REPORT OF THE EXTERNAL REVIEW OF THE INNOVATION, TECHNOLOGY AND SOCIETY (ITS) PROGRAM

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27 August 2010

Commissioned by IDRC's Evaluation Unit, IDRC, Ottawa

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List of Acronyms

ASEAN: The Association of Southeast Asian Nations

ASJA: Arab Science Journalists Association

ATPS: Africa Technology Policy Studies network

BRICS: Brazil, Russia, India, China and South Africa

CEDAW: Committee on the Elimination of Discrimination against Women

CITSL: Caribbean Industrial and Technological Services Ltd

DFID: The UK's Department for International Development

EPTD: Environment and Production Technology Department

FLACSO: Facultad Latinoamericana de Ciencias Sociales

FTR: Final Technical Report

GEH: IDRC's Governance, Equity and Health program

GLOBELICS: The Global Network for Economics of Learning, Innovation and Competence Building Systems

GMO: Genetically Modified Organism

IAASTD: International Assessment of Agricultural knowledge, Science, and Technology for Development

IADB: Inter American Development Bank

IAR4D: Integrated Agricultural Research for Development

IBOP: Innovations for the Base of the Pyramid

IDRC: International Development Research Centre

IFPRI: International Food Policy Research Institute

IPR: Intellectual Property Rights

IPS: Innovation, Policy and Science

ISI: Institute for Scientific Information

IT: Information Technology

ITR: Interim Technical Report

ITS: Innovation, Technology and Society

KISS: Knowledge, Innovation and Service Systems

LAC: Latin America and Caribbean

LACRO: IDRC's Latin America and the Caribbean Regional Office

LINK: Learning INnovation and Knowledge initiative

MDG: Millennium Development Goals

MERCOSUR: Mercado Común del Sur (Southern Common Market)

NASW: National Association of Science Writers

NGO: Non-Governmental Organization

NISTPASS: National Institute for Science and Technology Policy and Strategy Studies, Vietnam

NRM: Natural Resource Management

OECD: Organisation for Economic Cooperation and Development

PAD: Project Approval Document

PCR: Project Completion Report

PL: Project Leader

PO: Programme Officer

R&D: Research and Development

RIU: Research into Use

ROKS:	Research on Knowledge Systems
S&T:	Science and Technology
SADC:	Southern African Development Community
SME:	Small and Medium Enterprises
STEPI:	Science and Technology Policy Institute, Seoul
STI:	Science, Technology and Innovation
UK:	United Kingdom
UN:	United Nations
UNESCO:	United Nations Educational, Scientific and Cultural Organisation
WFSJ:	World Federation of Science Journalists
WHO:	World Health Organisation
WTO:	World Trade Organisation

ITS PROGRAM EXTERNAL REVIEW

1. *Background*

This report is written primarily for consideration by the Board of Governors of IDRC, to assist in its oversight and guidance to the development of the Centre's work. The review also provides feedback to the ITS program leadership and staff, which may help them as they evolve the strategic direction and next steps in ITS programming. The IDRC Evaluation Unit, as well as other IDRC programs may also benefit from the generic findings.

The review has been commissioned as a summative evaluation of the ITS program's performance, in order to take stock of the new program's strengths and weaknesses as it nears the end of the first five - year cycle of funding. The specific questions addressed are:

- To what extent was the implementation of the program's prospectus appropriate?
- Overall, was the quality of the research outputs and publications supported by the program acceptable, given the context, intended purpose, etc.?
- To what extent are the program's outcomes relevant, valuable and significant?
- What are the key issues for the Centre's Board of Governors?

The principles guiding the review are those of independence, confidentiality, and appreciation of the challenges involved in ‗esearch for development' work in a conceptually demanding program area. Special attention has been given to reviewing the quality of decision-making in determining the design, strategy and operationalisation of the program. The review seeks to contribute to the advancement of understanding of the ITS field in a rapidly changing global context.

2. *The Innovation, Technology and Society Program*

The ITS is a relatively small program (operating on annual budgets of around C $ 5 million), located in the Innovation, Policy and Society (IPS) Program Area. The ITS' three main objectives, as stated in the Program Initiative Prospectus, 2006-11, are to develop improved understanding, capacities and linkages among Innovation System actors, develop Science and Technology policies contributing to improved functioning of Innovation Systems in the South, and strengthen socio-economic impact analysis, social inclusion, and learning capabilities in support of innovation and the governance of new technologies.

The inception of ITS marked the formalisation of work funded under the new IPS program area from March 2005, when the IPS inception report was approved. Prior work in this area included (but was not restricted to) a series of exploratory studies conducted either as research competitions (Research on Knowledge Systems - ROKS) or Science and Technology Reviews (STIs). Of the 89 projects funded over the period

2001-2009 (including projects approved before the ITS Prospectus but completed under ITS), 25 have ended and completed stage three Rolling Program Completion Reports[4].

Since 2006 ITS has funded a total of 74 projects, made up of 35 research support projects and 39 research projects, 3 of which have been completed at the time of the ITS final prospectus report. For program purposes ITS groups the projects in its portfolio under three _entry-points' (i) Impact and inclusion (30%); (2) Innovation system actors (31%); (3) Science and Technology Policies (35%).

Although this report focuses on the projects funded under ITS, both the ROKS and STI studies have been included, because they laid the conceptual foundations of the ITS program and the outcomes fed into the decision-making by staff during the ITS program period.

3. Review Methodology

The methodology used was developed by the review panel and validated by the Evaluation Unit (EU). Further details are provided in the annexes. The aim was to probe the outcome claims made in the final prospectus report, through the lens of the four review questions stated above.

Based on a preliminary reading of the documentation provided by ITS from the IDRC archives, and cited in the ITS final prospectus report (April, 2010), the review panel identified three issues through which to organise their initial work. Each provided a particular —window" through which to probe the review questions. The three issues were:

- Program-Level Issues: The processes and choices made in interpreting the Prospectus, and building the identity and determining the scope and strategy for the new program.

- How the program has addressed issues of social inclusion, gender, and, more broadly, issues to do with _democratising' S&T; while _gender' was flagged in the final prospectus report as an area of concern, social inclusion and democratisation of S&T were not. The initial emphasis placed by ITS on STI for economic growth would not in theory exclude these concerns but they seemed to have been given little attention (or reduced to issues of poverty reduction and/or the social needs of the poor).

- How the program went about identifying and working with innovation system actors and policy-makers in the implementation of the program.

The methodology encompassed interviews, assessment of project documents, an email questionnaire survey, a web-based inquiry, a bibliometric survey of journal articles, and

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[4] Summary Report: ITS Stage 3 Rolling Program Completion Report (rPCR) Review, 14.05.2010, prepared by Mel Yule. The projects included are: 104316,104043, 103929, 103811,103783,103470,103469,103350,103349,103311,103104,103060,102960,102959,102797,102764 ,102611,102334,102165,102135,102113,101678,101339,101236,101099

a Quick Scan of project documentation. These are further outlined below, and explained in detail in the annexes referenced.

Interviews

The review panel carried out 34 telephone and/or personal interviews with respondents who included ITS program staff, project leaders, project researchers and policy makers (Annex 1). Some respondents were contacted for follow-up discussion, and a number were interviewed by more than one panel member. The interview coverage represents approximately 38% of the 2001-2009 project portfolio, or 30 out of 74 of the ITS portfolio, and included all regions and program entry points (Annex 1). Written summaries of these conversations, often extending to an hour or more, have been shared among the panel members but not further distributed since the majority were conducted under conditions of confidentiality.

Together with the formal inquiries, described further on, the interviews provided the core input to the review panel's assessment, across all four of the review questions. The interpretations and experiences offered by interviewees were cross-checked with the relevant documentation and the findings of the formal inquiries.

Assessment of Project Documents

In order to tie interview respondents' comments to the project documents, different documents (correspondence, financial reports, project proposals, and projects' partial and final reports) related to each of the projects for which interviews were conducted were read by the panel. The panel also read additional documentation cited in the course of an interview.

The criteria used to assess relevance, significance and quality encompassed (i) interview respondents' judgements. Interviewees were encouraged to cite what they thought were ITS's most significant research outcomes and to assess the quality, policy relevance and influence of specific projects or the program as a whole; (ii) standard academic and scientific criteria for assessing research proposal and reviewing journal articles; (iii) the review panel's own knowledge of the relevant bodies of research literature, country contexts, and the S&T policy arena; (iv) the review panel's experience of conducting program reviews in the STI and development research areas, stretching over more than thirty years, and including reviews commissioned by developing country research institutes, agencies and ministries, as well as on behalf of development research funders and universities.

Specifically, the signifiers of program-level quality applied by the panel were as shown in table 1.

Table 1; Signifiers of Program-level Relevance, Significance and Quality

Program-level Signifiers	Assessed by means of
1. Outstanding - a consistent recognition of projects by peer community, stakeholders and interviewees as contributing to leading edge outcomes in the STI domain; and/or	Interviews; stakeholder and LINK surveys; bibliometrics; Quick Scan; panel members' knowledge of the STI domain and state of the art

	researching key strategic and policy issues in rapidly changing global/local contexts and in the STI domain	
2.	Significant - a consistent recognition of a specific project by peer community, stakeholders and interviewees as contributing major added value at the level of the project and/or in the project context.	Interviews; stakeholder and LINK surveys; bibliometrics; Quick Scan. In selected cases, significance assessed also by a panel member with deep knowledge of the project context, relevant policy debates, and project theme.
3.	Useful/relevant - recognition by researchers interviewed of outcomes considered useful in the context and/or for purposes of institutional capacity building and development of skills and/or the understanding among those involved; recognition by policy stakeholders as relevant to their concerns	Interviews; stakeholder and LINK surveys; bibliometrics; Quick Scan. in a broader perspective, assessed against panel members' knowledge of the STI domain and state of the art
4.	Worthy - recognition by researchers and peer community as contributing added value to STI research in the context but of little wider use or broader relevance	Interviews, stakeholder and LINK surveys; bibliometrics; Quick Scan; panel's analysis of selected project documents
5.	Solid - methodologically sound but contributing little added value to the STI domain	Interviews; panel's review of research project documentation and selected journal articles; bibliometrics; Quick Scan

The panel also took into account (i) the comparable work that has been undertaken in this program area over the last several decades by other organisations, and of contemporary initiatives supported by other agencies and research funders; and (ii) the perceptions of policy-makers and policy researchers, with emphasis in the LAC region (elicited through an email questionnaire survey, Annex 2), and of a global peer community of practice, LINK (Annex 3).

In addition, the documentation for five projects that were highlighted, either in the final prospectus report or by interview respondents, as having made notable contributions to research networks and partnerships, were selected for more detailed analysis of the processes and decisions that contributed to the outcomes claimed in the final prospectus report, and the project partners were interviewed. The component ‗research networks' was chosen because of the potential that ‗networking' has to reveal how ITS interacted with the logic and dynamic of processes of change and influence in order to achieve the outcomes claimed in the final prospectus report.

An analysis of 25 rolling program completion reports prepared by Mel Yule[5], who provided research assistance to the panel, provided further helpful insights.

Formal Inquiries

The interviews and documentary analyses were completed by four formal inquiries:

- A questionnaire survey[6] distributed by email to 56 researchers and project leaders, of whom 37 responded (see Annex 2).

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[5] Summary report: ITS Stage 3 Rolling Program Completion Report (rPCR) Review , May `4, 2010
[6] by Carlos Aguirre

- A web-based inquiry[7], posted for 3 weeks on the LINK site, representing a global network of some 2000 researchers, practitioners, and decision-makers in the field of innovation (N = 127 responses), as a check on how one of ITS' peer communities view the program (Annex 3).

- A desk analysis[8] of the paper trail for 13 projects, randomly selected from (a) those included in the rPCR analysis (N=3), and (b), first excluding those specifically targeting social inclusion and gender issues, the list of all projects developed in or after the 2006/7 fiscal year (N=10), as a quick scan of the extent to which and how _social inclusion' and _gender' have been mainstreamed.

- A web-based analysis[9] of the citation index and Impact Factor for all English-language journal articles (N =36). The five with the highest scores were then excluded and five of the remaining articles selected randomly and read by the panel.

Finally, a preliminary Bibliometric analysis using Google Scholar was carried out on the books resulting from ITS support and published by IDRC[10]. This procedure did not yield usable results so no further reference is made to it in the report.

Limitations of methodology

The methodology for under taking this review was set down in a document by the ER and this was approved by the EU. Inevitably there are limitations to any evaluation. These related predominantly to the limitation arising from the time and resources available to undertake the review-- 25 day for each reviewer and no provision for face to face meeting with any project or programme personnel. One could argue that with more time and resources more interviews could have been conducted and more detail could have explored in face to face meetings. With more resources a number of different professional communities could have been surveyed instead of just one. With more time available all 5 outcomes discussed in the final prospectus report could have been verified in more depth. The ER does not how ever feel that these limitations have affected the main findings of the review.

4. Summary of Findings

This section first summarises and then details the main findings of the review panel, structured in relation to the four questions addressed. Further details of the findings and analysis are given in the annexes 2-8.

Review questions	Review panel's findings
To what extent was the implementation of the program's prospectus	Appropriate at project level, with a few exceptions (in relation mainly to partner choice in some instances, and networks)

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[7] by Andy Hall & Janice Jiggins, assisted by Kumuda Dorai
[8] by Mel Yule
[9] by Mel Yule
[10] by Mel Yule

appropriate?	Inappropriate at program level. The core issue is how the initial choice for breadth[11] has been interpreted in implementation. The program lacks an identifiable niche and identity in a huge, multi-disciplinary field with potential to cover all areas of human activity, and that has a deep intellectual and policy history. No clear program logic or operational strategy has emerged. The program lacks a well-articulated theoretical understanding of how S&T research influences, shapes, or informs policy and innovation processes (and thus of how to structure STI researching processes appropriately).
Overall, was the quality of the research outputs and publications supported by the program acceptable, given the context, intended purpose etc.?	Quality: highly variable, ranging from outstanding (a handful), or significant (a few); useful and relevant at a project level (the majority of projects), to worthy i.e. contributing modest added value to the STI domain (a large minority)); and solid i.e. methodologically sound but adding little value to the STI domain (a few).Quality overall weak in relation to issues of social inclusion and negligible in relation to gender issues.[i12]
To what extent are the program's outcomes relevant, valuable and significant?	Outcomes at the level of the program are of only modest relevance, value and significance to the ITS domain as a whole, in what is a rapidly moving policy arena.
What are the key issues for the Centre's Board of Governors?	The ITS domain is an exceptionally demanding program area. The program needs to consider how to balance more effectively its human resources and ambitions. The program needs to develop a niche and identity with a clear logic and strategy that would enable it to make rigorously tested contributions in a complex and fast moving field.

4.1   The Appropriateness of the Implementation of the Program's Prospectus

Main elements of the ITS program, as implemented

The program has a declared ambition to use an ‗innovation systems‘ conceptualisation of change processes as a way of understanding and contributing to policy formulation in the ITS program area. The operational vehicle chosen to achieve this was a portfolio of 74 individual research and research support projects, with an overall ambition to contribute high-quality policy-oriented published research. About half of these were inherited from the earlier ROKs programme and the rest were undertaken under ITS.

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[11] BoG Minutes, June 2006, pp7-8

[12] The ITS final prospectus makes a more favourable claim for the social inclusion work, relying heavily for this claim on the impact studies carried out under project 103577, but accepts there are no research findings or outcomes related to gender equity and ‗few projects have explicitly looked at gender‘ (p22).

Within this overall framework the program chose to emphasise an ambition to (i) contribute to the development of the capacity of predominantly young and emerging research groups in partner countries; and (ii) strengthening research partnerships and networks and the links of these to policy. There were also two elements in the program that derived from work initiated prior to the launch of the ITS program or taken over from other program areas: support to policy reviews in selected countries and support to science communication.

Main risks perceived by the panel

The chosen approach of ITS contained three inherent risks:

- The program's ability to appropriately identify what the prospectus describes as _developing country-based researchers and research-led organisations' that could contribute to an understanding of innovation, as well as contribute to institutional change associated with innovation processes and the deployment of new technology.

