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### Globalization and interdependence

## Science, technology and innovation for sustainable development

### Report of the Secretary-General

#### *Summary*

The present report, submitted pursuant to General Assembly resolution [76/213](#), provides information on the implementation of the resolution, in particular through the work of the Commission on Science and Technology for Development, the United Nations Conference on Trade and Development and other relevant United Nations organizations. In the report, the Secretary-General discusses the role of science, technology and innovation in accelerating the recovery from the coronavirus disease (COVID-19) pandemic and the full implementation of the 2030 Agenda for Sustainable Development at all levels; presents findings from high-level policy discussions on science, technology and innovation as an enabler of sustainable development at the national, regional and global levels; showcases lessons learned and good practices from developing countries in strengthening capacities for science, technology and innovation; discusses the progress made in implementing the outcomes of the World Summit on the Information Society; highlights initiatives to strengthen the science-policy interface within the United Nations and enhance global support mechanisms for science, technology and innovation; and provides recommendations to support the implementation of the 2030 Agenda.

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\* [A/78/150](#).



## I. Introduction

1. In response to General Assembly resolution 76/213, the present report contains information on the role of science, technology and innovation in accelerating the recovery from the coronavirus disease (COVID-19) pandemic. It also contains findings from high-level policy discussions on ways to harness science, technology and innovation for the achievement of sustainable development; as well as lessons learned and good practices from developing countries in strengthening capacities for science, technology and innovation; and a summary of discussions concerning the progress made in the implementation of and follow-up to the outcomes of the World Summit on the Information Society. In the report, initiatives are highlighted to enhance global support mechanisms for science, technology and innovation.

2. Section II below contains an analysis of how science, technology and innovation could be leveraged to accelerate the recovery from the pandemic and the full implementation of the 2030 Agenda for Sustainable Development. Section III contains findings from high-level policy discussions on the ways to advance strategic planning on science, technology and innovation for sustainable development. Section IV includes the work of the United Nations system in building science, technology and innovation capacities. Section V provides a conclusion and recommendations to Member States and the international community.

## II. Science, technology and innovation for acceleration of the recovery from the COVID-19 pandemic and the full implementation of the 2030 Agenda for Sustainable Development at all levels

3. Progress towards the 2030 Agenda for Sustainable Development has been halted as the world faces a multitude of challenges, including the COVID-19 pandemic, the climate crisis and the war in Ukraine. Such crises affected the progress towards the Sustainable Development Goals, causing setbacks in the advances already made, with greater impacts on vulnerable groups. For example, more than four years of progress in the fight against poverty have been lost due to the pandemic, which is exacerbated by the impacts of the war in Ukraine.<sup>1</sup>

4. Science, technology and innovation play a critical role in building resilience and in accelerating the recovery from the COVID-19 pandemic. One example is the quick development of diagnostic tests and vaccines to deal with the disease.<sup>2</sup> New technologies increase the ability of people to absorb and adapt to shocks. Through virtual platforms, people could work remotely, socialize and interact with each other while maintaining social distancing. Also, the pandemic induced innovation in industrial sectors. For example, biomedical engineers from the Integrated Polytechnic Regional Centre in Rwanda worked on the first locally produced ventilators at affordable prices to respond to the pandemic.<sup>3</sup> The pandemic has demonstrated the importance of science, technology and innovation and the need for adaptable

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<sup>1</sup> United Nations, *The Sustainable Development Goals Report 2022* (Geneva, 2022), available at <https://unstats.un.org/sdgs/report/2022/The-Sustainable-Development-Goals-Report-2022.pdf>.

<sup>2</sup> Renan Gonçalves Leonel da Silva, Roger Chammas and Hillegonda Maria Dutilh Novaes, *Rethinking Approaches of Science, Technology, and Innovation in Healthcare during the COVID-19 Pandemic: The Challenge of Translating Knowledge Infrastructures to Public Needs*, *Health Research Policy and Systems* 19, no. 1 (July 21, 2021): 104, <https://doi.org/10.1186/s12961-021-00760-8>.

<sup>3</sup> For more information, see [www.newtimes.co.rw/covid-19/rwandan-biomedical-engineers-produce-ventilators](http://www.newtimes.co.rw/covid-19/rwandan-biomedical-engineers-produce-ventilators).

governance to ensure flexibility and resilience in the face of future disruptions, highlighting how open-source technology could facilitate knowledge-sharing and respond to common challenges across countries.

5. However, the digital divide and the associated inequalities in technology diffusion have brought to light the persistent issue of the digital connectivity gap. Existing inequalities, such as those related to income, gender, age, education and health, affect people's access to the benefits of technologies and risk further exacerbating social divides. To facilitate a more robust recovery, a strong global financing framework for development in science, technology and innovation, along with increased official development assistance, should be considered to bridge the digital divide and promote sustainable development.

6. As highlighted by the 2023 Technology and Innovation Report by the United Nations Conference on Trade and Development (UNCTAD),<sup>4</sup> advancing the Sustainable Development Goals requires social and technological innovation, as well as feasible, cost-effective and scalable technologies. Governments, the private sector and other stakeholders have to enhance their capabilities to identify and develop technologies and sectors for sustainable development. Priority sectors could be supported through policy instruments both in terms of demand and supply. Financing opportunities should be expanded to develop and commercialize new technologies for the achievement of the 2030 Agenda for Sustainable Development. It also calls for strengthening international cooperation for more sustainable production.<sup>5</sup>

### **III. Advancing strategic planning on science, technology and innovation for sustainable development**

7. The Commission on Science and Technology for Development, the United Nations focal point for science, technology and innovation for sustainable development, acts as a forum for strategic planning, sharing lessons learned and providing foresight about trends in science, technology and innovation in key sectors of the economy, as well as drawing attention to emerging and disruptive technologies. At its twenty-fifth session, the Commission considered the priority themes of “Science, technology and innovation for sustainable urban development in a post-pandemic world” and “Industry 4.0 for inclusive development”.<sup>6</sup> At its twenty-sixth session, the Commission considered the priority themes of “Technology and innovation for cleaner and more productive and competitive production” and “Ensuring safe water and sanitation for all: a solution through science, technology and innovation”.<sup>7</sup>

#### **A. Science, technology and innovation for sustainable urban development in a post-pandemic world**

8. Representing an estimated 90 per cent of all reported COVID-19 cases, urban areas have become the epicentre of the pandemic.<sup>8</sup> Given that both population and economic activities tend to be concentrated in urban areas, it is imperative to direct

<sup>4</sup> United Nations Conference on Trade and Development (UNCTAD), *Technology and Innovation Report 2023: Opening Green Windows - Technological Opportunities for a Low-Carbon World* (New York, 2023).

