Commission on Science and Technology for Development (CSTD)

Contribution to the 2020 High-level Political Forum

This note synthesizes findings from the Commission on Science and Technology for Development (CSTD) as a contribution to the High-level Political Forum (HLPF) scheduled to take place from 7 to 16 July 2020. It follows the outline proposed by the HLPF secretariat and draws on the two priority themes of the CSTD during the 2019-2020 inter-sessional period, namely "Harnessing rapid technological change for inclusive and sustainable development" and "Exploring space technologies for sustainable development and the benefits of international research collaboration in this context", and the findings and recommendations emerged during the Inter-sessional Panel held on 7 and 8 November 2019. These findings and recommendations will be considered by the CSTD during its 23rd annual session in 2020. The CSTD will also review progress made in the implementation of the outcomes of the World Summit on the Information Society and listen to presentations on science, technology and innovation policy reviews of Ethiopia, Panama and Uganda.

1. Key policies and measures to ensure "accelerated action and transformative pathways" for realizing the decade of action and delivery for sustainable development.

In its 2019 session, the Economic and Social Council reaffirmed the CSTD's role as the United Nations focal point for science, technology and innovation (STI) for development, in analyzing how STI, including information and communications technologies (ICT), serve as enablers of the 2030 Agenda for Sustainable Development. In this regard, the CSTD acts as a forum for strategic planning, sharing lessons learned and best practices, providing foresight about critical trends in STI in key sectors of the economy, the environment and society, and drawing attention to new and emerging technologies. The Council also affirmed that the CSTD, within its existing mandate, would contribute to appropriate reviews of the HLPF (E/RES/2019/25).

a. Critical gaps in implementing the 2030 Agenda within the area of responsibility of the intergovernmental body (bearing in mind interrelations with other goals and targets)

As highlighted in the Report of the Secretary-General on the progress made in the implementation of and follow-up to the outcomes of the World Summit on the Information Society at the regional and international levels, access to ICTs has continued to grow. Mobile cellular signals now reach more than 95 per cent of the global population, and it is estimated that more than 50 per cent use the Internet. However, there remain large discrepancies between regions and countries. The proportion of people using the Internet in developed countries is more than four times that in the least developed countries. Affordability is a barrier to access for many people, reducing opportunities to take advantage of new technology and potentially exacerbating other inequalities. Fixed and mobile broadband prices exceed 5 per cent of average gross national income per capita in various developing and the least developed countries, while in many developed countries prices are lower than 2 per cent. On average, women are 17 per cent less likely than men to use the Internet. The gap ranges from 3 per cent in developed countries to 43 per cent in the least developed countries (A/75/62−E/2020/11).

There is also a wide gap in technological capabilities between developed and developing countries. Research and development (R&D) expenditures in most developing countries remain much smaller,

both in absolute terms and relative to GDP than the world average. This reflects low business R&D expenditures: 32 to 38 per cent of R&D in developing countries, around half the world average of 68 per cent. In 2014, there were 1,098 researchers per million people globally, but only 87.9 per million in sub-Saharan Africa, and 63.4 per million in the least developed countries. The geographical distribution of science, technology, engineering and mathematics (STEM) graduates is also very unequal, with two-thirds of them being in Asia – mainly in India (29.2 per cent) and China (26 per cent) – only 5.2 per cent in Latin America and less than 1 per cent in Africa. This significant divide can both perpetuate existing inequalities and create new disparities; mainly affecting the least developed countries.[1]

A key issue is the gender divide in STEM, ICT and computing. Globally, only 28 per cent of researchers in 2013 were women. The proportion of women researchers in engineering and technology in most developing countries is 10 to 40 per cent. Women are also a minority among graduates in computer science and are underrepresented among STI decision-makers and in the digital sector.[2]