- There was an ambition to build the capacity of researchers who might be new to the ITS field and/or just starting their research careers. From the interviews, there appears to have been a presumption that developing country researchers in particular would need and merit special support. These considerations together implied a strong likelihood of a trade-off in terms of the quality of research.

- The program's ability to be able to articulate its approach clearly to others, particularly the idea of _innovation systems' as its guiding conceptual underpinning, to a range of stakeholders, potential research partners, but also those related to policy and enterprise-related activities. If it were unable to do this, it would fail to elicit research proposals addressing the broad topic it was aiming at.

Main findings of the review panel

General: implementation has been ineffective: The topic ITS addresses is an important one, but also one that has been researched for decades, by numerous disciplines (indeed, 19th century political economy already was asking some of the same questions). The literature is very large, theory-rich, and methodologically well equipped. The potential added value of ITS is not clearly expressed in the ITS prospectus (approved June 2006). The IPS inception report (March 2005) does provide a conceptualisation for work in this area that could be useful for researchers (although it is expressed in unduly jargon-led phraseology and, as many interviewees reported, this in itself could be a barrier to effective communication, and to understanding by others of what the program was about). It is not clear, either to the program staff interviewed nor the researchers and policy makers, why this particular conceptualisation was chosen. The panel notes that in the event the interpretation of _innovation systems' in project documentation has been both loose and inconsistent across the project portfolio. In particular, there does not seem to have been any concerted effort to address _systems' or _systemic change' in any theoretical depth.

The evidence assessed by the panel is consistent in indicating that at the level of individual projects, implementation on the whole has generated useful and/or significant outcomes at the level of individual projects and, with exceptions noted later in this report, has been appropriate to the contexts in which they were implemented.

However, all the evidence probed and assessed by the panel converges toward the conclusion that the implementation of the prospectus overall has been weak and ineffective. This has primarily occurred because the program never developed well-defined program logic i.e. a logical pathway for how the program would seek to move towards achieving its outcome ambitions and a strategy to achieve its ambitions that was articulated at program level. Without this clarity the necessary operational elements of the program were either missing or the operational choices made proved to be ineffective; there were also then no transparent and logically-derived grounds for deciding which requests for assistance to accept.

Furthermore the program did not explicitly acknowledge the program-level risks summarised by the panel above, or deploy an explicit strategy to avoid or mitigate the risks, even as these progressively became more evident to at least some of the program staff and researchers who were interviewed. As a result the program-level potential and outcomes were compromised and the potential for program-level learning became minimal. The following highlights some of the key implications:

No identified niche: The ITS programme area is large, cutting across many economic sectors, technology fields and policy domains and concerns. The area covered by ITS also has a global dynamic, driven by the ‗grand narratives' associated with climate change, energy security and global trade. Analysis and policy development, thus, need to span a range of scales, from the local to global, and to be responsive to the rapidly evolving global context[13]. Clearly, a relatively modest program such as ITS needs to make choices about where and how it can best contribute to reach its objectives. The chosen niche also needs to have a level of strategic relevance commensurate with an international programme. ITS, however, did not identify its niche. Instead it adopted opportunism as its mode of operation, casting widely for individually interesting research projects. This was based on the rationale that this would identify interesting researchers and research groups in partner countries, and that these could be capacitated to contribute to national, regional and global policy-making. While this approach to implementation may have some validity within a clear, intellectually-rigorous and defined niche — as the initiating step in a 10 or 15-year programme logic — in the absence of such boundaries the chosen approach to implementation became progressively less appropriate as the program evolved.

Furthermore, there is no evidence that ITS sought to identify projects that might test explicit hypotheses, or took consciously-justified experimental risks that could push the boundaries of the state of the art. To the contrary, it simply expanded the number of

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[13] We do not here suggest the program should focus on the issues arising from such global changes but rather that program strategy both takes cognisance of, and contributes to understanding of innovation processes and policy options in such contexts.

topics and research teams though the whole program cycle. This seems, on the basis of the interviews and questionnaire survey, to have come about simply as a response to partner country demands and by selecting proposals submitted to open invitations to submit proposals. Because there was no identified niche and no logic or strategy, ITS had no basis for declining support (beyond the judgements of staff and competitive grant assessors about the individual merits of each proposal). The outcome is a portfolio of individual projects that do not make up a _progam identity'; the program appears to have become largely a vehicle for channelling funding.

There are further consequences. The panel acknowledges that each project in itself could be considered relevant and appropriate for those involved. However, none of the projects reviewed builds systematically on existing state of the art, and little cross-project learning can be derived from the portfolio as a whole because there was no strategic effort made to implement the program in a way that would allow such learning to be rigorously gained. The review panel's view is that ITS' failure to identify its niche has severely undermined its ability to make strategic contributions to policy debates and practical understanding.

Low-risk programming led to little gain: In order for the program and the world at large to learn from the outcomes, ITS would need to organise its work strategically so as to offer the potential for program-level learning — and this would imply conscious experimentation, based on a thorough grasp of the state of the art in ITS research. The panel is of the opinion that the projects chosen were low risk and, as a result, little intellectual gain or policy-relevant understanding has been achieved (for instance, in understanding the contribution of ―embedded research" or of practical policy processes in contrasting contexts).

Lack of explicit theories of change: The program had a broadly-defined ambition of contributing to policy in the area of innovation. However, ITS itself articulated no explicit theories of change that set out how program activity would lead to its desired outcomes. Nor does it appear that researchers were required as a general rule to make explicit their own understanding of how _esearch' influences policy. On the contrary, both the panel's assessment of the documentation and the interviews make clear that the implicit hope was that research would lead seamlessly to policy change. This assumption ignored the accumulated learning on the topic of policy influence, which stresses the interlinking of research and policy processes. And indeed it ignored the program's own conceptualisation of innovation systems that positions research as a responsive element embedded in a system of interacting agents and change processes. The panel's view is that this lack of an explicit and relevant theory of change was a central failing of the program. It meant that there was no basis for developing the strategy that would guide the design and select a set of program activities to achieve ITS' outcome ambitions.

Ineffective or missing networking strategies: The main vehicle for developing networks (including linking to policy) was research support. While this did help support existing networks and create new, time-bound, project-based networks, research

support is not well-suited to broadening ‚networks' into networking that embeds research in wider arenas of change. (see annex 6, for a more detailed analysis). There is a large amount of accumulated knowledge on this point. However, ITS did not take specific steps to organise and add value to its research in ways that took cognisance of the accumulated wisdom captured in the extensive literature in the ITS field. The bulk of the research supported through ITS is constructed on conventional linear lines i.e. first do the research, then try to find ways to hand the results to policy makers. This practice ensures that research remains largely ‚policy informing', rather than directly policy-influencing (see also annex 2- results and analysis of the questionnaire).The panel notes that it is rather paradoxical that ITS' conceptualisation of its prospectus highlights the notion of research as an embedded element of networking in support of innovation, but did not take the steps to ensure consistently that the research it was supporting was adequately embedded in processes of change. This has undermined the impact of the program on policy processes and decisions.

Ineffective strategies for project support and development: ITS, in line with wider IDRC policy, adopted a grant-plus-business model where program officers also acted as research advisors and mentors. The panel notes that despite the difficulties associated with communicating a challenging prospectus to potential research partners, ITS did not adequately support its program officers — who were typically not well-grounded across the fields of science, social science, technology and policy — even after many senior and more experienced members of the ITS team left. A clear consequence of this was that research project development did not have the benefit of the accumulated, worldwide learning on many common aspects of policy processes and innovation processes, and this severely weakened the significance of much of the subsequent research in terms of ITS studies and policy-making in support of innovation.

The review panel would also, however, like to acknowledge the flexibility and responsive way in which the program officers applied themselves to the task of trying to get to grips with a very challenging field, and to respond to requests for support. The interviews with grantees make clear that this ‚way of doing business' was highly appreciated.

Ineffective use of accumulated expertise on innovation studies: The panel acknowledges the laudable efforts ITS made to support teams of (often young) researchers in partner countries, with an ambition to strengthen their capacity for research in this area. However, the panel notes that much of the research that resulted is on topics that have already been widely researched for many years and that research supported by ITS has not been adequately informed by this history. The panel notes that some attempt was made to link ‚mature' ITS researchers, to those beginning to explore the field, as in projects 105170, 105357, or 104043. However, in the first two cases, it was attempted at the same time to secure cross-fertilisation between Indian and Chinese experience, an effort rated by the researchers interviewed as not without interest but ‚of little real value' (because the institutional settings for policy-making are so different). In the third case, while the collaboration on sorting out policy options for a particular technology application in the health field generated ‚excellent' research

outcomes (leading to papers in Nature and Nature-Biotechnology – see annex 7), the researchers involved appear from interviews to have had little or no familiarity with the relevant ITS literature. Thus while the outcomes from this project contribute high value within the field of application they have little relevance or significance in the wider domain. The panel's view is that ITS should have used its projects to connect researchers to the global ITS research community more purposefully and that this should have been seen as a key capacity development measure. It would have specifically helped toward the larger goal of sharing the accumulated learning and methodological experience, and would have given young researchers access to wider professional networks and opportunities.

The panel further notes from its documentary analyses and interviews that capacity-building has been too narrowly defined in terms of skill and method development. A more broadly defined concept of capacity building, which includes aspects of networking, is now widely accepted as the ‗gold standard' in development research practice, also in other areas of IDRC's work.

4.2 The consequences of these programmatic choices

In the panel's view, the programmatic choices made have had profound consequences for the kinds of outcomes achieved[14]. Overall, the panel can say with confidence that each project was relevant and contributed value to someone. It also judges that while the quality of the individual project outcomes was highly variable, especially in relation to the challenges of ‗social inclusion' (annex 4), it was in general acceptable and, in some cases, excellent (annex 5), with, as the final prospectus report itself notes, the notable exception of the work on ‗gender' (see further annex 4). However, the overall finding of the panel is that none of this adds up to anything of particular or general significance because of the chosen approach to implementation. This judgement is further illustrated under the five outcome areas reported in the ITS final prospectus report (more details are given in annexes 2-8).

4.2.1 Outcome area 1: Contribution to policy influence

The panel follows the state of the art in ITS research in distinguishing between ‗policy influencing' and ‗policy informing' research. Policy influence is evidenced in the degree to which research practice is embedded in policy processes and the results are traceable in policy documents, speeches, and resultant legislative or regulatory measures. Policy informing research is policy-oriented research that seeks to provide science-based or more broadly, research-based information relevant to a particular policy decision.

Policy influence is one of the key outcomes anticipated by the ITS program and claimed in the final prospectus report. The analysis carried out by the panel, drawing on the results of all methods used but in particular on the questionnaire survey show that policy influence has been achieved in the policy review studies but to only a minimal extent in

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[14] These findings were presented to ITS program staff in a conference call on 21.07.2010. The discussion showed that they were broadly accepted.

the more academically-oriented research projects. In these latter cases policy-makers were informed of research results, through traditional channels such as policy briefs, research reports, invitations to join seminars and workshops, journal articles and book chapters, and occasionally also in newspaper and other popular media. In only a few instances e.g. project 103783, on biosafety management of GMOs, in China, is a policy brief known to have reached a policy-maker and influenced his thinking, leading to a request for follow up research.   There are many reasons specific to each project that might explain why outcomes have been largely policy-informing, but in general what seems to have been lacking was an explicit strategy for achieving policy influence, embedded across all projects as a standard consideration in project and research design.

Further, from the panel's documentary analysis, it seems that when policy analysis was carried out, the analysis typically concentrated on a small set of policies related directly to the project's core interest, or to a narrowly defined set already labeled as _ITS‗ policies. Little attention was paid to the fact that in most developing countries, the fundamentally important policies are spread across sectors, and rest on implicit rather than explicit assumptions about what promotes innovation (a term that in any case often is conflated simply with _change‗). The projects, neither singly nor collectively, offered any advances in trying to understand the impacts, for example, of commercial policies (such as free trade agreements) on innovation, or the effects of poverty alleviation policies, fiscal policies, or environmental policies on innovation, let alone raising questions of the relation between rates of innovation and competences within society, or the contribution of domestic or foreign direct investment to innovation. Among other things, this means that a policy maker is no wiser at the end of this ITS program cycle about, for instance, which policies he or she might consider to achieve desired innovation outcomes or how to move toward policy coherence across the competing interests of different sectors[15]. This is an important omission that needs to be corrected in the new programming cycle.

In addition, a significant number of those interviewed are of the view that when considering project proposals ITS was not keen to support those aiming to build the kinds of information and indicator-based data sets that are the necessary underpinnings of policy formulation. Indeed, the panel is aware of the numerous wasted past investments in developing quantified evidence that have been abandoned subsequently as impractical to update, too costly, or not much used because _numbers leave out the

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[15] Project 103783, offers a case in point. While the claim in the final prospectus report that policy influence was achieved vis a vis the specific concerns of the project and the interests of the sponsoring ministry is well-grounded, in a larger view of policy processes in China, it is clear that the ministry's views and interests are only one among other powerful interests and policy concerns that are shaping policy. Policy-making in the whole area of seed systems, and the weight to give to trade, IPRs, biosafety, food security, environmental and human health concerns in relation to innovations in seed systems, remains contested and very much _unfinished business‗. Project support to participatory plant breeding, and to the development of policy in relation to _access and benefit sharing‗ provided through another IDRC program area, has documented these policy conflicts and tensions, and provided an analysis of the emergent policy arena that would have helped to contextualise better the outcomes claims for this project made in the final prospectus report.

un-measurable'. However, the panel also notes that when innovation policy makers lack such quantitative data, the ‗power of numbers' cannot be brought to bear on ITS policy processes and innovation policy outcomes.

4.2.2 Outcome area 2: Contribution to a better understanding of the impacts of emerging technologies on developing country communities

It is not clear what ITS has sought to achieve under this heading. As the interviews made clear, and as the panel's own experience of the ITS domain confirms, social inclusion is not something that can be confined to impact studies, nor to how science, technology and innovations can address the social needs of the poor; policy makers in many countries, and across the private commercial, public and civil society sectors are asking how a wider range of stakeholders' might be included in STI decisions and policies-making processes.[16] (see further annex 4)

The documentary analysis, interviews, bibliometric study and the Quick Scan of the documentation for 13 projects all converge toward the conclusion that the social inclusion impact work is weak, and confirm that the gender work indeed has been negligible. The details to substantiate this judgement are set out in the annexes.

The impact studies have ranged from consideration of the impacts of specific technologies or S&T policies on poverty or specific groups of the poor, to the poor as innovators and knowledge actors, to the development of indicators and methods for assessing certain kinds of impact and to the role of particular social categories (e.g. ‗entrepreneurs') in extracting commercial value from knowledge. The panel notes that the impact studies have been (are being) conducted in ‗end of pipe mode' based on (implicit) models of linear processes of knowledge generation, sharing and use, and the transfer of S&T, i.e., a theory of change that is applicable only under a limited set of conditions, purposes, and contexts. The work has not built on IDRC's historic strengths in socio-economic analysis and has thereby missed opportunities for adding value in at least four areas of international importance: developing and testing new approaches and procedures and impact assessment tools for multi-stakeholder inclusion in S&T decision-making and policy processes; engaging in societal and technical debates on risk governance and risk management under globalisation and climate change; understanding the options for the governance of emergent technologies; and testing and adding to new modes of operationalising ‗research into use' and their impacts. Generally, outcomes from the impact studies show variable quality and value, weak overall performance and missed opportunities.

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[16] As noted in the IDRC Board of Governor Minutes, June 2006, pp7-8: ―The most difficult thing, and the prospectus has not addressed this very well, is the linkage between building up STI capacities and the question of social equity. We know that injecting some nature of rigour of modern technology into indigenous or popular innovations may be able to increase productivity, but that is about all we know. What we need to know more is what type of policy instruments, what type of policy environments, what type of incentive systems, what type of institutional arrangements will lead to greater equity?"

