

# The Interamerican Development Bank approach to assistance to STI policy in Latin America and the Caribbean

## Introduction

Beyond encouraging signs of progress, the overall picture in Latin American and Caribbean economies (LAC) continues to be one of significant gaps in private sector innovation activity and technology adoption as well as in public sector investments in science technology and innovation (STI). The starting point of the IDB's approach to innovation systems is that private sector is central to innovation activity, but a number of well-known market failures determine that it may not produce the socially optimal level of innovation for a given economy if left to its own devices. Thus, governments play a critical role in enhancing competitiveness by directly encouraging business innovation, by establishing an enabling environment for firm innovation and technology-based entrepreneurship, and by providing complementary public goods such as scientific knowledge and advanced human capital. In LAC, these initiatives at market failure correction have to contend with additional issues, most notably a considerably heterogeneity in the initial conditions prevailing in the economies of the region, as well as the weak capabilities of the state to design and implement policy in this sector.

The Inter-American Development Bank (IDB) is, in this context, concerned with promoting and supporting public policies that directly encourage firm innovation, establishing an enabling environment for technology based entrepreneurship, and ensuring that complementary inputs and public goods indispensable for the innovation system to work (such as highly skilled human capital, scientific infrastructure and research) are in place. National innovation systems need to play a critical role in enhancing firm productivity and hence provide a solid base for growing competitiveness across LAC economies. With a portfolio of 24 lending programs and US\$1.2 billion, the IDB has built a large operational footprint in the area of STI. Across LAC, the Bank supports STI policies through lending programs and provides non-reimbursable technical assistance that supports diagnostics, sector studies, comprehensive policy reviews and project design and evaluation.<sup>1</sup>

The general principles underlying Bank operational work in the STI sector are:

1. Activities, programs and policy instruments supported in the context of Bank operations must respond to a clearly identified market or coordination failures. In developing solutions, Bank-supported interventions are to minimize and mitigate the risk of capture by stakeholders and dynamic inconsistency in their execution.
2. Given the heterogeneity of baselines in material, intellectual and institutional resources across economies of LAC, the Bank will strive to develop STI lending and technical assistance programs that are tailored to the specific needs of each country at any given time. In each case, the policy mix is bound to be different.

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<sup>1</sup> In the specific area of STI policy reviews, the IDB has sometimes used teams of Bank specialists to complete them (see for example, "Ecuador: Análisis del Sistema Nacional de Innovación: Hacia la consolidación de una cultura innovadora", 2014, <https://publications.iadb.org/handle/11319/6664>). In other cases, it has contributed, in varying degrees of involvement, with OECD reviews; Perú and Colombia are examples. Beyond these comprehensive exercises, this paper outlines the general approach of the IDB to the support of national innovations systems in LAC. A fully developed presentation of such approach can be found in Navarro, Benavente and Crespi "The New Imperative of Innovation", 2016, <https://publications.iadb.org/handle/11319/7417>).

3. Building institutional capacity in the national innovation systems following internationally sanctioned best practices in the field remains a major area of focus in the design of all Bank operations in this sector.
4. Bank operations incorporate a strong component of evaluability, and a sustained effort to improve data availability aimed at facilitating program monitoring and assessment in the field of STI policy.
5. Bank operations in STI are to include activities and resources devoted to better communicate their results and impacts as well as to engage non-traditional groups and institutions in innovation and science policy.

Some details follow.

### **1. Correcting market failures and avoiding political economy risks.**

Market failures associated with innovation activity represent, worldwide, a compelling rationale for public intervention aimed at fostering productivity growth through the encouragement of firm innovation. Under the market conditions typical of developing countries, knowledge gaps regarding specific market distortions create a strong case for active innovation, science and technology policies. Such policies are primarily concerned with helping both the public and the private sector to overcome the main barriers to knowledge creation, diffusion and practical use that prevail across developing economies such as those typical of LAC.

The way IDB-supported programs are organized, two general modalities of intervention exist: directly encouraging investment in innovation at the firm level, either individual firms or a group of firms linked in a value chain or a cluster -thus overcoming market failures related to informational asymmetries-, or addressing weak framework conditions (for example, by improving the availability in the economy of key inputs for innovation, many of which have public good qualities) that constrain the levels of innovation activity in the economy as a whole. Both firm-oriented and framework-enhancing policies can be horizontal, if they apply to the whole economy, or vertical if they concern a particular economic sector, industry, value chain or industrial cluster. Table A shows the quadrants resulting from this typology, and provides a partial list of policy interventions included in each quadrant, for illustration. Allowing for the particular circumstances of each economy, all four groups of interventions are potentially relevant for LAC's economies.

A major consideration in figuring out the best policy mix for a given country in a given moment of its economic development has to do with designing policy and deciding about public interventions bearing in mind that, even if market failures are endemic, it cannot be taken for granted that the process of addressing them will succeed. Positive externalities may fail to materialize, or their size might be lower than expected. Public services run the risk of being privately captured, or incursions in vertical innovation or science policy may run the risk of being shaped or implemented in ways akin to old fashioned and distortionary industrial policies. The institutional –bureaucratic, technical, political– capacity to execute a policy instrument that looks optimal on paper may very well not be in place. Institutional and risk analysis are thus essential components of IDB's approach to international assistance to STI.

