Further promotion of sustainable development goals using science, technology, and innovation

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In 2015, 193 United Nations (UN) member states unanimously adopted the 2030 Agenda for Sustainable Development. The 17 sustainable development goals (SDGs) drafted consist of 169 targets with over 230 indicators to be achieved by the year 2030.

CHALLENGES FOR ACHIEVING SDGs
The 2030 agenda depicts a better future for humanity, but it is facing challenges both internally and externally. The internal challenge comes from the capacity and resource limitation of the countries working toward SDGs. Imbalances in the level of social, economic,
scientific, and technical developments bring obstacles in capacity and resource standing in the way of the realization of the SDGs globally, challenging the commitment of leaving no one behind. In addition, data gaps limit the monitoring capabilities of global progress and the potential to guide actionable strategies and efforts in seeking solutions. Approximately 41% of the 230+ indicators for the 17 SDGs still lack sufficient data as of May 2022. The combination of statistical data and spatial data is in urgent need for scientific decision-making in various countries.

The major challenges from external uncertainties during implementation of the SDGs include the COVID-19 pandemic, regional conflicts, and climate change. In particular, the COVID-19 pandemic has caused the first global decline in sustainable development in 2020 since the adoption of the SDGs in 2015. Enduring global climate change is leading to unprecedented extreme weather events, frequent disasters, and serious challenges to global food production and resulting in dramatic biodiversity loss. Collectively, these challenges pose a comprehensive threat to human sustainable development.

STI FOR SDGs

Science, technology, and innovation (STI) is one of the most prominent strategy promoted to aid SDG implementation, which, along with the UN Technology Facilitation Mechanism (TFM), provides a strong institutional mechanism to enable international cooperation to improve access to STI and enhance knowledge sharing, thus ensuring that no one is left behind.

To encourage more participation in science and technology for the SDGs, 2022 was declared the International Year of Basic Sciences for Sustainable Development (IYBSSD2022) at the meeting of the UN General Assembly on December 2, 2021.

Innovative uses of technologies have contributed to COVID-19 responses. Examples include contact tracing apps, space science, polymerase chain reaction (PCR) testing, vaccines, and big data to support policy effectiveness. For climate change, an urgent action for worldwide technology transformation toward decarbonization and renewable energy is very important.

There are numerous uses of STI to directly support SDGs. For example, (1) gene editing and breeding technology can increase crop resistance to natural disasters and insects improving yields; (2) biomedical advancements, including the development of new vaccines and medicines, will help to reduce infectious diseases and keep people healthy; (3) a transition to renewable energy will help to reduce carbon emissions, improve air quality, and mitigate climate change impacts; (4) satellite observation and spatial analysis can monitor air, water, soil, and urban development, which can help find pollution sources and land cover change; and (5) digitization and communication technologies can help to improve efficiencies in industrial production, transportation, and government management.

STI also has prominent applications in monitoring and adjusting development of indicators to achieve SDG targets, as well as in providing support for decision-makers (Figure 1). For example, (1) big data, which measures SDG progress through satellite observation, navigation and positioning, surveying, and other data, can help make up for the shortages in statistical data that are slow to update for SDG indicators; (2) artificial intelligence, which can help automate data analysis of timely information for critical applications and processes important for decision support and management; and (3) sustainability science. It is important to note that the 230+ indicators in the SDG framework interact with each other. Sustainability science can help tackle these limitations and contested issues for sustainable development.

As an example of STI for SDGs, Big Earth Data can be seen as an emerging solution. The Big Earth Data approach, implemented by the “Big Earth Data Science Engineering Program (CASEarth)” of the Chinese Academy of Sciences, makes great effort to fill in missing data and share innovative data globally, develop methodologies and data analysis techniques, and provide decision support to SDGs by monitoring and identifying progress.

The relevance of SDGs with STI was analyzed by literature review and the number of published papers and patents were identified. Both of the two references found that SDG 1 (no poverty), SDG 4 (quality education), SDG 5 (gender equality), SDG 10 (reduced inequalities), SDG 16 (peace, justice, and strong institutions), and SDG 17 (partnership for the goals) have low relevance with STI, while the other SDGs are more closely related to STI. In contrast to the two references, we believe that SDG 1, which contains indicators related to farming and disaster reduction, can be supported by STI. STI may also provide job opportunities to reduce poverty. Although the 5 SDGs (SDG 4, SDG 5, SDG 10, SDG 16, and SDG 17) are less affected by STI, they are the crux of effective implementation of STI (Figure 1).

SHARING OF STI FOR GLOBAL SDGs

Although SDG 10 and SDG 17 were designed to help reduce all forms of imbalances among countries and promote common global development, at present, the progress toward these goals is not on track to be accomplished by 2030. Most important of all these is the imbalance in progress of science and technology among different countries. It is likely that compared with policy support or financial aid and contributions, sharing of science and technology would be a more durable and feasible solution to enable developing and less developed countries to work toward SDGs.

To achieve the SDGs and leave no one behind, we propose to better promote the sharing of related science and technology through global public goods, and a one-to-one assistance mechanism. Developed countries and world powers should shoulder their responsibilities and give full play to their respective advantages, jointly launch international organizations and programs, and lead the production, research, sharing, and training of global public goods.

In regards to STI, global public goods should include the following: (1) products, including commonly used medicines, vaccines, seeds, electricity, etc., which can guarantee a baseline for living and health; (2) technology, which can carry out the task of planting and breeding, digitization, advanced communication, artificial intelligence, and building low-carbon power stations; and (3) data, including monitoring data and decision-making models of global sustainable development indicators to guide local decision-makers.

The provincial twinning programs have been successfully used to achieve SDG 1 in China. China’s provincial twinning programs required a developed province to help a less-developed province or city and provide support in terms of talents, capital, and technology so as to achieve poverty alleviation and common prosperity. On the global scale, if a developed country, a large technical country, or a giant company was to support and train a less developed country to make full use of global public goods through this one-to-one assistance program, it may significantly promote global sustainable development.

Above all, half of the 15-year period has passed since the agenda was adopted in 2015, yet great challenges remain. Developing and sharing STI will play a decisive role in promoting global progress toward SDGs in 2030, and it also requires the joint participation of governments, enterprises, scientific and technological personnel, and all citizens.

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DECLARATION OF INTERESTS

The authors declare no competing interests.