4.2.3 Outcome area 3: Improved the sharing of STI information, knowledge, and experience

Under this outcome area ITS has sought to improve the sharing of information on science, technology and innovation. The interviews revealed that some researchers would have given little thought to this activity without ITS mentoring. However, as already noted, the chosen means are conventional (e.g. policy briefs, seminars and workshops, journal articles etc.) Support for attending conferences in particular has been highly appreciated by the researchers interviewed and in at least one instance (project 104043) has led to interest by UN agencies in follow up research. A number of younger researchers also viewed such opportunities as important contributions to building their capacity. However, the panel notes that such opportunities are no different to those offered through any well-regarded PhD program.

The interviews also revealed that the more specialist activity referred to as science communication, has been highly appreciated by project partners and the ITS' wider peer community (e.g. the web-based LINK survey; and data from the web-based user analysis carried out by SciDev.net) but not rated so highly by ITS program staff, because internally it is viewed negatively as a non-research activity. The success of the three projects devoted to science communication (see annex 5) has been due to the well-developed strategies and the accumulated knowledge and experience of the partners involved.

ITS' publication record (see annex 7) is viewed by the panel as modest, but sufficient, producing 32 journal articles (5 excellent, 27 useful, but not significant) 1 excellent book (from a publication grant), 3 excellent books from research grants.

The panel was struck by the fact that ITS, as a research program, holds no up-to-date central list of its print and web outputs. The panel notes that the sharing of information is left to the individual projects and that the program offers no added value in terms of information sharing. The program's contribution to sharing information is limited to the funding provided for this activity in individual projects and the provision of a limited number of publication grants.

A web-based survey (see annex 3) of the innovation studies community demonstrated a modest level of appreciation of ITS' publication-based identity. The print and web materials are hardly visible to the LINK peer community or to policy partners (see annex 2 - the questionnaire).

The material assessed by the panel robustly demonstrates that the greatest contribution to sharing information, experience, and knowledge has come about through the STI reviews and the small number of other projects in which policy makers invited researchers into the decision-making process. This is no surprise, since the potential of embedded research to achieve these outcomes has long been established.

4.2.4 Outcome area 4: Built capacity for production, sharing and use of STI knowledge

Undoubtedly the program did build project-level capacity for research in this area, and this was highly appreciated by those who benefited. However, there is little evidence that significant outcomes were achieved, except in one limited area -that of science communication.

The evidence further indicates that the means taken to build capacity were based on a conventional and narrow understanding of what it takes to strengthen capacity. Capacity building today is thought of as a combination of processes that take place at different levels in institutions and organizations, and to be successful they requires a more specific strategy than that just broadly stated under the ITS prospectus implementation. Generally, there have been appropriate but limited outcomes at the project level in terms of capacity-building.

4.2.5 Outcome area 5: Built partnerships and strengthened regional and international networks of researchers and policy-makers

Partnerships have been built by individual projects; some (e.g project 104043) have triggered research dialogue with potential new partners; others have strengthened existing links between researchers and policy makers (e.g. project 103783). In a few instances, partners have been inappropriately coupled together (e.g. in project 102764). One major network in the Africa region has had a troubled history. Development of effective partnerships otherwise in this region has suffered from deliberate staffing choices made by the program at its outset.

ITS highlights its support of research networks by suggesting that ―given that networks are an important means for influencing policy, including science, which is the raison d'etre of the programme" (final prospectus report page 2). Its achievements have been assessed by the panel as follows (see annex 6 for more detailed analysis): (i) Regional small grants programmes have been insufficiently networked into the international ITS community and the accumulated expertise in ITS' research domain, with much reinvention of the wheel as a consequence (ii) Research support to existing networks is helpful in that it has added resources and conferred some additional ‗recognition' of their work, but has not helped network members expand their networking into the policy arena (iii) Project-based research support to establish new networks has not (yet) proved to sustain partnerships and networks beyond periodic encounters at network meetings.

Since the ITS program lacks explicit mechanisms for building networks with policy partners and with other innovation actors beyond the researchers involved, it is not surprising that the evidence assessed by the panel indicates that the outcomes so far under this heading have been more modest than suggested in the ITS final prospectus report. The general experience in the STI field is that the use of research support, as a vehicle for networking that aims to influence policy or innovation processes, is inadequate, and this finding is well-documented in the relevant bodies of literature. The somewhat conventional research support offered through ITS (with the exception of

those projects in which policy partners invited researchers into the decision-making processes), thus may be regarded as inappropriate to achieving the goals set for outcome 5. Alternative approaches to strengthening networks in order to influence policy or innovation processes have been well-tested and widely reported in the relevant literature. The panel finds it surprising that ITS's approach to implementation under this heading was not informed by the accumulated learning on this topic. Interviews with program staff and experienced research-based project partners indicate that the program's lack of strategic clarity, the frequency of staff changes or inexperience of the staff might all be contributory reasons for this outcome.

5. The quality of the research outputs and publications supported by the program

The panel accepts that assessment of quality is influenced by the fact that ITS is a new program; that it has, to a considerable extent, sought to reach out to and support younger researchers; and that _knowledge and information' takes time to move around and make its mark. The panel also notes that a number of publications are in preparation as projects draw to a close and these could change somewhat the picture sketched here. The panel noted that the program holds no central record of research outputs of any kind, and while every effort was made to up-date the information available (see Annex 7) the panel acknowledges that some materials might have been overlooked. The panel also acknowledges that there is much more to —quality" assessment of development research than bibliometric analysis (presented and analyzed in Annex 8).

Generally, on the basis of all the evidence assessed, the panel judges the quality of ITS' research outputs to be as follows:

- Research output in quantitative terms is acceptable, if so far modest in quantity for a five-year program (with roots further back to 2001).

- With exceptions, such as those noted below, the research outputs have been only moderately visible to either the program's peers in the world of innovation studies (the LINK inquiry), or to decision-makers and policy individuals (the email questionnaire).

- Project participants are accessing and learning from the research findings of other ITS projects and IDRC programmes only to a limited extent (the interviews)

- The researchers interviewed position their research largely in terms of its interest to academic audiences.

- Although research embedded in policy-making processes was carried out (e.g. project on waste water treatment, Sri Lanka; STI reviews), the majority of the research grants were for research conceptualised in conventional process terms, i.e., first do the research, then figure out how to push _research into use'.

Overall, the panel judges the outcomes in terms of research quality somewhat less favourably than the final prospectus report. The panel_s reading of the evidence is that the quality of the research is acceptable, but highly variable.

6. The relevance, value and significance of the program's outcomes

Adequate relevance, value and significance at the project level: The panel acknowledges that the individual projects and their outputs have been adequate in terms of their relevance, value and significance to diverse audiences. Some have even been outstanding. Notable examples of relevance include the STI policy reviews and other demand-led initiatives, such as the small grants programmes in Asia. Notable examples of significance include publications in *Nature* and *Nature-Biotechnology*, a book (*The Future Control of Food* by Tansey and Rajotte prepared with a publishing grant, project number 103311) and three forthcoming manuals on innovation indicators in Africa by Gault, et al. (project number 104253).

Project outcomes do not add up to program-level relevance, value and significance: It is the panel's view that the evaluation of the relevance, value and significance of ITS' work needs to be judged at the program-level.

The evidence assessed by the panel indicates that the outcomes reported in the final prospectus report are, by and large, justified in terms of the specific projects referenced - but that is precisely the program's weakness. The reported outcomes are only the outcomes achieved by specific groups of people, in specific contexts, organised for specific purposes. As such, they have value but their anecdotal nature severely restricts what ITS can say to global policy debates of importance.

That is, the panel is of the view that the program's outcomes need to be judged in terms of their contribution to the intellectual and policy domain in which it has located itself. The panel's assessment is that because ITS has failed to identify and occupy a niche in a huge field, with a huge history, and develop an effective program logic and implementation strategy within the chosen niche, its outcomes have little relevance, value and significance at the program-level. Further, without an explicit set of testable propositions, the program is unable to contribute added value to the ITS field as a whole, either at the level of theory or of practice.

7. Summary: The program's strengths and weaknesses

7.1 Strengths
- Flexibility and responsiveness in the staff's approach to requests for support and in their readiness to negotiate adjustments over time in project budgeting and support.

- Engaged with national and regional stakeholders and their demands.

- In a general sense the establishment of the program was timely and facilitated the research work on ITS in countries where, with exceptions, research funding is otherwise quite difficult to access.

7.2 Weaknesses

Program implementation was appropriate at the level of the individual projects, but inappropriate and hence ineffective at the level of the program. The failure to identify an intellectual and policy niche - and develop a program logic and strategy for how to address issues within that niche- was the central weakness in implementation.

The overall quality of the research was acceptable, but highly variable. Quality in general was weak in the area of social inclusion and unacceptable in the area of gender. Quality was excellent in the areas of: science communication; 2 articles in *Nature/ Nature-Biotechnology*, 1 book on IPRs and the future control of food, and 3 manuals on innovation indicators.

In terms of relevance, value and significance the programme has ―many currants but no cake". In other words it has delivered project-level outcomes that are relevant, valuable and significant in relation to the projects' intended audiences and purposes. ITS has not delivered outcomes that are valuable or significant in terms of a rapidly-changing policy context or the already-accumulated understanding that exists in the ITS program area.

8. Key issues for the Centre's Board of Governors

The Review Panel recommends attention to the following:

- The ITS program potentially addresses challenges of critical importance at national, regional and global levels. The panel is convinced that IDRC could make a valuable, influential and significant contribution in this area.

- However, the panel also concludes that without intellectual leadership and professional experience relevant to this program area IDRC cannot expect significant outcomes. Investing in ‗more of the same' is not going to deliver anything outstanding in what is a fast-moving and highly-dynamic environment. There are reputational risks if a turnaround is not accomplished.

In consideration of IDRC's historical advantages, reputation and strengths in the ITS area, the panel recommends evolution of the ITS on the basis of:

- A justification based on the ―grand challenges" and existential threats facing human society, and within a context of dynamic policy evolution and a rapidly-evolving understanding of innovation processes within this environment.
  - o An explicit and robust identity in a ―niche" selected for its potential as a model to generate significant outcomes.
  - o An explicit program logic and strategy, anchored in explicit theories of how research shapes, informs or influences policy and processes of innovation and change.

ITS External Review Panel Report

Annexes

Annexes for the External Review of the Innovation, Technology and Science Program

Annex 1: List of questionnaire respondents and interviewees

List of Questionnaire Respondents (n=37)

Project number	Project Name	Name	Category
104227	National Innovation Systems in BRICS	Jose Cassiolato	Project coordinator Brazil
		KJ Joseph	Principal researcher (India)
		Chienlin Liu	Principal researcher (China)
		Alexander Sokolov	Principal researcher (Russia)
		Ragijan Maharajah	Principal researcher (South Africa)
104956	ST Review University Research Funding in Chile	Jorge Katz	Project leader
105164	National ST Policies in Nicaragua	Jorge Huete	Project leader
		Monica Caselet	Project advisor (FLACSO Mexico)
105427	ST Policy Review Panama	Gonzalo Rivas	Project Advisor (External expertise)
		L. Javier Jaramillo	Project Advisor (External expertise)
105167	Innovation policies in Latin America	Belen Baptista	Researcher
103783	Biosafety Management of GMO	Jikun Huang	Project leader
104068	Capability, Governance and nanotechnology focus in India	Ligia Noronha	Project leader
105177	Toward an innovation-led development path in the Philippines	Fortunato de la Pena	Project leader
		Cherry Gonzales	Researcher
		Cynthia Abalos	Researcher
104357	Aligning national S&T policy with Sustainable Development Strategy Sri Lanka	Mohan Musaninghe	Project leader
106101	New STI Strategy	Ca Tran Ngoc	Project leader

105357	Innovation systems for inclusive development - rural China - India	Rajiswara Raina	Researcher
		Xiaobo Wu	Researcher
105170	Grassroots innovation in China and India	Anil Gupta	Researcher
		Zhang Livan	Researcher
105180	Liveable and prosperous Asian megacities	Tereso Tullao	Project leader
103929	Implementing of sanitary and phytosanitary standards in SE Asia	Keng Yeang Lum	Project leader
103350	S&T policy for Mozambique	Marcelino ES Lucas	Project leader
104753	Building African Capacity in STI Indicators	Fred Gault	Project leader
104529	Accessing patented knowledge for innovation	Ngoku Okama	Researcher (Botswana)
		Nitya Nanda	Researcher (India)
		Edson Beas	Researcher (Brazil)
		Xiangdong Chen	Researcher (China)
103470	University Industry Linkages	Andres Lopez	Researcher (Argentina)
		Glenda Kruss	Researcher (South Africa)
		Eduardo Motta	Researcher (Brazil)
		Gabriela Dutrenit	Researcher (Mexico)
		Bo Goransson	Researcher (Sweden)
		Cristina Parra	Researcher (Venezuela)
		Lee Keoun	Researcher (Korea)

List of persons interviewed (n=34)

Project number	Project Name	Name	Category
105170	Grassroots innovation in China and India	Zhang Livan	Researcher
		Anil Gupta	Researcher
105357	Innovation systems for inclusive development - rural China – India	Rajiswara Raina	Researcher
		Veena Ravichandran	ITS programme officer
104227	National Innovation Systems in BRICS	Jose Cassiolato	Project coordinator (Brazil)
103783	Biosafety Management of GMO	Jikun Huang	Project leader
104530	Enabling Bio-Innovation for Poverty Alleviation in Asia	Edsel E Sajor	Project Leader
105669	Innovation at the base of the pyramid	Antonio G M La Vina	Project Leader
103577	Assessing the Socioeconomic Impact of Transgenic Crops on Small Scale Farmers : Best Practices	Melinda Smale	Project Leader
102764	New nano-scale technologies and marginalized peoples	Pat Mooney	Project Leader
103470	ROKS research competition	Bo Goransson	Project Leader
		David OBrien	ITS Programme Officer
103311	Resource manual for just, balanced and development focussed negotiations within the WHO Doha Development Round	Tasmin Rajotte	Project Leader
101678	Research Competition: Improving Learning and Alleviating Policy Gaps	Michael Graham	Ex IDRC Communications Division, Independent book editor, Grantee
103349	Peer to Peer support for science journalism in the developing world	Jean-Marc Fleury	Ex IDRC Director of Communications, Grantee & PL

105598	Science & Development Network (SciDev.net) Phase IV	David Dickinson	Project Leader
104043	South to South Collaboration on Genomics Innovation	Halla Thorsteinsdottir	Project Leader
105359	Gender in Innovation Systems Competition	Anastasiya Hozyainova	Project leader- Afghanistan
		Saaed Parto	Awardee
105164	Comments on Project S&T policies in Nicaragua	Federico Burone	Head of LACRO IDRC – Montevideo
104958	Comments on Project on Innovation policies for MERCOSUR	Gustavo Crespi	ITS former PO
104045	Comments on Support project to Academy of Sciences Senegal	Innocent Butare	ITS programme officer
104529	Comments on Project on accessing patents	Rob Robertson	ITS Former PO
106101	Responsible for S&T Strategy	Mai Ha	President of NISTPASS – Vietnam
105427	S&T Strategy of Panama	Ruben Berrocal	Secretary of S&T Panama
		Diana Candanedo	Head of the Planning Team
		Oscar Paez	Expert
	General comments	Isabel Bortagaray	LACRO Senior Program Officer
	General comments	Naser Faruqui	ITS Programme director
	General comments	Ellie Osir	ITS Programme officer
	General comments	Richard Isnor	ITS Former programme director
	Program considerations	Fred Carden	Direction Evaluation Unit
	Program considerations	Tricia Wind	Programme officer Evaluation Unit

Annex 2: The Policy-oriented Questionnaire Survey and Analysis of Results

Research for policy is one of the program's key objectives and in order to assess the achievement of this objective, between May and June a survey was conducted to examine the opinions of researchers regarding the influence that their projects had on the definition of science, technology and innovation policies.

A total of 56 questionnaires were emailed to researchers involved in 26 projects, of these 33 responses were received representing 16 projects. To complete the analyses, IDRC officers in the field and former IDRC officers informed or commented on 4 (of the above 26) projects, documents and reports (including telephone, personal and written interviews with researchers) were examined for an additional 11 projects. Table 1 identifies the projects for which responses were received and the number of researchers that responded and Table 2 lists those projects in the latter category.

