

**Economic and Social Commission for Asia and the Pacific**Committee on Information and Communications Technology,  
Science, Technology and Innovation**Third session**

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Item 5 (a) of the provisional agenda\*

**Inclusive technology and innovation for the decade of action  
for the Sustainable Development Goals****Guidelines for inclusive technology and innovation policies  
for sustainable development****Note by the secretariat***Summary*

Technology and innovation can increase the efficiency, effectiveness and impact of efforts to meet the ambitions of the 2030 Agenda for Sustainable Development; however, to do so, they must be inclusive by going beyond economic objectives to include social and environmental goals and by leaving no one behind.

The present document contains broad guidelines to formulate more inclusive technology and innovation policies for sustainable development.

Members of the Committee on Information and Communications Technology, Science, Technology and Innovation may wish to share national experiences – including effective practices and lessons learned – in promoting inclusive technology and innovation for sustainable development. The Committee may also wish to (1) provide comments on the draft guidelines contained in section III and on ways to develop these to be more practical for national implementation and use; (2) indicate the support – in the form of training and knowledge-sharing, tools, research or advisory services – that may be required from the secretariat to promote the formulation and adoption of national inclusive technology and innovation policies for sustainable development; (3) make recommendations to the secretariat on how to advance this agenda regionally; and (4) identify new and priority inclusive technology and innovation for sustainable development policy issues that the secretariat should work on in more detail.

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\* ESCAP/CICTSTI/2020/L.1.

## I. Introduction

1. Technology and innovation can increase the efficiency, effectiveness and impact of efforts to meet the ambitions of the 2030 Agenda for Sustainable Development; however, to do so, they must be inclusive. The coronavirus disease (COVID-19) pandemic has underscored that technology and innovation are critical to address pressing human challenges and that, to build back better, people must work to ensure that innovations are accessible and affordable for all.

2. To be transformative, policies promoting technology and innovation must go beyond economic objectives and also address social and environmental goals. Equally important, to leave no one behind, these policies should seek to ensure that the benefits and risks of technology and innovation are shared more equally.

3. Introducing an inclusive lens in technology and innovation policies will support technology and innovation for sustainable development – supporting more resilient economies – by enabling broad-based growth and fostering social welfare.

4. The present document contains broad guidelines on how to formulate more inclusive technology and innovation policies for sustainable development. Four areas to consider when creating such policies are addressed: overall objectives, direction, participation and governance. Questions to consider when developing these areas, in order to align them with the overall aim of policies that consider factors other than just economic growth, include the following: who benefits from such policies, who participates, and who sets priorities and oversees the outcomes.

## II. Why inclusive technology and innovation policies for sustainable development matter

5. In the past two decades, the Asia-Pacific region has been transformed by an unprecedented level of economic growth, which has expanded access to basic services such as health care, education and electricity to many outside the traditional metropolitan centres.<sup>1</sup> Technology and innovation were often at the core of such transformations, enabling many countries to leapfrog and catch up by changing their techno-productive infrastructure.

6. However, while the region's strong economic growth has more than tripled people's income, benefits from such economic prosperity have been unevenly distributed and have come with social and environmental costs. Industrialization has generated hazardous waste and intensified climate-related disasters, which disproportionately affect poor and vulnerable groups.<sup>2</sup> Even opportunities presented by the digital economy have increased inequality, as access to computers and the Internet is still far from accessible and affordable to all. For those at the base of the economic pyramid, scientific progress and emerging technologies are meaningless unless the solutions they provide are also affordable and relevant to their context and needs.

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<sup>1</sup> *Asia and the Pacific SDG Progress Report 2020* (United Nations publication, Sales No. E.20.II.F.10).

<sup>2</sup> *Economic and Social Survey of Asia and the Pacific 2020: Towards Sustainable Economies* (United Nations publication, Sales No. E.20.II.F.16).

7. The COVID-19 pandemic has underscored that science, technology and innovation are critical to address pressing human challenges. They are vital to test, track and trace COVID-19 patients and to find possible vaccines. Digital technologies have enabled many commercial, educational and other essential activities to continue throughout the pandemic. Yet, the pandemic has further exposed the inequalities that technology can create and exacerbate; for example, children in households without access to computers and Internet are missing out on education. To build back better, societies must seek technology and innovation solutions that support those groups that have been affected more. Societies must also work to ensure that digital technologies are accessible and affordable for all.

