor access to markets and
  vi.   Lack of investor-friendly policies.

Kenya developed a five-point strategy to capture these opportunities over the 2015-2025 period. The strategies are:
  i.   Launch sector-specific flagship projects in agro-processing, textiles, leather, construction services and materials, oil and gas and mining services and IT related sectors that build on our comparative advantages
  ii.   Develop Kenyan small and medium enterprises (SMEs) by supporting rising stars and building capabilities with model factories

iii. Create an enabling environment to accelerate industrial development through industrial parks/zones along infrastructure corridors, technical skills, supporting infrastructure and ease of doing business

iv. Create an industrial development fund

v. Drive results through the newly formed Ministerial Delivery Unit[iii]

b) Policy brief on Science and Technology Parks (S&TP)

The policy brief on S&TP focuses on how the Government will fast-track the development and implementation of STI and STP policies by encouraging policy learning, and policy experimentation in ways that mix top-down and bottom-up approaches in policy making; Establishing a reward and recognition system that attracts contributions to technological generation and knowledge transfer; and supporting University-Industry partnerships through various inducements; including tax incentives, project funding and seed funding[iv],

Policy interventions for the Science and Technology Park

The Government has also developed a Masterplan for establishing S&T Parks. Currently Dedan Kimathi University is constructing a Government-funded S&TP while Chuka University is constructing a second S&TP through collaboration with the Dutch Government. Policy interventions that will help leapfrog these Science and Technology Parks include the following:

i. Established National University-Industry collaborations committee will fast track partnerships

ii. A policy framework is being developed to support investment in S&TPs

iii. Competitive common Guidelines are being developed to support international Research and Development (R&D) platform.

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[i] Ministry of Industrialization-Kenya, January 2020

[ii] 1st Kenya Multi-sectoral Conference on ST&I in a Covid-19 disrupted world by NACOSTI; August, 2020

[iii] Big 4 Agenda etc.

[iv] Policy brief on Science and Technology Parks; 2020

REPUBLIC OF KENYA

KENYA'S CONTRIBUTION TO ISSUES PAPER

PRIORITY THEME 2:
STI for sustainable urban development in a post-COVID world

Submitted to the United Nations Commission on Science and Technology for Development (CSTD)

Introduction

As the world is faced with Faced with the unprecedented social and economic disruption caused by COVID-19 pandemic, countries, institutions as well as individuals have quickly developed and adopted technological innovations, tools and systems to save lives, maintain social fabric, prevent the spread of the disease and facilitate the functioning of businesses, jobs and education. The pandemic has presented an unfettered prospect for countries and institutions to increase investments in science, technology and innovation (STI) and its enabling R&D for; national security, public safety, social order, and wellness of the society, thus elevating STI as a first a responder to mankind's survival subject to providence[i].

1. **What are the concrete challenges that your country has encountered in transition towards sustainable urban development to make cities productive, inclusive, and liveable?**

Answers

Urban development is affected as follows:

i. Economy has slowed down because of cancellation of travel, business-related travels, the meetings, conferences and exhibitions.
ii. There has been a slowdown in the manufacturing due to low imports of raw materials; hence low consumption and low exports. There is overall slow down in supply chain management.
iii. The government has increased its fiscal spending to ensure hospitals are well equipped to deal with the pandemic. The fiscal deficit is therefore likely to increase
iv. Finance and Insurance Sector have suffered risk and credit default; necessitating increase in non-Performing Loans
v. There is slow down in the growth of the construction sector

Managing citizens in urban space is affected as follows:

i Enforcing Covid-19 protocol through management of movement of people, use of masks, sanitization etc. have not been easy due to slowness in embracing change management.
ii Managing crowds at stations where passengers get their means of transport to and fro to work has not been easy due to human psychology of togetherness
iii Managing eateries; including hotels, restaurants etc. in order to sustain the economy has not been easy and many people have lost their jobs due to intermittent closures based on the spiking character of Covid-19 variants.
iv Re-arranging work places to meet the condition of not less than 1.5 meters between employees sharing offices, students in schools, colleges and universities and general meetings
v Citizens find it difficult avoiding movement to the cities for leisure, shopping and work. This has made the government emphasize the need for people to avoid unnecessary walk-ins and if necessary, records to be taken and maintained for

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data/information management. People still find it difficult to get service by appointment

    vi It has taken the government some time to understand the dynamics of Covid-19 in order to develop and implement commensurate policies. Even then, the initial policies were only statements that targeted the most vulnerable as well as those offering essential services like Health, security, food sectors etc.

   vii The construction industry that was once booming experienced a big hiatus which brought about many loses in terms of jobs and idle equipment, tools and machines.

