



TECHNOLOGY
FACILITATION MECHANISM



UN IATT Working Group on Science, Technology and Innovation for the SDGs Roadmaps
Technical Inputs to the UN Guidebook

Title: Overview of International STI Funding Models and Holistic Plans

By Prof. Jian Zhang, Vice President of Institute of Climate Change and Sustainable Development, Tsinghua University, and Deputy Secretary-General of Global Alliance of Universities on Climate, China

Key Messages

- **Disparities in STI Funding:** Current STI funding models are inequitable, with developing countries lacking access to sufficient resources due to fiscal constraints, weak IP protection, and high investment risks. New funding models are needed to bridge these gaps.
 - **Blended Finance and Holistic Planning:** Blended finance mechanisms combining public, private, and philanthropic funding can de-risk STI investments in developing countries. A holistic plan at the national or sector level is essential to scale the effects and achieve systemic change.
 - **Strengthening IP and Policy Environment:** Strengthening intellectual property rights, tax incentives for R&D, and fostering innovation-friendly policies in developing nations can boost private sector investment and bridge innovation gaps.
 - **International Collaboration and Stakeholder Inclusion:** A national vision aligned with international cooperation must incorporate all stakeholders—governments, private investors, and multilateral institutions—ensuring incentives, monitoring, and verification. Developed countries should support developing nations with funding, technology, and capacity building, while developing countries work to create a conducive environment for investment, ultimately leveraging public and private capital to drive transformative STI advancements globally.
-

Problem Statement

Science, Technology, and Innovation (STI) funding plays a crucial role in driving global sustainable development, technological advancement, and addressing pressing societal challenges. However, existing international STI funding models have notable limitations, particularly in terms of inclusivity and equitability, especially between developed and developing nations. Current STI funding models mainly encompass public funding, private sector investment, and philanthropic foundations, each with distinct strengths and weaknesses.

Public Funding:

Public funding is predominantly sourced from national governments and international organizations. It is a significant contributor to STI, especially for early-stage and high-risk research where private investment might be lacking. Governments in developed countries, such as the United States or European Union member states, invest substantial amounts in research and development (R&D), often through dedicated funding agencies like the National Science Foundation (NSF) or Horizon Europe.

Strengths: Public funding can be directed towards fundamental research and long-term projects, often focused on societal benefit rather than immediate commercial returns. It also provides stability in funding for essential scientific work, particularly for basic research and projects that align with national or regional priorities.

Weaknesses: Despite its strengths, public funding is often politically influenced and subject to budgetary constraints. Public funding depends on fiscal revenues, which can be highly constrained in developing countries due to limited tax bases and inefficient tax collection. This restricts their ability to invest in STI, exacerbating disparities with developed nations. Additionally, reliance on tax income makes funding vulnerable to economic fluctuations, leading to instability, particularly in developing regions. The allocation can be biased towards national interests, which limits the availability of resources for international or cross-border projects, especially in the Global South. The reliance on domestic funding means there is an inherent imbalance in how STI resources are distributed globally.

Private Sector Investment:

The private sector provides another major source of STI funding, particularly for applied research and commercialization. Companies in industries such as pharmaceuticals, information technology, and energy invest heavily in R&D to drive innovation and create competitive advantages.

Strengths: Private funding can be highly responsive to market needs and provides significant resources for the commercialization of new technologies. It also promotes collaboration between researchers and industries, fostering innovation that meets immediate market demands.

Weaknesses: Innovation inherently has strong positive externalities, where the social returns often exceed private returns, leading to underinvestment by the private sector unless there is government intervention. In developing countries, this issue is further complicated by weaker intellectual property rights protection, a lack of societal respect for innovation, insufficient policies to nurture innovative talent within enterprises, and inadequate tax incentives. These factors create an unfavorable environment for private sector investment in STI. The private sector tends to prioritize investments that promise high returns and low risk, often neglecting early-stage research or investments in developing regions. Additionally, the risk aversion of private investors is exacerbated in cross-border contexts, where political, economic, and social uncertainties increase perceived risks, particularly in developing countries.

Philanthropic Foundations and Multilateral Organizations:

Philanthropic foundations, such as the Bill & Melinda Gates Foundation, and multilateral organizations, such as the World Bank, provide another significant avenue of STI funding. These organizations focus on global challenges like health, education, and poverty alleviation and are crucial in bridging funding gaps, particularly for initiatives that lack commercial viability.

Strengths: This type of funding can be targeted towards addressing specific global challenges, especially in areas underserved by both public and private sectors. It also offers flexibility, as it is less constrained by political cycles or profit motives.

Weaknesses: The primary limitation of philanthropic and multilateral funding is scale. The funding available, while impactful, is often insufficient to fully address the scope of STI challenges in developing regions. Additionally, these sources may lack the coordination needed to achieve systemic impact, and their priorities may not always align with local needs.

