2030 AGENDA FOR SUSTAINABLE DEVELOPMENT

Leveraging Science, Technology and Innovation for Implementing the 2030 Agenda

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Abstract

Global technology regimes and international organisations have played a significant role in facilitating Science, Techology and Innovation (STI) cooperation to cater to diverse needs in the areas of development and sustainability. However, the existing technology transfer models are found to be inadequate to meet the needs of developing countries. In this context, this Policy Brief examines the significance of Science and Technology (S&T) and availability of innovation driven solutions, to address sustainability challenges. Additionally, the Brief highlights role that G-20 may play in promoting the Sustainable Development Goals (SDGs) through supporting the best practices adopted for technology cooperation. It also puts emphasis on building technological as well as financial capacities, facilitating intellectual property regimes for fostering STI partnerships.

Challenge

The Third Conference on Financing for Development (FfD3) in Addis Ababa, by prioritizing Science, Technology and Innovation (STI) delivery, indicated the importance and support to addressing STI issues. There are challenges in Technology Cooperation, including capacity to absorb technologies, poor financial capacities of the governments and private firms in developing countries, and managing intellectual property rights (IPR) regimes. Majority of countries are yet to integrate STI policies with the Sustainable Development Goals (SDGs), and countries that have tried to do so have varied experiences (IATT 2018).

There is a need to assess how STI policies can be synergized with the SDGs. Concerns as regards lack of effectiveness of existing models and mechanisms have led to slow delivery of the expected results. The risks and costs of creating and adopting new mechanisms need to be addressed. Historically, STI cooperation has been confined to quantifiable, economic outcomes.

Although technology transfer is part of many conventions such as Convention on Biological Diversity, in general, these conventions have not been successful or effective in inducing technology transfer. A major factor has been lack of a mechanism that couples finance with technology transfer and incentivizes technology transfer. The Fund under Montreal Protocol has been successful because finance and technology transfer were linked. The United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement are using multiple solutions including creating institutional mechanisms, to address technology transfer. More needs to be done in this.

Proposal

The importance of STI and availability of innovation driven solutions, particularly to address sustainability challenges has been a key theme in many initiatives including the Rio+20 process that led to the 2030 Agenda for Sustainable Development, the Addis Ababa Action Agenda (AAAA), the UNFCCC and the Paris Agreement.

A large part of the technology requirements by developing countries to meet the SDGs are related to their needs in energy, agriculture and health sectors. Bridging knowledge gaps particularly in technical and scientific domains has been a core agenda of many interventions. The work at the United Nations Educational, Scientific and Cultural Organization [UNESCO] Institute for Statistics (UIS) on SDG 9.5 is to be strengthened further. The environmental effectiveness of the Montreal Protocol Fund has been substantial. The Global Environmental Facility (GEF), a joint initiative of the United Nations Development Program (UNDP), United National Environment Program (UNEP) and the World Bank, has facilitated developing countries to obtain new technologies and project financing at a low cost.

The Paris Agreement has elaborate provisions on technology development, transfer and financing for technology transfer. Climate Technology Centre and Network (CTCN) is envisaged as its implementation arm. According to Coninck and Sagar "Unfortunately, however, the CTCN, which is tasked with providing implementation support to developing countries, has not been supported commensurately with the needs and still suffers from a funding shortfall" (Coninck and Sagar 2017). So coupling funding with technology transfer is essential.

Digitalization and integration into digital economy can play a key role in meeting the SDGs as they enable leapfrogging and enhance access to goods, technologies and services. Emerging opportunities in FinTech including adoption of blockchain for governance and use of cloud computing and other digital technologies can make a positive impact. They can make a significant difference in sectors like agriculture (Tripoli and Schmidhuber 2018). Many developing countries are investing in digital infrastructure and upgrading their capabilities in managing information and communication technologies and digital technologies for enabling better access and inclusion (Chaturvedi et al. 2019). The role of S&T and Innovation policy frameworks in this is obvious, and there should be a synergy between S&T and innovation policy for the SDGs and policies in these emerging applications and technologies.

We make three specific proposals that harness the potential of STI for achieving the 2030 Agenda: 1) to establish a Technology Facilitation Mechanism (TFM), including a technology bank, for the implementation of the 2030 Agenda; 2) to

adopt new models for incentivizing innovations for global public goods and enhancing access to them; and 3) to integrate STI cooperation into strategies for the achievement of the SDGs. These are briefly discussed below.

