A dialogue on trade and development in South Asia

Vol. 8, No. 4, 2012

TRADE insight

TECHNOLOGY AND DEVELOPMENT

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editors' note

Bridging the technology divide

TECHNOLOGY is key to structural transformation and sustained economic growth. It is also critical for improving human wellbeing in terms of health outcomes. The yawning gap between technology development in the North and the South is one factor that explains the differences in living standards of the two worlds.

There is heterogeneity among Southern countries too. Fast developing economies such as China and select Southeast Asian countries are way up on the technology ladder, while countries in South Asia lag behind significantly in acquisition, generation, adaptation and application of technology. Even within South Asia, there are significant differences in technological capabilities and outcomes across countries, with India and Sri Lanka generally ahead of the rest, albeit outperformed by other developing countries. The structural handicaps faced by the four least-developed countries (LDCs) of the region—Afghanistan, Bangladesh, Bhutan and Nepal—are to a significant extent determined by their poor technological capacity. This holds equally true for the Maldives, which graduated from LDC status in 2011. Relatively low technology development also constrains India's and Sri Lanka's ability to move out of the middle-income trap.

A host of factors, internal and external, are driving the technological divide. Limited involvement of the private sector in research and development; silo mentality of technology promoting institutions; policy-implementation gap; human resource constraints; and budgetary constraints are the major internal factors. Low technology transfer is the major external factor.

At the multilateral level, there is a need to include technology issues in the post-2015 global development framework—which is relevant for developing and least-developed countries alike—and set milestones and targets for an effective enforcement of Article 66.2 of the Agreement on Trade-Related Aspects of Intellectual Property Rights of the World Trade Organization to enable technology transfer from developed countries to LDCs. It is unfortunate that developed countries have honoured Article 66.2 largely in the breach than in the observance. While placing technology in the global development framework, the issue of technology justice must also be addressed, as we have seen technological innovations ignoring the poor and the non-neutrality of technology.

The technological differences among South Asian countries indicate scope for intra-regional technology transfer in areas ranging from modern technology to indigenous farming technology. South-South technology transfer has the advantage of low cost of transfer coupled with fast diffusion and adaptation. The South Asian Association for Regional Cooperation (SAARC) as an institution lacks an active programme to promote technology in areas such as development of agriculture, manufacturing and services. Filling this gap is essential to facilitate intra-regional technology transfer. Furthermore, a collaborative regional approach needs to be adopted to draw technology from developing countries outside the region. A potential in this regard that remains to be harnessed is technology transfer from China, which is far ahead of all South Asian countries in almost every department of technology and, importantly, is also an observer to SAARC. In similar vein, SAARC must come up with initiatives to benefit, among other things, technologically from the presence of key developed countries as observers to the regional body. ■

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1. Journalists for Democracy and Human Rights (JDHR), Islamabad
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SRI LANKA
1. Institute of Policy Studies (IPS), Colombo
2. Law & Society Trust (LST), Colombo

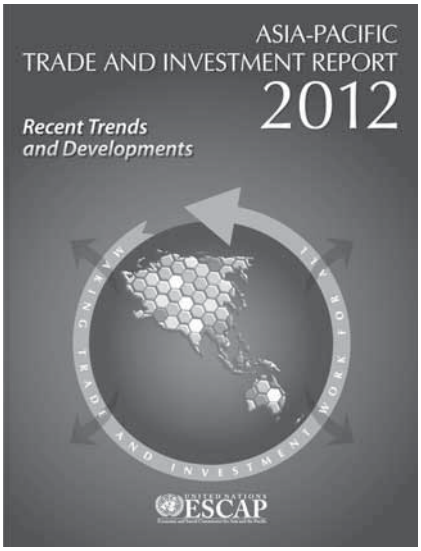
Asia-Pacific trade challenged by weak demand and high trade costs

"EXPORT opportunities will continue to depend largely on the growth of intra-regional demand and the ability of developing countries in the region to deal with various external shocks", is a key message of the *Asia-Pacific Trade and Investment Report 2012*, produced by the United Nations Economic and Social Commission for Asia and the Pacific.

According to the Report, the Asia-Pacific region's trade growth is threatened by continued weakening of demand with limited progress in reducing trade costs and barriers for low-income, landlocked and least-developed countries. Amid rising uncertainties within and outside the region, export growth and import growth are expected to slow down. Export growth in real terms in the developing Asia-Pacific region is expected to drop from 6.5 percent in 2011 to 2 percent in 2012, while the growth of imports is expected to contract from 9 percent to 3 percent during the same period. Pressure in the euro zone and the rising threat from a slowdown in emerging economies have raised the fear of a re-emergence of trade and investment contraction. How economies in the region will react to this weakening of external demand for their exports will determine the speed and quality of growth in the region.

In 2011, the Asia-Pacific region remained the largest source of its merchandise imports: almost 14 percent of imports by the region's economies was sourced from China, 27 percent from developing Asia-Pacific economies and 13 percent from developed Asia-Pacific economies. The European Union (EU) and the United States jointly supplied less than one fourth of imports while the remaining one fourth of imports came from the rest of the world.

The region accounted for over one fourth of global commercial services exports. Its share was the largest in exports of transportation services—almost 29 percent. It captured close to 28 percent of export of travel services and one fourth of exports of other commercial services. The region exported over half of global construction services and hosted eight of the world's 10 largest exporters of travel services in 2011.



The region as a whole, including developed economies, attracted 33 percent of global foreign direct investment (FDI) inflows in 2011, a considerable increase from its 18 percent share in 2005. Developing economies of the region are emerging as key sources of FDI in the region. The role of least-developed countries (LDCs) remains marginal with less than 1 percent of inflows going to these countries. Promoting investment flows in order to facilitate the entry of local companies into global and regional value chains is critical for sustained high growth of LDCs.

The average time required to complete trade procedures in the region still stands at three times the average of the Organisation for Economic Co-operation and Development. The cost of conducting intra-regional trade in goods remains particularly high, with intra-regional trade costs among Central Asian countries up to five times higher than those prevailing among EU countries.

Tariffs have accounted for 14 percent of total protectionist measures implemented since 2010 in the region. Measured by the number of discriminatory measures per US$1 million worth of exports, the exports of a group of Asia-Pacific LDCs were targeted 7.5 times more heavily than Asian BRICS countries.

