



Task Force 5
2030 Agenda and Development Cooperation

Policy brief

SCIENCE, TECHNOLOGY AND INNOVATION FOR SDGS POST- PANDEMIC: STRENGTHENING TECHNOLOGY FACILITATION MECHANISM AND GLOBAL PUBLIC GOODS FOR LOW- AND MIDDLE-INCOME COUNTRIES

SEPTEMBER 2021

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ABSTRACT

The UN has called for a “Decade of Action” in respect of SDGs in order to accelerate sustainable solutions to all the world’s biggest challenges. This policy brief highlights specific challenges for low- and middle-income countries (LMICs), challenges that result from technology and resource gaps assessed against shortfalls in SDG indicators. We propose that multilateral, regional and bilateral cooperation should lead to a strengthened technology facilitation mechanism (TFM), which was conceived by the UN as a global public good to implement the SDGs. Our policy recommendations are: (a) Support for **science, technology and innovation (STI)** missions for SDGs in LMICs based on country-level priorities; (b) multilateral and regional efforts to enable financing for technology facilitation under the TFM and in turn promote global public goods for LMICs; and (c) redesigning existing development cooperation modalities to enable LMICs to leverage the TFM, bridge capacity gaps, forge public–private partnerships and access STI for SDGs. G20 presidencies should incorporate the above priorities into their work programmes, build consensus and initiate specific actions to facilitate implementation of these recommendation. Operationalizing the TFM would be a concrete and credible outcome, helping to achieve effective multilateralism, enhancing access to technologies and promoting technology transfer to LMICs, thus achieving the SDGs.



CHALLENGE

The UN has called for a “Decade of Action” in respect of SDGs, to “accelerat[e] sustainable solutions to all the world’s biggest challenges — ranging from poverty and gender to climate change, inequality and closing the finance gap”. Such challenges are even more daunting for low- and middle-income countries (LMICs) due to the following reasons:

- i. **STI for SDGs:** There are technology and resource gaps across SDGs when assessed against the current status and shortfalls in SDG indicators in several LMICs. This may be seen in the context of pre-identified targets under each goal, suggesting both technology as well as resource requirements.
- ii. **TFM:** Agenda 2030 identified STI as one of the most important means of implementation of the SDGs and envisioned the creation of a global technology facilitation mechanism (TFM) to coalesce global support on financing and technology delivery to LMICs (Chaturvedi and Saha, 2016). While deliberations have been under way since 2016 through an annual STI Forum at the UN as well as the constitution of a high-level international expert group, a full-fledged TFM is yet to be operationalized and challenges remain in terms of mainstreaming this mechanism into international commitments. In 2019, a Global Pilot Programme on STI for SDGs was launched with five pilot countries (including India) and with support from selected G20 members including the EU and Japan. Delay in operationalizing a global TFM would have adverse impact on the fulfillment of Agenda 2030 (Chaturvedi, Rahman and Srinivas, 2019).
- iii. **Pandemic Response:** While STI is at the forefront of COVID-19 crisis management globally, challenges remain in terms of heterogeneous capacities, capabilities and access across LMICs. However, in high and some middle-income countries the COVID-19 pandemic has thrown up several examples of accelerated development of targeted STI solutions to mitigate the effect of the pandemic through collaboration and partnerships across similar countries and institutions (both from public and private sectors with greatly reduced barriers to knowledge flows). The challenge remains in replicating the same for other LMICs and across sectors.



PROPOSAL

To address the abovementioned challenges we propose three supportive policy recommendations: (a) Support for STI missions for SDGs in LMICs based on country-level priorities; (b) multilateral and regional efforts to enable financing for technology facilitation under the TFM and in turn promote global public goods for LMICs; and (c) redesigning existing development cooperation modalities to enable LMICs to leverage the TFM, bridge capacity gaps, forge public-private partnerships and access STI for SDGs (Chaturvedi, Alharbi and Saha, 2020). Accordingly, relevant national agencies in LMICs as well as international agencies should assess key elements of institutional preparedness and financing needs to bring in policy reforms, innovation in organizational practices and to leverage partnership among stakeholders, including the private sector. To highlight the G20's role in this regard, it may be pointed out that sectoral priorities and cooperation in technology have been recognized across G20 presidencies. Development cooperation for SDGs has featured prominently as part of G20 activity as well as the T20 processes. Science Twenty (S20) and Business Twenty (B20) have evolved into driving engagement groups in the G20, which suggests the need for closer collaboration among the T20, S20 and B20. The G20 Osaka Summit acknowledged the importance of STI for SDGs and endorsed the implementation of the UN Global Pilot Programme on STI for SDGs Roadmaps as part of the TFM (Chaturvedi and Saha, 2020).

