INTERSESSIONAL PANEL OF THE UNITED NATIONS COMMISSION ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT (CSTD)

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17-19 November 2021

Contribution by South Africa

to the CSTD 2021-2022 priority theme on "Industry 4.0 for inclusive development"

PRIORITY THEME 1: Industry 4.0 for inclusive development

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

Dear CSTD member,

As you are aware, the CSTD 24th annual session selected "Industry 4.0 for inclusive development" as one of the priority themes for its 25th session (2021-22 period).

This priority theme is directly relevant to SDG 9 on industry, innovation and infrastructure. As highlighted by the Technology and Innovation Report 2021, we live at the beginning of a new technological revolution around Industry 4.0 technologies such as AI, robotics, Internet of Things, and blockchain. The way to be prepared to benefit from Industry 4.0 is by promoting the use, adoption, adaptation, and development of technologies associated with this new technological wave. This priority theme will focus on the challenges and prospects for developing countries to pursuit an industrialization path considering the emergence of Industry 4.0. This may include the possibility of bypassing intermediate stages of technology that other countries have historically passed in their development process, often referred to as "leapfrogging". The priority theme will cover the impact of this new technological revolution on the traditional channels for technological learning, and innovation in developing countries, including FDI and participation in Global Value Chains. It will examine the opportunities for "leapfrogging". It will also consider the role of public policies in enabling vulnerable groups and communities to benefit from Industry 4.0, including through better and more equitably accessible jobs.

Questions to be addressed include: How can developing countries take advantage of the window of opportunity presented by the Industry 4.0 technologies for technological upgrading and catch up? What can countries do to ensure that Industry 4.0 does not increase inequality? What is the role of international cooperation in facilitating this process?

The CSTD secretariat is in the process of drafting an issues paper on the theme to be presented at the CSTD inter-sessional panel meeting on 17-19 November 2021. In this context, we would like to solicit inputs from the CSTD members on this theme. We would be grateful if you could kindly answer the following questions based on your experience from your country or region.

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

The Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution policy with the relation to the National Development Plan (NDP) sets out the mandate on Industry 4.0 about the national policy objectives of economic growth, job creation and inequality reduction. The policy focuses on the technological developments which are an important aspect of developing a progressive digital policy, the broad digital policy essential to upkeep social and economic transformation with the narrow advanced technologies of artificial intelligence, blockchain, drones and machine learning is problematic. The policy perspective is critical to ensure that the preconditions necessary to harnessing the benefits of the 4IR are achieved if the technologies are to serve developmental purposes with meaning, relative than intensify present social, economic and political inequalities.

One programme is the Digital Advantage 2035, which operates through the Council for Scientific and Industrial Research (CSIR) to provide the capacity to implement the ICT Roadmap developed by DSI in 2012. The ICT Research, Development and Innovation (RDI) Implementation Roadmap is a plan to guide the implementation of national ICT research, development and innovation strategy. The Roadmap is driven by the potential to deliver socio-economic impact, and illustrates a good public and private investment in ICT R&D. Digital Advantage is intended to enable South Africa to become a significant player in the global ICT RDI arena by:

- Providing more targeted engagement with industry
- Focusing on international collaboration
- Accomplishing more comprehensive and transparent monitoring of investment
- Making an impact, such as through jobs and business creation, contribution to GDP, societal influence and positioning South Africa for strategic advantage.

The Presidential Commission on FIR presented their report in 2020. The Report is government-wide proposed strategy that highlights key challenges, pillars and enablers for FIR in South Africa.

The Commission has made recommendations spanning such strategic areas as the country's investment in human capital; artificial intelligence; advanced manufacturing and new materials; the provision of data to enable innovation; future industries and 4IR infrastructure

In March 2017, the World Economic Forum (WEF) launched the Centre for the Fourth Industrial Revolution Network (C4IR Network), with the mission of ensuring that the fourth industrial revolution (4IR) does not just benefit a select few, but all of society. The methodology is a human-centric approach that is agile and based on rapid iteration.

The WEF's intent is for the C4IR Network to serve as:

A space for Global Cooperation: It is dedicated to co-designing policy frameworks and governance protocols, including laws, regulations, norms and best practices that accelerate the application of science and technology in the global public interest.
A "do-tank": Partner governments and companies will co-design and pilot these frameworks and protocols for rapid iteration and scale. The Centre is not a think-tank, but rather a "do-tank".
A champion for ethics and values in technology: All policies, frameworks and regulations developed at the Centre will prioritise ethics and values

The C4IR Network has established Centres globally and has already begun its expansion into other regions through its Affiliate Centre model

A WEF 4IR affiliate center was established in South Africa hosted at the CSIR (https://www.c4ir-sa.co.za/)

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.)?

Refer to Presidential Commission Report

National Advisory Council on Innovation (NACI) articulates the ability to mobilise the National System of Innovation (NSI) stakeholders and provide access to local and international experts who complement limited resources. The NSI is a network of institutions and resources in the public and private sectors that develop, share, support and promote science and technology innovations, knowledge, skills, performance and learning on a national level.

A major Department of Science and Innovation (DSI) initiative together with the National Research Foundation (NRF) is the multibillion-rand Square Kilometre Array (SKA), which is hosted in South Africa and Australia, and which extends into eight African countries. The SKA is the world's biggest telescope and also one of the biggest-ever scientific projects and multinational collaborations in the name of science. The amounts of data being collected and transmitted by the SKA means the project requires supercomputing power and Big Data management and analytics capabilities.