Amid tepid trade growth, Asia-Pacific countries continued to expand the network of preferential trade agreements (PTAs) and are now implementing almost 150 PTAs of different types and scopes. Frequently, partners come from outside the region, and there are only 19 agreements between countries sharing continental borders. The Report highlights the need to consolidate the content of liberalization and regulation under these multiple agreements in order to promote region-wide trade and investment integration. Two competing initiatives—Regional Comprehensive Economic Partnership and Trans-Pacific Partnership—are explored as possible efforts to deal with the noodle-bowl phenomenon *(Based on Asia-Pacific Trade and Investment Report 2012)*. ■

Farmers invest the highest in agriculture

INVESTING in agriculture is one of the most effective strategies for reducing poverty and hunger and promoting sustainability. This is the central message of *The State of Food and Agriculture 2012*, an annual report of the Food and Agriculture Organization of the United Nations (FAO). In 2010–2012, almost 870 million people in the world were chronically undernourished. The vast majority live in developing countries, where about 850 million people, or slightly fewer than 15 percent of the population, are estimated to be undernourished.

The regions where agricultural capital per worker and public agricultural spending per worker have stagnated or fallen during the past three decades are also the epicentres of poverty and hunger in the world today. South Asia is one such region. Farmers are by far the largest source of investment in agriculture. In spite of recent attention to foreign direct investment and official development assistance, and in spite of weak enabling environments faced by many farmers, on-farm investment by farmers dwarfs these sources of investment and also significantly exceeds investments by governments. On-farm investment in agricultural capital stock is more than three times as large as other sources of investment combined.

Therefore, farmers must be central to any strategy for increasing investment in the sector, but they will not invest adequately unless the public sector fosters an appropriate climate for agricultural investment. A favourable investment climate is indispensable for investment in agriculture, but it is not sufficient to allow many smallholders to invest and to ensure that large-scale investment meets socially desirable goals.

The report stresses that governments and donors have a special responsibility to help smallholders overcome barriers to savings and investment. Governments, international organizations, civil society and corporate investors must ensure that large-scale investments in agriculture are socially beneficial and environmentally sustainable. Governments and donors need to channel their limited public funds towards the provision of essential public goods with high economic and social returns *(Based on the FAO report The State of Food and Agriculture 2012)*. ■

A "low ambition" outcome in Doha

THE 18th Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) concluded in Doha on 8 December with "low ambition" both in emissions cuts by developed countries and funding for developing countries.

The most important result in Doha was the formal adoption of the Kyoto Protocol's second commitment period (2013 to 2020) to follow immediately after the expiry of the first period on 31 December 2012. However, the elements are weak. With Russia, Japan and New Zealand—original Kyoto Protocol Parties—having decided not to join in a second commitment period, and Canada having left the Protocol altogether, only the European Union, Norway, Switzerland, Australia, and a few others (totalling 35 developed countries and countries with economies in transition) are left to make legally binding commitments in the second period. The emissions cuts these countries agreed to commit to are in aggregate only 18 percent by 2020 below the 1990 level, compared to the 25–40 percent required to restrict global temperature rise to 2 degrees Celsius.

Another major criticism of the Doha decisions is the lack of funds to be provided to developing countries to take climate actions. The COP16 in Cancun in 2010 had decided that developed countries would mobilize climate finance of US$100 billion a year starting in 2020; and that US$30 billion of fast-track finance would be given in 2010–2012. But there is a gap between 2013 and 2020.

Developing countries demanded that there be US$60 billion by 2015, but the decision adopted in Doha does not specify any number as a commitment. It only "encourages" countries to provide at least as much as they had offered in the 2010–2012 period. A positive decision made in Doha was to prepare for, by the next year's Conference, the setting up of an "international mechanism" to help developing countries deal with loss and damage caused by climate change. Developing countries hope that this programme will lead to new funds being channelled to those countries suffering from flooding, drought, sea level rise and other forms of damage linked to climate change.

The Doha conference also adopted a work plan for the new working group on the Durban Platform that was set up in December 2011, but the text did not mention the principle of equity and common and differentiated responsibilities at the insistence of the United States *(Adapted from Martin Khor's article in TWN Doha News Update No.20, 10.12.12)*. ■

ckclinical.co.uk

India's IP Appellate Board rejects patent plea on cancer drug

ASTRAZENECA has been denied patent protection for its anti-cancer drug Gefitinib, becoming the latest multinational pharmaceutical company to run afoul of India's patent law. On 26 November, the Intellectual Property Appellate Board ruled that the molecule from the British company lacked invention. It was the third time the company was rebuffed over the anti-lung cancer drug.

Global pharmaceutical companies have been hit by a string of defeats in India, where the law amended in 2005 ensures patent protection for new drug compounds but is loath to recognize new forms of existing medicines. Multinational pharma companies, on the other hand, contend that Indian authorities have taken a narrow definition of the term "invention".

By disallowing patents for incremental innovation, India has fostered a thriving generics industry which is able to supply affordable drugs to hundreds of millions of poor around the world. The most high-profile case is the one being fought by Novartis in the Supreme Court over its cancer drug Glivec, for which it failed to receive patent protection. In March, the patent controller issued a compulsory licence allowing Natco—a generics drug maker—to make Bayer's patented liver and kidney cancer drug, which drastically reduced the price of the medicine.

India is growing rapidly as a market for pharmaceutical products. A report earlier this year by the Confederation of Indian Industries and PricewaterhouseCoopers estimated that the Indian market for pharmaceutical products would grow by 20 percent every year to US$74 billion in 2020 *(Economic Times, 29.11.12)*. ■

LDCs seek indefinite extension of transition period under TRIPS

THE least-developed country (LDC) members of the World Trade Organization (WTO) have submitted a "duly motivated" request to the WTO's TRIPS Council for an extension of the transition period for them to comply with the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) "for as long as the WTO Member remains a least developed country".

A proposed draft decision annexed to their request states that: "Least developed country Members shall not be required to apply the provisions of the Agreement, other than Articles 3, 4 and 5, until they cease to be a least developed country Member." The request was submitted by Haiti, on behalf of the LDCs, at a meeting of the TRIPS Council on 6–7 November. According to trade officials, since the request was submitted under "Other Business", no discussion took place on this issue. In introducing its request, Haiti asked for this issue to be put on the agenda of the next TRIPS Council meeting (scheduled to take place next March).

The request for the extension of the transitional period is under Article 66.1 of the TRIPS Agreement. The exemption had been due to expire end-December 2005, but the transition period was extended by the TRIPS Council until 1 July 2013 *(Kanaga Raja, TWN Info Service on Intellectual Property Issues (Nov12/03), 12.11.12)*. ■

South-South dimension of migration

www.dreamstime.com

INTERNATIONAL migration and associated remittances are playing an important role in the economies of many least-developed countries (LDCs), but most of them lack the institutional, economic and political conditions essential for harnessing remittance and diaspora knowledge to build productive capacities and thereby overcome the structural handicaps that characterize their LDC status, argues *The Least Developed Countries Report 2012*, whose thematic focus is on international migration and remittances.