8. As the world enters the decade of action for the Sustainable Development Goals, it will be crucial to harness the potential of technology and innovation to manage resources, ecosystems and knowledge in more sustainable ways, considering the well-being of present and future generations and leaving no one behind in the process.

9. Innovation, while largely driven by businesses, takes place in a system of interdependent institutions, including universities, investment banks and government agencies, as well as within a system of information and communications technology (ICT) infrastructure, regulatory frameworks and even cultural and social norms.<sup>3</sup> Rural communities, women, persons with disabilities, and people in other vulnerable and low-income groups are often unaware or unable to access, develop and benefit from technologies and innovations.<sup>4</sup> Therefore, policymakers, as they formulate policies to promote technology and innovation, need to consider carefully who benefits from technology and innovation.<sup>5</sup>

10. An inclusive innovation policy seeks to ensure that the benefits and the risks of innovation are more equally shared, with the consideration of whose needs are being met by innovation and how excluded social groups could be better served, while focusing on initiatives that promote broad participation in innovation, priority-setting and the governance of innovation.<sup>6</sup> Promoting inclusive technology and innovation also involves considering how different demographic groups, geographic regions and economic actors benefit from technology and innovation.

11. Inclusive technology and innovation policies make sense for two reasons. First, inclusive innovation can support more resilient economies by enabling broad-based growth. Second, such policies promote social welfare and social justice by increasing opportunities to make goods and services available to low-income and other marginalized groups and by enabling marginalized groups to take part in innovation activities.<sup>7</sup>

12. At its second session, the Committee on Information and Communications Technology, Science, Technology and Innovation welcomed

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<sup>3</sup> Bengt-Åke Lundvall and others, eds., *Handbook of Innovation Systems and Developing Countries: Building Domestic Capabilities in a Global Setting* (Cheltenham, United Kingdom of Great Britain and Northern Ireland; Northampton, Massachusetts, Edward Elgar, 2009).

<sup>4</sup> See ESCAP/CICTSTI/2018/6.

<sup>5</sup> Nesta, "How inclusive is innovation policy? Insights from an international comparison", November 2018, p. 29.

<sup>6</sup> *Ibid.*, p. 8.

<sup>7</sup> See ESCAP/CICTSTI/2018/6.

the work of the Economic and Social Commission for Asia and the Pacific (ESCAP) on inclusive technology and innovation policies and recommended that the secretariat support member States in promoting inclusive technology and innovation by, inter alia, making tools available for promoting and assessing inclusive technology and innovation policies.<sup>8</sup>

13. The following section contains the general guidelines for government officials and other stakeholders seeking to introduce an inclusive lens in the formulation of national science, technology and innovation policies. These guidelines include the key dimensions to consider in order to achieve more inclusive outcomes.

### III. Guidelines for inclusive technology and innovation policies for sustainable development

#### A. Guiding questions

14. There is no one-size-fits-all approach to promote more inclusive outcomes through technology and innovation policy, as the country-specific context, needs and capabilities will need to inform any policies. However, there are four areas that policymakers and stakeholders can consider in order to guide the formulation of more inclusive technology and innovation policies: overall objectives, direction, participation and governance (see table). Questions to consider when developing these areas, in order to align them with the overall aim of policies that consider factors other than just economic growth, include the following: who benefits from such innovation policies, who participates, and who sets priorities and oversees the outcomes. One or several indicators can demonstrate to what extent the policy is inclusive in each area. For instance, in terms of its direction, a technology and innovation policy would be more inclusive the more it seeks to address societal challenges and the more it addresses the particular needs of excluded groups.

#### Guidelines for inclusive technology and innovation policies for sustainable development: dimensions and indicators

<i>Dimension</i>	<i>Indicator of an inclusive approach</i>
<b>1. Overall objectives</b> Do the overall aims of innovation policy involve more than economic growth?	1.1 Objectives are not exclusively related to economic growth but take account of a wider range of socially desirable outcomes, such as sustainability, equality, health and well-being.
<b>2. Direction of innovation</b> Whose needs are being met?	2.1 Support for innovation addressing societal challenges and needs. 2.2 Support for innovation addressing the particular needs of excluded groups.

<sup>8</sup> ESCAP/CICTSTI/2018/9.