<sup>5</sup> Ibid.

<sup>6</sup> For more information, see <https://unctad.org/meeting/commission-science-and-technology-development-twenty-fifth-session>.

<sup>7</sup> For more information, see <https://unctad.org/meeting/commission-science-and-technology-development-twenty-sixth-session>.

<sup>8</sup> United Nations, *Policy brief: COVID-19 in an urban world*, (2020).

efforts to make urban settlements more inclusive, productive and environmentally sustainable.

9. Accelerating technological change in renewable energy, artificial intelligence, machine learning and big data have opened new possibilities for sustainable urban development and achieving Goal 11 at a lower cost. The use of sustainable renewable sources such as solar photovoltaic would help meet the increasing energy demand and deliver energy efficiently. Innovative solutions made possible by better digital systems and tracing technologies help reduce waste and the carbon footprint from excessive production and consumption in urban areas. In addition, digital solutions enable real-time water monitoring to improve water management and control leakage, while the use of low-emission vehicles and intelligent transportation systems help tackle congestion and mobility challenges.

10. Science, technology and innovation solutions not only improve the quality of life but also foster entrepreneurship, reduce unemployment and ease the financial burden in urban areas. For example, e-commerce platforms and technology-related training help address the economic disruptions intensified by the pandemic. Moreover, new digital tools can facilitate the reporting of abuses and violence, ensure equal access to urban services and promote joint support in urban planning for all stakeholders from different levels.

11. Governments could consider prioritizing policy efforts in three areas to deliver on their commitment to sustainable urban development: first, investment in digital infrastructure-building and integrating city planning with technology-based solutions; second, support for workforce development by providing training and other resources to the underrepresented workers, in particular, to accumulate the skills needed for technology transformation; and third, facilitation of entrepreneurship by providing tax incentives for businesses engaged in innovation and research.

12. At the international level, cross-border cooperation is essential for pooling, formalizing and transferring knowledge of effective science, technology and innovation solutions. This includes sharing best practices, expertise and resources to address common urban development challenges. By working together, countries can accelerate the adoption of new technologies and solutions, contributing to sustainable and inclusive economic growth.

## **B. Industry 4.0 for inclusive development**

13. Industry 4.0, the smart and connected production systems made possible by new technologies, can increase productivity and reduce the environmental impact of industrialization. However, developed countries are seizing most of the opportunities and developing countries are at risk of missing this technological revolution. As the pandemic has disrupted global trade and investment, consequently reshoring and the drop in foreign direct investment could hinder the broader deployment of Industry 4.0 technologies in developing countries.<sup>9</sup>

14. The challenges related to addressing inequality between and within countries triggered by Industry 4.0 technologies are focused on four issues: first, worker displacement, as robots could reduce or replace routine and low-skilled jobs; second, new technologies undermine the comparative advantage of developing countries and the share of value added in global value chains, thereby leading to product reshoring and investment restructuring; third, worker and consumer protection regimes could

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<sup>9</sup> UNCTAD, *World Investment Report 2022: International tax reforms and sustainable investment* (New York and Geneva, 2022). Available at: <https://unctad.org/publication/world-investment-report-2022>.

be harmed by data collection and utilization that violate the privacy of employees and consumers; and fourth, issues of gender inequality arise as women are relatively underrepresented in the artificial intelligence workforce and its systems tend to reflect and amplify existing gender biases and prejudices.<sup>10</sup>

15. The deployment of Industry 4.0 technologies requires strategic responses that are context-specific and reflect the priorities of a country and its resource mobilization capacity. Governments of developed countries with advanced manufacturing bases could prioritize policy responses aimed at maintaining and regaining their manufacturing position. Meanwhile, Governments of developing economies could focus on narrowing the technological gap through policies that foster innovation and technological adoption in the manufacturing sector. Less technologically advanced developing countries could emphasize establishing the necessary conditions for building digital infrastructure and skills for the adoption of Industry 4.0 technologies.

16. International collaboration is also important to support the deployment of Industry 4.0 technologies. Cross-border collaboration could take on a multitude of activities that facilitate cooperation between countries for technology diffusion. This includes knowledge and information sharing, conducting research, designing policies, implementing initiatives, promoting technology transfer, establishing legal frameworks and standards and providing capacity-building assistance.

### **C. Technology and innovation for cleaner, more efficient and competitive production**

17. Industry 4.0 and other frontier technologies offer transformative solutions to spur economic development while mitigating climate change. To turn these time-bound opportunities into reality, developing countries need to act fast with strong responses and sector-specific strategies to advance in the green revolution. Much of the success depends on establishing effective innovation systems at the national level, while international cooperation and political will to facilitate technology transfer are essential.

18. There are three channels through which latecomers can catch up technologically and green their production bases. First, by producing renewable energy technologies. As renewable energy products are often subject to limited tradability, demand-pull policies (e.g., feed-in tariffs) and policies facilitating trade in green technology products are important to create a domestic market and to open learning opportunities. Second, by applying frontier technologies to green global value chains. Greening global value chains could reduce carbon footprints and help firms meet the increasing demand for eco-friendly products. To scale the value-added ladder and move progressively to more sophisticated tasks, developing countries would need to strengthen digital competency, innovation capacity, infrastructure and institutional architecture. Third, by diversifying towards products with lower carbon emissions and higher technology levels. The identification and prioritization of new products for diversification should consider the country's existing technological and productive capacities and the availability of natural resources.

19. National Governments have different opportunities to harness green technologies and minimize the negative impacts of production. While most attention is focused on the diffusion of technologies, there is a need to build capacity to develop innovative solutions to sustainability issues. With the support of other stakeholders,

<sup>10</sup> United Nations Industrial Development Organization (UNIDO), *Industrial Development Report 2020: Industrializing in the Digital Age* (Vienna, 2020).

Governments could direct resources to establish the required policies and regulatory frameworks, strengthen technical and innovation capacity, and develop relevant infrastructure to promote the adoption and development of green innovation.

20. There is also a critical role for international cooperation to support green innovation. International collaboration could strengthen the capacity to build sustainable-oriented innovation systems in developing countries, facilitate technology transfer, promote multinational research for green innovation, adopt multilateral approaches to technology assessment and support North-South, South-South and triangular cooperation on science, technology and innovation for green innovation.

