Mapping Indian National STI to Garner 2030 Agenda for Sustainable Development

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Introduction

The role of STI in achieving sustainable social, economic and environmental development is widely accepted immensely by all over the globe [ECOSOC, 2014; USC. 2010; The Royal Society, 2012]. However, what really is missing is the policy elements and the action plans, which are to be highly focused on development targets. The United Nations System Task Team on the Post 2015 Development Agenda argues that "debates on how best to promote sustainable and inclusive development are incomplete without a full consideration of issues of STI". In most of the developing and least developed countries, the STI policy has often been pursued independently of the broader developmental agenda. Nevertheless, the scenario is changing surely, as many nations have started recognising potentials of the STI policy research and launched several initiatives to address challenges. This time, as the world has committed to the highly ambitious 2015 development agenda, the challenges are even bigger than before, as there are 169 targets for 17 goals to be achieved by the year 2030.

Some of these targets are crucially important and of utmost priority in many nations at their national level as well. Some of the major challenges in achieving these SDGs include defining relevant and more practical indicators; financing SDGs (initial estimation report indicates a financial shortfall of USD 8.5 trillion over the mandated 15 years for achieving SDGs); discerning potential facilitation and monitoring institutions (micro and macro level); and measuring accurately the progress in implementaion SDGs'. These challenges can be effectively geared with proper channeling of scientific knowledge, technological advancements

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and innovation at the national, regional and international levels. It is abundantly clear that role of the STI is positive and critical at each and every stage of the development. However, the question is, how a nation can harness strong linkages between technology and innovation policies for overall sustainable development and welfare. This issue is a pressing concern in almost all countries.

STI4SD Indicators and Policy Outcomes

Measuring STI is fundamental for the formulation of national innovation strategies. Absence of relevant indicators is often considered a major obstacle for design and implementation of STI policies in developing countries. Indicators would provide information allowing successful translation of activities and outputs of the STI into development. In other words, indicators should be considered as inputs for designing and implementating the public policies. National monitoring of development goals and targets is the most important and should rely on the nationally defined sets of indicators. National ownership at all levels of the SDG framework is critical, and national monitoring must respond to national priorities and needs. Unfortunately, developing and least developed countries have not been very successful in setting up relevant national indicators to measure outcomes of STI activities and development goals. All nations must recognise the significance of (i) creating a highly-mapped atlas of the national STI landscape relevant to SDGs; and (ii) formulating reliable STI for sustainable development (STI4SD) indicators for different target areas. These new sets of indicators would facilitate framing national STI4SD policies (enhanced STI policies aligned with the universal 17 SDGs &169 targets), which would in turn help in achieving development targets and monitoring their progress on the regular basis.

STI mapping for SDGs

Thematic mapping of national scientific activities, technological developments and engineering and innovation capabilities is the first vital step towards harnessing country's STI potential for sustainable development. It includes data collection, classification and mapping of different knowledge producers and knowledge users.

- Data collection on public, private, public–private–partners (PPP) academic institutions, R&D establishments, non–governmental organisations (NGOs), think tanks, plus individual innovators and entrepreneurs, mentors, government policies, angel, venture capital, institutional, and industrial

Figure 1: Mapping STI for SDGs

funding mechanisms, intellectual property rights mechanisms, technology transfer mechanisms, market input, and incentives, awards, and other innovation–recognition mechanisms.

- Classification of collected data-sets and identifying their potential expertise and capabilities for various development related issues, ranging from climate engineering and disaster management to containing international terrorism.
- Mapping categorized data-sets to create an all-inclusive knowledge base (data-base) for each of the 17 SDGs; and further extensive mapping to each of their targets (169 in total for 17 SDGs). Such thematic mapping would help clearly identifying the resources 'we have' and 'we further require' to achieve each of the development target. This would then facilitate formulation of strategic road-maps and then policies.