<i>Dimension</i>	<i>Indicator of an inclusive approach</i>
<p><b>3. Participation in innovation</b></p> <p>Who participates in innovation?</p>	<p>3.1 Measures to increase the participation of underrepresented and excluded social groups in innovation and innovative sectors of the economy.</p> <p>3.2 Measures to increase the participation of disadvantaged or lagging regions and districts.</p> <p>3.3 Measures to promote innovation in low-productivity or low-innovation sectors.</p> <p>3.4 Measures to involve civil society and social economy organizations in innovation.</p>
<p><b>4. Governance of innovation</b></p> <p>Who sets priorities, and how are the outcomes of innovation managed?</p>	<p>4.1 Measures to broaden participation in priority setting with regard to innovation.</p> <p>4.2 Measures to broaden participation in the regulation of innovation.</p> <p>4.3 Measures to mitigate the risks of innovation.</p> <p>4.4 Measures to promote fair distribution of the benefits of innovation.</p>

*Source:* Nesta, "How inclusive is innovation policy? Insights from an international comparison", November 2018.

**1. Overall objectives: do the overall aims of innovation policy involve more than economic growth?**

15. To be inclusive, the overall aims of technology and innovation policies must involve more than economic growth. Traditionally, science, technology and innovation policies have focused on supporting economic growth and competitiveness but have overlooked the potential of these fields to address social needs and promote sustainable development and shared prosperity.

16. The United Nations has been promoting global strategies to expand human development beyond gross domestic product growth for decades, with the 2030 Agenda for Sustainable Development being its latest, most comprehensive approach. As policymakers are rethinking development, innovation policies must reflect the three dimensions of sustainable development: the economic, social and environmental.

17. Some Governments in the Asia-Pacific region have linked science, technology and innovation policies to national social and economic development goals and, more recently, to the Sustainable Development Goals. For example, the Strategy for New India @ 75 defines national objectives for 2022–2023 in 41 areas, including technology and innovation, and explicitly connects each area

to the relevant Sustainable Development Goals.<sup>9</sup> The Society 5.0 policy in Japan sets forth a vision of a human-centred economy where technology and innovation will help people to live better lives.<sup>10</sup> The Government of Japan has established the Cross-ministerial Strategic Innovation Promotion Programme to coordinate the advanced technological capabilities of the public and private sectors to address societal challenges such as those faced by its ageing population. For example, automated driving systems are promoted to enable older persons with visual or physical impairments to move freely in self-driving vehicles, while also reducing traffic congestion and improving overall road safety.<sup>11</sup>

18. The secretariat has been supporting Governments in the Asia-Pacific region in the development of science, technology and innovation policies that are designed to create more inclusive outcomes.<sup>12</sup> For instance, in 2018, following a request from the Government of Cambodia, the secretariat provided policy advice on how the national science, technology and innovation policy being developed could support more inclusive outcomes by including an explicit goal to increase opportunities for these fields to contribute to national social welfare, environmental sustainability and equality. The achievement of such goals will be measured by a range of indicators: (a) percentage of women studying science, technology, engineering and mathematics and/or percentage of female researchers; (b) increased number of technology centres, staff and services offered outside Phnom Penh; (c) increased rice productivity; and (d) increased number of inclusive businesses and social enterprises.

19. Other United Nations initiatives also promote the linking of national science, technology and innovation policies to the Sustainable Development Goals. The United Nations Conference on Trade and Development, for instance, has updated its science, technology and innovation policy review framework to include new innovation approaches, such as social and grass-roots innovation, informal sector activity and digitization.<sup>13</sup> The *Guidebook for the Preparation of Science, Technology and Innovation (STI) for SDGs Road Maps*, published by the Inter-Agency Task Team on Science, Technology and Innovation for the Sustainable Development Goals, includes information on traditional regulatory levers and policy instruments as well as alternative pathways for getting existing technologies, specifically those relevant for attaining critical Goals, to poor and marginalized populations (what the Global Solutions Summit called the global last mile challenge).

20. However, the inclusion of social and environmental objectives is not sufficient to make a science, technology and innovation policy inclusive. An

<sup>9</sup> India, National Institute for Transforming India (NITI Aayog), *Strategy for New India @ 75* (New Delhi, 2018).

<sup>10</sup> Japan, Council for Science, Technology and Innovation, *Outline of the Fifth Science and Technology Basic Plan* (Tokyo, 2016).

