



ISSUES IN BRIEF

Fostering South-South Research Collaborations

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One of the most vexing problems of international development today is the growing economic disparity between the countries in the developed and developing worlds. This ever-increasing gap is reflected by the concentration of 86% of the world's GDP, 82% of export markets, 74% of telecom infrastructures, and 68% of foreign direct investment (FDI) amongst only 20% of the world population (UNCSTD, 2005).

Over the last decade or so, while millions of people across a number of developing countries seem to have made significant strides in economic prosperity, most notably in Brazil, Russia, India, and China (the BRIC countries), hundreds of millions still remain struggling under the crushing burden of meeting everyday needs — food, water, and shelter — as well as disease and conflict.

Perhaps an important, though sometimes neglected, element of the growing deprivation of the developing countries (the 'South') is in the educational and scientific areas. Today high-income countries spend roughly 1.5 to 3.8 per cent of their GDP on research and development (R&D) and fund more than 80 per cent of the world's R&D activities. In contrast, most developing countries spend less than 0.5 per cent of their GDP on R&D activities and some developing countries spend as low as 0.01 per cent (UNCSTD, 2005). The disparities in levels of primary and tertiary education are even more shocking.

Yet, it is the capacity to absorb and create knowledge and use it constructively that has been instrumental in improving the lot of peoples and nations throughout the course of human history. Whether one looks at the dynamics of the industrial revolution in the late 18th and early 19th centuries or the emergence of the so-called knowledge economy of the 21st, societies' capacity to use existing knowledge and create new knowledge has often paved the way for development and prosperity. Yesterday and today, scientific research and technological innovation are central to the development enterprise.

As the development of indigenous scientific institutions and capacities is becoming a key priority of national-level policy-makers in many developing countries, creating the necessary

human and institutional capacity to carry out scientific research and technological innovation in the countries of the South has also become an important goal for development planners and science and technology policy-makers. Two of the most important ways through which the latter is achieved are a) the exchange of scientific knowledge and best practices through the circulation of scientific talent (for example, through international fellowships and exchange programs) and b) international collaboration between researchers and institutions across countries.

While most international collaborations in this realm are primarily between sets of developed and developing countries (i.e. North-South collaborations), scientific collaboration and cooperation between countries of the South itself (i.e. South-South collaborations) are often overlooked. The latter, which have only recently begun to emerge, can be equally fruitful avenues for scientific capacity building in the South.

This paper looks at the current state of South-South research collaborations and develops a rationale for a more systematic and multilateral approach to pursuing such efforts.

Emerging Trends in International Research Collaborations

Scientific and technological research today is an international endeavor. Indeed in many ways it is the globalization of science and technology that has preceded the trend of economic and cultural globalization around the world. The advent of information technology and the internet have created a medium for communication and collaboration, enabling researchers from around the world to work with each other.

Recent decades have seen an increasing tendency among scientists and researchers around the world to collaborate with each other, and these collaborations happen in a variety of ways (i.e. North-North, North-South, and South-South). It is now widely accepted that collaboration between researchers in different countries can improve both the quality and

impact of scientific research. For example, a study commissioned by the United Kingdom's Office of Science and Innovation (2007) that looked at scientific collaboration between the United Kingdom, the United States, Western Europe, Australia, Japan, India, and China found that the trend towards international collaboration was growing faster than the overall volume of scientific output of these

countries. While scientific collaborations amongst developed countries grew by as much as 50 percent over two five-year periods, those between developed and developing countries (India and China) and those between these two developing countries grew much faster (see Figure 1).

The study also found that scientific papers co-authored by researchers from different countries received a greater number of citations — an indicator often used as a measure of scientific

Figure 1: Change in Scientific Collaboration Between Countries: Ratio of Internationally Co-Authored Papers Between 2001-2005 and 1996-2000

	UK	USA	Canada	France	Germany	Japan	Australia	China	India
UK	-	1.4	1.51	1.39	1.50	1.33	1.59	1.94	1.65
USA		-	1.35	1.31	1.37	1.31	1.50	2.23	1.54
Canada			-	1.34	1.56	1.28	1.51	2.05	1.56
France				-	1.40	1.49	1.55	2.05	1.48
Germany					-	1.36	1.61	1.96	1.81
Japan						-	1.49	2.20	2.10
Australia							-	2.50	1.96
China								-	2.79
India									-
Average	1.52	1.50	1.51	1.51	1.54	1.50	1.68	2.13	1.86

Source: UK Office of Science and Innovation, 2007

impact – than those authored by multiple researchers from a single country. U.S. National Science Foundation (2007a, 2007b) studies confirm the trend. One study found, for example, that peer reviewed scientific publications using at least one international co-author increased from 9 percent to 26 percent of all publications between 1988 and 2005 (National Science Foundation, 2007a).

