Innovation, Policy and Science

Innovation, Technology and Society (ITS) Program Initiative

Prospectus 2006-2011

This is an edited version of the ITS Prospectus approved by the IDRC Board of Governors in June 2006

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Background

Research makes crucial, but insufficient contributions to development. Many other factors influence *how* knowledge affects economic or social processes. Learning probably matters most in the process of acquiring knowledge and putting it to use. While developing countries need to gain greater access to global sources of information, it is not access to technologies or to information *per se* that is crucial for development; success requires the integration of science and technology (S&T) into the productive institutions and processes of societies. The magnitude of what this requires for most developing countries is formidable. Sweeping organizational and cultural changes are needed. In particular, it means leaving behind "linear models" of thinking about knowledge and innovation and shifting to a "systems" perspective. Several important issues can be identified in the environment in which the research to be supported by ITS will operate.

Empirical evidence is starting to provide a guide as to what does and does not work in fostering innovation. **Most of this experience comes from developed countries and is not always relevant to developing countries.** This opens unexplored avenues for research to improve the understanding and functioning of innovation processes and systems in lower income countries.

Working with (and re-working) existing knowledge, rather than simply generating new knowledge through research, is a predominant activity in innovation. Research can thus help identify if and where this is occurring in developing countries, as well as identifying opportunities for such reworking of knowledge to occur more naturally.

The actors that comprise innovation systems are not limited to scientific elites working in research organizations. People in banks, in companies, on farms, in business associations, and in non-government civil society organizations also contribute extensively to innovation. Non-experts also have an important role to play by determining acceptable levels of social risk related to the adoption or development of new technologies or in generating the social demand for political leadership in support of STI.

Innovation systems in poorer countries are much smaller in comparison with advanced countries and have weak links between different types of STI capabilities. Formally organized R&D activities undertaken in most developing countries, moreover, do not tend to align or overlap with the activities of private sector or "productive" enterprises to any significant extent. These structural, organizational, and linkage deficiencies in developing country innovation systems are compounded by a number of other factors — **policies, political leadership, laws, rules, cultural practices, and infrastructure are all vital to the functioning of innovation systems.**

While government policy and regulatory environments are critical to bridging S&T divides and creating knowledge societies, **two principal challenges are faced by policymakers, regulators, and the public**: the pace of scientific knowledge production and technological change; and the lack of clear and objective evidence to make effective S&T policy decisions.

Many important socio-institutional characteristics (i.e., behavioural norms and laws) and policy elements (policy statements and policy instruments) in support of innovation are either absent, weak, unlinked, or ineffective in developing countries. As a result, key innovation system actors and organizations, such as universities and technical colleges, often have a poor understanding of how their contributions to skills development can by aligned with productive strengths.

Another dilemma for STI policy in developing countries is the frequent divorce between efforts to foster innovation and those aimed at reducing social inequities. The need to link innovation and social policy objectives has thus become increasingly more apparent.

Appropriate social consideration of S&T also requires **increased transparency and access to trustworthy evidence and information**. Unfortunately, many developing countries suffer from inadequacies with respect to public sources of information and advice on S&T (particularly weak capabilities in science journalism).

More open and participatory modes of S&T decision-making can cause intense debates between groups who hold different viewpoints and values, or who have different tolerances for risk and willingness to accept change. In particular, efforts are needed to strengthen the policy research capabilities and participation of non-government civil society organizations in innovation and technology governance.

Program Details

The ITS program initiative was designed with these considerations in mind as it supports development-relevant research. This section provides details on the vision, mission, objectives, and expected outcomes of the program.

Vision

Science, technology, and innovation contributing to just, equitable, and sustainable social and economic development in low and middle-income countries.

Mission

The mission of the *Innovation, Technology and Society* Program Initiative **is to support research on a series of inter-related STI issues that can contribute to the enhancement of innovative capabilities, policies, and institutions to support just, equitable, and sustainable social and economic development in developing countries.** The overall goal of the ITS program will be to support analysis that will lead to improved understanding and functioning of developing country innovation processes and systems, as well as strengthen their learning capacity and social responsiveness. Support will be provided to research and the use of research methodologies that are empowering to recipient partners and institutions.