21. Furthermore, as highlighted by the *Technology and Innovation Report 2023*, the international community should improve consistency between trade, intellectual property rights and environmental agreements to support the development of technological capacity in developing countries for cleaner and more efficient production. Trade rules should, for example, permit developing countries to protect fledgling green industries through tariffs, subsidies and public procurement – so that they not only meet local demand but reach the economies of scale that make exports more competitive. Extending more flexibility to developing countries in the context of the World Trade Organization Agreement on Trade-Related Aspects of Intellectual Property Rights for environmentally sound technologies would also help make the multilateral trade regime more consistent with international climate change agreements. Global efforts should be put in place to accelerate the development of green technologies under the philosophy of common contributions to common goods, thereby promoting a partnership-oriented approach for green innovation.<sup>11</sup>

#### **D. Ensuring safe water and sanitation for all: a solution through science, technology and innovation**

22. Access to safe water and sanitation is a basic human right and it is framed under Goal 6 of the Sustainable Development Goals. A review of the global status of progress indicates that the world is not on track to achieve the Goals and that many countries are moving backward. Two areas of particular concern are the slow progress towards universal access to safely managed drinking water and sanitation services and the low level of implementation of integrated water resources management. There is a broad disparity in water and sanitation access between regions, between and within countries, with the vulnerable, marginalized and disadvantaged groups facing additional challenges.

23. The application of science, technology and innovation can expedite progress towards achieving universal access to water and sanitation in multiple dimensions. These solutions include nanotechnology, such as point-of-use water treatment systems employed in South Africa by Vulamanz Microfilter, which rely on a nanotechnology solution to filter contaminants without using any water treatment chemicals, or the technology developed by the Industrial Technology Development Institute of the Philippines, which employs anti-microbial nanocoating produced by ceramic water filters. Additional solutions will make it possible to close the sanitation deficit by using water-saving toilet technologies and by facilitating more cost-effective and efficient data gathering and forecasting for water and sanitation security with online monitoring systems. Science and technology also play significant roles in integrating water resources management. For example, the use of hydrological observation systems with the help of big data and artificial intelligence provides

<sup>11</sup> UNCTAD, *Technology and Innovation Report 2023: Opening Green Windows - Technological Opportunities for a Low-Carbon World* (New York, 2023).

reliable information on water quantity and quality, thereby enhancing delivery and research. Moreover, solar-powered water pumping systems enable water access closer to home, freeing women from tasks related to water collection and treatment.

24. Despite rapid knowledge generation and potential solutions, policymakers struggle to gain access to and utilize the information due to its inaccessibility and unusable format for decision-making. Three dimensions offer an avenue for countries to tackle these challenges: first, by reducing non-technological barriers through increased availability, affordability, awareness and accessibility of knowledge; second, by enhancing the transdisciplinary skills of water management teams and developing adequate skills among related workers; and third, by directing investment in irrigation methods and more effective distribution of water, to build sustainable water management infrastructure.

25. At the international level, establishing global partnerships and platforms under North-South, South-South, and triangular cooperation could help improve access to water and sanitation-related science, technology and innovation. These collaborations could facilitate knowledge exchange and technology transfer, enable the scaling up of good practices within domestic settings and inspire the replication and adaptation of successful technological, social and financial innovations.

## **E. Considerations in applying science, technology and innovation in sustainable development**

### **1. Integrating a gender perspective into science, technology and innovation**

26. The Commission on Science and Technology for Development continues to work on analysing the gender implications of applying science, technology and innovation in sustainable development with the assistance provided by the Gender Advisory Board. The extension of the mandate of the Gender Advisory Board of the Commission for a further five years, beginning 1 January 2021, allows it to complete its programme of work with the allocated extrabudgetary resources. Promoting equal access to and participation of women and girls in science, technology and innovation remains a challenge recognized by the twenty-fifth and twenty-sixth sessions of the Commission. Over half the global population lacks access to high-speed broadband, with compounding negative effects on economic and political equality. Within this group, women are furthest behind, in particular those in developing countries. To achieve gender equality and fulfil the rights of women and girls, it is important for Governments to take appropriate measures, including: implementing measures to include women, in all their diversity, in technical and policy committees related to science, technology and innovation; improving access and quality of science, technology, engineering and mathematics education for girls; and proposing gender-responsive technology design, development and deployment. Innovation efforts can also benefit from engaging women and girls as users, content creators, employees, entrepreneurs, innovators and leaders to ensure their active participation in all areas of development. Under the priority theme “Innovation and technological change, and education in the digital age for achieving gender equality and the empowerment of all women and girls”, prioritizing digital equity to close the gender digital divide is one of the areas of focus of the sixty-seventh session of the Commission on the Status of Women.<sup>12</sup>

27. To build the capacity of women researchers in developing countries working in the science, technology and innovation fields, UNCTAD has partnered with Okayama University and launched the Young Female Scientist Programme. It has supported 21

<sup>12</sup> For more information, see [www.unwomen.org/en/csw](http://www.unwomen.org/en/csw).

scientists from 10 countries to engage in cutting-edge joint research activities since 2020. In addition, during the twenty-sixth session of the Commission on Science and Technology for Development, UNCTAD and Thailand Science Research and Innovation formalized an agreement to strengthen the capacity of women to use technology. The partnership aims to train women researchers and entrepreneurs in developing countries to adapt and implement the bio-circular-green economy model. Harnessing the power of South-South cooperation, the programme is expected to equip women researchers and entrepreneurs with best practices in using science, technology and innovation to boost industry competitiveness and accelerate sustainable socioeconomic development.

## 2. Innovative financing models for science, technology and innovation

28. Innovative financing models play a crucial role in mobilizing and scaling up financing for science, technology and innovation, especially in developing countries, in support of the Sustainable Development Goals. The Commission on Science and Technology for Development encourages Governments and international organizations to consider these models through domestic policies and international collaboration to attract new stakeholders, deepen the sources of financing and direct investments towards innovations that address the Sustainable Development Goals.

29. UNCTAD research recommends that Governments facilitate cross-sectoral collaborative ventures with heterogeneous actors to increase the financial capacity of cities and urban communities to support research and development actions required to embrace science, technology and innovation solutions. In water and sanitation development, blended financing models at the macro level combined with microfinancing for small-scale operators are important to promote sustainable water businesses.<sup>13</sup> Moreover, the rapid development of sustainable and green finance and investment offers an important avenue to draw financial resources into green technology and innovation.

## 3. Technology foresight and assessment

30. Technology foresight and assessment exercises could help policymakers and stakeholders identify challenges, opportunities and new trends that can be addressed strategically, in particular in the context of the 2030 Agenda for Sustainable Development. Such exercises could also be used as a process to raise awareness, facilitate networking and partnerships, and encourage structured debate among all stakeholders towards creating a shared understanding of the implications of rapid technological change, making informed decisions and building consensus on future policies. During the twenty-sixth session of the Commission on Science and Technology for Development,<sup>14</sup> the science, technology and innovation foresight report for Botswana was launched as part of the science, technology and innovation policy review.<sup>15</sup> The foresight exercise aims to stimulate policy dialogues leading to consensus on priority areas and to provide a future dimension to strategic planning on science, technology and innovation.