2.   **How has the Covid-19 pandemic so far impacted on sustainable urban development, and what lessons could we draw from the Covid-19 pandemic on sustainable urban development?**

Answer:

    i.   The impact of Covid-19 on urban development is immediately seen as retrogressive and negative. But on the other hand the pandemic has enabled the Government of Kenya to be very innovative. For example, immediately the pandemic struck, the government encouraged all monetary transactions to be undertaken electronically; of course through the famous M-peas system. This reduced possible transmissions through currency. The main lesson learned here is that mankind should always seek for means and ways that are creative in order to sustain himself/herself.

    ii.   It was realized that everybody needed am immediate protection against the spread of the pandemic. This was because the pandemic was not biased towards gender, age, riches etc. and would strike at anybody regardless of social status. As expected the most vulnerable were in the ages from 58 years and above and such are the top managers and policy makers of cities, towns, markets. It was realized that every sector of society and more so the most vulnerable group needed to be cushioned against the pandemic.

   iii.   Kenyans were not talking to each other because more individual seclusion was taking root. The lesson learned was that people needed to talk electronically and mostly hold on-line meetings

   iv.   The government tried curtailing movement of people offering general services and encouraged only those in essential services. This worked well. So the lesson learned is that there is need to contain the pandemic through curfews and stoppage of movement of people in hot spots. However, those in essential services needed urgent attention

    v.   Even though urban development slowed down drastically, entrepreneurs who set up cottage systems/factories to manufacture portable mechanical dispensers of sanitizers, soap and water for hand washing, production of masks (both disposable and reusable) were in big business.

3.   **What projects/policies has your country implemented to use science, technology, and innovation to make cities productive, inclusive and liveable? What are the main outcomes? What are the main challenges confronted while trying to implement these projects/policies?**

Answer

i. The Government has developed Guidelines on Management of human resources during and post Covid-19 pandemic[ii]. Guidelines provide a framework for safe operations including how tele-counselling services can be utilized. By extension this will also apply to those in the private sector since it is the duty of the government to provide to citizens. Government policy statement ensures that the transport industry abides by the Covid-19 government protocol. Passengers are not allowed into their mode of transport unless they sanitize, thoroughly wash their hands with soap and water, wear masks at all times etc.

ii. The main outcomes are based on sampling of citizens to ascertain the numbers of those who are infected. However monitoring and evaluation are spelt out in Government policy. There will be periodic monitoring of implementation of protocol to ensure compliance and reporting.

iii. **Challenges;**

   a. The Government has not carried out enough civic education to enable everybody to respect protocol.

   b. Poverty amongst citizens impedes the implementation of Covid-19 protocol. For example not everyone is able to acquire technology that allows for online meetings away from office

   c. Some citizens are too stubborn to obey government directives

4. **Can you provide examples of policies/projects/initiatives aimed at strengthening national STI capabilities for sustainable urban development? For example, how does your country build technology and innovative capabilities through investments in R&D and human capital? What institutional and regulatory arrangements are in place to stimulate R & D and innovation, and to effectively address unintended consequences of technological innovation, such as privacy, ethical, gender and other concerns?**

Answer

Through Stakeholders initiatives the Government is cognizant of the fact that COVID -19 Pandemic presents immense risks to the economy and to key dimensions of national institutions including urban development. Advances in science, technology and innovation hold a key to mitigating against the widespread effects of the COVID-19 pandemic and other future emergencies. Accordingly, it resolved that;

There is urgent need for more investments in science, technology and innovation to enable the country secure national security and public safety rom Covid-19. Institutions and stakeholders in the STI Sector including Universities, University Colleges, Research Institutions, TVET Institutions, STI-based regulatory institutions, STI-based Ministries, Departments and Agencies, and the Private Sector should make deliberate efforts by investing in R&D. The industry should initiate, develop and market innovations that will

provide solutions to mitigate the adverse effects of COVID-19 on the urban space and people.

Kenya established the Science, Technology and Innovation Act, 2013 to harness advisory services through the National Commission for Science, Technology and Innovation (NACOSTI) in STI, National Research Fund (NRF) to manage funds for R&D and Kenya National Innovation Agency (KENIA) to identify and commercialize feasible innovations.