Objectives

Working toward its vision and mission, the ITS program initiative will support research and research-support activities to meet the following objectives:

1. Improving understanding, capacity and inter-linkages of innovation system actors (organizations and individuals) in developing countries;

2. Supporting the development of explicit and implicit S&T policies contributing to improved functioning of developing country innovation systems; and

3. Strengthening socio-economic impact analysis, social inclusion and learning capabilities in support of innovation and the governance of new technologies.

Outcomes

Enhanced understanding of innovation processes and opportunities — Key innovation system actors in developing countries will better understand the process of innovation at different geographic scales, as well as how they can interact more effectively with other organizations to improve their innovative performance. These actors will also become more informed and adept with respect to their ability to connect to global innovation systems (e.g., South–South and South–North linkages), and policy actors will better understanding the opportunities for explicit and implicit S&T policy interventions (i.e., policy instrument choices) to strengthen innovation systems. Developing countries will have stronger evidence to support the development and application of technological learning strategies. They will also be better prepared to undertake forms of innovation-related collaboration and integration with each other, as well as with other institutions in the broader global knowledge system.

STI policy processes or decision-making — Developing country researchers and research organizations working with the ITS program initiative will contribute to STI policy processes or decision-making by providing credible evidence that illuminates key policy dilemmas or gaps, uses research results to enhance the functioning of innovation systems, contributes to appropriate and sustainable S&T strategies, resolves complex STI governance issues, and

anticipates future STI policy challenges. Developing country governments will be better prepared to develop systematic innovation-policy frameworks that inform and link S&T policy-instrument choices across a range of ministries or agencies. Southern, Canadian, and other Northern policymakers, technical officers, and policy advisors (e.g., international donor organizations and financial institutions) will be able to draw on stronger evidence to give STI considerations more attention in their activities or in dialogues on the roles of STI for reducing poverty and addressing development challenges.

Evidence-based research for advocacy — Civil society organizations will be better able to use research-based evidence in their advocacy work related to S&T. Outputs from ITS-funded research will also enable social considerations to flow more openly into developing country S&T policy processes or the decisions made by actors in innovation system. The potential impacts from suggested S&T policy changes will be more predictable and developing countries will be better equipped to develop policy strategies for creating, accessing, and using domestic and international stocks of knowledge. Research will contribute to increased dialogue and awareness that serves to stimulate policy change for enhanced innovation in support of socioeconomic development and poverty alleviation in developing countries. Finally, developing countries will have improved understanding in negotiating and applying international agreements on S&T, including intellectual property (IP) negotiations to promote access to proprietary technologies or foster mechanisms for technology sharing.

Greater equity and social inclusion — Developing country S&T policy dialogues and decision-making processes will be characterized by greater equity and social inclusion (e.g. multi-stakeholder participation). Gender dimensions of innovation and S&T decision-making will be better understood and efforts to enhance the roles of women (and women's rights) in S&T will be strengthened. Developing country innovation and civil society actors will have a better understanding of the socioeconomic impacts of emerging technologies. They will also be able to draw from a body of evidence that serves to better understand which technological innovations are best suited to solve development problems. Social and policy actors in developing countries will better understand how and where to make useful interventions concerning new technologies.

Programming Strategy

The ITS programming strategy for achieving its mission and objectives includes the identification of developing country-based researchers and research-related organizations that can contribute new knowledge to improve the understanding and capacity of innovation system actors, S&T policy development, impact analysis, as well as contribute to the advancement of social, institutional, and legal norms and behaviours related to innovation and the governance of new technologies. The PI will aim to align, to the extent possible, its research programming with opportunities to influence STI policy development or new investments in STI capacity in developing countries. It will also use PI program funding to pursue coordinated programming opportunities with other international organizations, collaborative research with other IDRC program initiatives, inclusion of Canadian researchers in program activities, support of South–South and South–North partnerships, interregional institutional strengthening, the creation of (or support to) different types of networks, and support to individual research projects.

The key principles that will guide ITS activities:

- Encourage and support developing country researchers to identify Southern STI-related research issues, needs and priorities for attention;
- Support capacity building research that helps address key STI policy issues in the South (with focus on responding to Southern research priorities and proposals, as well as directing research funding to Southern research institutions);
- Build horizontal linkages with all IDRC Program Areas in areas targeted for ITS attention;
- Build on the Centre's experience and expertise in STI programming;
- Remain neutral and open to all perspectives and viewpoints concerning S&T;
- Ensure that gender is mainstreamed into all areas of ITS research and that gender considerations are given due focus in research proposals wherever possible; and
- Facilitate and foster South–South and South–North partnerships in support of ITS program objectives.