Emigration from LDCs grew rapidly in 1990–2010. With 27.5 million emigrants in 2010, LDCs as a whole accounted for 13 percent of global emigration stocks, or some 3.3 percent of the LDC population. Over 2000–2010, the increase in emigrant stocks was fastest for African LDCs. The destination of LDC emigrants varies across regions, but most go to South Asia, the Middle East and Africa.

Contrary to the general perception that LDC migration is a South–North phenomenon, the pattern of migration emerging has acquired a South–South dimension in recent decades. In 2010, high-income Organisation for Economic Co-operation and Development countries (namely North America and Europe) accounted for 20 percent of the LDC emigrant stock, while some 80 percent were in the South. Most LDC South-South migration tends to take place between neighbouring countries, where wage differentials are in general much smaller than in South–North migration.

Remittance receipts of LDCs climbed from US$3.5 billion in 1990 to US$6.3 billion in 2000, subsequently accelerating further to nearly US$27 billion in 2011. Despite some heterogeneity across countries, the value of remittances relative to gross domestic product or export revenues has historically been much greater in LDCs than in other regions. Similarly, for a number of LDCs, remittances constitute a key source of foreign financing. Consistent with the fact that the majority of LDC migrants actually move to other developing countries, it is estimated that in 2010, as much as two thirds of recorded remittances to LDCs originated in Southern countries *(Based on The Least Developed Countries Report 2012).* ■

Final extension to export subsidy programmes

THE Committee on Subsidies and Countervailing Measures of the World Trade Organization, on 23 October, approved the final extension of the transition period—until 2013-end—for export subsidy programmes of 19 developing countries. These programmes consist mainly of free trade zones and tax incentives.

The beneficiaries of the transition period are Antigua and Barbuda, Barbados, Belize, Costa Rica, Dominica, Dominican Republic, El Salvador, Fiji, Grenada, Guatemala, Jamaica, Jordan, Mauritius, Panama, Papua New Guinea, St. Kitts and Nevis, St. Lucia, Saint Vincent and the Grenadines, and Uruguay *(www.wto.org, 23.10.12).* ■

Dispute over solar subsidies

IN November, China filed a complaint at the World Trade Organization over local content requirements under renewable energy feed-in-tariff programmes in certain European Union (EU) member states.

According to the Chinese government, electricity produced by EU-made solar components benefits from favourable feed-in tariffs in some countries, which in turn hurt the interests of Chinese producers locked out from such subsidies. China's consultations request also claims that the measures at issue are inconsistent with the General Agreement on Tariffs and Trade and the Agreement on Trade-Related Investment Measures *(Bridges Weekly, Vol. 16, Issue 38, 07.11.12).* ■

South Korea to host Green Climate Fund

SONGDO, Incheon City, in the Republic of Korea, has been selected to be the home of the Green Climate Fund (GCF) by its Board.

The GCF was established at the 16th Conference of the Parties to the United Nations Framework Convention on Climate Change in Cancun in 2010 and its governing instrument was approved in Durban in 2011 at COP17. The selection of a host country brings the GCF a step closer to its operationalization to help disburse climate funds to support mitigation and adaption efforts of developing countries.

The Board agreed to work with a listing of 25 indicative priority matters in the work plan until the end of 2013. The top five of these were: the business model framework, private sector facility-related matters, resource mobilization, results management framework and the establishment of the independent secretariat. These items too are the key agenda items proposed for discussion at the first Board Meeting in 2013.

The work plan and priorities of the Board were hotly debated. Many developing countries wanted to focus on the structural and institutional issues they saw as critical to fully operationalizing the GCF such as the arrangements for the establishment of the independent secretariat, including hiring of the Executive Director and host-country arrangements and resource mobilization (all items which were initially set to be discussed in the later part of 2013), with other members placing emphasis on the private sector facility and business model in the first meeting. Small island developing states also wanted the issue of readiness and preparatory support to have priority. In the end, agreement was reached in principle on the elements of the Board's work plan and the indicative priority matters *(Marjorie Williams, TWN Info Service on Climate Change (Oct12/07), 29.10.12).* ■

www.iisd.ca

Harmonization of seed laws could sound death knell for African seed systems

AFRICAN governments are being co-opted into harmonizing seed laws relating to border control measures, phytosanitary control, variety release systems, certification standards and intellectual property rights, to the detriment of African smallholder farmers and their seed systems, says a report *Harmonization of Africa's seed laws: A recipe for disaster—Players, motives and dynamics*.

The effect of these efforts, which are being pushed through African regional trading blocs such as the Common Market for East and Southern Africa and the Southern African Development Community include: facilitating unlawful appropriation and privatization of African germplasm; providing extremely strong intellectual property protection for commercial seed breeders and severely restricting the rights of farmers to freely use, exchange and sell farm-saved seeds; facilitating the creation of regional seed markets where the only types of seed on offer are commercially protected varieties; and threatening farmer-managed seed systems and markets.

The report shows that harmonized intellectual property rights over seeds are all based on the 1991 Act of the International Union for the Protection of Plant Varieties (UPOV 1991). UPOV 1991 was developed by industrialized countries more than 20 years ago to suit their own interests and is totally inappropriate for Africa where 80 percent of all seeds are still produced and disseminated by smallholder farmers *(TWN Info Service on Intellectual Property Issues (Nov12/06), 30.11.12).* ■

IPR and technology transfer

A development perspective

The complex web of intellectual property, trade and investment rules has hindered the development of an international regime on technology transfer on fair and equitable terms.

K M Gopakumar

Fifty years of discourse on technology transfer at various international forums have brought a robust understanding on the concept of technology transfer. It is no more understood in a narrower sense of the importation of hardware such as plants and machinery by developing countries. Now it is understood as not only the purchase and acquisition of equipment but the transfer of skills and know-how to use, operate, maintain as well as understand the technology hardware so that further independent innovation is possible by recipient firms.[1]

Technological development capabilities are achieved in three stages: i) initiation stage, where technology as capital goods is imported; ii) internationalization stage, where local firms learn through imitation under a flexible intellectual property right (IPR) regime; and iii) generation stage, where local firms and institutions innovate through their own research and development (R&D).[2]

The process of accession and emulation of existing technology is commonly described as catching up, which is important to move up the ladder to develop inventive capacities. An enabling policy framework is necessary at both national and international levels to facilitate the smooth catching-up process.

IPR framework is considered as one of the important enabling factors to facilitate the transfer of technology; however, a technology transfer-friendly intellectual property (IP) law and policy framework alone cannot materialize technology transfer. The nature of IPR framework can facilitate or hamper technology transfer.

Although developed countries and transnational corporations (TNCs) advocate a strong IP regime at the national and international levels as a precondition to transfer technology, there is ample evidence that a strong IP regime in fact acts as an impediment to the transfer of technology. A study by the United Nations Industrial Development Organization states, "based on the experience of the Republic of Korea, it is argued that strong IPR protection will hinder rather than facilitate transfer and indigenous learning activities in the early stages of industrialization".