(A) SUPPORT FOR STI MISSIONS FOR SDGs IN LMICs BASED ON COUNTRY-LEVEL PRIORITIES INCLUDING PANDEMIC RESPONSE

Jump-starting innovation and creating absorptive capacities

The focus on LMICs is extremely important at this juncture because pre-existing knowledge on the linearity of the catch-up process as observed in the case of selected emerging economies may not deliver the desired results in the coming decades. This is because institutional preparedness still remains weak and structural transformations have remained incomplete in several LMICs. The wider challenge of access to both resources and knowledge perpetuated by inadequate global delivery mechanisms impedes a faster creation of innovation capacities in these countries. While earlier policy recommendations have suggested proactive roles for the government in facilitating innovation ecosystems, a variety of reasons beyond constraints of physical capital, namely a weak private sector, inadequate skills and information asymmetries, have been the main barriers. However, newer policy instruments that offer more flexibility in terms of jump-starting innovation as well as attaining scale by catering to local development needs are increasingly becoming popular. New policies focused on technology-led entrepreneurship development and start-ups and associated financial incentives are proving beneficial in the context of LMICs, for example in India and Kenya. There is also scope to leverage the existing pool of excellence, however limited in supply (for smaller countries) and focus attention on select public sector initiatives for achieving absorptive capacities and triggering a faster diffusion of appropriate technological solutions.



Implementing STI missions for SDGs

The ICT revolution, apart from reducing transaction costs for reaching consumers and business partners in value chains, has also enabled greater choices and a larger information base. Therefore, there is a growing faith in digital technologies as one of the key STI intervention areas in LMICs even as these countries continue to lack access to innovations in other fields. National schemes for developing digital technologies are being pursued with rigor. However, associated challenges in actual innovation capacities and the cost of technologies still remain. This calls for further strategizing on STI interventions based on priorities, especially with regard to achieving SDG targets. The use of effective policy tools beyond traditional STI policy means is urgently needed. The most important incumbent framework could be that of the SDGs, wherein the urgency for integrated approaches often leads to the identification of technology needs beyond immediate and visible priorities. Dedicated STI missions have been found effective in this regard in some countries. Even with low gross expenditure on R&D (GERD), for any country, such missions could be helpful in terms of optimizing resources as well as directing skill-building in a desired direction. Such missions could become part of STI Roadmaps, appropriately absorbing the SDG gaps. While STI missions are not expected to solve a wider range of pre-existing gaps, they could help in bridging information asymmetries, create partnerships and generate incentives for dedicated STI efforts in select sectors. However, all these three elements would be critical in the design as well as consolidation of such efforts.

Creating shared STI assets for global public goods

It must be noted that several African countries and countries in other less developed regions are still unable to reach any meaningful level of innovation ecosystem and have diminished absorptive capacities. These are also the countries that would continue to carry heavier burdens of poverty and development deprivations. STI missions in LDCs in particular should be focused on creating STI assets and international cooperation should enable steady technology flows or financing of such. The ultimate objective is to treat knowledge as a public good and create technology assets through public funding of R&D, public provisioning of goods and services including digital platforms, non-exclusive commercial licensing, risk-sharing and so forth in order to promote global public goods to enable access, equity and inclusion (Srinivas, 2020). The transnational nature of GPGs takes their provisioning and management beyond the scope of the private sector, except of course as responsible service providers.

STI missions should not only be a process but a means to achieve the goals of equity and inclusion in the national context. The assets and knowledge created in such mechanisms should be widely applicable. If such models are replicable and generously shared with other countries, national programmes for STI missions would emerge as contributing pillars of global public goods enabling technology access for the LMICs. For example India has invoked STI missions not only in areas of immediate priority but also in frontier areas to generate STI externalities for society and the economy and even to prepare for disaster mitigation.