<sup>11</sup> Japan, Cabinet Office, Bureau of Science, Technology and Innovation, *Cross-ministerial Strategic Innovation: Promotion Program (SIP) Automated Driving for Universal Services: R&D Plan (2019)*. Available at [https://en.sip-adus.go.jp/sip/file/sip\\_2019\\_plan\\_en\\_s-1.pdf](https://en.sip-adus.go.jp/sip/file/sip_2019_plan_en_s-1.pdf).

<sup>12</sup> In 2018, ESCAP provided a number of suggestions on how the national science, technology and innovation policy in Cambodia could support further inclusive outcomes. In 2019, ESCAP supported the development of the national development strategy, “Mongolia in the Digital Age”. In 2020, ESCAP is supporting the development of the national science, technology and innovation policy and strategy in Myanmar and the creation of the Action Plan to Implement Cambodia’s Science, Technology and Innovation Policy 2020–2030.

<sup>13</sup> Document UNCTAD/DTL/STICT/2019/4, p. 53.

inclusive policy should also include measures to address the needs of excluded groups and to increase their participation in innovation activities and in the governance of innovation.

## 2. Direction of innovation: whose needs are being met?

21. To harness the full potential of science, technology and innovation for the Sustainable Development Goals, innovation policies cannot be a neutral set of instruments to address market demand; they need to be purposefully designed to address specific social needs. That is, they need to be designed to address societal challenges and the particular needs of excluded groups.

22. A number of Governments in the Asia-Pacific region are instituting comprehensive technology and innovation strategies to better respond to today's biggest societal challenge, COVID-19.<sup>14</sup> As an example, the Government of the Republic of Korea has used an artificial intelligence-based big data system to shorten the time to develop COVID-19 test kits which – together with rapid emergency approval for test kits and support for companies to develop and launch test kits – has enabled the Government to rapidly conduct testing at scale. The Government has also developed an epidemiological investigation support system to develop capacity to analyse large data sets. These and other technological responses have been possible because of the pre-existing technological infrastructure providing high levels of connectivity, as well as policy innovations introduced in the public sector following the lessons learned from the Middle East respiratory syndrome crisis, such as a centralized Emergency Operations Centre and an amended law that enables public institutions to access relevant information to deal with public health needs.<sup>15</sup>

23. Technology and innovation policies must also include consideration of the particular needs of excluded groups. Many governments already do so, albeit to varying degrees. For example, the Government of Mongolia has considered the needs of two groups, the nomadic herders and the urban migrants living in *ger* districts,<sup>16</sup> in the formulation of its national development strategy “Mongolia in the Digital Age” (see box). These two groups were identified early on in the digital national readiness assessment in Mongolia as not benefiting from information and communication technology to the same degree as the mainstream population. For the nomadic herders, who have mobile connections, affordability is an issue, and urban migrants living in *ger* districts have limited access to basic infrastructure, including electricity.

<sup>14</sup> For more information, see ESCAP/CICTSTI/2020/1.

<sup>15</sup> Asian and Pacific Training Centre for Information and Communication Technology for Development, “Webinar: How the Republic of Korea turned the tide on COVID-19 using ICT”, video, 28 April 2020.

<sup>16</sup> *Gers* are the traditional tent dwellings of Mongolian nomads (what in other countries are called yurts). A *ger* district is a residential district, on the outskirts of developed neighbourhoods, where nomads settled in their *gers* when they moved to live in the city. *Ger* districts have limited access to utilities and infrastructure.

### **An inclusive lens in the national development strategy “Mongolia in the Digital Age”**

In 2019, the secretariat and the Pathways for Prosperity Commission on Technology and Inclusive Development of Oxford University’s Blavatnik School of Government supported the Government of Mongolia in the design of an inclusive national development strategy, “Mongolia in the Digital Age”, under the leadership of the Cabinet Secretary.

The collaboration included the creation of a national readiness assessment, multi-stakeholder dialogues, and the drafting of the National Digital Strategy Primer. Each of these steps integrated an inclusive lens.

The national digital readiness assessment was designed to examine who was benefiting or not from ICT. It identified digital divides (in terms of connectivity and affordability) between nomadic herders and urban migrants in ger districts on one side and those in the capital on the other. Nomadic herders have mobile connections, but affordability is an issue, while urban migrants living in ger districts have limited access to basic infrastructure, including electricity.

In the multi-stakeholder dialogues, excluded groups (namely, urban migrants living in ger districts) were invited to participate.