IPR and technology transfer

Exclusive rights that are due to IP create an asymmetric relationship between the technology seller and the technology buyer because IP protection prevents the use of protected IP on technology without the permission of the IP owner. Enhanced IP protection also impedes the transfer of technology in many other ways: i) IP holders simply refuse to license the technologies to the firms in developing countries; ii) patent holders may charge exorbitantly for the protected technologies; iii) IP holders, while transferring the technologies, may put onerous conditions, which may prevent further innovation on the technology; and iv) strong IPRs also have chilling effects on R&D of IP-protected technologies, especially those related to reverse engineering. Therefore, it is important that the IP regime at the national and international levels should have safeguards to prevent the abuse of exclusive rights. There is also a need to incorporate provisions to facilitate the transfer of technology.

Historical evidence suggests that IP regimes in developing countries

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should facilitate catching up in technologies. However, TNCs and their host countries advocate a strong IP regime tilted towards protection of IPRs with little room for technology transfer. Slowing down of the catching-up process would delay competition in technology-intensive manufacturing, services and agriculture, and thus protect the market monopoly of TNCs.

Different forms of IPRs affect technology transfer in different ways. For example, a copyright protection regime without adequate flexibilities (limitations and exceptions) would impede the free flow of knowledge. This in turn would affect the quality of higher education and hence the quality of human resource.

Brief historical background on IPR and technology transfer

From the very beginning of the international discourse on technology transfer, patent has been identified as one of the major IPR vehicles affecting it. In the 1970s and 1980s, different United Nations agencies such as the United Nations Conference on Trade and Development and the World Intellectual Property Organization (WIPO) carried out studies on patent and technology transfer, and different initiatives attempted to address the issue of abuses of patent monopoly on transfer of technology. A major issue of concern for developing countries was the anticompetitive provisions in the technology licensing agreements, especially licensing of patented licence, in the Paris Convention.

The conclusion of the Uruguay Round of negotiations of the General Agreement on Tariffs and Trade resulted in the establishment of the World Trade Organization (WTO), with the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) as one of its Agreements that were put in place to govern world trade. The TRIPS Agreement sets minimum standards for different forms of IPRs; however, the most onerous standards are related to patent protection. TRIPS standards on patent include, among others, expansion of patent protection to all technology areas, and expansion of the duration of patent protection to a minimum of 20 years. These standards curtail developing countries' policy space to regulate their national patent law to facilitate technology transfer. Thus the TRIPS Agreement virtually kicked away the ladder, which many developed countries used in their catching-up period.

Current state of play

Of the many TRIPS standards on patents, the 20-year patent protection period keeps the patented invention from the public domain for a long time and seriously slows down the catching-up process. In the past, countries like India provided only seven years of process patent protection for pharmaceutical inventions. Further, inclusion of importation as part of the exclusive right enhances the monopoly power of the patent holder considerably and virtually takes away almost all compulsion for the local working of the patent. Such a provision hampers technology transfer.

In recent years, IP protection has also been expanded through TRIPS-plus standards pushed mainly through free trade agreements (FTAs). This has further narrowed down the policy space for developing countries to pursue the catching-up process. Furthermore, the lack of capacity in many developing countries to check abuses of patent protection like securing multiple patent protection on the same invention, popularly known as "ever greening of patents", "patent thicket", etc. has created further barriers to technology development capabilities of developing countries.

The ongoing negotiation at the TRIPS Council or Committee on Technology Transfer under the WTO has not resulted in any concrete outcomes. Discussion on technology transfer within WIPO is taking place within

three committees, namely, Standing Committee on Patents, Committee on Development and IP, and Working Group on Patent Cooperation Treaty. However, these discussions have not resulted in any norm setting to take forward the existing legal commitments on technology transfer. The Technology Executive Committee established under the United Nations Framework Convention on Climate Change has identified IPR as one of the issues to be addressed in the coming days.

IP protection is also enhanced through the Bilateral Investment Treaties (BITS). Disputes related to IP in relation to investment protection and remedies thereof are covered by many BITs. This threatens the use of flexibilities to facilitate technology transfer such as through the use of safeguards and compulsory licence. BITs also contain certain provisions like banning of performance requirements, which, historically, like local manufacturing or local sourcing of products requirements, played a crucial role in technology transfer.

Way forward

The above discussion clearly shows that IP protection and its enforcement are moving towards a maximalist position during the last 50 years and have erected a great wall against technology transfer. The complex web of IP, trade and investment rules has vitiated the efforts of developing countries to develop an international regime on technology transfer on fair and equitable terms. According to Padmashree Sampath and Pedro Roffe "… the deeper specialization patterns created by trade opportunities into primary commodities, weak systems of innovation and the knowledge economy have led to a wider technological gap between countries than ever before".[3] Therefore, it is important to interrogate the status quo to make qualitative changes. Some non-exhaustive ideas in this regard are listed below.

First, it is important for developing countries to set up an international process to take a stocktaking of the TRIPS Agreement to assess how far the substantial provisions of the Agreement contribute to the achievement of its objectives mentioned in Article 7, which states, "The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations".

> Developing countries and LDCs should not accept TRIPS-plus obligations through free trade agreements or other international legal instruments.

Second, developing countries should either abrogate BITs or renegotiate their obligations under BITs, especially to exclude IP from the scope of the definition of investment, and to also regain policy space on performance requirements.

Third, developing countries should negotiate as a collective group and in a coordinated way on the ongoing negotiation on technology transfer in various international forums such as the WIPO and the WTO.

Fourth, the least-developed countries (LDCs) should pursue their request for the extension of transition under Article 66.1 of the TRIPS Agreement, which clearly states that "The Council for TRIPS shall, upon duly motivated request by a least-developed country Member, accord extensions of this period".

Fifth, developing countries, including LDCs, should not accept any more TRIPS-plus obligations through FTAs or other international legal instruments. In cases where certain developing countries have already entered into FTAs having TRIPS-plus provisions, political pressure needs to be built to renegotiate such obligations.

Sixth, at the national level, there is a need to develop an IP strategy with an objective to facilitate the emulation, innovation and invention of technologies by using the flexibilities provided by the TRIPS Agreement. However, the use of flexibilities can be made only for damage control and not regain the policy space that developing countries had before the TRIPS Agreement was put in place. Towards this end, the IP strategy should incorporate the following elements:

- Implementing high threshold level of IP protection, especially for patent protection, to avoid patenting of incremental innovations as well as the extension of patent monopoly through "ever greening" or "patent thicket" strategies.
- Developing and implementing guidelines for the disclosure of the invention through the patent specification in order to emulate the technology after the expiry of the patents or through a compulsory licence or government use.
- Providing policy and institutional framework to make use of TRIPS flexibilities such as compulsory licence or government use to facilitate technology transfer.
- Facilitating technology information contained in the patent application in order to enable further innovation. ■

Dr Gopakumar is legal advisor to the Third World Network.