Research Themes and Entry Points

Three thematic areas will frame both direct project grants and partnerships: *innovation system actors*; *science and technology policies*; and *impacts and inclusion* (see Figure 1 and Table 1).

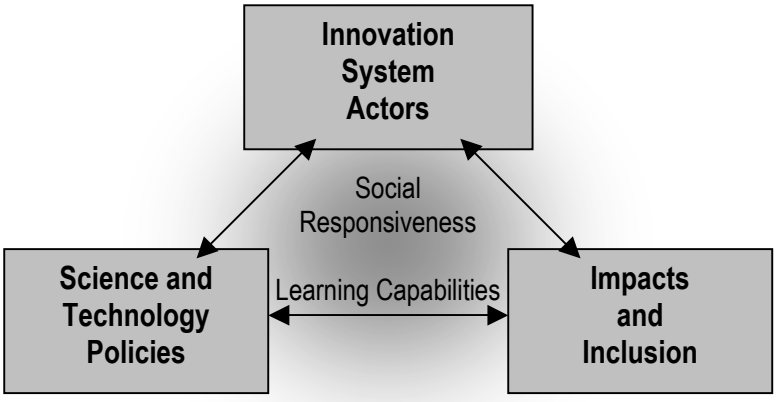

Figure 1: Thematic areas of the ITS program initiative.

The three entry point themes and their related objectives are not independent. Instead they interact with each other in ways that can help empower developing countries to more effectively

Table 1: Summary of Innovation, Technology and Society Themes, Objectives, and Outcomes.

Themes	Innovation System Actors	S&T Policies	Impacts and Inclusion
Objectives	Understanding and strengthening the capacity, roles, functions and linkages of developing country innovation system actors (organizations and individuals).	Supporting the development of explicit and implicit S&T policies that improve developing country innovation systems.	Strengthening socioeconomic impact analysis, social inclusion, and learning capabilities that support innovation and the governance of new technologies.
Research Activities	Research networks and research that enhance understanding of all aspects of developing country innovation systems. Projects to strengthen institutional capacities and linkages between innovation system actors in developing countries.	Projects, networks, and country-specific studies and pilot projects that support S&T policies and policy instruments that impact innovation systems and the linkages between innovation and social objectives in developing countries.	Projects, networks, and country-specific studies that seek to understand the impacts of new and emerging technologies; research on governance of technology; support for new laws or legal changes with respect to technology and IP governance; support for social and technical learning capabilities or strategies with respect to innovation and new technologies.
Expected Outcomes	Better understanding of: • processes of innovation in developing countries • innovation system actors, institution roles, and inter-dependencies, barriers, and gaps • how innovation system actors can enhance their technical learning capabilities with respect to innovation opportunities • how developing country innovation system actors and institutions connect to global innovation systems • opportunities for policy interventions to strengthen innovation systems in developing countries.	• Policy changes that enhance innovation in support of socioeconomic development and poverty alleviation in developing countries. • Social considerations and research findings will flow into developing country S&T policy processes and instrument choices. • Developing countries will be better equipped to engaging in, and benefiting from, domestic and international stocks of knowledge. • Developing countries will be better able to promote access to proprietary technologies and foster the creation of open access mechanisms. • International S&T programs and practices that impact on developing countries will be improved through evidence and coordination.	• A better understanding of the socioeconomic impacts of emerging technologies and enhanced knowledge of the effects of S&T on communities. • Evidence of which technological innovations are best suited to solve development problems. • Enhanced multi-stakeholder participation and gender equity in policy dialogues, risk management decisions, and communications associated with new technologies. • Enhanced capability to adjust behaviour, legal, and social norms to support innovation and inclusion in S&T decision-making. • Enhanced capabilities to develop and apply social and technical learning strategies related to innovation and S&T decision-making.
Typical Partners	Universities; policy research think tanks; NGOs; consumer advocacy associations; government agencies (including regulators); science academies or associations.	Universities; policy research think tanks; NGOs; consumer advocacy associations; legal associations or research institutes, science academies or associations government agencies (including regulators).	Universities, NGOs, business and other associations, labour groups, science academies or associations, legal associations or research institutes, and a wide variety of government agencies.

harness STI to address their development challenges. The starting point deals with improving understanding of innovation system actor roles and capacities in developing countries. The focus on *explicit* and *implicit* S&T policies helps to frame the enabling policy environment for innovation and innovation systems. Finally, research on impacts and inclusion will address issues related to improving social equity within innovation systems and bring a stronger range of social considerations to bear in STI decision-making.