Key Challenges in STI Funding Models, Particularly Across Borders

Despite the existing funding models, there are significant challenges in international STI financing, particularly regarding the distribution of resources between developed and developing countries.

First, STI funding is disproportionately concentrated in developed countries, which have greater access to resources, talent, and advanced technological capabilities. In contrast, developing nations often struggle with a weak STI infrastructure, limited funding availability, and higher risks associated with political instability and economic fluctuations. These regions, representing a large proportion of the world's population, have significant needs and potential application scenarios for STI advancements. However, due to higher perceived risks—such as political, economic, and social challenges—the cost of investing in these regions is elevated, making them less attractive for both public and private investors.

Moreover, there is a substantial gap in private investment flows to developing regions. Private investors are often unwilling to engage due to uncertainties and the lack of guarantees on returns. This risk aversion further exacerbates the divide, leaving developing regions without the necessary capital to foster technological innovation and develop locally relevant solutions. Consequently, there is an urgent need for new financial models that can better match the supply and demand for STI in these areas, ensuring that funding is accessible, equitable, and aligned with local needs.

Policy Solutions, Guidelines, Practical steps and Case studies

To address the existing disparities and challenges in STI funding—particularly between developed and developing countries—comprehensive policy solutions are necessary. These solutions should focus on creating an equitable and enabling environment for STI financing, de-risking investments, and fostering collaboration across borders. Below are proposed policy measures and case studies that illustrate practical steps and effective approaches.

1. Blended Finance for De-risking STI Investments in Developing Regions

Solution: Blended finance, which combines public, private, and philanthropic funding, can help address the challenges of funding STI in developing countries. By using concessional public or philanthropic funding to absorb part of the risk, blended finance structures can make projects more attractive to private investors. **Guidelines and Practical Steps:**

- **Public-Private Partnerships (PPPs):** Governments can use concessional loans or grants to reduce risks for private investors. For instance, seed capital could be

UN IATT Working Group on Science, Technology and Innovation for the SDGs Roadmaps
Technical Inputs to the UN Guidebook

provided by governments or international donors, with private investors joining at later stages.

- **Risk Mitigation Tools:** Multilateral institutions such as the World Bank can provide guarantees or political risk insurance to de-risk investments in developing regions, making them more appealing for private sector participation. **Case Study:** The African Development Bank (AfDB) has implemented blended finance mechanisms to foster STI investment in renewable energy projects in sub-Saharan Africa, leveraging public funding to crowd in private investment and share the risks.

2. Strengthening Intellectual Property Rights and Policy Support for Innovation

Solution: Developing countries need to establish robust intellectual property (IP) protection systems and create a favorable policy environment to foster private sector innovation. **Guidelines and Practical Steps:**

- **Strengthen IP Rights:** Strengthening intellectual property laws and enforcement mechanisms helps ensure that innovators can benefit from their inventions, providing an incentive for private sector investment.
- **Innovation-Friendly Policies:** Governments should introduce tax incentives, grants, and subsidies for R&D, focusing on sectors where innovation potential is high. Training programs for innovation management can help enterprises better utilize STI.
- **Public Awareness and Education Campaigns:** Promoting a culture of innovation through public awareness campaigns and educational programs will help raise societal respect for innovation and entrepreneurial efforts. **Case Study:** India has made significant strides in IP reform through its National IPR Policy, which streamlines the patent process and promotes IP awareness and enforcement. This has helped boost private sector investment in STI, especially in its burgeoning tech and pharmaceutical sectors.

3. International STI Collaboration Mechanisms

Solution: Establishing international collaboration platforms can bridge the gap between developed and developing nations by fostering knowledge sharing, technology transfer, and joint funding of STI initiatives. **Guidelines and Practical Steps:**

UN IATT Working Group on Science, Technology and Innovation for the SDGs Roadmaps
Technical Inputs to the UN Guidebook

- **Technology Transfer and Knowledge Sharing:** Developed countries can facilitate technology transfer and capacity building in developing countries by collaborating with local governments and institutions. These partnerships should be designed to ensure that the knowledge shared can be adapted to local contexts.
- **STI Cooperation or Clubs:** Climate clubs or similar international cooperative platforms could require member countries to jointly invest in STI initiatives targeting global challenges like climate change. Countries could pool resources to invest in innovations that address common challenges, ensuring a more balanced distribution of technological benefits.
- **Market-Based Supplementary Mechanisms:** International cooperation on STI can also benefit from market-based mechanisms, which can facilitate the flow of resources, including funding and technology, between developed and developing countries by creating a compensatory framework for global public goods. **Case Study:** Carbon trading cooperation between Switzerland and Peru under the cooperation mechanisms of Article 6 of the Paris Agreement. In this project, Switzerland provides financial support to Peru to develop sustainable clean energy and technology projects, and in return, Switzerland receives emissions reduction credits. By leveraging market incentives, this mechanism facilitates the flow of funding and technology, while enhancing Peru's capacity to address climate challenges and fostering technological innovation.