5. **Could you share case studies of regional and international cooperation that have helped your country in strengthening STI capacities? Can you provide success stories in this regard?**

Answer
Currently Kenya Research fund has amongst its many collaborators, engaged with the "Oliver Tambo Africa Research Chairs Programme"

Background

The International Development Research Centre (IDRC) of Canada in partnership with National Research Foundation (NRF) of South Africa and the Oliver & Adelaide Tambo foundation have jointly started Oliver Tambo Africa Research Chairs Initiative. The programme is open for Africa research intensive public universities. The Oliver Tambo Africa Research Chairs combine political, development and higher education objectives[iii].

Objectives
The key objectives of the Oliver Tambo Africa Research Chairs initiative are to:

i.   Contribute to expanded research and innovation capacities in and for Africa, in alignment with AU Agenda 2063 and STISA 2024;
ii. Attract and retain excellent researchers and scientists within Africa's higher education system;
iii. Contribute to Africa's global research competitiveness while responding to the continent's socio-economic needs;
iv. Contribute to Africa's career pathways for young and mid-career researchers, with a strong research, innovation and human capital development output trajectory; and
v.   Honour and promote the legacy of Oliver Tambo, emulating his values of professional excellence, integrity, inclusiveness, honesty, humility and respect for human dignity.

Scope of the Oliver Tambo Africa Research Chairs Initiative

The Oliver Tambo Africa Research Chairs Initiative builds on existing continental frameworks and intervention geared towards institutional capacity strengthening; the development of high end skills; recruitment and retention of excellent researchers; and incentives to support research that contributes to socio-economic and transformative development.

In this initial phase, Oliver Tambo Africa Research Chairs Initiative will focus on Countries participation in the Science Granting Council Initiative (SGCI). The SGCI is a multi-funder initiative that aims to strengthen the capacities of fifteen (15) science granting councils (public science funding agencies) in Sub-Saharan Africa (SSA) (that include Kenya) in order to support research and evidence-based policies that will contribute to economic and social development.

An initial ten (10) Oliver Tambo Africa Research Chairs across the SGCI participating countries will be established, focused on national research priorities and in alignment with AU Agenda 2063 and STISA 2024. Gender, disciplinary and geographical spread will be underlying considerations in the awarding of a chair. At least 60% of the chairs will be female holders, and up to 40% in the Humanities and Social Sciences.

Funding Levels

The Oliver Tambo Africa Research Chairs Initiative will provide awards of up to USD 215,000 per year to the successful chair. Each award covers administrative staff salaries; postdoctoral fellowships and bursaries for postgraduate studies; research operating costs; mobility costs; limited research equipment and infrastructure and overheads for the host institution.

Duration of the Research Chair

Research Chairs will be tenable for five (5) years subject to satisfactory performance by the Chair and availability of funds following the five-year in-depth review, there will be potential for a further five years on a decreasing scale of funding. It is expected that at this point additional funding will be sourced by either the Chair or the host university or the SGC to offset costs, with the Oliver Tambo Africa Research Chairs Initiative funding potentially reducing by 25% per year after the fifth year.

Institutional Requirements

Research Chairs will be awarded to public research-intensive universities in Africa that can host such Research Chairs in their own right. Only institutions that adequately demonstrate research strength and competencies in the identified thematic/research priority area of the research Chair and have the required research support infrastructure will be considered for awarding of outside Africa, may be involved as partners.

Progress made

Call for Research Chairs included a two-phased approach; of Phase 1 Call for Expressions of Interest (EoI) and Phase 2 Call for Full Proposals. The National Research Foundation (NRF) of South Africa in partnership with the Oliver and Adelaide Tambo Foundation announced for the Oliver Tambo Africa Research Chairs Call for Expressions of Interest by African public research-intensive universities. The call for Expressions of interest (phase 1) was open from 11th December, 2018 and closed on 8th February, 2019. In Kenya, the National Research Fund (NRF) participated as a Council while both Egerton University and Moi university participated and were recommended for the next phase.

6. **Could you suggest the contact person(s) of the nodal agency responsible for projects/policies or international collaboration related to the theme? We might contact them for further inputs.**

    Answer

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[i] 1st Kenya Multi-sectoral Conference on ST&I in a Covid-19 disrupted world by NACOSTI; August, 2020

[iiii] Guidelines on the management of HR in the public service during and post Covid-19 pandemic
[iii] Kenya National Research fund, August 2019