Dedicated STI4SD Indicators and Policies

Accurate and accessible real-time (or near-real-time) indicators are essential for measuring country's STI capabilities as well monitoring progress of SDGs. The goal/target-oriented thematic mapping of STI landscapes would highlight resource, technology and policy gaps, and produce coherent and easy-accessible data-sets; which would eventually facilitate (i) evaluating existing indicators, (ii) defining more-relevant new indicators and (iii) formulating new 'STI for sustainable development' (STI4SD) indicators and policies. As a matter of fact, macro-level indicators do not always reflect innovative capacity of the nation. The indicators have to be dynamic and at different granular levels (micro as well as macro) to ensure reliable and accurate measurement. The STI4SD indicators are crucial elements to formulate evidence-based and/or data-driven policies. Format suggested for 'STI4SD indicator' for climate action is shown in Table 1. Different STI indicator values are calculated for each target-area of the broader climate change mitigation action. By completing this indicator table, it would be easy to measure capability, current strength and weakness and predict the progress (and trend) and then prepare a draft plan for the future (through STI4SD policies).

Monitoring and Capacity-building

Coordinating and monitoring progress of SDGs is as important as the development efforts. Given the large number of development targets, it would

Table 1: A format illustration–STI4SD indicator table for climate action (Goal 13)

STI Indicators	Goal-13 : Climate Change Mitigation Actions				
	De-carbonized Clean Energy	Affordable Modern Cooking Solutions	Green House Gas (GHG) Emission Reduction	Carbon dioxide (CO2) Emission Reductions	Geo-engineering (Solar Radiation Management (SRM)
S&T Expenditure (% of GDP)					
R&D Expenditure (% of GDP)					
Researchers in S&T (% of work force)					
Human Resource on Innovation Activities					
Innovation Outputs					
Scientific Articles (in %)					
Granted Patents					

be highly ineffective and inefficient to have a single point monitoring system at the national level. Emerging consensus suggests that thematic monitoring and review would be an important complement for official monitoring at the local, regional, national and global levels. To give an Indian example, NITI Aayog[1] acts as a single point national monitoring and coordinating establishment for SDGs in India. Nevertheless, the efforts have been made through MoSPI[2] to disseminate progress monitoring process to different ministries, based on the target areas of SDGs.

In most of the developing and the least developed countries, conducive environment is lacking to enable constant engagement between scientific and policy-making communities. A dedicated multi-level engagement model (at the national and the sub-national level) between different stakeholders of STI and policy-making communities, need to be developed to monitor and measure progress of SDGs. It is also important to identify facilitation institutions to provide a platform for constant engagement among stakeholders, by organizing round-tables, discussion fora and dialogue sessions where scientists and policymakers can understand each other's point of view.

National Science Diplomacy Agenda

Based on the STI strengths and weaknesses evaluated through those cross indicators (STI4SD) discussed in the previous section, countries can start formulating national science diplomacy agenda (to look for opportunities to create cross-border scientific collaborations/exchanges). The 21st century's most pressing issues – identified as global challenges – are international; no one country would be able to solve the problems on its own. The challenges ranging from disaster management, rapid climate change, pollution and livable cities, infectious disease to international terrorism – in one way or the other - have a scientific dimension [Raymond Saner, 2015]. The global problems require global solutions with appropriate willingness and cooperation among nations. It is very important to create a pivotal role for science and technology in foreign-policy-making (Vaghan, 2013). As the power and importance of science diplomacy is recognised by many countries, now they, large and small, developed and developing, are expressing a keen interest in experimenting this special foreign policy component; as the future is going to be completely technology driven in all walks of life. However, without integrating proper strategy at the system level, it is difficult to practice. Effective use of science diplomacy requires a coherent strategy. It is very important for each nation to formulate its own national science diplomacy agenda (Vaghan, . 2012), based on their geo-political, scientific strength and weaknesses, interests and developmental needs.

Endnotes

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2. Ministry of Statistics and Programme Implementation, Govt of India.

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