Innovation System Actors — The objective of this first thematic entry point is to improve understanding of the respective roles, as well as enhance the capacity (including the learning capability) and interactions of individual and organizational actors (people and their ideas) involved in developing country innovation systems. Research activities will include funding regional and international networks, as well as stand alone studies that can improve understanding of the roles of such innovation systems actors and organizations in developing countries; address systemic gaps and barriers in actor interactions and linkages; and inform the development of learning strategies, policy interventions, or behaviour of innovation-system actors. Early emphasis will be placed on the roles of universities, publicly funded research institutes, private sector producers, and science academies, associations, or advisory bodies.

Research under this thematic entry point will contribute to the development, sharing, and implementation of innovation “systems” oriented analytical tools and evidence to support more effective organizations and organizational linkages in developing countries. A focus on innovation system actors will help to identify the wide range of people and organizations involved in innovation, as well as their demands and aims, the capabilities they have, their weaknesses, and the types of relations (conflicting, competitive, and cooperative) they maintain in society. Support will be provided for research analysis on developing country innovation system actors and inter-linkages at local, regional, national, and international levels, as well as along sectoral and technological lines.

Research under this theme will also attempt to identify and examine the *evolving* roles of key actor organizations (i.e., universities and financial institutions) in developing country innovation systems, as well as key gaps and barriers acting to prevent or limit their innovative activity and inter-linkages. Finally, the international linkages of developing country innovation system actors, both from a South–South and South–North perspective, will be explored.

The expected outcomes of research activities under this thematic entry point include: a better understanding of actors (individuals and organizations) comprising innovation systems in developing countries (local–international, as well as along sectoral and technological lines); their roles and inter-dependencies; and the barriers and gaps in developing country innovation systems with respect to innovation actor capabilities (including learning capabilities) and inter-linkages.

Science and Technology Policies — The objective of the second thematic research entry point is to support the development of *explicit* and *implicit* S&T policies that contribute to the improved functioning of developing country innovation systems. The policy process in any country is complex and policymakers are rarely able to act alone in its formulation or implementation. Policies and policy-instrument choices are almost always decided through a complex iterative process between action and ideas, formulation, implementation and review — all of which involve various levels and scales of activity.

ITS research programming under the *S&T policies* thematic entry point will concentrate on evidence that can inform a relatively broad range of policy-development and policy-instrument choices necessary to enhance developing country S&T and innovation capabilities. Research

activities under the S&T policies theme will also include stand-alone project grants, as well as support for regional networks or country-specific studies and pilot projects providing action research and analysis of inter-linked areas of S&T and innovation policy.

Research is expected to focus on informing the development of STI indicators and performance metrics (particularly in Africa); scientific human resources and skills development; S&T advisory mechanisms; bio- and nanotechnology regulatory policy; S&T networking (i.e., institutional linkages and collaboration) policies; and policies for enhancing S&T communications (i.e., public understanding of S&T). Research will lead to improved quality of information directly related to S&T and innovation-related activities in developing countries. It will help inform new generations of policy instruments targeted at enhancing the capacity, roles, and linkages of innovation system actor organizations such as universities, publicly funded research institutes, and private sector firms.

Policy research under this theme will also help developing countries bridge S&T divides by drawing on comparative analysis of policy instruments designed to increase access to global knowledge and technology networks, adopt IP strategies in support of local technological capabilities, and identify South–South and South–North modes of STI collaboration. Finally, a key aim of research in this thematic area will be to generate outcomes that persuade political, business, and civil society leaders, as well as citizens in general, that building endogenous science and technology capabilities in developing countries is a high priority task — both domestically and internationally.

The expected outcomes of research supported under this entry point will be increased evidence, dialogue, and awareness that serve to stimulate policy change in developing countries in order to encourage innovation in support of social and economic development. The potential impacts on traditional livelihoods, production, markets, and exports from suggested S&T policy changes will become more predictable. Research methodologies and activities should help identify appropriate opportunities for grass-roots approaches to advocate for change related to S&T policy decision-making, as well as identify where it is more appropriate for specialized experts to dialogue with policymakers. Developing countries will be better equipped to develop their own policy strategies for engaging in, and benefiting from, international stocks of knowledge. In particular, the impacts and risks of adhering to (or ignoring) internationally developed intellectual property rights (IPR) rules with respect to innovation and access to knowledge will be better understood. It will help inform whether alternative models of IPRs inspired by open access models of knowledge sharing offer unique development opportunities and determine whether these approaches are compatible with existing IP systems and rules or with emerging business models.