31. UNCTAD is conducting a pilot project on technology assessment in selected developing countries in Africa to strengthen the capacities of national policymakers

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<sup>13</sup> UNCTAD, *Ensuring Safe Water and Sanitation for All: A Solution through Science, Technology and Innovation* (Geneva, 2022), p. 40. Available at: <https://unctad.org/publication/ensuring-safe-water-and-sanitation-all-solution-through-science-technology-and>.

<sup>14</sup> For more information, see [https://unctad.org/system/files/non-official-document/ecn162023\\_stip\\_p02\\_MLim\\_en\\_.pdf](https://unctad.org/system/files/non-official-document/ecn162023_stip_p02_MLim_en_.pdf).

<sup>15</sup> Country-level science, technology and innovation policy reviews conducted by UNCTAD are available at: [https://unctad.org/publications-search?f\[0\]=product%3A635](https://unctad.org/publications-search?f[0]=product%3A635).



and other stakeholders in designing and implementing policies that support the learning, diffusion and adoption of technologies in the energy and agricultural sectors. It will provide assessments of the social, environmental and economic impacts of adopting technologies.<sup>16</sup> Technology foresight and assessment exercises will complement each other and serve as important tools for policymaking in science, technology and innovation.

## **IV. Building capacity for science, technology and innovation**

### **A. Integrating policies on science, technology and innovation into national development strategies**

32. Between 2021 and 2023, UNCTAD completed the science, technology and innovation policy reviews<sup>17</sup> of Angola,<sup>18</sup> Botswana and Zambia<sup>19</sup> and made progress in its review of Seychelles. The reviews provided recommendations to orient science, technology and innovation investment and capacity development to take advantage of the opportunities created by the Sustainable Development Goals. That is particularly relevant concerning digital technologies and their interaction with mainstream sectors such as light manufacturing and agriculture.

33. The findings of the reviews include the need for development strategies to leverage science, technology and innovation in the development of productive capacities for industry, manufacturing and services and in the development of competitive higher-value-added activities and more complex export products. It is critically important that science, technology and innovation efforts be intensified, strengthening links between Government and the private sector and between the private sector and academic institutions. There is a need for policy coherence across major areas of development policy, including science, technology, innovation and industrial policy, to accelerate development. In that regard, science, technology and innovation issues should be brought closer to the centre of national development policy. Capacity-building is an important element during the policy review processes and remains a crucial need for the countries reviewed. In that regard, UNCTAD has been delivering capacity-building on science, technology and innovation for Sustainable Development Goals and is developing an e-learning platform which will be active in the fourth quarter of 2023.

34. The policy reviews have often ignited a renewal in science, technology and innovation, raised its profile in national development strategies and facilitated the inclusion of related activities in international cooperation plans. A key feature of the reviews is the systematic effort made to involve a broad range of stakeholders. That participatory process can mobilize networks of actors towards transformation through policy experimentation and learning. The activities under the reviews have enabled policymakers and other stakeholders in the countries reviewed to reach a better understanding of the key strengths and weaknesses in their science, technology and

<sup>16</sup> For more information, see <https://unctad.org/project/technology-assessment-energy-and-agricultural-sectors-africa-accelerate-progress-science>

<sup>17</sup> Science, technology and innovation policy reviews are undertaken by UNCTAD at the request of Member States. Through the review, the science, technology and innovation stakeholders in a country can identify the key strengths and weaknesses of their innovation systems and establish strategic priorities for their development. For additional information, see <https://unctad.org/topic/science-technology-and-innovation/STI4D-Reviews>.

<sup>18</sup> For more information, see <https://unctad.org/publication/science-technology-innovation-policy-review-angola>.

<sup>19</sup> For more information, see <https://unctad.org/publication/science-technology-and-innovation-policy-review-zambia>.

innovation systems, and to identify strategic priorities and policy options for improving such capacity and becoming more innovative.

## **B. Aligning intellectual property with development strategies**

35. A balanced and effective global intellectual property ecosystem should promote innovation and creativity for a better and more sustainable future as well as support technological diffusion. Governments face increasingly complex challenges regarding how to design an intellectual property system that best serves their policy objectives, responds to rapid technological change and mainstreams intellectual property in economic, development and social policymaking.

36. The World Intellectual Property Organization (WIPO) assists Member States in producing and implementing national intellectual property strategies that positively influence economic development, innovative and creative capacity and the vitality of enterprises. WIPO offers tailored strategic and process-oriented support to its Member States throughout the national intellectual property strategy development process. In particular, WIPO offers strategic advice regarding the intersection of intellectual property and economic development, innovation and creative industry policies; the intellectual property legal framework; the intellectual property policy framework; intellectual property administration; the role of intellectual property in research and development, technology transfer and creative industry support infrastructure; support for businesses, innovators and creators; nurturing a culture of intellectual property; and considerations to enhance the use of intellectual property as a strategic tool especially among underserved or underrepresented groups, considering diversity, equity and inclusion.

37. In addition to customized assistance, the WIPO Methodology for the Development of National Intellectual Property Strategies (second edition, 2020)<sup>20</sup> provides step-by-step guidance and explanations, including various tools, examples, templates and other resources. Training and workshop sessions have also been organized, such as the virtual WIPO workshop “Cross-Regional Experience-Sharing on IP Strategy Development and Implementation” in December 2022.

## **C. Leveraging science, technology and innovation for industrial development**

38. The United Nations Industrial Development Organization (UNIDO) offers a portfolio of policy advisory services to support developing countries in integrating science, technology and innovation policies into national industrial development strategies, with emphasis on Goal 9 on industry, innovation and infrastructure. UNIDO has developed a new set of diagnostic toolkits and accompanying training programmes to equip policymakers with a set of tools to appraise a country’s readiness for innovation, digitalization and industrial upgrading in line with long-term national development strategies. These activities fill a gap regarding intelligence on practical approaches to evidence-based policymaking, methodologies and empirically tested role models on how to articulate industrial policies with policies in areas related to innovation, climate change, digitalization and other trends shaping industrial development.

39. UNIDO emphasizes leveraging progress in new digital technologies to support the productive transformation of developing countries’ economies. In addition to analytical work to understand the impact of frontier technologies in industry, as

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<sup>20</sup> For more information, see [www.wipo.int/publications/en/details.jsp?id=4522](http://www.wipo.int/publications/en/details.jsp?id=4522).

documented in the Industrial Development Report,<sup>21</sup> UNIDO provides concrete technical initiatives around entrepreneurship training and digital skills development; learning and experimentation in the use of digital technologies to underpin the competitiveness of innovative firms; and formulation of dedicated policies to create suitable industrial ecosystems that foster digital transformation of firms, especially industrial small and medium-sized enterprises. UNIDO has successfully concluded its technical assistance to Jordan in drafting an artificial intelligence strategy and an implementation road map, as an execution of the Jordan policy for artificial intelligence 2020.