The National Digital Strategy Primer for Mongolia explicitly seeks to enhance access to ICT in rural areas and for urban migrants in ger districts.

### **3. Participation in innovation: who participates in innovation?**

24. Inclusive technology and innovation policies expand participation in such activities. These policies address the participation of underrepresented and excluded social groups (for example, women, low-income groups and persons with disabilities), inhabitants of regions that are lagging behind, or workers in low productivity and/or innovation sectors (for example, micro and small enterprises). To promote inclusive innovation, it is therefore crucial to introduce specific policies, strategies and programmes that target those at the margins of society. Examples include strategies supporting innovation among low-income groups (grass-roots innovation), policies promoting women in science, technology, engineering and mathematics careers, and programmes supporting innovation capabilities of small entrepreneurs outside the central economic hubs.

25. Public policies can encourage innovation in informal sectors and communities (often referred to as grass-roots innovation)<sup>17</sup> and bring about collaborations and learning between formal and informal systems of innovation. The Honey Bee Network has long supported grass-roots innovations in India by acting as a bridge between the mainstream economy and people at the grass-roots level, allowing the latter to become active participants in the innovation system. In Malaysia, the Innovation Foundation promotes grass-roots innovations and helps to boost their commercial success. Building on these experiences and supported by the secretariat, in 2019, the Government of the Philippines adopted the Grass-roots Innovation for Inclusive Development Framework Plan.

<sup>17</sup> Grass-roots innovation is an innovation that emerges from the people in the countryside or locality with traditional and informal knowledge systems, with or without blending with formal knowledge. Gill Seyfang and Adrian Smith, “Grassroots innovations for sustainable development: towards a new research and policy agenda”, *Environmental Politics*, vol. 16, no. 4 (July 2007), pp. 584–603.



26. For policymakers seeking to promote grass-roots innovation, the secretariat has published the *Policies and Strategies to Promote Grass-roots Innovation Workbook*,<sup>18</sup> in which it identifies policy options and lessons learned to provide a conducive environment for grass-roots innovation.

27. Including gender considerations in science, technology and innovation policy is the right thing to do and makes economic sense. Gender disparities in these fields and in the broader socioeconomic context (including cultural norms) affect the opportunities and choices available for women to participate in and benefit from these fields. These disparities are often sector specific; for example, men are underrepresented in the health sector while women are strongly underrepresented in engineering and ICT. These gender gaps will be further exacerbated, and will probably look different, with future technologies. For example, in the artificial intelligence industry, women's participation is below 30 per cent.<sup>19</sup>

28. Greater responsiveness to gender inequalities in these fields requires sex-disaggregated data on science, technology and innovation inputs, activities and outcomes, as well as context-specific research that brings to light the specific challenges that women face in accessing education in these fields, in benefitting from science, technology and innovation, or in leading productive careers and taking leadership roles in these fields. In Malaysia, equal or near equal representation of men and women is required in the curriculum development teams in order to reduce gender biases in terms of content and learning outcomes. Furthermore, students that excel in science and mathematics are automatically placed in the science, technology, engineering and mathematics stream at the upper secondary school level. Statistically, girls perform better than boys in these subjects and as a result this policy has had a direct impact on the enrolment of girls in these subjects.<sup>20</sup>

29. Technology and innovation policies should also be geographically inclusive. On the one hand, the concentration of innovative capabilities within specific areas can be beneficial for economic growth. The physical proximity between businesses, markets and research institutes leads to considerable gains in scale and scope resulting from agglomeration effects.<sup>21</sup> However, when economic activity becomes disproportionately concentrated in major metropolitan areas, those in the countryside are often neglected and as a result do not have access to vital public utilities and employment opportunities. Inclusive innovation policies can counter regional inequalities by providing access to knowledge, services and funding to innovators from outside the capital and major cities. The Industrial Cluster Policy in Japan, for instance, has supported 18 regional industrial clusters throughout the country by financing and facilitating partnerships between businesses and research institutes and by

<sup>18</sup> ESCAP, Honey Bee Network and GIAN (ST/ESCAP/2907). Available at [www.unescap.org/resources/policies-and-strategies-promote-grassroots-innovation-workbook](http://www.unescap.org/resources/policies-and-strategies-promote-grassroots-innovation-workbook).

<sup>19</sup> Ann Cairns, "Why AI is failing the next generation of women?", World Economic Forum, 18 January 2019.