While the overall trend is unambiguous, the growth in collaboration or its impact is not uniform across all developed and developing countries. Another National Science Foundation (2007b) study estimates that while the proportion of internationally co-authored articles by scientists of Brazil, China, and Taiwan remained roughly constant between 1993 and 2003, those by scientists from India increased from 13 to 21 percent. There is also considerable evidence to suggest that prevalence and impact of international collaboration varies across various scientific disciplines (see Figure 2).

Figure 2: Change in Scientific Collaboration with Chinese Scientists: Growth Ratios for Co-Authored Papers Published Between 2001-2005 and 1996-2000

	UK	USA	France	Germany	India
Clinical	1.77	2.56	1.85	2.64	2.22
Health	1.43	1.95	2.33	2.26	3.38
Biological Sciences	2.09	2.79	2.34	2.49	3.17
Environment	2.15	2.91	2.32	2.46	4.00
Mathematics	1.70	1.89	2.04	1.62	2.44
Physical Sciences	1.98	2.01	2.06	1.81	2.71
Engineering	1.87	1.89	2.28	1.62	3.06

Source: UK Office of Science and Innovation, 2007

Emerging Trends in South-South Research Collaborations

To be fair, South-South research collaboration is not an entirely new phenomenon. However the need for formal institutional capacity and a logical framework to guide the South-South research collaboration movement is only now beginning to be felt. There appear to be several reasons for this emerging trend.

- First, the forces that fuel other forms of collaboration – such as the Internet, communication technologies, and ease of travel – are also making South-South research collaboration easier to carry out.
- Second, the emergence of a scientific hierarchy within the developing countries themselves is creating classes of leaders and followers within the scientific arena, making it possible for some of these countries to ‘give,’ and others to ‘gain,’ through scientific collaboration.
- Third, recent improvements in the economic circumstances of certain developing countries have resulted in increases in scientific spending, which itself creates both an opportunity and an impetus for greater collaboration.
- Finally, the opening up of the world through globalization has been accompanied by a closing-down of international research collaboration in some countries – particularly the United States – driven primarily by anti-immigration sentiments and security challenges of the post-9/11 era. This has shifted the attention of some developing countries towards the South rather than the North.

On a bilateral and multi-lateral level as well, developing countries are increasingly choosing to collaborate with those of relatively similar economic standing. Some of the relatively well-known examples of these collaborations have come from Africa, India, China, and Brazil. Many of these arrangements have political origins, and are spurred as much by the agendas

of political leaders as by any demand from the scientific community. Nevertheless, they can become important sources of funding for South-South research collaboration that can also produce scientific and technical benefits.

The Rationale for South-South Research Collaboration

The value and benefits of North-North and North-South research collaboration are well established, in terms of increasing research productivity and bringing mutual advantages to the participating partners, in both theory and practice.

In contrast, the concept of South-South research collaboration is still in its infancy. Three main reasons to promote South-South research collaborations are usually put forward by its proponents:

- To enable these countries to work together to address some of the problems that they may have in common (for example, tropical diseases, agricultural needs or threats from climate change).
- To broaden the overall opportunities for researchers in developing countries.
- To provide opportunity for developing country researchers to help other developing country researchers develop an indigenous capacity to generate, manage, and utilize science and technology to address their needs.

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The first rationale advanced for increased attention to South-South collaboration makes for the strongest arguments in the favor of such endeavors. Certain scientific problems – particularly those that result from specific common social or geographical environments – can favor collaboration between countries of similar socio-economic circumstances and scientific standing. Examples include the co-development of a possible malaria vaccine or low-

cost HIV/AIDS treatments, problems associated with water-borne diseases, or those relevant to certain climatic zones, etc.

With regards to the second rationale, South-South collaborations can certainly broaden the opportunities available to researchers within countries that may not (for reasons such as resource availability or international relations) be able to pursue other forms of international collaboration and thus open avenues for professional advancement and growth. But this may not be a sufficient rationale in and of itself. If such collaborations are to be productive, the motivation behind them must be matched with the concrete benefit they may bring to all participating parties as well as creating a productive research environment for all partners.