40. UNIDO is advancing a strategy on artificial intelligence in close dialogue with its Member States. Moreover, UNIDO is preparing to launch a Global Alliance on Artificial Intelligence for Industry and Manufacturing. The Alliance would help create a more conducive environment for firms and Governments to take advantage of artificial intelligence and other advanced digital production technologies.

## **D. Developing data for science, technology and innovation policy, research and analysis**

### **1. Indicators on science, technology and innovation**

41. The United Nations Educational, Scientific and Cultural Organization (UNESCO), through its Institute for Statistics, has been actively engaged in the development of indicators on science, technology and innovation concerning the Sustainable Development Goals. The Institute has undergone a transformation of its science, technology and innovation statistics programme with a new focus on key priority statistical data and indicators, in particular those around the production of target 9.5 indicators, as the core work of the programme. Accordingly, since 2021, it has been administering a revised survey of research and development statistics that collects data for the production of target 9.5.1: research and development expenditure as a proportion of gross domestic product and target 9.5.2: researchers (in full-time equivalent) per million inhabitants and a set of selected gender-disaggregated research and development indicators. Efforts to increase data coverage is a priority for the coming years with a focus on helping countries produce data for the purposes of monitoring these indicators.

42. The UNESCO Institute continues to collaborate with its data partners, such as the Organisation for Economic Co-operation and Development, Eurostat and the Network on Science and Technology Indicators – Ibero-American and Inter-American in sharing data and in maintaining the main methodological guides on measuring research and development (Frascati Manual).

43. The UNESCO Institute also contributes to capacity-building activities in the collection of science, technology and innovation data and indicators and participates in other meetings organized by regional partners. Since the publication of the previous report, the Institute has delivered a virtual national training workshop on science, technology and innovation statistics for Uzbekistan and contributed to several other virtual meetings, including the Economic and Social Commission for Western Asia – UNESCO Institute for Statistics Sustainable Development Goals series of webinars for the Arab region.

<sup>21</sup> For more information, see [www.unido.org/publications/industrial-development-report-series](http://www.unido.org/publications/industrial-development-report-series).

## 2. Big data indicators for sustainable development

44. The Global Pulse is regarded as the innovation lab of the Secretary-General. It works at the intersection of innovation and the human sciences to inform, inspire and strengthen the ability of the United Nations system and those it serves to anticipate, respond and adapt to challenges. Recent data innovation projects include: (a) the collaboration with the Office of the United Nations High Commissioner for Refugees, the World Health Organization and private institutions to conduct epidemic modelling on how COVID-19 could spread in Cox's Bazar to help health professionals verify the impact of proposed policy changes;<sup>22</sup> (b) a collaboration with the Ministry of National Development Planning of Indonesia to develop a data analysis tool to better understand the challenges and to inform evidence-based policymaking for micro, small and medium-sized enterprises in order to develop a flexible dashboard system that accommodates the dynamic needs of policymakers and allows easy integration of new data and data visualization; and (c) a collaboration with the Governments of Ghana and Uganda to work out road maps for opening up access to data and ensuring the responsible use of artificial intelligence.

## 3. Frontier technology readiness index

45. To assess national capabilities to equitably use, adopt and adapt frontier technologies, UNCTAD introduced a frontier technology readiness index in 2021, which was updated in 2022. The index analysed 166 countries in 2022 and comprises five building blocks, namely, information and communications technology (ICT) deployment, skills, research and development activity, industry activity and access to finance. Based on the index, the economies most ready for the equitable deployment of frontier technologies are high-income countries, notably the United States of America, Sweden and Singapore, while emerging economies are primarily found in the second quarter of the ranking. The least ready countries are in Latin America, the Caribbean and sub-Saharan Africa. There are developing countries climbing up the ranking and overperforming thanks to policies and incentives in place. For example, Brazil was able to improve its position due to an increase in ICT development. India is the greatest overperformer (67 positions better than expected according to its gross domestic product per capita), reflecting its achievements in terms of ICT, research and development and labour skills, followed by the Philippines (54 positions better) and Viet Nam (44 positions better) which have high rankings in industry and significant foreign direct investment in high-technology manufacturing.

46. Since 2021, the overall value of the index has increased from 0.44 to 0.50 points but the gaps between groups of countries remain wide. Overall, developing countries have lower rankings for ICT and skills, while least developed countries, landlocked developing countries and small island developing states face enormous challenges in terms of ICT and research and development.

## 4. Global Innovation Index

47. Since 2007, the WIPO Global Innovation Index has been a reference tool for countries to collect and improve innovation metrics and to inform their innovation policies with factual evidence. The Global Innovation Index has collected science, technology and innovation data for more than 150 countries since 2011. It compares the innovation performance of roughly 130 economies in detail, highlighting their innovation strengths and weaknesses and pinpointing any gaps in their innovation metrics.

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<sup>22</sup> For more information, see [www.unglobalpulse.org/microsite/epidemic-modelling-in-settlements/](http://www.unglobalpulse.org/microsite/epidemic-modelling-in-settlements/).

48. A survey carried out by WIPO in early 2022 shows that 70 per cent of WIPO member States use the Index. Given its wide use, the Index has effectively led to a demand-pull on innovation metrics and the extensive data audits have also helped in correcting a number of mistakes in submitted and published science, technology and innovation country data.

## **5. Indicators on telecommunications and information and communications technology**

49. The International Telecommunication Union (ITU) assists Governments with the collection and dissemination of ICT data, the production of statistics on ICT infrastructure and on access to and use of the infrastructure by households and individuals. It organizes online courses on the ITU Academy platform and technical workshops. The workshops are held at the national and regional levels to exchange experiences and discuss methodologies, definitions, survey administration and other issues related to the collection, dissemination and use of ICT statistics. The courses and workshops are based on the ITU Handbook for the collection of administrative data on telecommunications/ICT and its manual for measuring ICT access and use by households and individuals.

## **E. Promoting regional development of science, technology and innovation**

### **1. Africa**

50. The Economic Commission for Africa (ECA) organized the Fifth African Science, Technology and Innovation Forum on accelerating the development and diffusion of emerging technologies to build a green, inclusive and resilient Africa. The Forum involved over 800 participants from 41 countries and it called on Member States and their partners to scale up investment in research and development, infrastructure, entrepreneurship and open science.