<sup>20</sup> United Nations Educational, Scientific and Cultural Organization, International Bureau of Education, "Sharing Malaysian experience in participation of girls in STEM education", *In-Progress Reflection on Current and Critical Issues in Curriculum and Learning*, No. 3 (Geneva, 2016).

<sup>21</sup> Organization for Economic Cooperation and Development, *Innovation Policies for Inclusive Growth* (Paris, 2015).

developing marketing channels, entrepreneurship, human resources and other critical factors.<sup>22</sup>

30. In addition, governments can also support innovation capabilities in civil society or promote social businesses to support innovations that address the needs of excluded groups. At the country-level, Governments can, for example, promote inclusive business practices,<sup>23</sup> as the Association of Southeast Asian Nations has done at the regional level since 2017, to encourage innovation in business models to provide goods, services and livelihoods on a commercially viable basis to people living at the base of the economic pyramid.

#### **4. Governance of innovation: who sets priorities, and how are the outcomes of innovation managed?**

31. Technology and innovation policies can be more inclusive when measures are taken to expand participation in setting priorities and overseeing the outcomes of innovation. Measures to expand participation in setting priorities would ideally involve systematic processes of consultation with key stakeholder groups – those who are directly and indirectly affected – including targeted beneficiaries. This requires more than asking the experts or publishing a draft policy for comments. It also includes providing opportunities to co-create scientific and technological solutions to social problems. For example, the responsible research and innovation platform – an initiative of the European Union promoting responsive research and innovation – enables different stakeholders from academia, the private sector, government and civil society to co-create research and innovation solutions that respond to the needs of a group of people.<sup>24</sup> The Social Sciences and Humanities Research Council of Canada has also launched a grant scheme specifically to encourage social researchers to work alongside government, industry and non-governmental organizations to provide social insights on the differentiated social impact of COVID-19 and to design recovery measures in stakeholder-driven partnerships.<sup>25</sup>

32. Inclusive technology and innovation policies include checks and balances, as well as regulatory mechanisms to monitor the application and impact of innovation. One way for regulations to address the fact that technologies and industries change quickly and to broaden participation in the regulation of innovation is to incorporate regulatory sandboxes which enable business to test innovative propositions with real consumers in a controlled environment. These small-scale experiments connect policymakers and businesses with stakeholders to increase understanding of their needs, while also providing opportunities for regulators to gather information from consumers about issues where further regulatory protection might be required.<sup>26</sup> For example, to encourage innovative financial products and services, the Monetary Authority of Singapore introduced a regulatory sandbox in 2016 for financial institutions and non-financial players. Similarly, the Land Transport Authority

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<sup>22</sup> Japan, Ministry of Economy, Trade and Industry, *Industrial Cluster Project 2009* (Tokyo, 2009).

<sup>23</sup> For more information on inclusive business, see ESCAP/CICTSTI/2020/5.

<sup>24</sup> Anne Snick, Eve Dallamaggiore and François Aze, “Fostering a Transition towards Responsible Research and Innovation Systems (FoTRRIS): conceptual framework for CO-RRRI - deliverable D1.2” (Mol, Belgium, 2016).

<sup>25</sup> Canada, Social Sciences and Humanities Research Council, *Partnership Engage Grants COVID-19 Special Initiative* (Ottawa, 2020).

<sup>26</sup> Financial Conduct Authority, “The impact and effectiveness of innovate” (London, 2019).

introduced a regulatory sandbox to allow autonomous vehicle trials to take place on public roads in Singapore in early 2017.<sup>27</sup>

33. Inclusive technology and innovation policies encompass measures to promote the fair distribution of the benefits of innovation. For instance, financial globalization, digitization and the rise of frontier technologies are enabling rent-seeking behaviours among technology companies that deepen inequality.<sup>28</sup> Governments can introduce measures to ensure that the extreme wealth created by rent-seeking digital companies and platforms is shared with those who helped to create it. These include not only taxation, but also competition or antitrust policies, as well as measures to give consumers ownership rights over their data streams and to share royalty revenues with those contributing to the creation of intellectual property.