Table 1: List of Projects and Number of Researchers that Responded to the Survey

Project	Number of researchers responded	Project	Number of researchers responded
103470	7	105164	2
103350	1	105167	1
103783	1	105170	2
104068	1	105177	1
104227	5	105180	1
104357	1	105357	2
104529	4	105427	2
104956	1	106101	1

Table 2: List of Projects Analyzed from Comments of Researchers, PO and Documents Reviewed

Project	Project
102560	104511
103060	104574
103311	104753
103929	104904
104041	104872
104045	

The questionnaire contained 10 questions, which are shown below, together with a summary of the responses received.

Question 1: Who proposed the project?

Table 3 lists the projects according to whose initiative these were proposed. It can be seen that 7 projects were proposed by the researchers initiatives, 2 by researchers at the suggestion of policy makers, 1 was proposed by the policy maker and 6 originated in a joint decision of the researcher and the policy maker. In the case of the third group, in one project proposed by the policy maker ITS suggested the research team.

Table 3: Who proposed the Project?

Researcher (s) own initiative	Researcher suggested by policy maker	Policy maker	Joint decision researcher – policy maker
103470	103783	105427	104956
104529	104357		105164
104227			105167
104068			105177
105357			103350
105180			106101
105170			

Q2. ***How did you decide on the specific research topic / what made you decide on this topic? Was there a specific problem that policy makers were trying to resolve at the time the project was proposed?***

Projects have been defined by researchers following different visions and problems that needed investigation. Table 4 shows the different approaches taken to select projects and research topics, following a set of pre defined categories for transmitting research results to policy makers. Some projects follow more than one category.

In classifying the categories under which projects and topics fall, it is important to notice that several of the ITS projects were not strictly research projects but rather policy reviews, which were undertaken to influence, or even impact, policy in a direct manner[1].

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[1] For the purposes of analyzing the survey, it should be noted that a broad definition of research can be adopted, as to include all academic research in addition to reports (as long as they are not confidential), policy, viewpoints, etc., it includes reporting and research undertaken by research institutes, think tanks, in-house ministry research centers, and aid-donors. In this way any document containing information and knowledge is considered research.

Table 4: Types of Models used for defining project

Type of model used	Question: How was the research topic defined?	Project	Outputs and policy recommendations / evidence that policy has been influenced or informed
Knowledge-driven model: Researchers identify potentially valuable knowledge hoping results will be used by policy makers	Researcher defines research topic	103470 104529 104227 104068 105357 105180 105170	Project 104227 was an ongoing research initiative which required further support to fulfill its research agenda, but being a research network its policy influence is limited. The other projects were built around IDRC/ITS calls or from proposals made directly to IDRC/ITS.
Research interest model: Partially open window of influence. Government working on an issue acknowledges need for research but has more pressing priorities and/or a shortage of resources to engage.	Researcher acknowledges the need to develop a certain topic, inscribed in the policy makers agenda and requests support.	103783 104529 105357	These projects were proposed by researchers but topics were suggested in agreement or under suggestion of policy makers. In case of project 104529, although the project was proposed by researchers, the topic has been inscribed for years in the policy maker agenda.
Problem-solving model: Policy maker requests research to find a solution to a specific problem. Results have higher probability to be used. A clear demand opens a window of policy influence.	Policy maker request support to research on a topic of its interest.	104357 104956 105164 105167 105177	In project 105164 policy maker requested a regional organization for support, in turn this organization requested ITS financing. Project 104357 is a good example of the request made by Government to a research institution for supporting the preparation of an S&T plan.
Interactive-model: Researcher and policy maker interact throughout the research and results have a higher probability to be used.	Researcher and Policy maker jointly define the research topic.	103350 105427 106101	In projects 103350 and 106101, researcher and policy maker is the same person.

Type of model used	Question: How was the research topic defined?	Project	Outputs and policy recommendations / evidence that policy has been influenced or informed
Political-model: In rigid political systems probability of using research results depend on how they are presented and fit into established visions, difficult to think research will actually have direct influence on policy.	Researcher may suggest the topic following a potential window of opportunity.	103470 (Venezuela case)	The results of this project, although of importance, do not necessarily conform to current political thinking.
Tactical model: Policy makers announce awaiting research results so they do not have to take decisions, or justify decisions on research only to transfer political cost to researchers.	Policy maker suggest topic for political reasons.	No	No project can be classified under this category.
Enlightenment model: Research trickles down in a slow, indirect and cumulative way on way of perceiving problems and solutions by policy actors. In the long run changes in policy.	A category of projects suggested by researchers (similar to knowledge driven model).	104129	Many projects follow this category.
Research as part of the intellectual enterprise of society: As society evolves new problems appear that are studied by social research.	Clearly a category of projects suggested by researchers or enlighten policy-makers (similar as above).	104068	This project tried to respond to issues that were not debated (or at least claimed that were not being debated) in the country at the time of its execution.

Q3. Was (is) your research project known to policy makers in government at the moment of execution?

Only two projects were not known to policy makers during execution 104529 (the Brazil component of this project) and 105180. In this case, researchers have been advancing their work to collect data —presentable" to the policy-maker, on which they would expect a feedback. The rest of projects had been made known to policy-makers, to varying degrees of —informing" by personal communications from researchers, invitations to dialogues, conferences and seminars where the project results were presented and discussed or the transmission of proposals of policy briefs.

There have been many channels of communication between researchers and policy makers informing the latter of the project. Besides the projects that were proposed by policy makers, and many projects actually executed under their guidance, in many cases researchers had personal contacts with them, in other cases, such as for example project 103470, the researchers approached the national organization for S&T co funding. In other cases, for example project 103470, the proposal was approved by the research body in a relevant ministry before the conduct of data collection.

In other cases, those proposed by the policy makers, one of the traits of Project 105427 was the interactive mood that prevailed along its execution through interviews with the stakeholders, meetings to deliver preliminary results and to receive feed back. Also, many projects produced policy briefs (105357) and working papers (104068). In some cases the projects were executed by the policy maker him(her)self (106101), or the research team had researchers who held decision making roles in government (105357).

In project 103470, of the 12 countries included in the project, national workshops with invited representatives from government, industry and academia were held in the beginning of the project life cycle to get input on how the research could be made more relevant for decision making.

Q4. Did you have a policy-maker on your research team, for this specific project?

Nine of the projects surveyed had a policy maker in the research team in different ways (104227 – BRICS – Brazil, for example had an intern from the Ministry of Science and Technology). In some cases the project researcher was at the same time a policy maker (103350, 106101) or the researchers worked along side policy makers (105164, 105177, 105170, 104357, and 103783). In the particular case of project 105427 the external reviewers had extensive experience as policy makers.

Some other projects (e.g., 105177) had steering committees composed of policy makers who contributed to on-going discussions and provided opinions deemed useful by the researchers. In this latter case, policy makers provided historical and up-to-date policy documents and information; provided insights of policy making procedures and assisting the other team members understanding evolution of policy; provided critical inputs for interpreting research results; helped in policy dialogues; and in this way helped to transfer project outputs to policy formulations and implementations

Q5. Do you think there is a real gap of collaboration between the scientific community and policy-makers? If so how can it be closed?

A number of researchers (65%) believe there is a large gap between researchers and policy makers, and have pointed out to the reasons and difficulties being faced to close the gap, some of the more important are:

- Policy makers think in a more practical and broad way, scientific community thinks more specific. While doing research, the scholars also need to think broadly while proposing policy suggestions.

- Extent of gap depends on the sector. It is very small within the agriculture sector, where the scientific community and policy makers have agreement on most issues. The gap is larger in sectors like public health or water, defense and external affairs where there is a dynamic and critical S&T community. Closing the gap demands regular communication and good networking practices between the two and involvement of other actors in and outside respective sectors.

- One way to close the gap is the continuous engagement and feeding results into the variety of civil-society and governmental processes.

- Policy makers are not inclined to read lengthy research reports, provision for policy briefs, highlighting the major finding are helpful.

- Researchers have to choose topics that have both theoretical and practical/policy implications, to ensure mutual interest and benefits in project collaboration.

- It is important to involve many stakeholders (including policy makers) in both the design and development of the project.

- It is necessary to review the process by which research agendas are set in order to satisfy policy maker's demands and concrete problem of entrepreneurs. It is also necessary to strengthen the dissemination of research results, reviewing polices for access and diffusion; strengthen the capacity of statistical analysis of STI policy organizations; develop strategies to build bridges that favor contacts.

- It is necessary to produce real arguments for S&T policies that would help S&T policy makers to influence REAL decision makers.

- The very nature of the scientific activity helps to create a bias in the —advisory" function of the scientific community. In the case of one country the scientific community has been an important player in the definition for a —suply" side innovation policy that the country pursues, leaving aside important aspects of a broad innovation policy that addresses social issues.

- Education and training are key as most researchers are unaware of the policy directions for example in the area of patents; many do not understand the concept of patents.

- There are few officers of high level that understand S&T and rotate frequently as ministers and policy changes, and many leave due to brain drain.

- Utilization of research in policy making should be assessed in the long-term perspective. The first and foremost task should be to lay the foundation of a strong knowledge base, so as to lead to a demand for research when the issue arises. Further, for research o be useful to policy makers, it should

provide a comparative perspective linking the global, national and local dimensions. These insights would help reducing risk in policy making.

- Researchers should learn the jargon of policy makers.

- Research could be based on predetermined policy direction.

- Researchers must be trained or knowledgeable on social issues affecting a country. Exposure to social issues is key to close gaps with policy-makers.

- Changing the academic incentive system to put more emphasis on third mission/extension activities; today, engaging in dialogue with people outside the academic community is regarded as a spare time activity and does not in general generate academic credit.

- If there will be any policy influence or informing, the research projects should be made known to policy-makes from the onset, and the projects should specifically point out at how that will be achieved.

- Unwillingness of most researchers to court controversy, share their findings to knowledge and data providers to validate their findings and thus gain authenticity.

- In some countries there are specific decision making procedures and scientists do not have the skills of writing policy briefs.

- In terms of research influence, government backed research organization may have better chance to influence the policy making process, while those in scientific communities (mainly in universities) do not, pushing scholars even more to the academic significance of their research.

Q6. What problems exist in transmitting research results to the policy - maker

There are several reasons provided that difficult the transfer of research results to policy makers:

33 % believe this is due to the lack of tradition in cooperation.

22% believe that the difference in jargon makes transmission of results difficult.

23% believe that there is lack of channels for communication.

18% believe that timing is the main cause.

5% believe there are legal barriers.

Q7. Which are the bodies that could best build bridges between researchers and policy makers?

Opinions are divided as to which are the bodies that can best build bridges between researchers and policy makers, 24% favour think tanks, while 18% favour scientific committees, professional associations and NGO, 12% specialists in knowledge transfer and 10% foundations. To this list it was added that chambers of industry and commerce, private public partnerships, and individually well recognized scholars are also important vehicles.

It is pointed out however that because each organization has its own agenda (hidden or not), it is difficult that they can become bridges, as shown by experience so far. A more appropriate vehicle is transparent platforms with clear accountability. —To

much reliance on think tanks often having retired bureaucrats on their staff is a completely misguided strategy."

Q8. *Does a participative approach, through the creation of networks involving researchers, policy-makers, practitioners and representatives from civil society – offer the possibility of a continuing cooperation?*

90% of researchers believe that a participative approach helps to bridge the gap, while 10% is not sure. It has been pointed out however that project leadership is key if the approach is to succeed, and this does not occur at all times. Further, networks supported or promoted by ITS are in fact research networks with weak linkages to policy makers (or not involving policy makers). Leading a network is not just about leadership in a developing context, it depends on the job load of the leader (normally a leading figure in a developing country would have too many tasks to fulfill) or the resources put at his(her) disposal, or the institutional set-up under which the leader works has its own limitations.

Q9. *In your country (or region) is there a tendency of policy makers to use research results. How can you assess this tendency?*

70% of respondents believe that there is a slowly growing tendency in the use of research results by policy makers, and takes time for this situation to change, but there are important limitations that need to be overcome for the process to be accelerated. The general opinions can be resumed as follows.

- Researchers must look to demands from policy makers. There are strategic and policy research organizations and institutions in regional and national level, which indicates that research findings from scientific communities, beside research from government backed institution are needed by policy makers from time to time.

- There is a traditional lack of confidence and trust between academic institutions and the policy-makers, and in some cases governments do not admit other knowledge but that produced under their ideological premises.

- Policy makers tend to listen and cooperate with those members of the research community that are close to them (ideologically, or even geographically) and often one finds different, sometimes, conflicting views within one single policy organization that are connected to different groups pf the research community.

- In the more advanced of the developing countries, policy makers are increasingly participating in seminars, workshops, and in many cases budgetary offices or Ministries of Finance are conducting impact evaluation on public programs, which in turn is stimulating a more rational and research-based approach in the designing of public policies.

- Policy makers think that research results are less valuable than their own expertise.

- Policy makers do not devote sufficient time to read and analyze research reports, so these have to be transmitted in a short an concise way, further efforts must be made to ―sensitize" policy makers to the need of looking at research results, for building up action agendas, in spite of the fact that policy decisions are often driven by political considerations.

- Policy makers require advice and if research is backed by (preferably quantitative) evidence, there will be a good basis for policy advice.

- The analytical frameworks under which researchers and policy makers work is different and further public servants do not have a S&T career and for the research community the decision making process is a strange and unknown phenomena. Moreover, there is no learning attitude in policy makers in general.

- Research results are of course utilized by policy makers but not in a systematic and organized way. That means that the research results that reach policy makers are generally random, person-based and fragmented.

- As policy making decisions are becoming more complex, decision makers to admit the need of the research community to identify future trends and S&T priorities.

Table 5 summarizes the answers given to questions 7 and 9, under a set of given categories.

Table 5: Supply and Demand in Research – Policy Linkages

Supply	Findings
Quality and credibility: Policy makers tend to trust more in research and recommendations backed by quantitative than qualitative information.	Many of the projects lack quantitative information, or the indicators used are inconsistent or erroneous.
Relevance: Research results will be used only if they attend the problems policy makers are trying to solve at any given time.	Many of the projects deal with research questions that are interesting in themselves, but not necessarily attempt to answer day-to-day problems seen by policy makers.
Timeliness: Research will not be utilized if it is not available the moment the policy maker is forced to take a decision.	The policy reviews have been undertaken timely, but some of the research projects will produce results only after policies have already been drawn and decided upon.
Dissemination: Research has more probability to be used if effort is made to disseminate findings among potential users.	Much research results have been transmitted to policy makers through policy briefs, workshops, conferences, reports.
Clarity: Research will have more probability to be used if findings are conclusive, straight to the point and are communicated clearly.	With exceptions, the jargon used by researchers is not clear to policy makers, and research results are not conclusive.

Demand	Findings
Interest of governments: Government is interested, policy makers consider issue of importance but do not have the necessary structures or activities in place through which research recommendations can be implemented.	Some projects that have been of interest of Governments, yielded results that are difficult to place in policy making, as the organizations in charge of S&T are weak.
Emergent issues: Policy makers might not be interested in research program but there is a strong research agenda.	Some of the research communities that have made proposals to ITS are very strong and forward looking, thus chose topics of relevance (to them).
Valuing research: Tendency of policy makers for using research results.	There is noted a slowly growing tendency in the use of research for policy making in most of the countries where the projects were executed.
Degree of training: The use of research results increases as the academic level of the policy maker increases.	The academic level of policy makers has indeed increased in most of the countries where the projects have taken place, so the non-use of research results must be sought elsewhere.
Experience in research: Policy makers experienced in research have more probability of using technical inputs in policy.	With exceptions policy makers are not trained in research. Some think tanks attached to governments or academies of science have policy makers which have experience in research.
Experience in government: Stability of relevant decision making organizations is key for internalizing research results into policy making.	In most of the countries where the projects were conducted there was political stability, but there was only a relative continuity of the decision makers.
Government disinterest/hostility: Policy makers are explicitly pursuing other priorities.	The interest of decision makers lies in grand challenges affecting the countries' social and economic stability. Many of the projects do not follow from a recognition of these challenges.