51. ECA is developing five origin research and innovation labs as sustainable, responsible and innovative spaces that: attract the best talent to make Africa the global pole for solving complex and wicked problems; inspire Africa to generate ground-breaking and revolutionary solutions; and showcase innovative solutions that can be deployed on a massive scale in Africa and globally. It will build on the growing technological and industrial base, youthful population and the diaspora.

52. To advance and improve science, technology and innovation policy implementation, the ECA launched the Science, Technology and Innovation Policy Design and Implementation Guide<sup>23</sup> at the request of the African Union and following wide consultations with stakeholders. The Guide is also being used as a training resource for policymakers and researchers in collaboration with New Partnership for Africa's Development and the United Nations interagency task team on science, technology and innovation for the Sustainable Development Goals.

### **2. Asia and the Pacific**

53. The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) has supported policymakers in fostering grass-roots innovation, in introducing an inclusive lens in the formulation of national science, technology and innovation policies and digital economy policies and in promoting inclusive business models. Projects include: catalysing women's entrepreneurship; supporting the

<sup>23</sup> For more information, see: [www.uneca.org/eca-events/sites/default/files/eventdocumets/sti\\_pdi\\_guide\\_draft.pdf](http://www.uneca.org/eca-events/sites/default/files/eventdocumets/sti_pdi_guide_draft.pdf).

Government of Cambodia in the development of its science, technology and innovation road map 2030 and its national research agenda; engaging with the Government of Colombia to facilitate South-South collaboration between Member States in Asia-Pacific and Latin America to support knowledge sharing on effective policy measures to promote business innovation for inclusive and sustainable development; supporting Cambodia, the Lao People's Democratic Republic, Thailand and Viet Nam to develop a South-South and triangular collaboration programme on science, technology and innovation; a collaboration with Google and the Association of Pacific Rim Universities to support the development of country-specific artificial intelligence governance frameworks and national capabilities; and a partnership with the Government of Colombia to convene a policymakers community of practice on the green transition of business. Some of the results and lessons learned are summarized in the report entitled "Frontiers of inclusive innovation: formulating technology and innovation policies that leave no one behind".<sup>24</sup>

54. ESCAP has also been actively engaged in promoting business innovation to achieve the Sustainable Development Goals. Initiatives encompass: promoting inclusive business models in the Association of South East Asian Nations (ASEAN) with the inclusive Business Action Network and in food and agriculture systems with the Bill and Melinda Gates Foundation; supporting Governments in the region to spearhead policies that enable business innovation, resulting in the "Guidelines for the Promotion of Inclusive Business in ASEAN";<sup>25</sup> the adoption of the "2022–2025 Program on support for private sector enterprises in sustainable business"<sup>26</sup> by Viet Nam; supporting two regional events to facilitate exchange on inclusive business models among policymakers in Asia, namely, the ASEAN Inclusive Business Summit and the Asia Regional Inclusive Business in Agriculture Forum; and supporting 10 members of ASEAN to promote inclusive business at the subregional level.

### 3. Europe

55. The Economic Commission for Europe (ECE) has played a pivotal role in aiding countries in the region in their pursuit of the 2030 Agenda and the Sustainable Development Goals. Regarding science, technology and innovation, ECE initiatives in 2022 include: (a) launching a report on e-commerce in transition economies, which highlights the exacerbation of the digital gap by the COVID-19 pandemic and the role that its subsidiary body, the United Nations Centre for Trade Facilitation and Electronic Business can play to mitigate the issue; (b) publishing with the Centre a set of aligned standards for the digitalization of intermodal transport data exchanges to support global value chain cargo movements; (c) issuing a guide on how machine learning can enhance official statistics; (d) publishing a technology brief on carbon-neutral energy-intensive industries; and (e) launching the ECE Transformative Innovation Network to facilitate learning among stakeholders.<sup>27</sup>

56. ECE has also worked on country and regional assessments, policy studies, flagship reports such as the "Innovation for Sustainable Development Reviews"<sup>28</sup> and "Sub-regional Innovation Policy Outlook",<sup>29</sup> as well as thematic publications that serve as practical guides in implementing policy guidance and recommendations. In

<sup>24</sup> ESCAP, *Frontiers of inclusive innovation: formulating technology and innovation policies that leave no one behind* (Bangkok, 2021).

<sup>25</sup> ASEAN Secretariat, *Guidelines for the Promotion of Inclusive Business in ASEAN* (Jakarta, 2020).

<sup>26</sup> For more information, see: <http://asemconnectvietnam.gov.vn/default.aspx?ZID1=14&ID8=121639&ID1=2>.

<sup>27</sup> United Nations Economic Commission for Europe (UNECE), *Annual Report 2022: Connecting countries Recovering better Driving progress Improving lives* (Geneva, 2023).

<sup>28</sup> For more information, see <https://unece.org/innovationsustainable-development-reviews-i4sdrs>.

<sup>29</sup> For more information, see <https://unece.org/innovation-policy-outlook-ipo>.

2023, publications include a report summarizing the main results of an assessment of the North-Western Sahara Aquifer System, which is shared by Algeria, Libya and Tunisia to promote further development, and the Smart Sustainable Cities Profiles of Grodno, Belarus, and Tbilisi, among others.<sup>30</sup>

#### 4. Latin America and the Caribbean

57. The Economic Commission for Latin America and the Caribbean (ECLAC) has been working to foster science, technology and innovation to support economic development, upgrading and diversification, increase in productivity and underpin strategic sectors or specific initiatives, such as digital transformation, energy transition, circular economy, electromobility and the health-related manufacturing industry.

58. The Conference on Science, Innovation and Information and Communications Technologies, a subsidiary body of ECLAC that brings together high-level regional authorities responsible for science, technology and innovation policy, has been instrumental for knowledge exchange and coordination of strategies and actions at the regional level. The Conference biennial plan of activities for the period 2022–2023 aims to strengthen public institutional science, technology and innovation capabilities and to link the latter with the region’s strategic challenges. ECLAC has conducted training programmes in science, technology and innovation policies and is implementing technical assistance projects, in coordination with international donors and cooperation agencies, in different strategic areas such as smart cities, digital economy, energy, green transformation and electromobility. ECLAC is also responsible for generating knowledge and has released several reports and notes on science, technology and innovation, including policy analysis and proposals, such as “Science, technology and innovation: cooperation, integration and regional challenges”<sup>31</sup> and “Science, technology and innovation for sustainable development: Lessons from the Caribbean’s energy transition”.<sup>32</sup>

#### 5. Western Asia

59. The Economic and Social Commission for Western Asia (ESCWA) has been partnering with relevant stakeholders for localizing science, technology and innovation towards adequate and sustainable knowledge and skills for accelerating the implementation of the Sustainable Development Goals. Initiatives include: (a) the compilation of technology compendiums and publication of technical booklets in Arabic; (b) the production of 66 maps of local ecosystems covering the 22 Arab countries; (c) the launch of the Digital Enabling Platform for the Arab Region as the small and medium-sized enterprises enabling tools and knowledge hub; (d) hosting the first Arab small and medium-sized enterprises summit; (e) the launch of the Arab Innovation Platform to develop digital solutions for challenges related to the Sustainable Development Goals in partnership with the Office of Information and Communications Technology; and (f) the launch of the Arab Digital Inclusion Platform for templates formulation of national e-accessibility policies and the development of national technical e-accessibility guidelines. The Arab Digital Inclusion Platform, was awarded a champion prize by the World Summit on the Information Society.