Notes

1 Sangeeta, Shashikant. 2010. "IPRs and technology transfer issues in the context of climate change."

2 Khor, Martin. 2012. "Climate change, technology and intellectual property rights: Context and recent negotiations". Research Paper 45 (April). Geneva: South Centre.

3 Sampath, Padmashree Gehl and Pedro Roffe. "Unpacking the international technology transfer debate: Fifty years and beyond". Issue Paper No. 36. Geneva: International Centre for Trade and Sustainable Development.

Technology justice

Technology justice requires understanding and adapting to the current drivers that power technological innovation.

Vishaka Hidellage

Despite advances in development theory, economic growth and new technologies continue to be key de facto descriptors of "development" that inform macro policy and practice. Consumption growth continues to be a necessary goal in developing countries to help ensure even basic living standards for all. Macroeconomic growth policies followed today in most developing countries, however, fail to tackle poverty effectively.

What is Technology Justice?

History shows that technology has been a powerful tool for human development, assisting more people to lead better, happier lives. Exponential growth in this arena, however, also exposes a complex picture of severe unequal distribution of development. Inequality exists between and within regions, countries and communities, where, despite dramatic technological advances, approximately a third of humanity is still deprived of basic technologies. Poor understanding of the focus of and factors affecting technology innovation have often resulted in unexpected/unsatisfactory outcomes when attempting to use technology in the fight against poverty.

The last half a decade has seen governments, through the United Nations (UN), conclude many multilateral agreements aimed at making the world safer and healthier, and ensuring greater opportunity and justice for all. This comprehensive body of international law, considered one of the great achievements of the UN, indicates global importance given to the act of being just and/or fair and to the concept of moral rightness based on ethics, rationality or equity.

Despite the above intentions, innovations which underpin development do not benefit everyone equally, more often favouring social groups already better off. Science and technology (S&T) development and application happen in high-income locations, while being weak or non-existent in low-income areas populated with poorer communities. People with greater capabilities, power and social capital are better able to innovate, benefit, make profit and learn by innovating. This fosters biases in economic growth, further reinforcing global, regional and societal disparities.

Technology (knowledge and tools) enables people to achieve well-being by reducing effort and resource use, and lowering cost. Technical innovation is essential for people to be able to make more effective use of resources available to them and to respond to social, economic and environmental changes.[1]

Technology Justice (TJ) is a path to understand this problem and guide solutions. It is about empowering the poor in developing countries to access improved technologies, make and choose the technologies they wish to use, in ways that enable them to respond to changing needs and opportunities, and lead the kind of lives they want. TJ is defined as the right of people to decide, chose and use technologies that assist them in leading the kind of life they value without compromising the ability of others and future generations to do the same.

Technology divide

Technology divide[2] is the gap between rich and poor communities in the knowledge, equipment and tools available, accessible and used by them. For example, a small farmer uses hand tools and animal traction in agriculture giving low return in a world plentiful of tractors, harvesters and other modern equipment.

Old is the technology-divide debate, and while it has been recognized over the ages, no substantial progress has been made to bridge this divide in its entirety. Today, centuries after the introduction of the first commercially viable incandescent bulb by Edison, 1.3 billion people live in darkness, with no access to electricity, and 2.7 billion people still cook over open fires.[3]

> Only about 5 percent of the world's resources allocated for health research are applied to health problems in low- and middle-income countries.

The problem is not dissemination of existing technologies alone; it is also about the focus of technology innovation. Only about 5 percent of the world's resources allocated for health research are applied to health problems in low- and middle-income countries, where 93 percent of the world's preventable deaths occur.[4] The Food and Agriculture Organization of the United Nations estimates that the 80 poorest countries of the world account for just 6 percent of global, publicly funded agriculture research and development (R&D), and just 2 percent of privately funded agriculture R&D.

Barriers to pro-poor technology

Technological innovations ignore the poor

Pro-poor technological innovations are generally slow and limited. Markets often do not work for the poor. Global investment in technology R&D does not address the global challenges of today: there are nearly 1 billion malnourished people, 1.3 billion without electricity and nearly 1 billion still without access to clean drinking water. According to Bill Gates, there is something very wrong with a world that spends more on developing a cure for male baldness than it does on finding a vaccine for malaria.[5]

Limited capacity of the poor for innovation

The poor "innovate" to make things slightly easier or better for themselves by reworking or adding to existing knowledge. Yet their "innovative ideas" are developed in isolation and often get abandoned halfway due to lack of skills and guidance or affordability issues. No support system exists for these to grow and become available to a wider community.

Lack of technology transfer

Technology for poverty reduction need not be innovative development but an adaptation of technologies that already exist somewhere else. Examples of such transfer have shown to make a difference in the lives of the poor. For example, hand pumps improve access to water. The poor often cannot access these options or essential expensive adjustments required for adaption by them, necessitating support from an external party or government.

Technology transfer is a major development concern in developing countries, which are net importers of new technologies. The history of technologically advanced countries was more a history of successful technology transfer than a history of developing technologies on their own in the initial phases of development.[6] Technology transfer at present is a complex exercise with no "one-size-fits-all" approach, and various approaches, both direct and indirect, or formal and informal, are used. Yet the underlying assumption of transfer from the "developed North"—where the right answers to the world's problems originate—to the "underdeveloped South" has implications for developing countries and the poor. There is clear recognition that unless a process of transformation occurs, technology will not be effective. Technology transfer from laboratories to poor communities is essential. However, careful differentiation should be made between this and "technology dumping", that is, dumping of older energy-inefficient and environmentally harmful goods such as refrigerators and compact florescent lamps with inferior phosphors.

Political dimensions of technology innovations

Any new technology introduced into an unjust society can harm the marginalized. For instance, the damage inflicted on sea ecology by trawlers has negatively impacted small fishermen's catch and livelihoods. The populations of fish such as sardine and cod have significantly diminished in northern seas due to this. Regulatory bodies in the North, although well aware, have not moved to ban trawling as northern trawlers have moved to exploit southern seas (e.g., Indian Ocean) legally or illegally.