Supply and Demand Linkages	Findings
Personal contact: Systematic encounters between researchers and policy makers.	There has been encounters but not systematic.
Networks: Experts associate and conform epistemic communities and/or experts associate in a wider network, in which other key actors of policy making participate.	Networks that have been supported are research networks, and no participation of policy makers exists. Other collaborations (not networks) created by the projects were short-lived, lasting only while the project received funded.

Think tanks and/or other intermediaries. Think tanks within government structure more directly connected to policy or specialized organizations such as academies of science.	Some of the projects have used think tanks connected to government structures (104357, 106101).

Q10. What do you think are the main results of your project that have informed or influenced policy making and how? Are there any evidences of this?

Most projects claim that it is too early to be able to measure how effective they have been in informing or influencing policy, even though results have already presented to policy makers. Many feel there are potentialities in the results that can be exploited by policy makers. Only in two cases project leaders have indicated that research reports have not been transferred to policy makers, and that publications for these projects are envisaged.

Several researchers are aware that policy makers make part of the day-to-day complexity of the changes taking place in the world, and need critical and detailed analysis to better formulate relevant responses. This means new approaches from the research communities, which must be developed.

On the other hand, several projects have indicated that publications produced have been well received by both the academic community and decision makers. In the first case some of the results have been published or accepted at ISI Journals /[2].

Examples of results reaching policy makers are given in project 103783 where such results were translated in 2009 into 15 policy briefs, all published as the State Council's policy briefs; 12 of them were notified to the top national leaders.

In some cases (e.g., 103470 - South Africa case) the project contributed to policy making at the sector and institutional levels. The influence on government policy making is more difficult to assess directly, although in the case of this country, there is evidence that research work is read by government officials (work cited in speeches by the minister of science and technology, or in tender documents commissioning further research).

In project 105427, government is making direct use of the recommendations of the policy review team.

In project 105357 (China case), some of the research findings have been sent to the central and local governments as policy briefs, which have received official affirmation and information that results would be considered in future working plans.

In the case of project 103470 in some of the countries, the dialogue between the researchers and policy makers during the course of the project has resulted in an increased recognition that university research has relevance for the policy making process.

In project 104574 one of the results was to strengthen the capacity for evaluating policy instruments and S&T programs.

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[2] See Annex 7 on Research Quality in this Report

In one particular instance, it has been pointed out that the sole fact that a member of the scientific community was invited for the first time to support the preparation of the national S&T plan, was an important accomplishment of the project.

In project 104357, the overall objective of the research project was to facilitate the Science and Technology (S&T) policy process and the endorsement of an S&T policy document and implementation strategy by the government. In this particular case both objectives were achieved.

Some projects (following the policy review methodology) have in effect contributed to the preparation and adoption of national science, technology and innovation policies and plans (103350, 104357, 105427, 105164).

In the case of project 103470 (Brazil – case) the project facilitated entry of new issues, such as emerging technologies into the public policy —Agenda of the Secretariat for S&T" in the State of Minas Gerais.

Annex 3: The LINK Survey and analysis

Total number of Unique Visits: 127

Completes: 55

Survey Questions

1. Have you heard of the Innovation Technology and Society (ITS) Programme of Canada's IDRC (International Development Research Centre)?

2. Have you ever read or used any of the documents/publications produced by the programme?

3. If you responded 'yes' to Question 2, then, in your opinion, what is the quality of these documents/publications in terms of their contribution to Innovation Systems research (on a scale of 1 to 5 — 5 being the highest and 1 the lowest)?

4. Have you ever collaborated on an Innovation Technology and Society Programme Project?

5. If yes to Questions #2 and 4, how would you rate the relevance of IDRC's ITS work?

6. How would you rate the significance of IDRC's ITS work?

7. Who do you think is the main audience for the outputs of a programme of this sort?

8. Any Other Comments?

Survey Responses

1. Have you heard of the Innovation Technology and Society (ITS) Programme of Canada's IDRC (International Development Research Centre)?

Response	# of Respondents	% of Respondents
Yes	30	55
No	25	45

2. Have you ever read or used any of the documents/publications produced by the programme (list provided)?

Response	# of Respondents	% of Respondents
Yes	20	36
No	35	64

3. If you responded 'yes' to Question 2, then, in your opinion, what is the quality of these documents/publications in terms of their contribution to Innovation Systems research (on a scale of 1 to 5 — 5 being the highest and 1 the lowest)? (n=20)

Response	# of Respondents	% of Respondents
Low	0	0
Somewhat Low	2	10
Fair	2	10
Somewhat High	10	50
High	6	30

4. Have you ever collaborated on an Innovation Technology and Society Programme Project? (n=54)

Response	# of Respondents	% of Respondents
Yes	9	17
No	45	83

5. If yes to Questions #2 and 4, how would you rate the relevance of IDRC's ITS work? (n=15)

Response	# of Respondents	% of Respondents
Not at all Relevant	0	0
Slightly Relevant	1	7
Somewhat Relevant	3	20
Relevant	6	40
Highly Relevant	5	33

6. How would you rate the significance of IDRC's ITS work? (n=36)

Response	# of Respondents	% of Respondents
Not at all significant	0	0
Slightly significant	6	17
Somewhat significant	8	22
Significant	20	56
State-of-the-art	2	6

7. Who do you think is the main audience for the outputs of a programme of this sort?

	Response
1	Public Policy Makers Policy Researchers Students
2	Professionals working in the technology and development field in both North and South.
3	the main audience would be all the professionals working in the development sector as well as in related engineering and IT field
4	Scientist for development
5	Researchers in developing countries (including PhD students), policy makers (if they ever get the time to look at such reports)
6	all stakeholders in low income countries, not just policy makers.
7	Professionals and practitioners in the field. Many of the documents I have read were accessed on the website of the author's own organization (e.g. IFPRI discussion papers; search on author's publications). I was directed to The Future Control of Food by the author and was happy to see it available on the IDRC website.
8	Researchers Some practitioners with deep knowledge in Innovation systems and technology
9	just researchers
10	Developmental practitioners and field level agencies looking for betterment of life at the grasssroots level.
11	Difficult question to answer, as I have no idea what it actually does.
12	Different actors involved in ITS issues such as policy makers, civil society, interest group, researchers and business people.
13	All relevant stakeholders: farmers, ext, workers, marketers, researchers, poicy/opinion/politicians, financial institutions etc
14	Currently the audience seems to be sector-specific policy makers and other academics, especially academics within select disciplines/sectors.
15	The main audience is public as they are the beneficiaries of the programs and also different stakeholders and Organizations are also benefited from the source.

16	Mainly researchers, academics and professionals in this area.
17	1 Policy makers, both in developed and developing countries, especially since those in developed countries can learn an awful lot that is transferable to developed situations. 2 Researchers and practitioners with an interest in innovation systems
18	STI academics and practitioners (the latter including staff of international organizations that do applied work on STI in countries), policymakers responsible for activities on STI
19	Public policy makers
20	Other researchers.
21	Mid-level policy makers and technical and scientific staff
22	Academia? By the quick look at publications...
23	Development professionals, researchers and policy makers.
24	Researchers, policymakers and in some cases activists/advocacy
25	Research and policy oriented audiences

Researchers	
27	Scientists, researchers - not development professionals
28	Audiences would include researchers, students, development practitioners, policymakers, funders/donors
29	Developments practitioners, Social Science researchers and students of development
30	Academics and policymakers
31	Yours audience are poor people on third world countries.I think that you could change this target and focusing on emerging countries e.x Albania and Euro-Asia region because those countries have the great rates of economic development on recent years.
32	Mainly academic
33	a person or any form of organisation who need an innovation or have already a little innovation unidentified existing by them and therefore needs to be developed.
34	Going just by the name of the programme (I do not know it), I think it would be oriented to applied researchers

| 35 | Science, technology and innovation policy makers; policy researchers; Scientists; social scientists; sociologists; economists; industrialists; administrators involved in the STI fields, undergraduates and graduates of STI field, media personnel etc. |

8. Any other comments?

1	No
2	Should be available in other languages
3	The IDRC should utilize the expertise of Canadians working in science and innovation policy, here in Canada and internationally. This program is least visible within Canada. Canadian universities should be recognized as a partner in science and innovation policy programs in low-income countries.
4	Yes, systems approach and linkages for innovation and cycles involved are really beneficial to replicate and customize such programme in other developing countries both in horizontal and vertical way. But, such initiative needs to be strengthen in terms of technology component.
5	I suggest that the main audience should be the community of innovation scholars and the broader development community to which policy relevant lessons should be fed. However, I am part of that community and I cannot remember ever having seen any outputs of the IDRC ITS programme
6	Non.
7	I know Little about innovation approach, my participation in INAR4D was the first, and is a very difficult term to define and visualise to majority of stakeholders especially the farmers.
8	The innovation systems research community is a highly fragmented one, drawing the innovation systems debate into different (often comfortable) corners. ITS must challenge and increase the interaction among them. In this questionnaire, words like relevance and significance, are not clear - relevance to what? pro-poor innovation? innovation systems research? innovation and policy discourse?
9	Its better to consider people living in developing countries in accessing the IDRCs items for improving their life and standard of living. Also for work simplifications.
10	Perhaps the "society" is not well catered for in terms of dissemination of evidence based information/findings. This may be enhanced better through integration of this program with other on-going programs targeting the same or related knowledge based outputs.
11	No

12	There is a need for a vigorous campaign to familiarise "Innovation Systems" approach to development programming at all different levels.
13	Very good initiatives
14	IDRC's ITS can benefit from interface with new-niche research programmes such as the DFID-funded RIU Programme.
15	More joint work of academics with civil society is desirable
16	Pleas could you expand your target with countries of Euro-Asia region.
17	The programme has helped strengthen ST&I policy research in the developing world and also strengthen links with similar groups in the North.. What I am less sure about is the success of the programme in the influence that the research has had on policy.
18	i would want to join this organisation and help in its course since i belong to these developing countries which requires innovation and so needs to know requirements.
19	I know about IDRC and have collaborated with them on PhD research projects related to agricultural development and NRM. I think highly of IDRC in general, but have never heard of the ITS programme. Then again, I am not so interested in programme names anyway.
20	Concerned that many believe "innovation indicators/innovation system" means industry activities only. Others think that it is more relevant to economics analysis. Only a few are aware that the pioneering work on the subject has been to promote the country's socio-economic development and it promotes sustainability. Suggest that it will be useful to conduct media briefings, seminars, workshops/ publications etc., that are very necessary to make the stakeholders and the society aware of this important phenomena/concept and work towards its anticipated benefits.

Annex 4: A Note on Social Inclusion and Gender

1. Objectives related to SI and Gender, as stated in the IPS inception report and ITS Prospectus

The language used in the IPS inception report emphasises pro-active development and testing of processes and procedures for strengthening multi-stakeholder equity (including gender equity) in STI policy processes, the democratisation of new technologies and STI decision-making, and multi-stakeholder consideration of issues of governance and control

The ITS prospectus' objectives and anticipated outcomes can be summarised as:

Table 1: ITS objectives and anticipated outcomes related to social inclusion and gender

Objectives	Anticipated Outcomes
- Improving understanding, capacities and linkages among Innovation Systems actors. - Developing (explicit, implicit) S&T policies contributing to improved functioning of South Innovation Systems. - Strengthening socio-economic impacts analysis, social inclusion, and learning capabilities in support of innovation and governance of new technologies.	- Enhanced understanding of innovation processes and opportunities. - STI policy processes or decision making strengthened. - Evidence-based research for advocacy. - Greater equity and social inclusion.

i.e. the language used in the ITS prospectus regarding social inclusion has become more technocratic and with a stronger emphasis on researching ‗end of pipe' impacts in comparison with the IPS inception report. Mention is made (p9) of the need for the program to be gender aware.

From the June 2006 Board of Governors Minutes (p11) the panel notes a concern none the less to maintain the broader perspective:

> ‗The most difficult thing, and the prospectus has not addressed this very well, is the linkage between building up STI capacities and the question of social equity. We know that injecting some nature of rigour of modern technology into indigenous or popular innovations may be able to increase productivity, but that is about all we know. What we need to know more is what type of policy instruments, what type of policy environments, what type of incentive systems, what type of institutional arrangements will lead to greater equity?'

The panel found during interviews that there was a consistent tendency among program staff to reduce discussion of social inclusion to impact studies, and conventional, one-off studies of specific technologies and poverty reduction, and the

social needs of the poor; this was a point of frustration among some of the research grantees interviewed.

It is further noted that both the IPS inception report and the ITS prospectus emphasise the value of seeking and understanding developing country perspectives, including perspectives on the nexus between STI and matters of social inclusion and gender. This points to the critical importance of program capacity to identify, seek out and understand the full range of perspectives. However, the interviews made evident that there was little awareness among program staff or project grantees in general of the relevant STI sections in policy instruments such as CEDAW, the Millennium Development Goals, or Agenda 21, or of who might be responsible for their translation into national law and policy in the countries in their regions, or of national policies on women's development in relation to STI outcomes claimed in the final prospectus report.

The ITS final prospectus report reports outcomes in five areas: 1. Contributions to Policy Influence, based on I. STI reviews & II. generated by ITS projects; 2. Contributions to better understanding of impacts on the South of emerging technologies; 3. Improved sharing of STI information, knowledge, and experience; 4. Built capacity for producing, sharing, using STI knowledge; 5. Built partnerships and strengthened regional and international networks of researchers and policy makers.

Key statements across these outcome areas that relate to social inclusion, and the panel's comments, are given below:

Table 2: The Panel's response to key statements in the ITS final prospectus report

Final Prospectus Report	Panel's comments
Whether or not STI policy leads to economic growth or poverty alleviation has been insufficiently established – a potential area of weakness' (12).	This is a very long-standing debate; did ITS develop an appropriate and effective strategy for helping to resolve the debate?
Socio-economic best practices' assessment methodology is being developed and tested in a number of countries in relation to one project, on the impacts of GM crops on small farmers (Project no. 103577) (15).	This is a useful but by no means unique endeavour; numerous approaches to best practice have been and still are being developed and tested: where's the comparative assessment of the added value?
While ITS has begun to focus more on innovation for poverty alleviation' this has not yet generated tangible evidence serving to stimulate policy changes in support of socio-economic development and poverty alleviation (22).	This is a very long standing issue stretching back several decades; what has the program contributed that might have made a difference? Can this question be resolved by means of more research?
As already indicated, evidence in support of some outcomes presented in the report is incomplete. Clear baselines were not established at the outset of the program'	Why was this basic programming step not taken?

(23).	

The key statement relating to Gender speaks for itself:

There are no research findings or outcomes related to gender equity and _few projects have explicitly looked at gender' (22)

2. Analysis from the Quick Scan gender analysis of project documentation[3]

The self-reported outcomes have been validated by the findings of a Quick Scan of the paper trail relating to thirteen projects randomly selected from the portfolio of ITS projects listed under the entry-points 1) Innovation system actors, and 2) S&T Policies developed on or after the 2006/2007 fiscal year i.e. excluding projects specifically targeting issues of social inclusion and/or gender. The sample included three completed projects, selected from the list of rolling project completion reports (rPCRs) (See table 3).

Table 3: List of projects reviewed

Project number	Project Title	Project Status	Entry Point	Gender Categorisation, based on the Quick Scan
105356	Globalization of Innovation: Manifestation, Determinants and Implications for the Emerging Economies of China and India	Active	1 & 2	Women-incidental/Gender blind
105180	Toward Innovative, Liveable and Prosperous Asian Megacities	Active	1 & 2	Women-incidental/Gender blind
105165	Innovation, Learning and Institutional Frameworks in Natural Resource Industries (Argentina, Brazil and Chile)	Active	1	Women-incidental/Gender blind
105160	Latin American Research Consortiums: a Comparative Analysis	Closed	1	Women-incidental/Gender blind
104574	Empirical Evidence and Policy Implications from National Systems of Innovation Surveys in LAC	Active	1	Women-incidental/Gender blind
104530	Enabling Bio-Innovation for Poverty Alleviation in Asia	Active	1 & 2	Women-specific research
104529	Accessing Patented Knowledge for Innovation	Active	2	Women-specific research
104357	Aligning the National S&T Policy with the National Sustainable Development Strategy in Sri Lanka	Active	2	Women-incidental/Gender blind
104227	National Innovation Systems in Brazil, Russia, India, China and South Africa	Active	1 & 2	Women-incidental/Gender

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[3] The Quick Scan analysis was carried out by Mel Yule at the request of the panel

	(BRICS)			blind
104044	Application of Total Innovation Management to Chinese Small and Medium Enterprises	Closed	1 & 2	Women-incidental/Gender blind
104043	South-to-South Collaboration on Genomics Innovation	Active	1 & 2	Women-incidental/Gender blind
103929	Implementation of Sanitary and Phytosanitary Standards in South East Asia	Closed	1	Women-incidental/Gender blind
103783	Biosafety Management of Genetically Modified Crops (China)	Closed	2	Women-incidental/Gender blind

The analysis included a review of project approval documents (PADs) authored by responsible officers at IDRC and technical reports written by project proponents. The interim technical reports (ITR) of active projects and final technical reports (FTR) of closed projects were also reviewed.