1. <u>Establish a Technology Facilitation Mechanism (TFM) as althernative mechanisms</u>

Several developing countries held an unambiguous position in support of the establishment of a TFM which they consider as one of the most transformative means to implement sustainable development. India, through its successive submissions, has highlighted the point that immediate and urgent delivery of technology development, deployment, dissemination and transfer to developing countries require suitable responses. Current institutional arrangements are not equipped to meet the genuine needs of developing countries in technology development and transfer.

The international technology oriented mechanisms to address climate change are oriented towards: 1) knowledge sharing and coordination; 2) research, development and demonstration; 3) technology transfer; and 4) technology deployment mandates, standards, and incentives (Coninck and Sagar 2017). The United Nations (UN) has undertaken several initiatives over the years to address the challenge of technology gap between developed and developing countries for environmentally sound technologies. The most prominent initiatives in the area of technology transfer are: 1) the Multilateral Fund under the Montreal Protocol; 2) Green Climate Fund, 3) GEF; and 4) the Climate Technology Centre and Network of the UNFCCC. These are necessary and are not sufficient as more is needed in terms of Research and Development (R&D), funding, technology transfer and adoption and in terms of synergy amomg them.

The 2030 Agenda, prima facie, has only produced a rough skeleton of the proposed TFM. The structure proposed consists of UN Inter-Agency Task Team (UN IATT), Multi-stakeholder Forum on Science, Technology and Innovation for the SDGs (STI Forum) and Online Platform.

While over the years, the UN, through its various specialised agencies with sector specific niches, has been mapping capacity gaps in the developing countries, there is a new and emerging need to identify systemic deficiencies that can be identified and addressed through TFM. These include capacities for

technology assessment, particularly in the domains of development and sustainability in the first place in tune with the SDGs.

Next would be in terms of ecosystems so that individual countries can come up with specific (cost effective) technology solutions in these domains and contribute to the global repository. And finally, to have relevant capacities to absorb and use technologies that are being transferred. Effectively, capacity building would entail overcoming both institutional and resource constraints.

Inspired by the already established Technology Bank for the least developed countries (LDCs), a key outcome of the Istanbul Programme of Action for the Least Developed Countries for the Decade 2011-2020 (IPoA 2011-2020), we propose that a universal technology bank be created as the core institution of the TFM. The activities around the TFM technology bank and dissemination of technologies require careful policy design to mitigate informational asymmetries and address market failures and other systemic challenges. The technology bank will enable LDCs to meet their needs in technologies relevant to achieve the SDGs. It will facilitate technology transfer, help in capacity building and will assist in identifying reliable and suitable technologies. It can house patent pools, clearing houses and other information and technology sharing initiatives.

The design of the technology bank itself would require mechanisms to facilitate technology acquisition overcoming institutional bottlenecks like IPRs and lack of capacity. Finally, the TFM also has to develop a template for financing both ends of the activities. This further suggests timely delivery and could mean customization in response to user needs. The users in many cases, we expect, would be national governments or private parties (mostly mediated through national governments or relevant UN agencies). We propose Technology Needs Assessment as an important activity in this.

The needs of the LDCs and graduating LDCs should be given special attention in the work of the proposed technology bank. The TFM should visualize a complete scheme of activities that brings on board the regional UN agencies which could work together with the IATT, technology bank, other UN bodies on the ground and national governments in facilitating transfer of relevant technologies and enable their adoption.

Novel models and modes for incentivizing innovation such as, open source, open innovation, crowd sourcing and innovation prizes, can be explored and adopted. By now there are many successful examples in this regard and there is an ever growing literature on these models and their adoption in different sectors, ranging from agriculture to drug discovery. India launched Open Source Drug Discovery project for developing drugs for Tuberculosis (TB).

In case of emerging technologies, the Synthetic Biology Strategic Research Initiative at the Cambridge University is promoting open source approach to development of synthetic biology based processes and products and has also developed an open source based Material Transfer Agreement. In addition to these, it is initiating many schemes to promote low cost innovations and competitions to fund research and development in synthetic biology that will meet specific challenges. The emphasis on open source and responsible innovation makes this a good model to study, adopt, and make relevant for developing countries and LDCs.

There is substantial literature on alternative mechanisms to share innovations through novel licensing mechanisms that emphasis on maximizing social good than enhancing revenue from licensing. These mechanisms, often based on General Public License, can be tailor made for different types of needs and arrangements in sharing IP and innovation (Bogers, Bekkers and Granstrand 2012).