The last of the three primary rationales mentioned above is perhaps the easiest to address. South-South research collaboration provides an opportunity to build capacity for carrying out scientific research within a country. Collaborating with scientists of countries with similar socio-economic and scientific background can help to ensure that research is more attuned with a particular country’s needs. Pursuing these collaborations also creates a critical mass (sectorally or regionally) of scientists working on a particular set of problems that generates the necessary momentum to solve those problems. However, it needs to be acknowledged that there can be a downside too: working with scientists with similar institutional backgrounds may deprive collaborating scientists of opportunities to learn from international best practices and professional norms, which still reside in the advanced economies of the North.

In all instances, therefore, where South-South collaboration is proposed or pursued, the collaboration must include precise arrangements that are carefully evaluated and designed to achieve the maximum usefulness, benefit, and sustainability of the joint effort.

From a practical and pragmatic standpoint, what constitutes effective South-South research collaboration? Several issues should be addressed when considering the practical challenges of putting in place such arrangements between countries, institutions, and scientists. These include:

- Are there particular topical avenues or research areas that are better suited for countries of the South alone?
- Should South-South research collaboration be pursued on a broad-based or problem-by-problem basis?
- What is the most appropriate institutional level (i.e. between countries, between institutions, or between individuals) at which collaboration is best pursued?
- What is the role of incentives for both institutions and individuals in promoting South-South collaboration linkages?
- What kinds of policy interventions and initiatives can be used to promote South-South research collaboration?
- Are there any particular institutional arrangements between countries that may improve the likelihood of success? Do the optimal institutional arrangements vary between different scientific sectors?
- How important is funding in promoting and sustaining South-South research collaboration?

Obstacles to South-South Collaboration

Clearly, there are many important issues at stake here that need to be considered as the practice of South-South research collaboration matures. In particular, there may be pragmatic arguments that in some instances South-South research collaboration, however attractive, may not be appropriate. In other circumstances, there may be hurdles to such collaboration that significantly reduce its chances of success.

Funding with 'strings'. One strong impediment to effective South-South research collaboration is the availability, or rather lack, of independent research funding. Availability of funding for science and technology is often a political decision, made on the basis of an established (or perceived) social contract between the people, political leadership, and the scientific community. Research in the South is generally more prone to the constraints of funding limitations and politicization simply because the funding pool is so much smaller. Indeed, one of the primary incentives for participating in North-South collaboration is the ability of such collaboration to act as highly sophisticated vehicles of development assistance from the developed to underdeveloped partners.

In contrast, this argument is somewhat weak for South-South collaboration because financial support for scientific research in many of the participating countries in the South is already considerably limited, if not lacking completely. While the above can be countered with the assertion that South-South collaborations may sometimes be undertaken at a fraction of the cost of North-South collaborations, the actual experience of putting these together suggests that the actual costs can be significantly high, that many of these initiatives remain critically under-funded, and often they fail to go beyond mere political slogans.

Institutional arrangements. Another important issue is the type of institutional mix necessary to make South-South collaboration work. South-South collaboration can be carried out under a variety of institutional regimes. For example, these may be:

- A hub-and-spoke type arrangement — with one “core” country collaborating with several smaller countries.
- A senior-junior partner type arrangement — a large country collaborating with a small country.
- Equal-partners type arrangement — two or more countries of equal standing collaborating.
- Regional arrangements — research collaborations within a region.
- Dispersed arrangements — research collaborations dispersed across multiple partners.

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Each of these arrangements has its own challenges and constraints. Experience of trying to promote research collaboration among existing regional blocks, such as Asia Pacific Economic Cooperation (APEC) or South Asian Association for Regional Cooperation (SAARC), for example, highlights the importance of the need to find areas of overlapping interests, align strategy with interests, and provide support with appropriate institutional

structures. It is, therefore, important to understand the dynamics and politics of each collaborating entity to arrive at optimal institutional structures necessary for successful South-South research collaboration.

Alignment of incentives. One of the most important dimensions in the South-South research collaboration, as in any kind of scientific collaboration, is the motivations and incentives of the individual researcher. A mismatch between what is expected of individual scientists and researchers, and what they are rewarded for (financially and professionally) can lead to dysfunctional behaviors and ineffective collaboration.

For example, one of the primary motivations for scientists from developing countries to engage in North-South collaboration is the opportunity to work alongside scientists from the developed world. This not only leads to transfer of knowledge and international best practice, but also improves their chances of getting published in high-quality journals of international repute. This motivation may be considerably weakened when scientists are required to work with other scientists of the same level of international standing, as is likely to be the case in many South-South collaborations.