The projects were analysed on the basis of whether they exhibited six gender-sensitive design features. These design criteria were adapted from the gender evaluation[4] of the Governance, Health and Equity (GEH) program at IDRC:

> ➢ Goal/Objective and the presence and degree of social inclusion and gender focus;

> ➢ Gender analysis based on sex disaggregated data currently available;

> ➢ Gender strategy articulated, including collection of sex disaggregated data ;

> ➢ Gender parity on research project team;

> ➢ Participation of Ministry of Women/Social, or civil society organisations; and

> ➢ Reasons why gender is not a factor articulated.

Based on evidence gleaned from project documentation the level of gender inequality/inequity in the research projects was evaluated and projects categorized according to categories also taken from the GEH report:

Gender-transformative research: Project contributes to a deeper understanding of gender inequality. It has the potential to improve the lives of large numbers of women, and relations between women and men, through significant policy influence nationally, regionally or globally.

Gender-integrated research: Project includes a gender analysis or outlines a process for conducting a gender analysis including an examination of socially constructed relations between different categories of women and men, relations of power, differential access to and control over resources and benefits, etc. within the context of the project's overall research questions. The social and gender analysis should be based on a quantitative and qualitative analysis of sex-disaggregated

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[4] Neena Sachdeva, Dana Peebles and Kisanet Tezare, Kartini International, 2008. Final Report of Phase 2: Projects review, Gender Evaluation of the Governance, Equity and Health program of IDRC.

data, illustrate how this data will be treated in the methodology and included in the strategy for implementing the research methodology. Either specific objectives, or other means of monitoring social and gender inputs and outputs, need to be outlined.

Women-specific research: Project focuses on women but does not show evidence of a detailed analysis of gender relations, including power relations, between different categories of women and men. Women are designated as the focus (participants, beneficiaries, target group) of the project.

Women-inclusive research: Women are included as one of the target groups (beneficiaries or participants) in the project.

Women-incidental/gender-blind project: Women are incidental to the project. Women may be mentioned in passing, but there is no analysis of women as a target group. This could also be deemed gender-blind research, where no differences between men and women are mentioned.

While these categories focus on gender this evaluation will look for evidence of social inclusion more broadly as it is considered in the ITS objective ‗impact and inclusion‘: equitable inclusion of diverse social interests in S&T decision making (particularly with respect to the rights and interests of women).

3. Findings

The findings of the evaluation are organized according to the six gender-sensitive design features listed above.

3.1 Goal/Objective and the presence and degree of social inclusion and gender focus

The ITS prospectus explains: ―that 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 harness STI to address their development challenges". What is evident in certain projects reviewed is that while the overarching goal of the research may be to reduce social inequities and positively impact marginalized populations, social inclusion is not the central theme of the study (i.e. included in a specific objective) or a means to achieving the declared objectives (i.e. participatory methods) (105356; 103783; 104530; 104357; 103929; 105180; 105160). For instance, while the goal of 104529 is to ―ensure the widest and least costly access to patented knowledge and technologies to address pressing social and economic challenges" the specific research objectives were to study patent law, the right to compulsory licenses and patent pools, and patent clearing houses. In the case of 104357 the project set the objective of improving social justice but failed to report on these findings in the FTR.

3.2 Gender strategy articulated, including collection of sex disaggregated data

Often when ITS projects mention social inequities or inequalities they do not include gender analysis in their research strategy. Other projects articulate a gender strategy in their PADs. For example, the PAD of project 104044 states: ―Care will be taken in the study to include women in adequate numbers and gender variables will be included in the analysis". However, there was no discussion of gender analysis in the FTR. Another project (104574) planned on including gender as an explanatory variable of the cooperative behaviour to test the eventual differences in propensity to cooperate. The feasibility of gender analysis was to be discussed with country experts during the inception meeting but never came to fruition nor is it mentioned in

the FTR. Project 105180 chose to employ ¬gender-neutral methodologies while ensuring sensitivity to gender balance". Gender variables were to be included in all analyses but are not discussed in the first interim report.

As part of the application for the `Awards` projects 104529 and 104530 it was made explicit that ¬proponents of each project will be required to address any gender considerations relevant to their proposal". The applicants were asked to consider:

a) What are the major gender issues identified by the research? (What are the difficulties/obstacles women and men face in the particular bio-innovation problem situation?)

b) What are your particular techniques/ measures to ensure women's voices are included in your data gathering? (e.g., appointment of women enumerators, organizing homogenous focused group interviews based on gender, age, and class when prioritizing problems, etc.)

c) What are the expected benefits of men and women (e.g. in terms of income, time saving, services accessed, etc.) from the specific action agenda investigated or proposed by the research?

Several projects among those selected articulated a gender strategy. One looked at the socio-economic and other factors which influence low levels of innovation, another the gendered biotechnology development and innovation use among different social groups of households and the gender division of labour, and a third project concentrated on the gender dimensions of the variety adoption in vegetable production including livelihood and health effects on poorer sector of the society. Both projects are currently active and it was not possible to determine whether gender analysis remains at the centre of the research.

3.3 Gender analysis based on sex disaggregated data currently available

As explained in the previous section even when PADs outline a gender strategy gender analysis most often was not carried out or presented in their interim or final reports. Overall the commitment to collect or analyse sex- disaggregated data in the research projects is uneven and not conducive to gender analysis.

3.4 Gender parity on research project team

Data on the gender parity of research teams was not always provided in project documents. When available the percentage of women on teams ranged from 25% to 50% (103783; 104754; 104357; 105165; 104227; 105160; 105180). In the PAD for project 105180 the proponent explained ¬the six project teams, including administration personnel, [were] selected according to merit, but in the process accomplished a fair overall gender balance, with equal treatment of all individuals irrespective of gender or ethnicity". The proponents of project 104043 felt that simply having a female lead-researcher was a sufficient gender component for their project.

3.5 Participation of Ministry of Women/Social, or civil society organisations

Several ITS projects chose to engage a wide range of stakeholders in their research (103783; 103929; 105356; 105180; 105165). The reasoning provided in the PADs and FTRs was either to gather the perceptions of various individuals and groups (105165), to have a high probability of influencing policy, or to ultimately to improve the quality of life and social equity (105180). In the FTR of project 103929 the benefits of including a wide range of stakeholders was that it was the first time

stakeholders were involved in discussions on the implementation of Sanitary and Phytosanitary Standards. Ideas for improving the integration of the whole spectrum of stakeholders emerged in some of these workshops and pointed the way to a more structured system of sharing knowledge and learning. The proponents of both 103929 and 105165 proposed a participatory approach in which stakeholders influence and share control over the project planning (objectives and activities) and implementation. Despite a notable effort to include diverse stakeholders there is no specific mention of women's participation in these activities.

3.6 Reasons why gender is not a factor articulated

The reasoning behind choosing not to address gender issues or strive for social inclusion was rarely explained in project documentation. In the case of project 104574 research proponents reported that there was simply no sex disaggregated micro-data for analysis to be included in the study.   The responsible officer of 104043 stated that a lack of gender in the research proposal was attributed to a lack of gender methodology training. She shared gender resources with the team to remedy this.

Overall ITS projects with the entry-points of either S&T policy or innovation system actors do not focus on gender or women. The majority of the projects are found to be women-incidental/gender blind for their complete lack of gender analysis or their failure to follow through with the gender strategy articulated in the PADs (See table 1). Two of the thirteen projects (104529 and 104530) are categorised as women-specific since these ‗Awards‗ projects required applicants to consider gender in their research proposals. Both projects are active at the time of writing as such reporting on research findings is incomplete, however, the proposals state that the research will gather sex disaggregated data and perform a gender analysis.

4. Analysis from the interviews: Gender

A handful of the researchers and research leaders interviewed ‗had done their best‗ to ensure that questions of gender were included, and to balance women's participation in their work, and some are actively beginning to seek out women entrepreneurs and women STI leaders as their work progresses. However, the respondents reported:

- A widespread lack of understanding within ITS of the theories related to and concepts of gender identities and gender relations, the (recent) history of their development, and why these have come into widespread usage

- Confusion among both program staff[5] and grantees about using ‗gender‗ as a heuristic tool, or as an analytic tool, or as a more acceptable surrogate for ‗women's advancement‗, and about whether the underlying goal was women's advancement by means of STI policy, or for redress to achieve ‗simple parity in numbers‗.

- A widespread lack of knowledge of the ‗gender‗ policies‗ and key paragraphs related to STI and women and gender issues in national and international policy, law, and regulations.

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[5] see also summary of ITS Team Chat, Gender & S & T, posted on the Intranet, April 30 2008

- Lack of evidence of effort to analyse at the program level how emerging STI policy regimes (such as IPR regimes), the standards and regulations developed and enforced by the private commercial sector, or regional trade policies might impact this issue in relation to STI.

- A reluctance to even discuss the shifting sands of power and empowerment by means of or in relation to or as a result of policies, science and technologies.

5. Analysis from the interviews: Social Inclusion

The question then arises as to why these acknowledged weaknesses have occurred. Of the 14 telephone interviews[6] conducted that pursued this issue (among other topics) the interviewees' comments on ITS's support to social inclusion included the following:

- It is due to the inexperience of program staff (variously: they are just beginning their career development; with insufficient socio-economic competence or familiarity with the region; insufficiently aware of the vast literature on this topic and/or of the existence of innumerable donor assessments and best practice guidelines).

- It is an internal policy matter.

- All our farmers are small farmers so any technology that helps them is socially inclusive.

- Young researchers do not have the capacity or experience to be able to bring together and synthesise the empirical evidence and concepts across such difficult (and, in disciplinary terms, unrelated) fields as innovation, policy, and social inclusion.

- You need to have the courage and support to question pre-analytic assumptions, question why things are as they are and not simply describe them. You need to be able to lay bare the implicit values that STI decision-makers and policy people – and researchers – bring to the negotiating table, and the underlying reasons why entrepreneurs and innovators make the decisions they do.

- We are discouraged from raising too insistently these difficult questions of power, governance and control, of access and benefit-sharing.

- We did not carry out any baseline so then we found we could not say/will not be able to say very much about this topic at the end.

- The management of the project by ITS proved difficult so this issue slipped into the background.

- The ITS program staff do not in general understand social inclusion in terms of the value of helping to develop a scientifically informed

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[6] Projects designed with large social inclusion components or focussing on social inclusion (105357; 102764; 103311; 105170); projects addressing gender issues (105359-008); other projects (103783; 103470-006; 101678; 103349; 104530; 104043; ROKS IV) that might or might not have dealt with some aspects of social inclusion and/or gender but which were not specifically designed to do so.

citizenry or ensuring that societal debates about emerging technologies are science-informed.

- The researchers still think in terms of ‗end of pipe' linear transfer processes, and their concern to share information remains locked into the familiar round of books, journal articles, conferences and seminars (even if they venture into the realm of public seminars, they remain in the mode of hoping to transfer expert knowledge).

- The staff keep raising questions of diffusion – they don't understand that this is one of the most rigorously and extensively studied of all issues in the social and economic sciences, across many sectors, that has engaged researchers of a very wide range of disciplines from all across the world for decades (see, for instance, the work of Everett Rogers et al., Röling, or chapter 2 of the IAASTD global report, where much of the key literature is referenced). It is no longer of scientific interest (though of enduring practical concern).

Overall the interviews confirmed that the program leadership has not consistently guided the evolution of the program or provided clarity and focus concerning what was expected under the rubric of social inclusion.

The panel notes that none the less there have been valuable and relevant contributions by some projects to context-based social inclusion issues, as well as significant project level outcomes as a result of longer-standing activities (e.g., 105170; 102764).

6. Panel's reflections on the findings on social inclusion:

The findings indicate that ITS in general cannot lay claim to recognition for supporting leading edge research on the interplay between STI, social inclusion, and policy.

The ITS program is not positioned at the forefront of the by now numerous innovative approaches and experiments taking place around the world in relation to the development and testing of processes, institutions and procedures for strengthening social inclusion, for instance by means of multi-stakeholder procedures in STI policy processes;   the democratisation of governance of new technologies and in STI decision-making; and multi-stakeholder consideration of prospective outcomes (e.g. in Foresight studies), and of actual (intended and unintended) outcomes. These are all areas where IDRC in the past had established leadership.

7. The Review Panel's overall assessment

The ITS's acknowledged weaknesses in the areas covered by this Note are the more surprising, given IDRC's historic strengths in development-related policy studies and socio-economic research and in its advocacy of gender awareness, as well as method developments in these areas. It seems there has been very little carry over from the collective IDRC experience or other programs that might have had something to offer to ITS in this respect.

It appears to the Panel that the ITS rushed into projectisation of the program's ambitions before sufficient clarity and focus had been reached internally concerning what it would seek to achieve, and how, with respect to social inclusion and gender. Once locked into projects it has proven difficult either to require or guide project participants in how they might (retrospectively in most cases) become accountable for significant outcomes.

It further appears to the Review Panel that this weakness carries some reputational risk for IDRC as a whole, given expectations in the wider world that are based on its historic leadership in key areas of this agenda.

Annex 5: Science Communication

What is ‗science communication'? It can be helpful to begin by stating what it is not:

- science communication is not about the ‗communication of scientific information' (this is primarily the work of science journals, conferences and so on)

- it is only partly about ‗end of pipe' effort to get research results ‗transferred' to (potential) users

The basic justification is that in a multi-polar world of conflicting interests, where scientific information is manipulated in the service of power and self-interest, the work of science communication is more needed than ever. It demands particular attention to ethical standards and to the design of the procedures and processes under and through which dialogue and communication occur.

On the basis of the interviews, and the surveys, as well as in the panel's own wide experience, it is evident that the peer community (researchers, S&T decision makers, policy makers) external to the ITS community perceives the historic contribution of IDRC to science communication as pioneering work, as highly relevant to both national and global challenges in the program area, and as a significant contribution, setting benchmarks for others to emulate.

The work carried out under the head of science communication within ITS has not built strategically on the leading edge achievements and reputation developed by IDRC in this area. The support has been limited (essentially, to three projects (105598 –SciDev.net; 103783-Peer to Peer Support for Science Journalism in the Developing World; and 102764- New Nano-scale Technologies and Marginalized Peoples). This work is regarded by the external peer community also as highly relevant and important but as insufficient to maintain IDRC's leading edge.

This loss of impetus has occurred at a time when science communication is seen as of increasing significance, as the world confronts a range of unprecedented existential problems of great complexity. DFID for instance has called for a donors' meeting in October 2010 to push forward science communication; the Nordic and the Dutch donors and numerous leading science councils and science funders also are increasing their grant making in this area. The justification for the renewed interest is fourfold:

- realisation that there is no direct line between a scientific discovery (or a new technology) and its use, or societal acceptance;

- in the face of interdependent risks created by the ‗grand global challenges'(such as climate change, zöotic diseases or energy security,) the realisation that involuntary or managed change, on scales and time frames never before attempted, cannot be accomplished without ‗informed publics;'

- societal debates on the kinds of S&T and innovation processes that are needed, and under whose control and governance, become rapidly polarised and lose their scientific content in the absence of robust and effective science communication; and,

- both the increasing pressure on natural resources and climate change are producing ‗surpises'; science communication plays an essential role in alerting society at large as well as more specialist publics to the nature of the

risks and probable consequences, across rapidly evolving fields of understanding.