As discussed in the Report of the Secretary-General on harnessing rapid technological change for inclusive and sustainable development, although official development assistance (ODA) is an important source of technical and financial support to developing countries to close gaps in technological capabilities, ODA targeting STI capacities has not increased over the past decade. Moreover, in 2017, less than 4 per cent the ODA commitments to developing countries were reported in sectors associated with STI (E/CN.16/2020/2).

b. Priority measures to:

i. Accelerate action

As highlighted in the Report of the Secretary-General on harnessing rapid technological change for inclusive and sustainable development (E/CN.16/2020/2), some of the priority areas by governments and other stakeholders to accelerate action towards achieving the SDGs are:

1. Further national digital agendas that support closing digital divides in access and skills through appropriate ICT infrastructure and improving users' capabilities, especially among vulnerable groups, youths, and women and girls;
2. Promote policies for skills development relevant to rapid technological change in terms of life-long learning, entrepreneurship training, upgrading of skills for innovators and capacity-building for researchers; and
3. Support innovation by creating financing mechanisms and other programmes to support business adoption of new technologies, disseminate their application and share examples of successful business models.

In the specific case of accelerating action through space technologies for sustainable development, as discussed in the Report of the Secretary-General on exploring space technologies for sustainable development and the benefits of international research collaboration in this context (E/CN.16/2020/3), some of the priority actions are:

1. Develop national policies and strategies with a grand challenges approach to space science, technology and data for the achievement of the SDGs that bring together Governments, academia, the private sector and civil society to take part in such activities, from basic research to implementation;

[1] UNCTAD (2018). *Technology and Innovation Report 2018: Harnessing Frontier Technologies for Sustainable Development*. (United Nations publication. Sales No. E.18.II.D.3. New York and Geneva).
[2] Ibid.

2. Increase national support not only for building upstream capabilities (such as launch facilities and satellite engineering) but also for critical downstream capabilities (such as processing and analysing Earth observation data) that support the achievement of the Goals; and
3. Develop open data, cloud computing and science policies that incorporate the sharing of Earth observation data;

ii. Ensure transformative pathways to realize the decade of action for achieving the 2030 Agenda

Rapid technological change could be transformative in implementing the 2030 Agenda, and several frontier technologies have already shown great potential to help to achieve the SDGs. For example, big data can address critical global issues, create scientific breakthroughs, advance human health and improve decision-making and the effectiveness of development interventions. The Internet of things (IoT) monitors and manages connected objects and machines and has applications in healthcare, agriculture, energy and water management and quality. Artificial intelligence combined with robotics could transform production and business, especially in manufacturing. Similarly, 3D printing allows faster and cheaper low-volume production and rapid iterative prototyping of new products. Biotechnology makes possible personalized treatments and genetic modification of plants and animals. Nanotechnology is used in water purification, battery storage, precise management of agrochemicals, and in the delivery of medication. Renewable energy technologies provide electricity in rural areas far from the grid systems, while drones are used in precision farming and could revolutionize the delivery of supplies and replace humans in dangerous tasks. Small-scale satellites are used in communication networks and in applications that use high-resolution imagery such as for monitoring land use and for urban planning. These satellites will soon be affordable for more developing countries, businesses and universities. Blockchain technology can be used in applications in which ensuring the integrity and traceability of the information about transactions is important, such as for identity management and land registration.[3]

In this regard, the CSTD has highlighted that to be prepared to benefit from rapid technological change, countries need to promote the use, adoption, adaptation and development of frontier technologies for sustainable development, including by:

1. Building absorptive capacities in new technologies to be able to follow the pace of technological change in the productive sectors and society and ensure the diffusion, adaptation and deployment of new technologies in the relevant development contexts. Innovating entrepreneurs should be able to identify a competitive advantage in the country that is enabled by the combination of change in technology and a supportive environment. Some examples are Kenya's mobile phone-based money transfer – M-Pesa, Brazil's development of liquid biofuels, and China's photovoltaic and solar thermal heating technologies. There is no one-size-fits-all strategy on how this could be done, but it requires that the relevant ecosystem of innovation be exposed and actively interact with the new technologies.
2. Matching the supply of skills to rapidly evolving market needs. This requires suppleness in education policies, including transforming education and training systems to keep pace with technological advances, especially in digital technologies. It is critical to recognize that a lot of this learning happens on the job and interacting with the technology. These digital skills are part of a broader process to build and strengthen innovation systems that develop productive