Global power groups manipulate and make poorer countries buy "science and technology" on their terms, convincing (or bribing) national power groups in poorer countries that these will address poverty. The introduction of the carnivorous Nile Perch[7] in Africa led to the extinction of local fish that communities depended on while the export industry owned and serviced by "foreigners" profited; and in Europe, dishes made of Nile Perch were enjoyed at the cost of increased poverty in Africa. In India, a new seed policy proposed in 2004 restricts or prevents the use of sustainable seed sharing and management system practices traditionally employed by farmers in India, to the benefit of corporate organizations that invested in improved seed R&D.[8]

IPR issues

Technology development is a continuous process. Each change, adaptation or innovation builds on existing knowledge that has been created through accumulation of previous changes or knowledge, usually over generations. Most technology development is incremental and not totally inventive. Everyone, therefore, should have the right to knowledge creation and expansion to make their own lives better. Contrary to this, an expansion of intellectual property regimes has been seen globally over the last decade with stricter obligations to comply with free trade and intellectual property rules. Exclusive rights, even if temporary, restrict access to new technologies by the poor, resulting in price hikes.

The environmental impacts of many technologies used today predominantly by the rich have resulted in a world crisis.

Communications and cooperation

Various groups and types of people who contribute to innovations, such as farmers, scientists, policy makers, extensionists and the private sector, do not always come together. Many existing technologies viewed to have the potential to reduce poverty significantly remain out of reach.

Non-neutrality of technology

S&T development is not neutral. Often, benefits are reaped by the rich with the poor bearing the costs. Poor farmers in Kalpitiya (dry zone), Sri Lanka in the 1990s were introduced to new technology of intensive contract farming to produce gherkin for export. Many ended up being poorer with debts to pay and degraded lands by the time the industry decided to move on.

When S&T attempted to solve a problem of the masses (e.g., addressing hunger), it tended to take the problem in isolation of the systems it exists in (nature, ecology, society, etc.), focusing on isolated benefits and ignoring holistic costs and benefits to people and society. Another example from the fishery sector is light coarse fishing introduced after the Second World War to increase fish production, through the use of bright illumination to attract fish. Unfortunately, it also attracts substantial inedible marine life important to marine ecology and biodiversity. Recognizing its detrimental effects, it was banned a couple of decades later, although the practice continues in South Asia.

Intergenerational justice

The environmental impacts of many technologies used today predominantly by the rich have resulted in a world crisis. Technology innovation and dissemination is extremely partial to the wants of rich and powerful consumers while ignoring the needs of the poor. It also prioritizes the aspira-

tions of today's generation over those of future generations. The addiction of today's global rich to fossil fuel-based technologies leaves a very difficult legacy of climate change to future generations, limiting their ability to live the lives they aspire to.

Delivering TJ

The concept of TJ requires a rethinking of how to encourage and nurture technological innovation that has social value and is environmentally sustainable. The appropriateness of a technology should be defined in terms of the situation and characteristics, including knowledge and capabilities of the social group benefitting from it, such as the requirements of the scale, and the cost and complexity of the technology.

At the macro level, S&T design for development should be re-conceptualized in "systems terms", taking historical forces into account. This represents a radical departure from the way most external support has been organized to date. Presently, most funding to S&T is project oriented. Instead of focusing on isolated examples, an innovation systems approach emphasizes the networked interactions of multiple actors, public and private, local and national, in processes which initiate, import, modify and diffuse technologies.

Efforts to promote dynamic innovation systems need to run hand in hand with regulation. In developed countries, consumer concerns are aired in the open and there is even public dissent about risks, but these are not yet evident in the developing world. Global public reflections on science, technology and risks should not just be on the contents of science, but also on the institutions controlling it. Regulating introduction and use of technologies needs to take account of public understanding of risk and uncertainty. Protests in India against Bt brinjal,[9] maize and cotton[10] show the consequences of the lack of it. Forums are required for providing space for discussion on different views of the risk and uncertainty that can influence regulatory responses and challenge existing trade-related barriers if necessary.

Regulating introduction and use of technologies needs to take account of public understanding of risk and uncertainty.

Engaging people, especially the poor, in national and global debates around S&T policy is important. These debates need to "move upstream" to encompass broader questions about how S&T agendas are framed, the social purposes they serve, and who stands to gain or lose. As such, "public engagement with science" is much more than a narrow technical debate about risk/safety. It could and should encompass dialogue and debate about future technology options and pathways, involving a wide range of perspectives and inputs, using, if necessary, techniques like horizon scanning, technology foresight and scenario planning.

TJ also requires understanding and adapting to the current drivers that power technological innovation. National S&T policies and related research funding, tax systems, international trade agreements and regulations need to be aligned to add value and create an environment of collaboration and open source approaches to R&D. Processes that result in greater social and environmental benefits will be preferred over those based on competition and capture of intellectual property rights.

New science-based technology solutions are essential to some major problems the world faces. These systems will need to fully harness the power of existing indigenous knowledge. Knowledge which cannot be commoditized and undervalued by the current systems. Access to external knowledge is important for the poor in deriving better solutions, to add to local knowledge or adapt to the local context, giving them the choice of deciding whether to adopt or not.

While such people-led processes are preferred, transfer of science-led technological innovations backed up with appropriate infrastructure, services and skills have also shown to deliver appropriate solutions for the poor—for example, the empowering impact on the lives and housing of rural women in Bangladesh after mobile phones were introduced through the Grameen Bank micro credit programme.[11]

It takes generations to comprehend the ramifications of a new technology. Therefore, decisions about whether or not or how to use a new technology will necessarily be ambiguous. Society must be guided by the precautionary principle. ■

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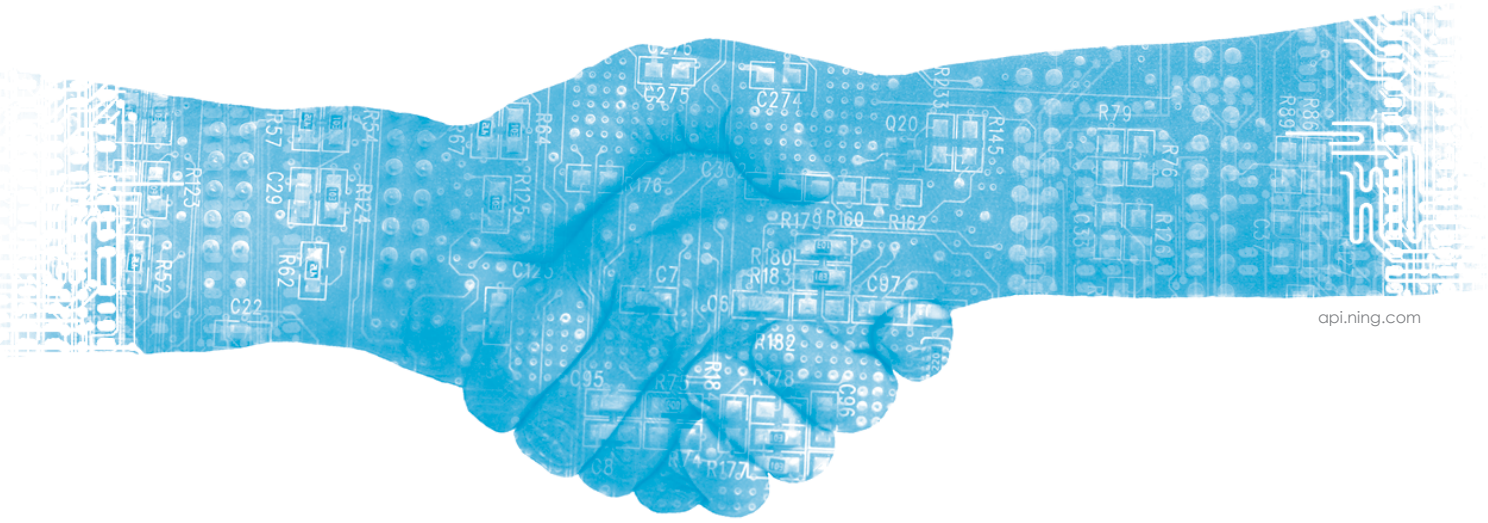