(B) MULTILATERAL AND REGIONAL EFFORTS TO PROMOTE TFM AND GLOBAL PUBLIC GOODS FOR LMICs

Assessing country priorities

While the aspiration for a full-fledged TFM remains within the operational mandate of the UN agencies, the global impact of such a mechanism is only slowly being recognized. It is well acknowledged that prior global technology transfer provisions under various agreements have led to sub-optimum results. Often, shortfalls in technology assessment and forecasting and weaker institutional preparedness have hampered technology absorption in most developing countries. As the world has made a speedy transition to the realities of the fourth industrial revolution and the emergence of frontier technologies, questions of wider technological divides have sharply come into the picture. This is despite that fact that some of the technologies could potentially be applied at scale and can move towards favourable pricing. Clearly, ownership issues, absorptive capacities as well as appropriateness with regard to country level needs are making a difference in terms of access. This is all the more significant because underdevelopment is widespread even as greater heterogeneity among LMICs makes uniform policy and institutional solutions redundant.

Supporting the Global Pilot Programme on STI for SDGs Roadmaps

The current initiative being incubated at the UN called the Global Pilot Programme on STI for SDGs Roadmaps, if appropriately guided and implemented, may have answers to several questions in regard to how similar technological interventions bring different results, both positive and negative across countries. This should bring in greater understanding of an appropriate roadmap building exercise for individual countries, keeping in mind the country contexts, the needs, institutional and technological readiness and alternative pathways for avoiding irreversible damage on account of resources and time. The Decade of Action on SDGs as a benchmark is already a grim reminder of the urgency and vastness of the challenges. The COVID-19 pandemic has made the crisis even more severe across a variety of goals.

An STI for SDGs Roadmap is expected to lead to understanding the level of a country's preparedness, as well as technology surplus and deficits. Paradigmatic shifts in bilateral, regional and multilateral cooperation on technology are needed to match demand and supply. This won't be easy unless we have a fuller understanding of how countries actually cooperate on technology, how science diplomacy is actually practised and how market mediated delivery mechanisms can be influenced to bring innovators and end-users closer. While the key barriers to technology transfer have been well documented over the years, they have not been assessed against the nature of existing global challenges and the need for global public goods. This is evidently clear in times of the pandemic – vaccine equity is becoming a big challenge, the move towards GPGs in the form of GAVI and COVAX is falling short of the widespread demand. India and South Africa's joint proposal for an IPR waiver on COVID-19 vaccines has gained support from 100 odd countries but has been opposed by several technology exporting countries.

While developing countries have made significant progress in leveraging technology for catch-up, leadership from developing countries on innovation for a vast cohort of technologies is yet to come. The localization of SDGs would need appropriate technologies, but



this is not happening because of existing barriers and low absorptive capacities that have impeded innovation systems (Saha and Shaw, 2019). Hence, STI Roadmaps are extremely important for widening the choices with regard to STI solutions. Local skills and capacities should be developed, keeping in mind SDG gaps and STI capabilities. Beyond technologies, cross-country cooperation that urgently builds absorptive capacities is extremely important, especially as technology transfers are accompanied by knowledge transfers on policy and ecosystems on best practice methods. This is something that India is practising in terms of creating digital public goods and their wider applications in fellow developing countries.

The other important dimension of the Global Pilot Programme on STI for SDGs Roadmaps is its ability to create multiple platforms of bilateral and regional engagements on technology cooperation on STI for global public goods. This may be utilized as a tool not only to strengthen alignment, review and resource mapping for national STI for SDGs efforts but also as a conscious agenda to trigger international cooperation on knowledge, technology transfer, capacity, network and finance for the operationalization of the TFM.

Strengthening TFM modalities

The modalities of the proposed TFM should be undertaken at two levels. One, at the national level informed by actual STI for SDGs Roadmaps evolved through inter-ministerial and multi-stakeholder approaches. Second, at the global level, it will be coordinated by inter-governmental mechanisms (in this case the UN) for strengthening existing global public goods as well as creating new ones. At both levels, STI interventions need to be informed of an array of scientific challenges connected with identified development gaps and sustainability needs with due consideration for multi-dimensional nature of challenges. The normative frameworks driving such interventions should be rooted in considerations of access, equity and inclusion to satisfy preconditions for local and global public goods. The framework towards achieving such global public goods should be the guiding principle for effective review on utilizing STI resources for global public goods. In other words, there should be demonstrable models to suggest that in the absence of particular STI interventions and resources, full-scale global public goods in an area of concern may not be achieved, thus delaying the global achievement of SDGs. In a post-COVID scenario there has to be much greater recognition of the fact that no one is safe until everyone is safe, or no one is safe until everything is 'sustainable'.