34. Inclusive technology and innovation policies introduce measures to mitigate the risks of innovation. Frontier technologies, particularly artificial intelligence, have the potential to promote transformative gains in industrial productivity but also to widen the digital divide and change the number and nature of jobs; they also raise ethical concerns, including concerns about bias.<sup>29</sup> Governments can adopt various policy measures to address the social and ethical pitfalls of artificial intelligence and other technologies. For instance, to address potential displacement of labour, the Government of Singapore has put in place innovative financing mechanisms for citizens to pay for upskilling or reskilling training programmes that also provide tax-incentives for companies to invest in their lower paid workers.<sup>30</sup> In 2016, the Government of Japan established the Advisory Board on Artificial Intelligence and Human Society and has been actively proposing guidelines on global artificial intelligence research and development in international discussions. The proposed guidelines would be non-regulatory and non-binding, what is known as soft law, in order to promote the idea of human beings as the focus of policies and to promote an appropriate balance between the benefits and risks of artificial intelligence.

## **B. Other considerations for developing inclusive technology and innovation policies for sustainable development**

35. Governments' experiences developing inclusive national science, technology and innovation policies in Asia and the Pacific reveal a number of issues to consider when promoting and formulating these types of policies.

36. Inclusive innovation policies offer additional and complementary opportunities for inclusion but will not address inequalities on their own. For example, taxation, education policies and rural infrastructure development policies are key to support economic, social, and regional inclusion.

37. Inclusive considerations should be an integral part of each step of the process of creating innovation policies, from agenda setting and policy design, to the evaluation of technology and innovation programmes. Partners financing

<sup>27</sup> *Evolution of Science, Technology and Innovation Policies for Sustainable Development: The Experiences of China, Japan, the Republic of Korea and Singapore* (United Nations publications, Sales No. E.19. II.F.4).

<sup>28</sup> *Inequality in Asia and the Pacific in the Era of the 2030 Agenda for Sustainable Development* (United Nations publication, Sales No. E.18.II.F.13).

<sup>29</sup> *Evolution of Science, Technology and Innovation Policies for Sustainable Development*.

<sup>30</sup> ESCAP, "Artificial intelligence in Asia and the Pacific" (Bangkok, 2017).

these activities play a critical role in encouraging the introduction of an inclusive lens and in providing guidance.

38. Introducing an inclusive lens in national science, technology and innovation policies is not an easy undertaking and it requires progressively raising the bar. It requires deeper consultations, broader expertise and harder negotiations between conflicting objectives (for instance, between investing in pockets of research excellence or in a wider number of technology diffusion centres in rural areas). Introducing an inclusive lens is particularly difficult in developing countries with basic science, technology and innovation capabilities and limited science, technology and innovation policy experience as those countries have to address multiple development goals with limited resources. Inclusivity considerations may be limited initially and expanded as the national innovation system becomes more robust.

39. Stakeholders will need to prioritize which inclusive dimensions to address. It is critical to identify the science, technology and innovation policy areas that have the greatest potential to promote inclusive outcomes. Depending on the context, it may be promoting research and technology transfer centres in rural areas or, in another context, it may be promoting innovation capabilities among women entrepreneurs. Equally important is identifying the marginalized groups that would benefit the most (in terms of the breadth and depth of social impact) from specific support. For example, in the case of Mongolia, supporting the *ger* districts community was identified as a priority. Ensuring that women can fully participate in and benefit from science, technology and innovation activities can be a good starting point – with potentially a large impact as women form half of the population.

40. Both expertise and data are required for innovation policy and social development. Inclusive innovation requires expertise not only in promoting innovation activities but also in fostering social development, shared prosperity and environmental sustainability. It also requires the availability of data disaggregated by sex, geography and income group to enable inclusive assessments, monitoring and evaluation. The availability of basic science, technology and innovation data, let alone sex-disaggregated science, technology and innovation data, is particularly scarce in least developed countries.

#### **IV. Issues for consideration by the Committee**

41. Members of the Committee on Information and Communications Technology, Science, Technology and Innovation may wish to share national experiences – including effective practices and lessons learned – in promoting inclusive technology and innovation for sustainable development. The Committee may wish to (a) provide comments on the draft guidelines contained in section III and ways to develop these to be more practical for national implementation and use; (b) indicate the support – in the form of training and knowledge-sharing, tools, research or advisory services – that may be required from the secretariat to promote the formulation and adoption of national inclusive technology and innovation policies for sustainable development; (c) make recommendations to the secretariat on how to advance this agenda regionally; and (d) identify new and priority inclusive technology and innovation for sustainable development policy issues that the secretariat should work on in more detail.