South-South Technology Transfer

Relevance for South Asia

South-South technology transfer offers the potential to increase productive efficiency and improve the quality of life of the masses living in South Asia.

Lopamudra Patnaik Saxena

In today's global economic and political landscape, the South-South development paradigm is making new waves on the world stage. Many developing countries that constitute the global South have emerged as centres of economic and financial power and technological innovation. The growing political and economic links among these countries have given impetus to South-South cooperation, and technology transfer as a crucial component in this framework is increasingly attracting much attention.[1]

Ever since the Buenos Aires Plan of Action for Promoting and Implementing Technical Cooperation among Developing Countries was put in place in 1978, the significance of South-South technology transfer has been recognized, and technical cooperation among Southern countries has been taking place, albeit in a modest scale. The recent upsurge in interest in South-South technology transfer is in light of new efforts at national and regional levels to address shared challenges such as that unleashed by climate change, as well as to cope with new demands arising from the transformation of production and consumption patterns.

Against the backdrop of the phenomenal shift in international cooperation on technology transfer along South-South lines, this article discusses how relevant it is for South Asia.

South Asia and South-South technology transfer

South Asia has grown remarkably in the past few decades. This has created new realities with important implications for international relations. A burgeoning middle class, for example, spurring consumption-led growth; increasing South-South trade; and the emergence of "knowledge economy",

among others, have profoundly transformed the socio-economic landscape of the region. However, the region faces serious challenges from, *inter alia*, poverty, food and energy insecurity, agriculture stagnation, climate change, slow industrial development, and infrastructure constraints. The extent and intensity of these challenges in each of the eight South Asian countries are as diverse as their individual socio-economic-geophysical profiles.

There are significant barriers to intra-regional movement of goods, services and people in South Asia, making it the least-integrated region in the world. There are also significant differences in their technical, institutional and absorptive capacities. However, in view of the changes seen in the structure of multilateral development cooperation along South-South lines, and the phenomenal strides made by Southern countries in technology and innovation in different sectors, the relevance of South-South technology transfer for South Asia needs a closer scrutiny.

Trade and investment, and technology transfer

The share of South-South trade in global trade has increased dramatically, particularly in the past decade. The number of bilateral, intra-regional and inter-regional trade agreements in Asia has grown significantly in the recent past. For example, in South Asia, countries are party to the Agreement on South Asian Free Trade Area and the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation, among others. In the past decade, South-South investments have also increased as many developing countries' firms/companies are emerging as the world´s major transnational corporations.[2]

It is well known that trade and foreign direct investment affect the flow of technology and vice versa. Therefore, increasing trade and investment among Southern countries means there are greater opportunities for South-South technology transfer in the region.

Agriculture productivity and water resource management

In South Asia, increasing agriculture productivity and growth remains a vital challenge. In the face of increasing demand for food from growing populations against limited land and water resources for agriculture expansion, increasing the productivity of existing farmlands is a key consideration towards achieving food security. Under South-South cooperation, many initiatives in the agriculture sector are under way, which range from "sharing expertise on how to increase productivity, to technical assistance in watershed management, to scientific research on developing seeds adapted to the particular conditions of different regions."[3] South Asian countries can improve their productive capacities through such cooperation.

For example, the water-saving and soil-related technologies and aquaculture methods, through which China brought about its rural transformation, could be relevant for South Asia.[4] Other technologies particularly relevant to agriculture in the South Asian context relate to irrigation and water management. A joint programme of the International Fund for Agricultural Development and the Food and Agriculture Organization of the United Nations involving eight Asian countries, of which four are from South Asia, is under way in this direction.[5] Another instance of successful South-South technology transfer in agriculture has been the transfer of high-quality rice seeds from Bangladesh to many countries in Asia and Africa.[6]

Climate change and environmental concerns

Technology transfer plays a critical role in effectively responding to the challenges of climate change. However, the potential of South-South technology transfer in reducing greenhouse gas (GHG) emissions, and mitigating the impacts of and adapting to climate change, is yet to be fully explored.[7]

In South Asia, there is a general consensus that old technologies need to be replaced by climate-resilient new technologies. For example, developing flood-resistant and drought-resistant seed varieties and making use of emerging biotechnologies to develop new genotypes to cope with climate change risks has become all the more important, for which technology transfer is essential. In South Asia, at the national levels, the climate change policies of India, Nepal, Pakistan and Sri Lanka include components of technology transfer. At the regional level, the Thimphu Statement on Climate Change emphasizes the importance of promoting low-carbon green technology in the region. While these are good on paper, efforts at implementing them have to be upscaled to make an impact. Particularly, in light of the failure of Article 66.2 of the Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization (WTO)[8], it has been observed that technology transfer in the region has to rely on South-South regional cooperation.[9]

Regarding environmental challenges such as pollution of air and water resources due to industrial discharge, household waste, inadequate treatment of sewage, desertification, land degradation, etc., initiatives of the United Nations Environment Programme (UNEP) to promote South-South knowledge exchange are under way.

Industrial development

With increasing globalization, technology and knowledge have emerged as key factors of production. In South Asia, many industries are small- and medium-sized enterprises, which use old technologies and inefficient production processes. Therefore, building domestic technological capabilities within national systems of innovation and moving up the global value-added chains as well as developing new technological capacities for diversifying into new areas is essential.[10] South-South technology transfer is useful in that respect.

Some initiatives in this regard include the setting up of the Internation-

al Centre for South-South Cooperation in science, technology, and innovation in Malaysia by the United Nations Education, Scientific and Cultural Organization; several South-South cooperation centres set up by the United Nations Industrial Development Organization in China, India, Brazil and other middle-income countries to facilitate industrial development; and the launching of a South-South Exchange Mechanism by UNEP that connects people to innovations and best practices in the global South.[11]

Energy security

In South Asia, energy is mainly sourced from non-renewable resources, which are limited and also polluting. Moreover, rapid industrialization has meant phenomenal increases in rates of energy consumption. While demand for energy has soared to keep up with the needs of economic growth, access to steady energy supplies remains a bottleneck. At the same time, since the Kyoto Protocol came into effect, green energy development has emerged as an important issue in international development circles.