While the rationales for pursuing scientific and research collaboration between countries of the South can be compelling the bottlenecks and obstacles are equally daunting at the individual, institutional, national, and international levels. South-South research collaboration, however politically attractive, should therefore not be pursued uncritically.

Towards a Multilateral Approach to South-South Research Collaboration

South-South research collaboration is a new and emerging field of endeavor. For many reasons it is a trend that needs to be encouraged and promoted by the global scientific community and the policy-makers alike. Creating the political will and financial space to support South-South research collaborations should be a high international priority.

In an apparent, but often repeated paradox, practical applications of knowledge may precede an in-depth theoretical understanding of the underlying principles. The same is true of South-South research collaboration. Here too, the practical implementation of the idea has preceded the development of a conceptual framework (or theory) that helps in understanding and addresses the several issues already raised above. With a few notable exceptions (one being a survey on South-South cooperation for development published in the United Nations Development Program's Cooperation South magazine in 2000), there is a general dearth of systematic thinking on, and deep understanding of, the basic issues and challenges that have constrained the growth of this idea.

The answers to the questions raised above would constitute a comprehensive framework to guide the development of South-South research collaboration. Such a framework would put all the pieces of the puzzle together seamlessly. The current absence of answers, however, is likely to remain a significant constraint, if not an outright bottleneck, even though South-South research collaboration may mature over time.

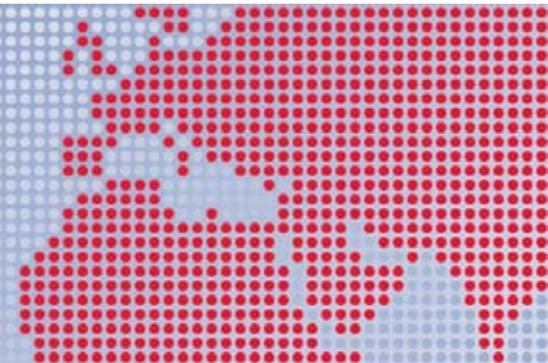
Such a framework would use knowledge about international best practices, taken not only from existing South-South research initiatives, but also from North-North and North-South research collaborations. This would help develop a best practice toolkit to ensure that South-South collaborations operate effectively and deliver value to participating countries.

A comprehensive framework would also encourage an evidence-based policy regime for South-South collaboration. It would identify effective policy levers, initiatives, and institutional interventions to inform the policy debate and help in designing South-South collaborations that deliver on their promises. Understanding what motivates scientists would be an important component of such an evidence-based policy regime. This would help design incentives that encourage researchers to work under different cooperative schemes.

Finally, the framework would draw on the theory and practice of international cooperation in general to develop a workable recipe for multilateral scientific collaboration. It would need to avoid generating conflicting political and national interests, exploit similarities and complementarities in scientific capacities, and overcome regulatory and legislative differences.

Such a framework, and the process of arriving at it, could foster South-South research collaboration in three important ways.

- First, it would rid the field of vague, ill-structured and untested 'experiments' and provide a solid evidence-based foundation. Collaboration may be based on an adaptation of the Centers of Excellence model, on the replication of international cooperative agreements, by creation of institutions similar to the International Centre for Theoretical Physics in Trieste, or even a mix of each of them. In each case, a focused, evidence-based policy regime is most likely to succeed.
- Second, the process of creating and arriving at the framework will itself increase the chances of a political consensus on its implementation. International scientific collaboration requires political will at the highest level within participating countries. And this must be fully backed by a serious commitment of resources. Only by putting their money where their mouths are can policy-makers ensure that South-South research collaboration is more than a political slogan.
- Third, a comprehensive, multilateral approach to South-South research collaboration would provide the basis for a common legislative and institutional framework. This could free institutions from bureaucratic red-tape that might otherwise restrict international collaboration.



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Placing South-South collaboration in a multilateral, rather than bilateral, framework would also create a level playing field, allowing countries to participate on appropriate terms and ensuring that larger players do not exploit smaller countries for short-sighted political gains. Ultimately, however, the true success of South-South research collaboration initiatives can only be measured by their ability to achieve sustainability beyond an initial period of enthusiasm and startup funding, deliver high-quality and high-impact research, and solve challenging scientific problems of the South.

Making South-South research collaboration succeed on all of these measures is one of the biggest organizational and political challenges facing the scientific community in the South. ●

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