However, the interviews demonstrated that science communication is not widely appreciated or supported within ITS itself because it is not considered to be ‚research,' or is pigeon-holed simply as ‚research into use' by means of ‚transferring or sharing knowledge developed by researchers.'

The three projects: why they are considered to be excellent

SciDev.net is a pioneering web-based form of science communication and capacity-strengthening. The idea took shape in a chance conversation with an IDRC staff person at a meeting in Trieste. It took time to find the right place to support the initial idea within IDRC, but eventually funding support (beginning in 2000) was channelled through ROKS, under the ‚research into use' justification. Accessing IDRC support became more difficult when ITS was set up, when the emphasis appeared to shift to doing conventional research.

The ambition primarily is to *inform decision-making by supporting public discussion, policy debates, and officials.* It combines development of content with capacity-strengthening.

The editors receive continual information on how well SciDev.net is meeting its ambition. The art of attracting ‚hits' is akin to newspaper management, actual demand and user categories are monitored through the website, with the editors deciding what to put on the site by orchestrating the supply to match latent demand, in continuous loops of feedback and adjustment.

The special feature of Sci-Dev.net is that the materials posted on the site are developed by print journalists in the South. Web-based support and mentoring is provided to help them identify upcoming stories, and to develop, and produce the materials; interns are invited to the London office to ‚learn on the job'; information on techniques of science communication also is made available on the site, with links to other multi-media resources.

Peer to Peer Support for Science Journalism in the Developing World similarly combines development of content and capacity-strengthening. It addresses the tension between the limited numbers who can be supported by ‚hands on peer to peer mentoring' of individuals, by strategic planning of follow up support to the mentees, and to the development of ‚associations' of science journalists (or equivalent local forms of organisation), which as they gain experience are then in turn ‚twinned' with appropriate associations of greater maturity and experience who provide continuing support and mentoring (e.g. initial mentees in the Middle East were supported to form the Arab Science Journalism Association, that was then twinned with the National Association of Science Writers).

New Nano-scale Technologies and Marginalized Peoples takes a different tack. It builds on the IDRC's tradition of support to e.g. the Crucible Group, in developing procedures and processes for off-the record science-informed dialogue among divergent stakeholder groups. Unfortunately, the high-level and deeply confidential processes of dialogue developed by the etc group, and the more public and confrontational multi-stakeholder discussion forums run by the Meridian group, were ‚coupled together' in the same project by ITS, causing the etc group to withdraw, to avoid being compromised in the more public and confrontational settings favoured by

the Meridian group (that serve a different purpose). This led to a loss of two years of its work on nano-tech until it could find alternative funding.

Excellent but not sufficient

While ITS has limited itself to modest support to science communication, others have been busy developing, testing, and assessing the comparative merits of what has become a large range of options for building science communication platforms, procedures and processes, in different S&T decision-making and policy contexts, including Citizens' Juries, multi-stakeholder negotiations, adaptive management, foresight exercises, scenario planning etc., with associated development of methods and techniques. These typically may involve knowledge actors who hitherto have not been brought together, such as, for instance, research funding councils, scientific societies, research institutes, private commercial stakeholders, land use planners, natural resource authorities, local and municipal governments and civil society organisations. The nature of the field is dynamic and expanding.

Annex 6: A Note on Networks and Networking

The programme highlights its support of research networks by suggesting that ―given that networks are an important means for influencing policy, including science, which is the raison d'être of the programme" (prospectus report page 2). Of course there are other reasons why networking may be an important intended outcome. These include: strengthening national and regional communities of practices in national and regional arenas with a view to strengthening communities of practice on specific research areas (to help share method and findings); strengthening networks between research, practice, enterprise and policy with a view to strengthening use and relevance of research; and strengthening networking between national and regional research networks and the international community with a view to accessing expertise, methods and accumulated learning. In addition to the effectiveness of the networks in term of their ability to achieve these objectives, they also need to be judged in terms of persistence over time.

ITS has supported research networks both explicitly, for example the support of the BRICS and associated Globelics initiative, and implicitly through thematic research funding notably through small grants programmes. The prospectus report highlights networking as one of its 5 outcome areas (ITS projects have built partnerships and strengthened regional and international networks of researchers and policy markers). Flagged within this outcome area are a number of notable outcome area achievements. The first is the networking associated with the ROKs programme which the prospectus report flags as successful because second phase projects have emerged around core project teams. The second area is the networks around small grants program. And the third is the research teams emerging around multi-country studies. It is notable that the prospectus report does not mention the program's earlier support to the African Technology Policy Studies network, the only formal network in its historical portfolio. The ITS self evaluation should have indicated the reasons for the discontinuation to this important regional network in a core area of ITS work.

This review has looked in detail at the networking activities in ROK's successor programme, in small grants programmes and at multi country projects. The relevance and significance of networking outcomes is discussed in more detail in section 3. Our focus here is on whether the strategic and operational approaches used to support networking were appropriate.

Trade off between research focus and development of a broad based network. Evidenced, for example the phyto-sanitation project's (103929) need to select action research themes to explore processes of change amongst multiple actors, but there was some discomfort with this in as it was not viewed as research.

Regional small grants programme poorly linked to international community with much reinvention of the wheel as a consequence. Laudably, the small grants (and other) projects -- for example bio-innovation and innovation at the base of the pyramid focused on supporting regional research -- sought to build the capacity of regional research teams. However faced with an unfamiliar research topic and approach these teams at best reinvented the wheel or at worse simply set off in a research direction that accumulated learning elsewhere could have told were unfruitful. The existence of regionally located, internationally reputed expertise, on for example indigenous and local innovation, was not known to regional program staff. More generally a focus on building new regional research networks not only

cut the projects off from wider expertise and accumulated learning, but it tended to alienate the program as a whole from older research and development practice networks that could have propelled ITS towards global objectives through partnership and advocacy.

Research support to existing networks helpful. This is evidenced by support to the BRICS project. This provided research funding to well established network of researchers. This support has been used to continue their work and this network will probably continue into the future. One drawback with this approach is that it does not leverage expansion of the network into policy arenas.

Research support to establish new networks less sustainable. The Bio-safety project is an example of a multi country research project that that was successful in terms of developing a research network that jointly developed a method (for assessing impacts of GM crops). The network worked well during the life of the project when the project leader (in an international organisation) was able to act as a focal point for interaction and methods and results sharing. Once project funding was finished the network ceased to function at the international level, although nation teams in some cases continued to work. Some of the project partners, however, were recycled in other research projects. Annual meetings of small grants awardees, while undoubtedly valued by project teams, can not really be considered to be the basis of network outcome claims. It was pointed out by a board member in one of the small grants based programmes that because programme have not been able to project a coherent vision of their new approaches the standard of proposals is highly variable both in terms of quality and focus. Most proposals are opportunistic and the only common organising principle connecting the nascent research network is their interest in accessing funds.

Without explicit mechanisms research funding is poorly suited to building networks to policy. Interviews with project leaders commonly expressed the difficulty of getting "policy buy-in" to projects. This seemed particularly challenging where —alternative" approaches and ideas such as bio-innovation or bottom of the pyramid innovation were being pursued. One advisory board member pointed out that neither of these projects had undertaken stakeholder engagement exercises at the beginning in order that they could develop a constituency of both researchers and policy actors that shared a vision of the approach and the relevance of its findings. Support to existing, academically-oriented research networks has proved not to broaden links and stakeholding, despite the excellence of research delivered.

In summary, networking is a laudable ambition for a program like ITS, as are its efforts to focus on capacity building in the regions that it works. However, its use of research as the main support vehicle (and fairly narrowly defined research support at that) has proved to be inadequate and inappropriate to achieving this goal. Without additional resources being directed toward specific network strengthening activities ITS research support will deliver no more network strengthening additionally than the many other forms of research support that exists. While it is true that the earlier ROK's awardees do represent a very loose network of researchers the main function of this network seems to be in collaborating in to attract new research funding from ITS and elsewhere. This has an undoubted value, but it can not be said to be contributing directly to ITS's ambition to be a driver of institutional and policy change in support of innovation processes relevant to society.

The panel concludes that its rather paradoxical that while ITSs' conceptualisation in its prospectus highlights the notion of research as an embedded element of network in support of innovation, the program did not take additional steps to ensure that the research it was supporting was adequately embedded. This has undermined the impact and significance of the programme.

Annex 7: Publications List
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- Halla Thorsteinsdóttir, Tirso W. Saenz, Maria Carlota de Souza Paula, Wen Ke, Magdy A. Madkour, Sachin Chaturvedi,Victor Konde. Introduction

- Tirso W. Saenz, M. C. Souza-Paula, Christina C. Melon, Monali Ray, Halla Thorsteinsdóttir: Setting a Southern Course: Brazil's South-South Collaboration in Health Biotech

- Wen Ke, Zhang Jiuchun, Li Lexuan, Chen Guang, Christina C. Melon, Halla Thorsteinsdóttir: Beyond the Great Wall: China's South-South Collaborations in Health Biotechnology

- Magdy A. Madkour, Sahar Aly, Nefertiti Adly, Christina Melon, Halla Thorsteinsdóttir: Learning through Collaborations: Egypt's South-South Health Biotechnology Collaboration

- Sachin Chaturvedi, Halla Thorsteinsdóttir: Growing Southern Agenda: India's South-South Health Biotech Collaboration

- Victor Konde, Halla Thorsteinsdóttir: Promoting African Unity: South Africa's health biotechnology collaboration with Sub-Saharan African countries

- Halla Thorsteinsdóttir, Tirso W. Saenz, Maria Carlota de Souza Paula, Wen Ke, Magdy A. Madkour, Sachin Chaturvedi,Victor Konde. Conclusion

Erika Kraemer-Mbula and Watu Wamae (Eds.) (Forthcoming). *Innovation and the Development Agenda*. IDRC/OECD.

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Andrew Kapoor, Peter Singer, Joseph Wong, Halla Thorsteinsdóttir: South-South Collaboration in Health Biotechnology: Sub-Saharan Africa's Collaboration with China and India.

Eun, Jong-Hak, "Behavioral patterns of Chinese firms in pursuing innovation crossownership type analysis," working paper.

Joseph, KJ, and *Vinoj Abraham,* "Inter Industry Variations in Industry University Interactions and their Determinants," *Economic and Political Weekly* (submitted)

Lee, Keun, and Boo-Young Eom, ―Determinants of Industry-Academy Linkages and Their Impact on Firm Performance: The Case of Korea as a Latecomer in Knowledge Industrialization," *Research Policy*

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Rajeshwari Raina. Fostering Bio-Innovation in Asia: Knowledge Gaps and Challenges.

Rajeshwari Raina. Fostering Bio-Innovation in Asia: Ways Forward.

Annex 8: A Note on Research Quality

Preliminary remarks

The Panel notes the ambition stated in the ITS prospectus to support and promote what has become known as ‗embedded research' i.e. research embedded in the processes and with the stakeholders in innovation processes and in S &T policy making and decision taking.

The Panel accepts the subjective element inherent in judging research quality, and that instruments to measure quality objectively have well-understood limitations.

The Panel accepts also that assessment of quality is influenced by the fact that the ITS is a new program, that to a considerable extent it has sought to reach out to and support younger researchers, and that ‗knowledge and information' takes time to move around and make its mark. The Panel also notes that a number of publications are in preparation as projects draw to a close and these could change somewhat the picture sketched here.

The Panel discovered that the program holds no consolidated list of research outputs and makes no central effort to keep track of these in any organised fashion. While every effort was made to update the information available (annex 9), the Panel acknowledges that some materials might have been overlooked.

General findings

Overall, the ITS panel considers that:

- research output in quantitative terms is acceptable, if modest in quantity for a five year program (with roots further back to 2001);

- with exceptions, such as those noted below, the research outputs have been only moderately visible to either the program's peers in the world of innovation studies (the LINK inquiry), or to decision makers and policy individuals (the email questionnaire);

- project participants are only to a limited extent accessing and learning from the research findings of other ITS projects and programmes (interviews);

- the researchers interviewed positioned their research largely in terms of its interest to academic audiences, except in those projects which were embedded in policy processes; and,

- although embedded research was carried out (e.g. project waste water treatment, Sri Lanka; STI reviews), the majority of the research grants were for research conceptualised in conventional process terms i.e. first do the research, then figure out how to push ‗research into use.'

Specific findings

Journal articles All English-language journal articles published by the time of this Review (N=32, of which 21 international and 11 national) were accessed in Google Scholar and Scopus and the Impact Factor of the journal and the Citation Indices were extracted (if available) (see analysis at the end of this Note) Not surprisingly, articles published in Nature (2) and Nature Biotechnology (3) scored highest on all counts. These articles clearly add significant value to important societal debates and policy thinking. However, the Panel also notes that articles such as these implicitly

adopt a particular point of view of the purpose of innovation and the role of science and technology in processes of change. The harder societal and policy issues are not confronted.

The other articles (where such information is available) scored in the lower-middle to lower range for university-based academic research. The Review Panel has read five randomly selected articles of those remaining once the 5 _high fliers' have been excluded (n=27)[7]. In the Panel's judgement they make solid, worthy, and useful but not outstanding or significant contributions to the flow of evidence-based information on the topics addressed.

Interview respondents' judgements of the quality of the journal article output are in line with this analysis. The panel notes that none the less an article so classified might still have significant local impact if its appearance can make an opportune contribution to a particular decision or policy process.

In a number of cases interviewees drew attention to additional journal articles written in non-European languages and intended for a domestic audience. While the Panel cannot assess these directly the point is well taken that these, too, may be contributing significant input to societal debates, entrepreneurial decision making, and policy thinking.

Conference and seminar papers The program has provided support for research teams, and especially younger researchers, to attend domestic and international conferences and interact with a wider audience (that typically included also non-academic stakeholders). This is highly appreciated by those who have benefited, and has been experienced as a significant contribution to (academic) career development. On a number of occasions, the researchers have developed important contacts as an outcome of their presentations, and these appear to be opening up further opportunities (e.g. reported by project 104043, in relation to UN agency interest in following up the work on South-South collaboration on health biotechnology).

Books and book chapters ITS has generated a steady stream of books, monographs and book chapters, mostly printed commercially. One book, Tansey & Rajotte's on The future control of food (2008), has been cited by interviewees as _outstanding' [_aclassic reference', _indispensable',' hugely influential', opinions with which the panel wholeheartedly agrees].The book builds on earlier work that was part funded by ITS; the main ITS contributed to the book preparation and publication costs [103311]. Three other manuals and monographs, arising from research support to one project (104753) in Africa are regarded as especially _significant' because filling a felt practice need, a knowledge gap and as contributing importantly new information and analysis. No research-based project as yet has attempted interactive multi media web-based publishing.

Additional materials Interview respondents, where appropriate, were asked if they wished to share additional materials that might not have been mentioned in project reports but that they considered to be significant outputs of the project (and in a number of cases, of closely related work though not supported through the ITS). These were read also by the Panel and accepted as evidence of lively efforts to contribute to the flow of intellectual debate, as well as to extend research findings to non-academic audiences.

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[7] Göransson, B., 2009; Pun-Arj, C. 2009; Hunag Jikun et al., 2007; Hu et al., 2009; Smale et al., 2008.

Final reflections

Experiential highlights Not surprisingly, a number of researchers reported during the interviews that, for them, the highlights included the opportunities created through the project to interact and come into dialogue directly with policy makers and decision takers, and/or with entrepreneurs. They not only experienced such moments as personally satisfying but it reinforced their belief that ‗research influence' is most effective when such direct interactions and dialogue can be orchestrated. This insight, however, is not in itself new, having been robustly established before the inception of ITS and indeed it forms one of the justifications for ‗embedded research'. This point draws attention once again to the importance of assessing the kinds of investment the program has made in the *researching process* as a core strategic program decision, rather than ‗research quality' per se.

