Role of Science, Technology and Innovation to achieve the Sustainable Development Goals

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India played a prominent role in the formulation of the United Nations Sustainable Development Agenda 2030 and committed to achieving the 17 Sustainable Development Goals (SDGs) and the 169 associated targets, also known as Global Goals[1]. These goals were adopted by all United Nations Member States in 2015 to bring the world to several life-changing 'zeros', including zero poverty and hunger. These goals are integrated and comprehensively cover social, economic, and environmental dimensions of development. To help achieve the goals, it promotes multi-stakeholder engagement, national to global action plans, public-private partnerships and it strives to harness Science, Technology and Innovation (STI) to accelerate progress.

STI is a fundamental tool to balance social, economic, technological, and financial resources during the process to achieve these goals. The STI community can help drive progress on the SDGs in preparing and advising policies, searching for the innovations to address the local needs, and monitoring the progress and challenges. STI facilitates to accelerate progress by promoting better use of evidence in policymaking and by addressing the gap areas in the process of development. The governments from different nations are already involved in the meaningful interaction of science advice and policymaking – from local to global – that increases the likelihood of significant impact.

Most of the nations have recognised the role of STI for their prosperity and to achieve the Agenda 2030. It may leapfrog social, diplomatic, and political obstacles and create new pathways for progress. The imperative for the STI community to support UN Agenda 2030 and the Sustainable Development Goals is clear but not easily put into practice. The inherent complexity of the SDGs and difficulty in rigorously evaluating their progress exacerbates this, as does the nature and organisation of science and policy.

An initiative called the Technology Facilitation Mechanism (TFM) is a collaborative platform for multi-stakeholders to support and strengthen synergies among science and technology initiatives within the UN system[2]. Apart from economic growth, STI contributes to addressing the societal issues both technically and



Figure 1. Sustainable Development Goals (Source: https://www.undp.org/content/undp/en/home/sustainable-development-goals.html)

non-technically. In the Addis Ababa Action Agenda, Member States committed to 'adopt science, technology and innovation strategies as integral elements of our national sustainable development strategies' (para 119)[3]. All participants recognised the importance of STI to achieve the Agenda 2030 and emphasised on the need of roadmaps and action plans at local, national and global levels during the annual meeting 2017. Their recommendations involved STI capacity building in each country, including human capacity; development of national policies addressing the SDGs; strengthening the science advisory ecosystem and the STI policy framework; and create private-public business opportunities in pursuing SDG solutions.

The Inter-Academy Partnership (IAP) project 'Improving Scientific Input to Global Policymaking' also sets out to explore some of the processes and mechanisms for STI-for-SDGs and to share its findings as a practical guide for academics and the wider science community[4]. Science and scientists can support the SDGs by maintaining an open and ongoing dialogue with policymakers, identifying challenges, advising on policy interventions, and devising solutions by understanding enabling conditions, constraints, and drivers in their respective geographic contexts. They may also contribute towards exploring future scenarios, including the impact of new and emerging (potentially disruptive and transformational) technologies; communicating science to policymakers and non-scientific audiences (including conveying risk and uncertainty); engaging the academic community and the wider public on the SDGs and encouraging them to get involved.

Why Focus on STI for SDG Roadmaps?

The last four industrial revolutions helped tremendously in human progress by the advancement of STI. However, these revolutions also disrupt traditional and social life. The development made through science and technology increased inequality within and a great divergence between countries. The introduction of the fourth industrial revolution has widened the gap even further between countries that led these revolutions and the developing world. The developing countries are not very prompt to adopt emerging technologies and are far behind in productivity as compared to the developed ones.

Historically, some countries, such as Germany, Japan, and the Republic of Korea, have been very successful at technological catch-up and have become technology leaders themselves using STI as part of their development strategies. The developed countries are well prepared and have an explicit STI strategy with a strong base of human and institutional capital, and effective government policies. However, most of the developing countries are still in the process to place effective strategies to use STI for their economic and social development to achieve SDG goals. They need to take advantage of technologies that already exist, as well as to make effective use of the potential offered by new emerging technologies and to mitigate the risks they present. The impact of STI is more crucial and needs the highest level of involvement from the government during the development and implementation process.

Challenges

At the same time, scientists face many challenges in applying science to the SDGs. Science and policy worlds are different and typically weakly connected. There is a lack of awareness and understanding of policy structures, processes, and players in the wider global science community. Another problem is the lack of reliable data for indicators, monitoring and evaluation, and assessment of progress. This is even true for the developed OECD countries; it has been estimated that only 57% of the targets can be quantitatively evaluated. Globally, the situation is dismal, with the lack of quantitative indicators combined with poor or incomplete data collection in many states.

Though all developments are directly and indirectly related to STI, most research and research support systems, including rewards, incentives, and career structures, are not typically designed around science for societal benefit. Apart from basic issues, interactions between the SDGs and their targets are complex and, in many cases, poorly understood. Action on one may reinforce or conflict with another. The nature of scientific research itself is incomplete and imperfect; it tends to lag the pace of change; both its development and its applications are unequally distributed, and; traditionally it is conducted in disciplinary silos.

At the global level, tools have been developed to track progress on the goals and some targets, e.g. the SDG tracker[5] and the Atlas of SDGs 2018[6]. For nation-states, the SDG Index and Dashboard[7] present useful indicators of where nations might prioritise and where science and science policy can contribute. Nevertheless, data gaps are significant, and these trackers and their appealing graphics can be misleading: for example, the SDG-13 map (climate action) gives an optimistic picture of progress, arguably because CO_2 emissions are difficult to attribute nationally and a few less-developed nations have low emissions.

Conclusion

India has been explicit in its strategies for achieving rapid growth and development including STI. It is also focusing now on inclusiveness and environmental sustainability. India's ongoing major changes and a plethora of challenges encourage for the formulation of the 5th Science, Technology, and Innovation Policy, 2020 (STIP2020) which is being facilitated jointly by the Office of the Principal Scientific Adviser to the Government of India and the Department of Science and Technology[8]. The Science Policy Forum has put up a commendable effort to gather and process inputs from as many as 15,000 stakeholders from around the country and abroad. It encourages local to global innovation, need-based technology development, and sustainable growth.

The interdisciplinary and convolution of SDGs ought engagement at many levels of detail and many levels of governance. There are many international issues like climate change, extreme weather, deforestation, population, health, and pandemic that need attention and trust of multi-stakeholders at local to global levels. There is a need for strengthening the international partnerships on STI for SDGs. Otherwise, many third world countries and developing countries will be going to fall far short of other goals. Collaborative efforts, better coordination, and complementarity may change the trajectory and accelerate progress towards the achievement of SDGs.

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