[3] Ibid.

capacities for industry, manufacturing, services, and higher value-added activities and exports. Also essential are generic, fundamental and complementary skills – such as literacy, numeracy and basic academic skills – together with basic financial and entrepreneurial skills and, increasingly, basic digital and even coding skills. Internet access is also critical. Besides advanced cognitive skills, such as STEM, inherently human skills and aptitudes are important, as they are difficult for robots and machines to emulate. [4]

As discussed in the Report of the Secretary-General on harnessing rapid technological change for inclusive and sustainable development, frontier technologies could also have unintended consequences, potentially widening inequalities or create new ones (E/CN.16/2020/2). Some of the different channels in which that can happen are:

1. Frontier technologies can eliminate some jobs while creating others.[5] The net effect remains ambiguous, although there are signs of polarisation of jobs and unfavourable impact on women. For most developing countries, the effects of frontier technologies on employment is likely to depend on their economic feasibility and the structure of each country's economy.[6]

2. Initial disparities could be accentuated by the different timing in which frontier technologies are adopted by different groups in the society, giving those that already have an advantage an additional head start. An important issue is the availability and access to essential technological support infrastructure (for example, electricity and the Internet). Unequal access to these support infrastructures is closely associated with geographic disparities in coverage of the infrastructure (e.g. rural and urban, mountainous or remote regions) and their affordability.

3. Another channel is market concentration. In an increasingly digitalized economy and society, more and more value is being created by transforming data into digital intelligence and then monetizing it. Thus, access to data becomes crucial to generate value. Digital platforms are uniquely positioned to record and extract data. This has resulted in a high concentration of market power in a few global digital platforms. Under current policies and rules, we may see further consolidation and even rising inequality.[7]

4. Emerging technologies and technological convergence also give rise to issues of citizen's rights, privacy, data ownership and online security. Governments are encouraged to adopt institutional frameworks and regulatory regimes for data collection, use and access, for privacy and security, balancing individual and collective rights, and allowing private sector innovation.

5. Frontier technologies may also increase the technological gap between countries. Technologies are usually applied first and more intensely in industries, services and segments of value chains in which more industrialized economies have a comparative advantage, widening the technological gap. This tendency risks to perpetuate technological disparities between developed and developing countries. In fact, as highlighted by the *Digital Economy Report 2019*, the development of global digital platforms has already created a large gap between on the one side the US and China, the two countries that spearheading the

[4] UNCTAD (2017). *Information Economy Report 2017. Digitalization, Trade and Development*. (United Nations publication. Sales No. E.17.II.D.8. New York and Geneva).
[5] UNCTAD (2016). *Robots and Industrialization in Developing Countries*. UNCTAD Policy Brief No. 50. October 2016.
[6] UNCTAD (2017). *Trade and Development Report 2017. Beyond Austerity: Towards a Global New Deal*. (United Nations publication. Sales No. E.17.II.D.5. New York and Geneva).
[7] UNCTAD (2019). *Digital Economy Report 2019 - Value Creation and Capture: Implications for Developing Countries*. (United Nations publication. Sales No. E.19.II.D.17. New York and Geneva).

development of these technologies, and on the other the rest of developed and developing countries.