4. Improving Access to International Funding

Solution: Developing countries often face barriers to accessing international STI funding, including bureaucratic obstacles and lack of capacity to navigate funding processes.

Simplifying these processes and providing capacity-building support is crucial. **Guidelines and Practical Steps:**

- **Capacity Building for Funding Access:** International organizations should provide technical assistance to developing nations to help them prepare competitive applications for international STI grants. This includes training local researchers and institutions on proposal writing, project management, and financial compliance.
- **Streamlining Funding Processes:** Institutions providing international STI funding should work to simplify application and reporting requirements, making the funding more accessible to institutions in developing countries. **Case Study:** The Global

UN IATT Working Group on Science, Technology and Innovation for the SDGs Roadmaps
Technical Inputs to the UN Guidebook

Challenges Research Fund (GCRF), a £1.5 billion fund in the UK, has simplified its grant application procedures and provided support for collaborative projects involving partners from developing countries, ensuring better access to international funding for researchers in low- and middle-income regions.

5. Encouraging Private Sector Involvement through Targeted Incentives

Solution: Governments in developing countries need to introduce incentives for the private sector to invest in STI. These incentives can help overcome the reluctance to invest in high-risk innovation projects, especially those with uncertain returns. **Guidelines and Practical Steps:**

- **Tax Incentives for R&D Investments:** Offering tax deductions or credits for R&D expenses can encourage private enterprises to invest in innovation. This should include special incentives for investments in areas aligned with national development priorities.
- **Access to Financing for Innovative SMEs:** Establish venture capital funds, backed by government guarantees, to provide financing for start-ups and small enterprises focused on technological innovation. This is crucial as SMEs are often drivers of innovation but lack the capital to scale their ideas.

6. Promoting Regional STI Hubs and Networks

Solution: Developing regional STI hubs can help create concentrated ecosystems where talent, infrastructure, and funding intersect to promote innovation. **Guidelines and Practical Steps:**

- **Developing Regional Innovation Ecosystems:** Governments in developing regions can establish special economic zones (SEZs) or innovation districts focused on specific sectors like green technology or digital solutions. These hubs would foster collaboration among universities, industries, and start-ups, enabling knowledge spillovers.
- **Fostering Regional Networks:** Regional STI networks can be promoted through funding for cross-border R&D projects, allowing developing countries to pool resources, share knowledge, and benefit collectively. **Case Study:** Kigali Innovation City in Rwanda is an emerging hub that seeks to attract investment in technology and innovation by providing tax incentives and a favorable regulatory environment.

By partnering with international institutions, the hub aims to foster a collaborative ecosystem to address challenges specific to the African context.

Specific Recommendations

To effectively transition towards sustainable development and maximize the impact of STI investments, a **holistic plan to scale the effects** is essential. Currently, international STI collaborations often focus on specific projects, such as clean energy technology investments in the climate domain. While such targeted efforts—like constructing a renewable energy plant—are valuable, they frequently lack the scale needed for transformative change. To achieve systemic impact, projects require a broader, integrated approach, encompassing supporting infrastructure such as grid technologies, dispatch systems, and more.

National Vision and Holistic Planning:

To truly leverage international funding and achieve scale effects, countries need to establish a national vision for STI, supported by scientific models. This vision should be translated into a holistic plan at least at the sector level. Such a plan would allow for strategic use of international resources, creating a framework for coordinated growth across complementary areas. It must also involve all stakeholders—including governments, private investors, civil society, and multilateral organizations—while creating incentives and implementing robust monitoring and verification mechanisms to ensure equity and integrity.

Global Guidebook and Framework of Cooperation:

The Global Guidebook and Framework of Cooperation should help bridge existing gaps by encouraging developed nations to provide developing countries with financing, technology, talent, and capacity building. Meanwhile, developing countries need to strengthen their national frameworks, streamline regulations, create conducive investment environments, and offer essential infrastructure and data access. These actions will lower entry barriers for investors and enable private capital to better identify opportunities.

By integrating public capital, private capital, and insurance mechanisms, early-stage investments can be de-risked, encouraging more private sector participation. Public funds and guarantees can significantly reduce the risks perceived by private investors, leading to



UN IATT Working Group on Science, Technology and Innovation for the SDGs Roadmaps
Technical Inputs to the UN Guidebook

greater mobilization of global private capital, thereby achieving a scaled impact and facilitating fundamental transitions in key sectors.