(C) DEVELOPMENT COOPERATION TO ENABLE LMICs TO LEVERAGE THE TFM, BRIDGE CAPACITY GAPS, AND ACCESS STI FOR SDGs

Support for the localization of development through STI

One key element in the faster creation, consolidation or propagation of global public goods is that of accelerated diffusion of proven technologies. The question of access, equity and inclusion is of paramount importance here. When mapping SDG gaps and tallying those with STI resources one often finds that the enormity or the complexity of the challenge is daunting and pre-existing STI solutions are inadequate (and all necessary solutions are not sufficient). This makes STI enterprise even more complex and localization efforts more challenging.



Bridging capacity gaps to leverage the TFM

International cooperation could be a realistic strategy to overcome such problems. Increasingly, faster diffusion of ICT technologies has raised hopes and expectations, but digital divides are still impeding progress. This can also be said for ICT solutions for user interfaces driven by local customization, even as core technologies defining Industry 4.0 (which aids both producers and consumers) are still beyond the reach of several LMICs. The ecosystem approach on matching wider R&D efforts and access to the Industry 4.0 cohort of technologies would enable fuller realization of SDGs (Chaturvedi, Rahman and Srinivas, 2019). At present, differential progress on these fronts is leading to sub-optimal outcomes in LMICs. The promotion of global public goods on technology resources would greatly lower the search and transaction costs for several developing countries, releasing substantial resources to be allocated for the localization of SDGs in these countries.

In this context, the creation of a TFM, that would enable wider technology access and availability; and fuller realization of STI for SDGs Roadmaps is expected to guide policy choices in LMICs on feasible roadmaps on deployment. This could be followed up with an assessment of the existing gaps in technology availability and stock of STI resources. This assessment could inform appropriate choices on acquisition, not necessarily of innovations but associated products and processes. Finally, there is significant scope for such roadmaps to lead to effective TFM where, beyond centralized structures, diffused efforts on bilateral and multi-lateral cooperation on technology can evolve for making technologies available and so for TFM to play a facilitating role.

Development cooperation to enable LMICs to leverage the TFM, bridge capacity gaps and access STI for SDGs should lead to greater confidence in TFM and address some of the above-mentioned concerns. Development cooperation modalities, under North–South, South–South and Triangular Cooperation frameworks must be guided towards creating capacities directly complementing country-level schemes on STI Roadmap initiatives and at the same time institutionalizing an array of activities to enable resource pooling and technology access through the TFM. Without explicit recognition under development cooperation schemes, TFM will remain illusory for several LMICs, who often resort to ad hoc and case-specific methods of technology acquisition and deployment with sub-optimal and short-lived impacts.

Conclusion

The vision behind the creation of a global technology facilitation mechanism (TFM) as part of Agenda 2030 was to accrue global support on financing and technology delivery to LMICs. The blistering pace of scientific developments around COVID-19 has so far eluded several LMICs, creating serious disadvantage with regard to access and capacities. In order to address multidimensional, cross-domain and cross-boundary challenges spelt out in the SDGs, cooperation among countries to deliver STI solutions to LMICs remains crucial if the SDGs are to be met. A global TFM should be the immediate and urgent institutional response (SDG 17). This should be based on experiences of international collaborations for the co-creation of knowledge and technology facilitation in order to preserve, protect and



promote global public goods for LMICs. The experiences of individual countries on STI missions and large-scale deployment (based on parameters of access, equity and inclusion) should be propagated as global best practices and effectively promoted through the TFM. In this context, the work programmes of G20 presidencies should incorporate the above priorities, build consensus and initiate specific actions to facilitate (a), (b) and (c) as outlined above. Operationalizing the TFM would serve as a concrete and credible outcome, helping to achieve effective multilateralism, enhancing access to technologies and promoting technology transfer to LMICs, thus achieving the SDGs.



NOTES

¹The Prime Minister's Science, Technology, and Innovation Advisory Council (PM-STIAC) in India has launched nine STI missions: Natural Language Translation; Quantum Frontier; AI; National Biodiversity; Electric Vehicles; Bio Science for Human Health; Waste to Wealth; Deep Ocean Exploration; Accelerating Growth of New India's Innovations (AGNII).



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