Therefore, while directing rapid technological change towards inclusive and sustainable development, countries also need to deal proactively with these potential unintended consequences. In this regard, Governments are encouraged to consider the following areas for action:

- Government and other stakeholders should ensure a smooth transition period and that those who lose their jobs can find decent alternative livelihood paths. Governments should pay attention to retraining, life-long learning, and employment support mechanisms that could address the risk of technological unemployment.
- Existing inequalities must be addressed head-on and in the first place to avoid the threat of rapid technological change perpetuating or increasing inequalities. Governments and other stakeholders should continue striving to reach universal electrification and to close digital divides. All stakeholders should also continue to fight all forms of social biases and discriminations. Governments should explore ways to increase the coverage of new goods and services that use frontier technologies and address the SDGs to vulnerable and low-income groups, including by providing these goods and services as public services.
- The international community is encouraged to raise the awareness of the private sector of the unintended consequences of new goods and services that use some of these frontier technologies. Companies should build their capacity to identify potential negative effects and establish mechanisms to improve their R&D processes to avoid biased design. All stakeholders are encouraged to develop mechanisms to ensure that data used for training AI applications are free from biases and discriminations.
- Governments and other stakeholders could support innovation by creating programmes and mechanisms to disseminate the application of frontier technologies and the examples of successful business models. There is also a role for competition policy to reduce the potential negative effects of excessive market power of leading technology firms on further innovation.
- Governments and the international community should continue to promote international technological assessments and foresight exercises to better understand the impact of rapid technological change on inequality and sustainable development, including by developing models that could capture the effects of automation on developing countries.

2. Contribution of the intergovernmental body to accelerated action and transformative pathways and realizing the decade of action and delivery for achieving the 2030 Agenda within its area of responsibility (including its cooperation with ECOSOC and other intergovernmental bodies).

The CSTD's priority themes have reflected the need for an integrated and action-oriented approach to accelerate action for achieving the 2030 Agenda, by dealing with cross-cutting issues and the use of STI for the advancement of the 2030 Agenda as a whole. For example, the priority theme for the CSTD's 23rd session on "Exploring space technologies for sustainable development and the benefits of international research collaboration in this context" covers key issues related to applications of space science and technology for achieving the SDGs, including in ensuring food security, reducing the risk of disasters, preventing humanitarian crises, monitoring natural resources and reducing poverty, as well as telecommunications and health. It analyses how new technological developments that reduce the costs of using space-based applications and collaborations among local, national, regional

and international stakeholders can potentially increase the uptake of Goals-relevant applications, particularly in developing countries (E/CN.16/2020/3).

Guidance from the CSTD deliberations has contributed to the policy support provided by UNCTAD to developing countries through its STI policy review programme. This was particularly important in adapting the programme's methodological framework to the requirements of the 2030 Development Agenda. These reviews help STI stakeholders in developing countries to identify the measures that are needed to integrate science, technology and innovation policies into their national development strategies and to ensure that such policies and programmes are supportive of national development agendas.

The discussions and recommendations of the CSTD encouraging Governments, the UN and other stakeholders to conduct foresight and technological assessments on existing, new and emerging technologies and their implications for sustainable development, have helped to inform the CSTD secretariat on the preparation of programmes, for consideration by donors, to support member countries in building their capacities for technological assessments. Following the guidance from the CSTD a new Development Account project undertaken by UNCTAD will support pilot technology assessment exercices in developing countries.

The CSTD has also moved forward in critical areas of the digital economy and society both in terms of policy and practice. For example, the CSTD working group on Improvements to the IGF (2011-2012) agreed on a series of recommendations to improve the operation of the Forum which were endorsed by the GA. Since 2012, the IGF has made significant progress in implementing recommendations of the Working Group. The close relationship between the CSTD and the ICF is made evident every year when the IGF presents its work to the CSTD's annual and Intersessional meetings.

As the only functional commission of the Economic and Social Council with a Gender Advisory Board, the CSTD continues to analyze the gender implications of applying innovation and knowledge for sustainable development. The Gender Advisory Board identifies and highlights the gender dimensions of the annual priority themes of the CSTD through contributions at the Inter-sessional and Annual Commission meetings, panels to explore issues for each theme, contributions from Commission Members, expert contributions, and participation in discussions.