Impacts and Inclusion — The social norms, established practices, rules, and laws that prescribe behavioural roles and regulate the social relations between individuals and groups in developing countries are of critical importance to innovation and the functioning of innovation systems. The objective of this third thematic entry point, therefore, is to strengthen socioeconomic impact analysis, social inclusion, and related learning capabilities in support of innovation and the governance of new technologies. Research activities under this theme will be principally directed toward action research and research-support grants focused on strengthening analytical, participatory, and social learning capabilities. Special attention under this thematic entry point will be directed, wherever possible, to addressing gender implications and inclusion of women (recognition of women's rights) in S&T governance and decision-making.

Research under this thematic entry point will link strongly with the other two entry points. It will, for example, help to identify potential or real socioeconomic impacts (both positive and negative)

associated with decisions of innovation system actors and policy interventions. It will help improve the systemic inclusion of social objectives, considerations, and institutional participation in policy actions or governance of STI. Building on recent programming initiated by the Centre under the *Biotechnology and Emerging Technologies Task Force*, research support will continue to improve ethical considerations in S&T decision-making, the regulation and governance of technology (e.g., in risk assessment and risk communication where risk-risk trade-off analysis or adoption of precautionary approaches are necessary), and in developing legislative changes or new laws where appropriate.

Research supported under this third entry point will also address impacts and relevance of new technologies for different societal groups in developing countries (from small farmers and fishers; urban and rural communities) and strengthen equity in the South by examining ownership and access issues vis-à-vis new technologies. It will also include targeted activities to enhance evidence-based media reporting on S&T and address social equity and impact issues related to intellectual property rights (e.g., address legal issues with respect to IP protection or open access models, and strengthen the capacity and equity of developing countries in IPR-related negotiations).

The expected outcomes of research supported under this thematic entry point will be a better understanding of approaches to assess both the positive and negative impacts of technology and innovation, as well as contributing to strengthened and equitable inclusion of diverse social interests in S&T decision-making (particularly with respect to the rights and interests of women). Research under this theme will contribute to a stronger understanding of behavioural, cultural, and legal barriers to innovation (including barriers such as technological access and technological learning capabilities) in developing countries. It will also generate the development of methodologies and processes whereby developing country innovation-actor organizations and other stakeholders can take steps to collectively plan their own innovation agendas and make use of S&T foresight techniques.

Ordinary citizens, policymakers, political leaders, and other key innovation system actors (producers, entrepreneurs) will be better informed about S&T issues in their respective societies. The efforts under this research entry point will also help to elevate the visibility of STI as a matter for policy attention. Finally, the participation of civil-society organizations in innovation and technology governance will be enhanced. These organizations will be better equipped to serve as an important mechanism for bringing civic engagement into the process of technological change and innovation in developing countries — an important aspect of democratic decision-making and practice.

Exploring New Initiatives or Emerging Opportunities — The ITS program initiative will explore possibilities for catalyzing or partnering in new research capacity development initiatives and emerging opportunities related to our three thematic entry points. For example:

Financing mechanisms for S&T in developing countries. A major issue facing developing countries is the financing of these efforts from public, private, and international sources. An international research effort into STI financing may be of interest to developing country partners and international research funding organizations.

Strengthening regional networks of university research. Six US-based international foundations have recently established a partnership to examine possibilities for strengthening university research and teaching capacity through regional networks. The ITS program initiative has been invited to examine and participate in this initiative.

Creating an African engineering research consortium. IDRC has played a key role in the creation of successful research consortia and networks in Africa — including the African Economic Research Consortium and the African Technology Policy Studies Network. Recent research outlining the importance of engineering, design, entrepreneurship, and technology management in innovation suggest that the time may be ripe to propose a new research consortium model to bring together engineering and other related research capabilities from across Africa or in other regions.

Creating an international health innovation systems research network. Following discussions with the Rockefeller Foundation, there is interest in developing South–South research networks in health innovation systems research organized primarily around links between hubs in relatively advanced developing countries and lesser developed country nodes.


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