<sup>30</sup> For more information, see: [https://unece.org/publications/oes/welcome?key=&title=&field\\_publication\\_date\\_st%5Bmin%5D=&field\\_publication\\_date\\_st%5Bmax%5D=&country&page=1](https://unece.org/publications/oes/welcome?key=&title=&field_publication_date_st%5Bmin%5D=&field_publication_date_st%5Bmax%5D=&country&page=1).

<sup>31</sup> ECLAC, *Science, technology and innovation: cooperation, integration and regional challenges* (Santiago, 2023).

<sup>32</sup> ECLAC, *Science, technology and innovation for sustainable development: Lessons from the Caribbean’s energy transition* (Santiago, 2022).

60. Other programmes include the annual Digital Arabic Content Award in recognition of innovative digital Arabic content products that focus on sustainable development in the region, a collaboration with the World Summit Awards and the launch of entrepreneurship centres in Casablanca, Morocco, and Riyadh in collaboration with the International Chamber of Commerce and ECA. Moreover, the ESCWA Government Electronic and Mobile Services Maturity Index is maintained to assess the progress towards the implementation of digital transformation in government services on a yearly basis.<sup>33</sup>

## **F. Implementing the outcomes of the World Summit on the Information Society**

61. In accordance with the mandate given by the Economic and Social Council and the General Assembly, most recently in their resolutions [2022/15](#) and [77/150](#), respectively, the Commission on Science and Technology for Development serves as the focal point in the system-wide follow-up to the outcomes of the World Summit on the Information Society.

62. In 2022 and 2023, the Secretary-General issued reports on the progress made in the implementation of and follow-up to the outcomes of the World Summit on the Information Society ([A/77/62-E/2022/8](#) and [A/78/62-E/2023/49](#) respectively). In the reports, it is highlighted that the information society has evolved significantly since the World Summit on the Information Society but the progress has been unequal between and within countries, demanding continued cooperation between Governments and other stakeholders to achieve universal connectivity. It is noted that the rapid technological change makes it challenging to develop appropriate national regulations and international norms to guide digital development for the common good. For example, artificial intelligence is likely to have a significant effect on the job market and accentuate job polarization while presenting challenges on how to ensure its responsible use and development on the basis of ethics, human rights and inclusion. This highlights the urgency and importance of building consensus and formulating international ethical and technical standards, normative guidelines and rules and regulations to ensure digital development benefits humanity as a whole.

63. At its twenty-fifth and twenty-sixth sessions, the Commission on Science and Technology for Development stressed the success that the World Summit on the Information Society process has achieved, including in spreading the benefits of ICT, while recognizing the challenges emanating from the pandemic, the decline of multi-stakeholder collaboration to address digital divides and the inequalities associated with the diffusion of new technologies. The need to close the digital and connectivity gaps as early as possible was emphasized.

64. Building on the report of the Secretary-General entitled “Roadmap for digital cooperation: implementation of the recommendations of the High-level Panel on Digital Cooperation” ([A/74/821](#)), the Global Digital Compact provides an opportunity for strengthening international digital cooperation. The Global Digital Compact could benefit from making full use of the knowledge and institutional memory that exist in the Commission on Science and Technology for Development given its near 20-year system-wide review of the progress made in the implementation of the World Summit on the Information Society and its unique advantage of being an intergovernmental forum with a long and deep culture of multi-stakeholder participation in the field of science, technology, innovation and development, including the two working groups on enhanced cooperation. The road map outlining the contributions of the Commission

<sup>33</sup> United Nations Economic and Social Commission for Western Asia (ESCWA), *Government Electronic and Mobile Services (GEMS-2022) Maturity Index* (Beirut, 2022).



to the World Summit on the Information Society 20-year review was discussed during the twenty-sixth session of the Commission, and it was stressed that it should produce substantive inputs to inform and guide the Economic and Social Council (ECOSOC) and the General Assembly in the World Summit on the Information Society 20-year review. Member States were encouraged to provide financial or other support to enable efforts similar to those made during the World Summit on the Information Society 10-year review.

## **G. Strengthening global support mechanisms for science, technology and innovation**

### **1. Technology facilitation mechanism**

65. The Technology Facilitation Mechanism was created by the Addis Ababa Action Agenda to support the implementation of the Sustainable Development Goals and launched by the 2030 Agenda for Sustainable Development in 2015. The Mechanism comprises four components: (a) the interagency task team on science, technology and innovation for the Sustainable Development Goals; (b) the 10-Member Group of high-level representatives of private sector, civil society and scientific community (10-Member Group); (c) an annual multi-stakeholder forum on science, technology and innovation for the Sustainable Development Goals; and (d) an online platform for information on existing science, technology and innovation initiatives, mechanisms and programmes.

66. The Mechanism illustrates a new One United Nations initiative and multi-stakeholder model of work. It has engaged more than 120 staff from 48 United Nations entities and thousands of scientists and stakeholders to harness science, technology and innovation for the Sustainable Development Goals. For example, the interagency task team capacity-building workstream has pooled science, technology and innovation expertise from across the United Nations system and has delivered a series of nine training workshops on science, technology and innovation policy and instruments for the Sustainable Development Goals with about 1,200 science, technology and innovation officials from 74 countries with 51 per cent of the participants being female. There are 10 such workstreams, including a science, technology and innovation for the Sustainable Development Goals road map pilot programme on research and analysis, emerging science and frontier technologies, and on gender issues.

67. In May 2023, the 10-Member Group released their report entitled “Science, Technology, and Innovation for the SDGs – Progress, Future vision, and Recommendations”.<sup>34</sup> It contributes to the international community’s discussions on how to make science, technology and innovation work best for sustainable development. It draws lessons from progress made since 2015 in the science, technology and innovation for the Sustainable Development Goals road maps, outlines a future vision for science, technology and innovation and makes 11 specific recommendations.