The Gender Advisory Board identified and raised awareness on the need for increasing women participation in STEM, which are driving rapid technological change, and for women to participate in the policy decisions and creation of research and development agendas. The Gender Advisory Board also advocates for access to technology, participation in priority setting, and a better understanding of the different roles that women play and the specific needs they might have. The Gender Advisory Board, through its collaboration with Gender InSITE, has developed strong connections to the global science community in its work with organizations such as the International Science Council, InterAcademy Partnership, the World Academy of Sciences for the advancement of science in developing countries (TWAS) and Organization for Women in Science for the Developing World.

In January 2019, in support of the work of the CSTD and the Commission on the Status of Women (CSW), UNCTAD, UN Women and the Government of Austria organized a workshop on "Applying a Gender Lens to Science, Technology and Innovation" back to back with the Commission 2018-2019 Inter-sessional Panel. The workshop discussed gender perspectives in STI, examined opportunities for gender-responsiveness in STI. Findings and recommendations of the workshop were presented at the 22nd session of the CSTD and were made available to the CSW at its 63rd session and contribute to

the preparatory process for the 25th anniversary of the Fourth World Conference on Women and the Beijing Declaration and Platform for Action.

The CSTD has reiterated the need to strengthen the voice, participation and leadership of women and girls as consumers and producers of science and technology for the implementation of the 2030 Agenda and to leave no one behind. In this regard, in its 22nd session, participants welcomed the collaboration and exchange of views between the CSTD and the CSW, and encouraged the CSTD to play a role in gender equality in the digital society, by considering how women and girls can benefit and contribute to STI.

3. Selected recommendations for accelerating progress and moving on transformative pathways for realizing the decade of action, for possible use in drafting the HLPF declaration.

Achieving the 2030 Agenda for Sustainable Development requires the full use of all the available tools and harnessing rapid technological change must be an essential part of this process. In this regard, the following areas require the attention of policymakers:

- Need for effective STI policies. Without appropriate policies, technologies, be they old or new, are unlikely to deliver progress on the global development agenda. In this regard, UNCTAD's STI Policy Reviews support Governments to integrate policies for STI into their national development strategies while working towards the SDGs. Voluntary contributions are invited in order to support the STI Policy Reviews in LDCs and low-income developing countries.
- Build stronger national capacities in STI. Governments need to build their capacities to facilitate the use, dissemination, adoption, adaptation and development of technologies and innovative solutions for the SDGs and for achieving national development goals. Voluntary contributions are also invited to support capacity building in STI in the least developed countries and low-income developing countries and in particular the efforts being deployed in this area by UNCTAD and other agencies participating in the IATT of the Technology Facilitation Mechanism.
- Increase women participation in STEM. Given that STEM is driving rapid technological change, Governments should facilitate women's access to technology, participation in priority setting, policy decisions and creation of research and development agendas. Governments and the international community needs to advance the understanding of the different roles that women play, their specific needs, and the differential impact that they face from technologies.
- Promote inclusive debate on frontier technologies. Developing countries, especially the least developed countries, not engaged in the development of frontier technologies but likely to be affected by their consequences, need to be part of the international debate on frontier technologies and the SDGs. The CSTD is the focal point within the United Nations for STI for development and plays a central role in analysing how STI, including ICTs and frontier technologies, serve as enablers of the 2030 Agenda.
- Improve foresight and technological assessment. The international community needs to advance its understanding of risks and benefits and policy options to steer innovation in ways that leave no one behind. Countries are encouraged to undertake strategic foresight and technological assessment initiatives to better the socio-economic and environmental implications of new and innovative technologies.
- Strengthen normative frameworks related to frontier technologies. Alonside major opportunities for sustainable and inclusive development frontier technologies also give rise to issues of citizen's rights, privacy, data ownership and online security. Many initiatives, not always consistent, are under way to respond to the normative challenges that these issues

present. An inclusive dialogue with the full involvement of the developing countries is necessary to help advance normative frameworks and regulatory regimes for data collection, use and access, and for data privacy and security, balancing individual and collective rights, and allowing private sector innovation.

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