**Table A. Innovation, Science and Technology Policy in Four Quadrants**

Scope	TYPE	
	Horizontal	Vertical
Public Good	Higher education/Training. Support to scientific research. Research on general purpose technologies (Digital technologies, biotech, Nano-tech). Research infrastructure. Highly skilled immigration. Regulation of emerging technologies. Technology transfer organization. Entrepreneurship education. Intellectual Property Rights (IPR) legislation and regulation. Innovation climate. Technology extension.	Technological institutes (agriculture, industry, energy, fishing, etc.) Sector-specific extension programs. Technological consortiums. Challenges. Industry specific training programs. Industry specific skilled immigration programs.
Market Intervention	Research and Development (R&D) subsidies for firms. R&D tax credits. Financial measures supporting firm innovation (guarantees for technology investments, intangibles, values, etc.) Adoption subsidies. Public financing of seed, angel and venture capital funds. Generic business incubators and accelerators. Tax incentives for innovation. Innovative public procurement.	Strategic sectors programs (ICT and software, green technologies, etc.). Business incubators and accelerators focused on a particular industries or technologies.

## 2. Adapting to heterogeneous country conditions

More generally, significantly different policy design and implementation provisions will be in order according to how sophisticated a particular economy is to begin with and how far its firms are from the technological frontier. It is thus indispensable to tailor the design of policy and programs to country-specific conditions.

Table B aims to illustrate, in connection with the distinction made above between types of programs that constitute market interventions and those that produce public goods, how some types of policies could be different in the case of national economies operating at different distances from the technological frontier, with those policies in the first row having the uniform characteristic of being less demanding in terms of public sector institutional capacity or private sector sophistication. This, of course, remains a rough approximation to the effort that needs to be made in designing appropriate STI policies in the case of each particular economy: the size of the domestic market and the prospects of foreign markets for each industry, the availability of basic inputs, both human and physical, industry-specific technology trends, global competition, local connectivity conditions, local institutional traditions and regulations, and still other factors need to be and are in each case weighted in order to maximize the positive impact of interventions.

**Table B. Tailoring Interventions to Specific Country Conditions**

	TYPE		
Technological Frontier	Far	<p>Market Intervention</p> <p>Innovation funds, technology diffusion programs and institutions. Business incubation. Incentives for ICT adoption in business. Entrepreneurship education. Business climate reforms.</p>	<p>Public Good</p> <p>Enhancement of engineering education and technical post-secondary programs. Basic technological infrastructure: broadband, standards and quality systems, metrology laboratories. Early stages of competitive scientific research funding.</p>
	Close	<p>Public/private financing of seed, angel and venture capital. Business accelerators. Sector innovation funds. Cluster and value-chain development programs.</p>	<p>Advanced degree scholarships. Advanced talent acquisition strategies. Research institutions in General Purpose Technologies (Biotechnology, Nanotechnology, ICT). Innovation climate reforms (technology transfer programs, IPR development initiatives and regulations)</p>

### 3. Institution building and coordination

It has been key, in the Bank's experience in the sector, to build capabilities in critical institutional areas such as policy design, implementation, management know-how and information systems, particularly in (often found) cases in which the institutional framework for the sector is weak or poorly defined. An interesting avenue for institution building, specially wherever institutions do not exist or are just initiating their activities, has been to implement projects through execution units created ad hoc for the Bank program at hand. Far from preventing domestic institutional development, in practice, such units can create capability where very little existed and such institutional capability builds up and proves to be eventually decisive when a window of opportunity for STI policy institutional consolidation becomes a real possibility.

In addition, the STI sector requires intensive intra-governmental coordination as well as considerable dialogue and harmonization of public and private strategies and perspectives. It is standard in the IDB approach to innovation system's support the adoption of international best practices in this area, which adds sustainability to institutional development. Experience has shown that pre-existing coordination capacity among key public and private actors needed to advance a project can be easily overestimated and dedicated efforts have to be employed to put in place governance, decision-making and policy dialogue arrangements that support the execution of STI projects.

### 4. Advancing impact evaluation of STI policy

Aware that impact evaluations of STI programs are fraught with methodological challenges, the IDB has dedicated efforts to enhance data availability, undertake impact evaluations and advance the state of the art in program evaluation in the field. Every lending program and several technical assistance projects contain funding and expertise for the development of innovation and science surveys according to international standards, and exercises in experimental or quasi-experimental approaches to the assessment of project's results

IDB work in the field has obtained conclusions -for LAC economies- in line with international literature and has represented an essential tool in the improvement of the design of programs as well as in advancing policy dialogue with national authorities. In addition, most project contain specific

resources to be dedicated to the enhancement of the local counterpart's capacity to carry out monitoring and evaluation activities on a regular basis.

### **5.Communicating results and involving stakeholders**

Given that many of the products of investments in STI are intangible and complex, and are often poorly understood by decision-makers and the public at large, special resources are reserved in IDB investment program to disseminate the benefits that particular target groups (SMEs, research institutions) and society at large receive as a result of this kind of investment. This is especially valid in the case of new programs, in which communication and dissemination activities have contributed to the participation of new beneficiaries and to maintaining demand. Beyond this, making STI investments relevant for society goes beyond "communication" strictly defined. The implementation of social innovation programs, using open innovation participatory platforms aimed at finding solutions to issues of social inclusion and poverty reduction, has proved to be a powerful instrument to get larger constituencies interested and involved in STI activities and policies. In this case, innovation policy itself becomes the most effective message.

The Bank has built an open innovation engine of its own in the Innovation Lab (iLab). This platform has been a successful vehicle for piloting new ideas in an open innovation framework. It has produced tangible results in the areas of social innovation and mobile services; both are highly valued by the countries the IDB serves. Innovative solutions produced by the iLab have been scaled up and incorporated in components of lending operations as well as technical cooperation programs.