The DSI has focused on the Council for Scientific and Industrial Research (CSIR) to strengthen industrial policy in the country such as the South African Affiliate Centre of the World Economic Forum for the Fourth Industrial Revolution, joining alongside China, India and Japan. The main focus is on understanding and dealing with technology governance challenges that prevent innovation and the effective deployment of technologies. The centre will be a multi-stakeholder partnership, bringing all together government, business, and other non-state actors to jointly assess technology governance challenges and to develop arrangements that can address the requirements of different stakeholders.

The key portfolios include AI and Machine Learning, Internet of Things, Robotics, Smart Cities and Digital Trade.

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?

Refer to Presidential Commission Report

South Africa has also domesticated the SDGs and has pledged to increase the number of young people and adults with skills for employment, decent jobs and entrepreneurship. South Africa, through the National Development Plan (NDP), has committed to providing quality education for all citizens by 2030. Hence, there is a need to ensure that all key economic sectors and citizens are capacitated with skills for the future by 2030. As most of the opportunities that will result have not been conceptualised by the current generation and are yet to be explored, the government needs to invest in providing relevant skills for citizens to be able to thrive in the digital world (4IR).

Transformation in education is essential if South Africa is to produce a globally competitive workforce that is continuously transitioning from roles that are becoming obsolete to roles that are in line with the knowledge-based economy of the future. By providing relevant skills required for the digital world, the country can mitigate the number of job losses due to automation and achieve the targets outlined in the NDP as well as the SDGs. South Africa will develop a super-smart society that leverages robotics, big data, AI, and the internet of Things to deliver services that enhance the quality of lives of all citizens. It will also create a resilient and digital skilled population that is able to adapt rapidly to the future digital world. Through investing in R&D activities that will provide solutions to South Africa's socio-economic challenges; STI will serve as an enabler that can be harnessed to overcome the digital divide and provide equal access that could result in better employment opportunities among vulnerable groups, as well as stimulate economic growth.

South Africa's funding for digital research has been concentrated on building capabilities in STEM. Over the years, the NSI has built South Africa's capacities through space sciences and cyber-infrastructure in physics, earth science, mathematics, computer science, engineering, big data, supercomputing, cyber-security, e-science and e-research through a variety of postgraduate teaching and training programmes. Through these projects, students are exposed to skills that are essential for the future digital world (4IR). Investments in initiatives on data science, blockchain alliances and mobile applications laboratories to support access to training and skills development for the future digital world have contributed towards inclusive development. The addresses the wider digital innovation agenda with a focus on advancing new digital technology fields (such as artificial intelligence and social data analytics), as well as on digital applications in public education (e.g. digital applications in mathematics and science teaching).

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

Refer to the Presidential Commission Report

The National System of Innovation (NSI) should enhance collaboration with other government departments and stakeholders to support on-going national initiatives and the implementation of national strategies to achieve the objectives of the NDP. The NSI invest in R&D to address the wider digital innovation agenda with a focus on advancing new digital technology fields and will pursue the following initiatives:

- Support the implementation of 21st century skills (coding, robotics) at basic education level.
- Invest in neuroscience research to develop methodologies that could enhance learning outcomes (AI, machine learning, virtual reality).
- Support the implementation of the National Plan for Post-School Education and Training (2020-2030).
- Support the development of 21st century skills at post-school level.
- Develop human capacity to harness the skills required for 4IR to enhance productivity and competitiveness.
- Forge partnerships with industries deploying 4IR technologies to enhance research and innovation and to support workplace learning.
- Invest in infrastructure to support massive open online courses (digital, web or app based).

• Support access to training and skills development that will prepare society for the digital world and minimise the social and digital divide.
• Develop STI indicators which include societal indicators to address South Africa's societal challenges.
• Intensify efforts in partnership with industry associations and sector education and training authorities to develop sector-specific digital skills and capacitate youth that are not in education, employment or training (NEET).

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?

Refer to Presidential Commission Report

Building and expanding research collaboration between South African and international scientists and scholars, including the progress of international research partnerships, remains an important priority for South Africa. International joint research and innovation engagements, undertaken at a bilateral and bi-regional level, will need to be supported by collaborative instruments to ensure the inclusion of women, youth, black people, HDIs and civil society where appropriate. In addition to building on existing RDI programmes.

In the African Free Trade Continental Area (AfCFTA) will provide opportunities for South Africa to advance infrastructure expansion and invest into new markets and regions through the development of value chains for locally manufactured 4IR technologies. In the outlook from medium to long-term, this would contribute to progressed economic performance and significantly, inclusive and sustainable development. Furthermore, South Africa as an innovation destination and exporter of innovation requires a science diplomacy positioning considered by new and dynamic international partnerships that involve NSI actors with non-traditional and non-state actors, such as multinational enterprises, philanthropic organisations, venture capital, regional and continental financial institutions.

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.

DDG Imraan Patel and DDG Dr Mboneni Moufhe, Selby Modiba at Selby.Modiba@dst.gov.za tel:+2712 843 6393, +2782 306 5114.

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

The Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution policy, the White Paper and the Decadal Plan.

https://www.bpesa.org.za/local-skills-development-research/presidential-commission-on-the-fourth-industrial-revolution-report-recommendations-and-way-forward-march-2020.html

https://www.c4ir-sa.co.za/

Please send your responses and any further inputs on the theme to the CSTD secretariat (stdev@unctad.org) by 6 September 2021. We look forward to receiving your valuable inputs.

Sincere regards,

CSTD secretariat