2. Adopt new models of innovation for global public goods

Addressing technology related issues from a public goods perspective will enable finding workable solutions. Non-rivalrous consumption and non-excludability are important features of public goods. Global public goods are the ones for those, international community has collective responsibility to provide as they benefit people, irrespective of country.

Stiglitz had argued that knowledge is a global public good. Scholars have pointed out that knowledge can be a public good while S&T itself can be considered as a public good and they have underscored the challenges in translating this into practice (Stiglitz 1999: 310). According to Archibugi and Fillippetti, transfer of knowledge is not sufficient to make productive use and users have to spend time and energy for assimilation. They point out that

normative implication of knowledge as a global public good is it needs greater public investment and global co-operation (Archibugi and Filippetti 2015).

Global public goods can be produced and adopted for finding cures to communicable diseases, enhance productivity in agriculture, protect environmental commons, and enable access to information and knowledge. Successful examples of such co-operation in S&T include the Consultative Group on International Agriculture (CGIAR) (for green revolution and further) and the European Organization for Nuclear Research (CERN) (for research in basic sciences).

However, there are greater challenges in accessing knowledge (including data and information) and applying it for S&T and for production of public goods. Access to scientific and technical knowledge is hindered by many factors, including intellectual property, lack of capacity and underinvestment in human development. Democratizing internet and liberal open access policies can facilitate better flow and utilization of S&T, and more efforts are needed in this (Garcia 2018).

While there are many initiatives to promote open access, there are limitations with them as they are too inadequate or often limited to addressing issues relevant to developed countries. We urge that there should be a global action plan on Open Access to S&T information and data, to meet the needs of developing countries and LDCs.

3. Integrate STI and the SDGs in development cooperation

STI cooperation has been a successful component in Development Assistance Programs. This has resulted in significant capacity building, bi-lateral collaborative R&D and joint research in themes/topics of mutual interest. Developed countries and emerging donors such as India, China and Brazil have assisted many developing countries and LDCs through development cooperation based on the donors' capabilities and needs of the recipient countries.

S&T cooperation under India, Brazil and South Africa (IBSA) and Brazil, Russia, India, China and South Africa (BRICS) had resulted in collaboration in such areas as health, water and sanitation, Information and Communication

Technologies (ICT) for development and in technologies like nanotechnology, advanced materials, biotechnology (for health) and ICTs. However, integrating the SDGs in STI cooperation has not happened and there is a disconnect between STI cooperation and strategies for the SDGs.

There is a strong case to use STI cooperation to meet the SDGs by developing specific programs and mechanisms. For example, STI cooperation can be linked with specific goals of the SDGs. The current frameworks and agreements in STI cooperation can be analyzed from a SDG perspective, and institutions that facilitate STI cooperation can be asked to integrate meeting of relevant SDG targets as an objective for STI cooperation.

Selected good practices

<Japan : Integrating STI, the SDGs and development cooperation>

Prior to policy developments for amalgamating STI with the SDGs, Japan initiated its revival. The Organization for Economic Co-operation and Development reported that Japan has made steady progress in solving traditional environmental problems, notably air emissions, water pollution, and waste management (OECD 2010). Japan's STI policy is embedded in its SDG model, which reflects on promotion of Society 5.0, regional vitalization and empowering women and future generations (PMO Japan 2017).

The objective is integration of cyber-physical system and development of key technologies to transform socio-economic structure, including business and government services, production, healthcare, energy, food, traffic, infrastructure, disaster, finance (UNCTAD 2018). The 1st SDG award, instituted at the Third SDGs Promotion Headquarters meeting in June 2017, showcased technological interventions to cure infectious diseases, build smart cities, supporting maternal and child health in Japan as well as in developing countries (MOFA 2017).

Japan, the 5th Science and Technology Basic Plan (2016) lays the roadmap for addressing issues related to sustainable growth, by S&T interventions. Japan is committed to make every effort both domestically and internationally to achieve the SDGs. Japan has established the "SDGs Promotion Headquarters" as

well as the "SDGs Promotion Roundtable Meeting" under the multi-stakeholder framework in May 2016. The Headquarters formulated the "SDGs Implementation Guiding Principles" and held 4th meeting on December 26, 2017 (UNESCAP 2018).