68. The seventh and eighth science, technology and innovation forums were held in May 2022 and 2023, respectively. They deliberated on science, technology and innovation policies and solutions for recovering from the impacts of the pandemic

<sup>34</sup> 10-Member Group, *Report of the UN Secretary General’s 10-Member-Group of High-level Representatives of Scientific Community, Private Sector and Civil Society in support of the Technology Facilitation Mechanism* (New York, 2023). Available at <https://sdgs.un.org/sites/default/files/2023-05/10MG%20report%202023%20-draft%202023-05-01%20posted.pdf>.

and accelerating progress towards the Sustainable Development Goals, for strengthening trust in science, technology and innovation, for promoting global research cooperation, funding and partnerships, for forging an equitable digital future for all, as well as for national science, technology and innovation for Sustainable Development Goals road maps.

## **2. Technology Bank for the Least Developed Countries**

69. The Technology Bank for the Least Developed Countries conducts research and analysis to assess the development challenges in least developed countries and identify the science, technology and innovation capacities and policy options needed to address them. The support provided by the Technology Bank is implemented through three pillars of work. First is the country-specific technology needs assessment that assesses the science, technology and innovation ecosystem of least developed countries, maps out the key development challenges facing these countries and identifies the technologies, technical know-how and innovative capabilities required to find sustainable solutions. Second is the identification of appropriate technologies for transfer to least developed countries guided by the technology needs assessments. Third is about capacity-building to ensure that the technologies transferred are sustainable and that least developed countries develop the technological and innovative capabilities required for seamless and sustainable development. Recent activities include launching a report on the state of science, technology and innovation in least developed countries that contains best practices regarding support initiatives in this area; validating the technology needs assessment reports prepared for Bangladesh, Benin, Cambodia and Djibouti; finalizing the technology needs assessment in the Sudan; initiating a new technology needs assessment in the Lao People's Democratic Republic; and undertaking a technology transfer project to close the gap in health-care provision in Bhutan focusing on children with hearing difficulties.

## **V. Conclusions and recommendations**

70. Science, technology and innovation offer transformative solutions to accelerate the achievement of the 2030 Agenda for Sustainable Development. However, seizing these opportunities is not automatic and requires strong policy responses from Governments. In particular, developing countries generally lack the technical capacity to use, adopt and adapt frontier technologies, with the risk of being left behind by the technological wave.

71. Governments in developing countries need agency and urgency in building the necessary innovation capacities to take advantage of the technological opportunities as well as creating an enabling environment that motivates innovators, entrepreneurs and companies to develop and implement new ideas. It is essential to have a whole-of-government approach matched by a whole-of-society approach in research and development, to ensure policies and initiatives across different domains are well coordinated, relevant and effective in addressing social and economic needs.

72. The success of national policies also depends on global cooperation. In that regard, the international community has an active role to play in supporting developing countries to strengthen national capacities in science, technology and innovation through technical and financial support and promoting collaboration among stakeholders towards the achievement of the Sustainable Development Goals.

73. Member States may wish to consider the following recommendations:

(a) Develop and expand national policies and strategies with clear direction and road maps and regulatory and legal frameworks to promote the use, scaling up and development of science, technology and innovation for sustainable development;

(b) Conduct technology foresight and assessment exercises to explore possible scenarios and develop a strategic vision and intelligence to shape the diffusion of science, technology and innovation;

(c) Promote a whole-of-government, whole-of-society, multi-stakeholder and multisectoral approach to ensure that science, technology and innovation policies are consistent with national priorities and development plans, including in the energy, environmental and industrial spheres;

(d) Cultivate and empower local research and innovation ecosystems, with particular attention to gender equality and diversity, by providing local actors with the necessary knowledge resources and creating an enabling institutional and regulatory environment that strengthens innovation networks and linkages, promotes the development of an open innovation culture and facilitates cross-sectoral and multi-stakeholder collaboration;

(e) Build capacity in digital mindsets, skills and technology acceptance, while carefully considering the social, cultural, financial, geographical and climatic conditions in target communities, including the ability to operate and maintain technological solutions;

(f) Promote human capital accumulation for using, adopting, adapting and creating new technologies through entrepreneurship training, capacity-building for innovators and researchers, as well as initiatives that qualify and retrain the workforce, with particular attention to women in informal and artisanal small and microenterprises;

(g) Strengthen digital infrastructure, in particular high-speed and high-quality Internet connection, and address the connectivity gap between small and large firms, between urban and rural regions and between male and female users;

(h) Introduce innovative and more equitable financing mechanisms and facilitate cross-sectoral collaborative ventures with heterogeneous actors to increase the financial capacity for research and development actions required to embrace science, technology and innovation solutions;

(i) Identify, prioritize and foster green technologies and potential new sectors for sustainable diversification and structural transformation, while providing support and incentives to the private sector and academia to invest in research and development for the products and services that address development needs.

74. The international community may wish to consider the following recommendations:

(a) Engage multilateral organizations, development agencies and global networks of actors to build synergies between existing initiatives and produce new gender-responsive knowledge and technologies for sustainable development;

(b) Promote research collaboration, open innovation, knowledge exchange, technology transfer and capacity-building through North–South, South–South and triangular cooperation, with particular attention to using these opportunities for promoting gender equality and diversity within research teams;

(c) Enhance capacity-building support for developing countries through technical and financial assistance to strengthen the capacity of national innovation systems for inclusive and sustainable development;

(d) Promote international technology assessment and foresight mechanisms to help countries identify challenges, opportunities and new trends of the rapid technological change, in particular within the context of the 2030 Agenda for Sustainable Development;

(e) Develop financial mechanisms that promote financial assistance from high-income countries and investment from the private sector to developing countries for science, technology and innovation, in particular least developed countries, landlocked developing countries and small island developing states, recognizing the cross-cutting role of such mechanisms in achieving the 2030 Agenda for Sustainable Development;

(f) Improve consistency between international agreements on trade, intellectual property rights and climate change to provide proper incentives to climate action based on science, technology and innovation;

(g) Strengthen international cooperation to develop consistent normative frameworks, ethical guidelines, standards and regulations on frontier technologies to harness their potential while minimizing risks;

(h) Foster inclusive debate on frontier technologies for achieving the Sustainable Development Goals by facilitating efficient communication and collaboration between authorities, corporations, researchers, academia and individuals, with a focus on least developed countries that are less engaged in the development of frontier technologies;

(i) Promote laws and policies that ensure equitable access to and participation in the design, deployment and development of science, technology and innovation, especially women and girls, people in vulnerable situations and the most vulnerable countries.

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