The Panel has been disappointed to note that the research grants and competitions have relied predominantly on the conventions of academic research and only occasionally (e.g. in the waste water treatment/management project, Sri Lanka – 104357, where there was close interaction with policy persons and decision takers) sought to orchestrate researching processes of a different kind. In this perspective ITS has not positioned itself at the forefront of those developing and testing options for multi-stakeholder knowledge generation and learning. A few researchers (e.g. under 103929 – IS for Inclusive Development – India) have conducted case studies —embedded research" e.g. on how entrepreneurs decide how and what information they need, what they then do to access or commission this, and what researchers and research communities do in response to such ‗client demand, by means of soliciting invitations to position researchers close to entrepreneurial activity. However, the significance of this kind of work, as among the ‗best practice' approaches already established in innovation studies, has had no strategic impact on the program as a whole.

Further reflections on the contribution of ITS research to method development and theories of change A number of program staff have drawn the Panel's attention to the work on impact assessment (e.g. project 103577 – Assessing the Socioeconomic Impact of Transgenic Crops on Small scale Farmers: Best Practices). The Panel commends both the quality of publications flowing from this work and its usefulness. However, the Panel also notes that it sits comfortably within the ‗end of pipe' tradition of impact studies, for which there is a vast extant literature i.e. the implicit ‗theory of change' at work here remains locked into the familiar ‗linear model' of innovation as arising from expert knowledge that is transferred ‗down the pipe' to end users, and that then diffuses to others. Undoubtedly this is sometimes ‗how the world works'. It is often unquestioned and unexamined, not least because it is based on assumptions that are reassuring to experts and that appear to reaffirm the role of scientists and academic researchers as ‗leading knowledge actors'. However, this is one of the most extensively researched areas of social science and the weight of evidence and analysis demonstrates that often innovation processes do *not* work this way, and that there are other robust models and ‗theories of change' that are effective, compelling and necessary to understand and apply if policy makers and researchers want to intervene in ‗knowledge economies' and make the most of opportunities for innovation.

Although the interviews revealed, as the Panel had anticipated, that partnerships with recognised and thus more mature researchers, who already have established

international reputations in the ITS program area, are well aware of what is said here, the Panel was disappointed to note that by far the majority of the project leaders and partners interviewed, as well as program staff, were not at all familiar with the kind of discussion sketched here, or the literature and experiences accumulated over the last 60 years and beyond in relation to this. The Panel understands at least some of the reasons why this might be so but finds that it has severely limited the program's ability to develop leading edge work in the ITS area.

Table 7.1: Bibliometric Analysis (n=32)

Publication	Impact Factor	Citation Index-Google	Citation Index-Scopus	Citations (NOTE that google scholar citation indices also list all conference papers and other published documents that are not necessarily in peer-reviewed journals)
INTERNATIONAL				
Göransson, B., Maharajh, R. and Schmoch, U. (2009) ̲New challenges for universities beyond education and research', Science and Public Policy, Volume 36, Number 2.	2.57	NRF	2	Sotoudeh, M. (2010). 'Introduction: Technical universities for sustainable development - Learning to deal with complexity' GAIA 19 (1).
				Ciumasu, I.M. (2010). 'Turning brain drain into brain networking'. Science and Public Policy 37 (2).
Rapini, M.S., da Motta e Albuquerque, E. (2009). 'University–industry interactions in an immature system of innovation: evidence from Minas Gerais, Brazil'. Science and Public Policy, 36(5).	2.57	1	1	Ciumasu, I.M. (2010). 'Turning brain drain into brain networking'. Science and Public Policy 37 (2).
Costa Ribeiro, L., Machado Ruiz Æ, R., Ame´rico Trista˜o Bernardes, Æ.A. and Motta Albuquerque, Æ. E. (2009). 'Matrices of science and technology interactions and patterns of structured growth: implications for development'. Scientometrics, 12.	2.328	1	0	Ribeiro, L.C., de Azeredo Moura, I., de Melo Franco, L.T., Rapini, M.S., and e Albuquerque, E.M. (2009). 'The scientific and technological trajectories of four Latin American countries: Mexico, Costa Rica, Argentina, and Brazil'. Textos para Discuss.

Shanahan, M. (2006). 'Fighting a Reporting Battle'. Nature. Vol 443|28.	31.434	NRF	NRF	
Pun-Arj Chairatana. (2009). 'Knowledge, Innovation, and Service System in Latecoming Southeast Asia' Asian Journal of Technology Innovation 17, 1.	?	NRF	NRF	
Jikun, H., Zhang, D., Yang, J., Rozelle, S. and Kalaitzandonakes, M. (2008). 'Will the Biosafety Protocol Hinder or Protect the Developing World: Learning from China's Experience.' Food Policy, 33.	1.351	NRF	NRF	
Liefner, I. and Schiller, D. (2008). 'Academic capabilities in developing countries - A conceptual framework with empirical illustrations from Thailand'. Research Policy 37(2).	2.655	8	5	Kroll, H., Schiller, D., (2010). 'Establishing an interface between public sector applied research and the Chinese enterprise sector: Preparing for 2020' Technovation 30 (2).
				Ward, J. (2009). 'EAP reading and lexis for Thai engineering undergraduates'. Journal of English for Academic Purposes 8 (4).
				Adnan, N., Yaacob, Y., Hassan, M.K., Salleh, H.M., Noorbatcha, I.A. (2009). 'Developing CAS models in immunology teaching, 2009 Proceedings of the 2009 International Conference on Electrical Engineering and Informatics'. ICEEI 2009 1.
				Schiller, D., Brimble, P. (2009). 'Capacity building for University-Industry linkages in developing countries: The case of the Thai Higher Education Development Project'. Science, Technology and Society 14 (1).

				Liefner, I., Zeng, G. (2008). 'Cooperation patterns of high-tech companies in Shanghai and Beijing: Accessing external knowledge sources for innovation processes'. Erdkunde 62 (3).
				Zhao, W. and Wang, A. (2008). 'University-Industry Collaboration for Software Engineering Teaching'. The 9th International Conference for Young Computer Scientists.
				Lauridsen, L.S. (2009). 'The Policies and Politics of Industrial Upgrading in Thailand during the Thaksin Era (2001--2006)'. Asian Politics & Policy.
				Brooks, A. and Monirith, L. (2010). 'Faculty virtue and research capacity-building in the context of poorly funded universities: the case of the Royal University of Phnom Penh'. Human Resource Development International 13(1).
Hu, R., Pray, C., Huang, J., Rozelle, S., Fan, C. and Zhang, C. (2009). 'Reforming intellectual property rights and the Bt cotton seed industry in China: Who benefits from policy reform?' Research Policy.	2.655	NRF	NRF	
Huanguang, Q., Huang, J. and Yang, J. (2007). 'Consumers' Trust in Government and its Impact on Their Acceptance Toward Genetically Modified Food.' Economic Research Journal, 42(6).	?	1	NRF	Kaiguo, L.T.H.X.Z.A. (2008). 'Comparative Study on Domestic and Foreign Financial Institutions'. Journal of Financial Research.
(2007). 'Africa's academies: robust scientific institutions won't be built in a day'. Nature, 450 (1).	31.434	NRF	NRF	

Melon, C.C., Ray, M., Chakkalackal, S., Li, M., Cooper, J.E., Chadder, J., Ke, W., Li, L., Madkour, M.A., Aly, S., Adly, N., Chaturvedi, S., Konde, V., Daar, A.S., Singer, P.A., Thorsteinsdóttir, H. (2009), 'A survey of South-North health biotech collaboration'. Nature Biotechnology, 27(3).	29.495	3	3	Dionisio, D., Racalbuto, V., Messeri, D., (2010). 'Designing arvs patent pool up to trade & policy evolutionary dynamics'. Open AIDS Journal 4.
				Boshoff, N., (2010). 'South-South research collaboration of countries in the Southern African Development Community (SADC)'. Scientometrics 84 (2).
				Ray, M., Daar, A.S., Singer, P.A., Thorsteinsdóttir, H. (2009). 'Globetrotting firms: Canada's health biotechnology collaborations with developing countries'. Nature Biotechnology 27 (9).
Melon, C.C., Ray, M., Chakkalackal, S., Li, M., Cooper, J.E., Chadder, J., Sáenz, T.W., de Souza Paula, M.C., Ke, W., Li, L., Madkour, M.A., Aly, S., Adly, N., Chaturvedi, S., Konde, V., Daar, A.S., Singer, P.A., Thorsteinsdóttir, H. (2009). 'Mapping the Contours of South-North Health Biotechnology Collaboration: A Survey of Developing Countries' Firms'. Nature Biotechnology, 27(4).	29.495	NRF	NRF	
Falck-Zepeda, J., D. Horna, M. Smale. (2008). 'Betting on cotton: Potential payoffs and economic risks of adopting transgenic cotton in West Africa'. African Journal of Agricultural and Resource Economics, 2(2).	0.452	1	NRF	F-Z. José, Horna,D., Zambrano, P. and Smale, M. (2008). 'Policy and Institutional Factors and the Distribution of Economic Benefits and Risk from the Adoption of Insect Resistant (Bt) Cotton in West Africa'. Asian Biotechnology and Development Review 11(1).
Guellec, D and B. Van Potteslberghe de la Potterie. (2004). 'From R&D to Productivity Growth: Do the Institutional Settings and the Source of Funds of R&D Matter?'. Oxford Bulleting of Economics and Statistics,	0.705	85 (a sample shown here)	NRF	Madsen, J. B. (2008). 'Semi-endogenous versus Schumpeterian growth models: testing the knowledge production function using international data'. Journal of Economic Growth, 13(1).

66(3).				Aiginger, K. and Falk, M. (2005). 'Explaining Differences in Economic Growth among OECD Countries'. Empirica, 32(1).
				Madsen, J. B. (2008). 'Economic Growth, TFP Convergence and the World Export of Ideas: A Century of Evidence'. Scandinavian Journal of Economics, 110(1).
Thorsteinsdóttir, H., Melon, C.C., Ray, M., Chakkalackal, S., Li, M., Cooper, J.E.,Chadder, J., Saenz, T.W., de Souza Paula, M.C. Ke, W., Li, L., Madkour, M.A., Aly, S., Adly, N., Chaturvedi, S., Konde, V., Daar, A.S. and Singer, P.A. (2010). 'South-South Entrepreneurial Collaboration in Health Biotech: Boosting Trade and Innovation?' Nature Biotechnology, 28.	29.495	NRF	NRF	
Smale, M. Niane, A., Zambrano, P. and Jones, H. (2010). 'Une revue des méthodes appliquées dans l'evaluation de l'impact economique des plantes transgéniques sur les producteurs dans l'agriculture non-industrialisée: La première décennie'. Revue d'Economie Rurale, 315(1).	?	NRF	NRF	
Smale, M., Zambrano, P., Gruère, G., Falck-Zepeda, J., Matuschke, I., Horna, D., Nagarajan, L., Yerramareddy, I. and Jones H. (2009). 'Measuring the Economic Impacts of Transgenic Crops in Developing Agriculture during the First Decade: Approaches, Findings, and Future Directions'. IFPRI Food Policy Review, 10.	?	2	NRF	Glover, D. (2010). 'The corporate shaping of GM crops as a technology for the poor'. Journal of Peasant Studies, 37(1).

Smale, M., Zambrano, P. Falck-Zepeda, J. Gruère, G. and Matuschke, I. (2008). 'Economic impact of transgenic crops in developing countries: A note on methods'. International Journal of Biotechnology, 10(6).	0.367	2	1	Gruère, G.P., Mevel, S., Bouët, A., (2009). 'Balancing productivity and trade objectives in a competing environment: Should India commercialize GM rice with or without China?' Agricultural Economics 40 (4).
Smale, M., Zambrano, P. and Cartel, M. (2006). 'Bales and Balance: A review of the methods used to assess the economic impact of Bt cotton on farmers in developing economies'. AgBioForum, 9(3).	1.244	15	10	Glover, D. (2010). 'The corporate shaping of gm crops as a technology for the poor'. Journal of Peasant Studies, 37(1).
				Naranjo, S. E. (2009). 'Impacts of bt crops on non-target invertebrates and insecticide use patterns'. CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources, 4(4).
				Morse, S., & Mannion, A. M. (2009). 'Can genetically modified cotton contribute to sustainable development in Africa?' Progress in Development Studies, 9(3).
				Eaton, D., & Wiersinga, R. (2009). 'Impact of improved vegetable farming technology on farmers' livelihoods in asia: An overview of results of case studies in five countries'.
				Traore, O., Denys, S., Vitale, J., and Bazoumana, K. (2008). 'Economics & marketing: Testing the efficacy and economic potential of bollgard II under burkina faso cropping conditions'. Journal of Cotton Science, 12(2).

				Soleri, D., Cleveland, D. A., Glasgow, G., Sweeney, S. H., Cuevas, F. A., Fuentes, M. R., et al. (2008). 'Testing assumptions underlying economic research on transgenic food crops for third world farmers: Evidence from Cuba, Guatemala and Mexico'. Ecological Economics, 67(4).
				Morse, S., & Bennett, R. (2008). 'Impact of Bt Cotton on Farmer Livelihoods in South Africa'. International Journal of Biotechnology, 10(2-3).
				Kotschi, J. (2008). 'Transgenic crops and their impact on biodiversity'. GAIA, 17(1).
				Smale, M. (2007). Assessing the impact of technical innovations in african agriculture. Research Report of the International Food Policy Research Institute, (155).
				Vitale, J., Boyer, T., Uaiene, R., & Sanders, J. H. (2007). 'The Economic Impacts of Introducing Bt Technology in Smallholder Cotton Production Systems of West Africa: A Case Study from Mali. AgBioForum, 10(2).
				J Pender. (2007). 'Agricultural technology choices for poor farmers in less-favored areas of South and East Asia'. IFPRI discussion papers.
				Gruère, G.P., Mehta-Bhatt, P. and Sengupta, D. (2008). 'Bt Cotton and Farmer Suicides in India Reviewing the Evidence'. IFPRI discussion papers,

				Padaria, R.N., Singh, B., Sivaramane, N., Naik, Y.K., Modi, R. and Surya,S. (2009). 'A Logit Analysis of Bt Cotton Adoption and Assessment of Farmers' Training Needs'. Indian Research Journal Extension Education 9 (2).
Wamae, W. (2009). 'Enhancing the Role of Knowledge and Innovation for Development'. International Journal of Technology Management and Sustainable Development, 8(3).	?	NRF	NRF	
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Annex 9: Biographical notes of ER Team

Carlos Aguirre Bastos is researcher in the Centre for the Study of Science, Technology and Innovation of the National Academy of Sciences of Bolivia. At present is advising the National Technological University of Panama in its —Development Plan" and the National Secretariat of S&T of Panama in the definition of the National S&T Plan. Specialist in higher education, science and technology policies in developing countries, with ample experience in Latin America, Africa, South East Asia and the Middle East. He has been a visiting researcher in Argentina, Austria, Brazil, Germany, Italy, Japan, Panama, Peru, and the former Soviet Union. Has held several executive posts, among them President of the National Academy of Sciences of Bolivia, Executive Secretary to the National Council of S&T of Bolivia and Head of the Technology Policy Department of the Andean Group Secretariat.

Andy Hall is an agricultural science, technology and innovation policy researcher and advisor. The main focus of his work is exploring emerging patterns of innovation in the agricultural sector and the implications of this for sector planning and evaluation. He is currently Director of LINK Limited (www.innovationstudies.org) as well as being the head of the Central Research Team of The Research into Use (RIU) programme of UK's Department for International Development (DFID). He is a visiting professor at the department of Development Policy and Planning at the Open University, UK. Dr Hall received his Ph.D. in Science and Technology Policy Studies from SPRU, University of Sussex in 1994. He has held positions at the National Post-harvest programme, Kwanda, Uganda; the International Crops Research Institute for the Semi Arid Tropics, Hyderabad, India and the United Nations University-MERIT, Maastricht, the Netherlands.

Janice Jiggins PhD; Guest Researcher, Communications and Innovation Studies, Wageningen University, the Netherlands. (Professor, retired, Swedish University of Agricultural Sciences, Uppsala, Sweden). Program review experience on behalf of: the Ford Foundation, the World Bank, FAO, DGIS (Netherlands), DFID (UK), The Governments of India, Bangladesh, Republic of South Africa, the EU commission, and numerous university-based development research programs. Her experience also includes participation in the IAASTD; policy embedded foresight and scenario exercises at national, regional and global levels; and a range of expert witness hearings organised by governments and science councils.