Japan's collaborative efforts towards the SDGs are manifested through various programmes and projects in developing countries. For instance, Graduate School of Bioagricultural Sciences, Nagoya University and Kenya Agricultural and Livestock Research Organization (KALRO) created rice varieties and cultivation technology for Kenya to address SDG 2 (JST 2018a, b); in South Asia, the Japanese enterprise, Sompo Holdings, Inc. offers agricultural insurance products to reduce climate related risks in agriculture (SOMPO 2018). Similarly, the diagnostics technology developed by Nagasaki University is being used to produce affordable and rapid diagnostic kits including point-of-care (POC) test kits for local communities in African countries, to treat malaria, Flu and other Neglected Tropical Diseases (NTDs) (Nagasaki University 2015).

Other interventions to promote research and education for creating a sustainable society include Gender equality schemes in Science, Technology, Engineering and Mathematics (STEM) education, water desalination systems, clean energy sources, disaster risk reduction (2015-2030), waste management mechanisms and others (JST 2018b). In June 2018, The "Extended SDGs Action Plan 2018", on the lines of "SDGs Action Plan 2018" was released signifying the systematic efforts underlined by Government of Japan towards SDG implementations (MEXT 2018). The aforementioned plans acknowledged the role of STI in mitigating socio-economic issues of the country. It aims in reshaping national development plans, in the light of STI strategies for SDGs (UNCTAD 2018).

<Some examples of global solutions from the South>

Healthcare – Vaccine Development: India's success relating to domestic production of low cost drugs and pharmaceuticals is unparalleled in the developing world and has earned it the eulogy 'pharmacy of the world'.

Vaccines are among the greatest scientific achievements in modern medicine that have helped in saving humanity from the scourge of microbial infections. However, the available vaccines are far less in number than the target diseases, and the efficacy of those available is being continuously worked upon. India has

emerged as a hub of vaccine research both in the public and the private sectors and has been successful in commercializing a host of candidate molecules (hepatitis B, typhoid, anti-rabies, DTP-HB, DTP-HB-Hib, mOPV type 1, leprosy, hepatitis A, etc.).

Renewable Energy – International Solar Alliance: India is working towards increasing renewable energy capacity by more than 5 times from 32 GW in 2014 to 174 GW by 2022. India's focus and efforts at solar energy generation is well acknowledged. Under the solar mission India targets deploying 20,000 MW of grid connected solar power by 2022 and aims at reducing the cost of solar power generation in the country through aggressive R&D and domestic production of critical components.

India now hosts the International Solar Alliance of 121 partner countries along the Tropics of Cancer and Capricorn that received plentiful of sunlight. This platform is meant to address the special needs of these countries and generate larger quantum of investment and resources. India was joined by France in launching this alliance during COP 21 in 2015.

South-South Collaboration in Health Biotechnology: Cuba, Brazil and India have used South-South collaboration to develop vaccines, affordable diagnostics and drugs for enhancing access in developing countries and in ensuring that these are affordable (Thorsteinsdóttir 2012).

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Appendix

The Addis Ababa Action Agenda (AAAA) documents final decision on part of world leaders to establish a Technology Facilitation Mechanism – TFM. This was officially adopted at the UN Sustainable Development Summit in September 2015 for the implementation of the 2030 Agenda for sustainable development. India (along with Brazil) has been enthusiastically promoting the cause for TFM under the Post 2015 Development Agenda.

African Union (AU), under vision of AU Agenda 2063, adopted Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024). The strategy was developed with the support of a Working Group that had representatives from, inter alia, African Academy of Science, African Union Commission, New Partnership for Africa's Development (NEPAD) Agency, International Science Council (ICSU), United Nations Economic Commission for Africa (UNECA), and UNESCO. The Strategy identified 6 areas of priorities including, eradication of hunger, and, prevention and control of diseases and ensuring well-being.

Organizations like PIPRA (Public Intellectual Property Resource for Agriculture) are promoting capacity building in IPR management and licensing and are helping innovators and the users to use IPRs so as to balance the need to incentivize innovation and enhance affordable access.

Mechanisms like patent pools, clearing houses, patent commons enable technology sharing and the literature shows that they are effective in many cases. For example, the Medicines Patent Pool (MPP) has demonstrated that it can enhance affordable access in developing countries and by negotiating with innovators and producers in developing countries, it has created mechanisms for technology transfer, licensing and sharing of royalties.