Therefore, reducing dependence on fossil fuels, and exploring renewable energy resources such as wind, solar, hydropower and geothermal has acquired strategic significance for meeting energy requirements while moving into a low-carbon growth path. The recently held Rio+20 Conference had a special discussion panel on technology transfer and energy for the world's poor.

Although China and India are the two biggest emitters, they are also becoming leaders in the development and transfer of green energy.[12] Many South-South initiatives on energy security supported by development organizations such as the United Nations Development Programme (UNDP) are also under way.[13] Building expertise in low-carbon, energy-generating technologies and tapping the renewable energy potential in South Asia also requires further cooperation and technology transfer among South Asian countries. A recent instance of such cooperation is the cooperation between Nepal and India on technologies for converting waste agricultural biomass (crop residues) into energy.[14]

Health security

The importance of transferring technologies to develop and produce pharmaceutical goods is recognized in the Global Strategy and Plan of Action on Public Health, Innovation and Intellectual Property Rights of the World Health Organization. Emerging developing countries have successfully built domestic capacity and capabilities in pharmaceutical technologies through heavy investments in research and development. Accordingly, South-South cooperation to produce and market pharmaceutical drugs needed in developing countries has been increasing.

In South Asia, countries have pledged to promote scientific and technological linkages among themselves. Inter-regionally, India, Brazil and South Africa have been strengthening their partnership in this direction. However, it has been recognized that "despite the importance that Governments attach to South-South cooperation in science and technology, information on what is actually happening is scarce…". A recent study on South-South cooperation on health biotechnology among developing countries affirms this.[15]

Infrastructure development

In South Asia, poor infrastructure of public utilities (power, telecommunications, piped water supply, sanitation, sewage, etc.), public works (roads, irrigation and drainage systems), housing, and transport (railways, ports, airports) remains a major constraint to the region's development. However, in recent years, some initiatives have been undertaken to address this challenge. Among the major South-South initiatives taken on this front, China and India have been providing infrastructure financing, including to other countries of South Asia, for projects that are identified through bilateral negotiations and mutual agreements. Therefore, South-South technology transfer for infrastructure development should build on the South-South cooperation that already exists in the region on this front.

India's position in South Asia remains unquestionably pivotal to South-South technology transfer and cooperation.

Intra-regional dimension of South-South technology transfer

In the context of various developmental challenges faced by South Asia, South-South technology transfer offers the potential for increasing productive efficiency and improving the quality of life of the masses living in the region. South Asian countries have taken a regional initiative through the South Asian Association for Regional Cooperation in this respect by putting in place the Plan of Action on Science and Technology (2008–2013). It has identified specific areas of cooperation and priority sectors such as renewable energy, solid waste management, safe drinking water and rain water harvesting.

The cooperation is being pursued through the Technical Committee on Science and Technology whose mandate includes "strengthening of scientific and technological cooperation across the region; sharing of scientific and technological expertise; joint research and development and industrial application of higher technology."[16] However, much more can be done at different levels between different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations and research/educational institutions.

India's position in South Asia remains unquestionably pivotal to

South-South technology transfer and cooperation because of its relatively advanced technological and economic capabilities. India's successful experience in technology- and innovation-intensive sectors such as pharmaceuticals, biotechnology, information technology and telecommunications is of considerable relevance and use to other countries of the region.

Clearly, the geographical and cultural proximity offers tremendous scope in terms of acquisition, adoption, assimilation, and adaptation of technologies developed and operated in countries within the region. It has been observed that cultural similarities "enable better adaptation of technologies and thus, a more sustained operation. Subsequently, based on the experience gained, local capacity to further expand the delivery of technology can be built."[17]

A successful instance of intra-regional South-South technology transfer leading to better natural resource management and rural development is seen in the African context, where such transfer between the North and the West Africa regions has helped them successfully combat desertification.

Inter-regional dimension of South-South technology transfer

In the context of the financial and economic crisis engulfing the North, and the rapid growth of many countries in the South (East Asia, West Asia, South East Asia, Africa, and the Latin Americas), technology transfer between South Asian countries and other Southern countries is all the more relevant. Four clusters of Southern countries have emerged as providers of regional and sub-regional South-South development cooperation (SSDC). They include not only countries which are growing, but also that are diversifying their assistance and undertaking mutually beneficial inter-regional activities.[18] This is viewed as a unique phenomenon in international development and it offers opportunities to South Asia to be a part of the overall dynamic process of SSDC.

There are opportunities for South Asia to be a part of the dynamic process of South-South development cooperation.

Furthermore, a number of inter-regional initiatives undertaken by development agencies such as the UNDP to support South-South Cooperation include exchange of knowledge and ideas, for example, its "Solution Exchange" initiative which was launched in India in 2005, and now covers Bhutan, Cambodia, Indonesia, Thailand and Pacific Islands. It has also been reported that there is an emerging interest on the part of traditional donor agencies to support South-South capacity building under North-South-South triangular arrangements or through sponsoring third country training programmes.[19] These developments are of particular interest to South Asia.

All these initiatives (intra- and inter-regional) at different levels (national/regional; governmental-nongovernmental, development agencies, and specialized programmes by international organizations) on South-South cooperation underline the significance given to it and the potential for South-South technology transfer to strengthen this cooperation across a spectrum of areas. The impediments to such transfers are many and complex, but they also present significant opportunities for reform and the introduction of new approaches to dealing with the common problems. ■

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Notes

1 See for example, UNCTAD's *Innovation and technology report 2012*.

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10 UNDP (2009), Note 7.

11 Deen, Thalif. 2012. "UNDP predicts rise of the global south", www.ipsnews.net/2012/07/undp-predicts-rise-of-the-global-south/

12 Ding, Fei, Bui Duc Kinh, Liina Tonisson, Limin Mao and Shohei Ohya. 2012. "Green energy development and technology transfer in China and India." *Journal of International Development and Cooperation* 19 (2): 13–24.

13 The South-South cooperation exhibition at the Rio+20 Conference showcased successful cases. Initiatives include actual projects on solar energy funded by the India, Brazil and South Africa partnership for rural areas in Guinea-Bissau; and sharing of knowledge and skills as in projects on supplying electricity to rural areas of Afghanistan by India facilitated by UNDP. China is involved in the technologies for energy conservation, water conservation and renewable energy, focusing on small island developing countries and least-developed countries.

14 www.unep.org/SOUTH-SOUTH COOPERATION/case/casefiles.aspx?csno=63

15 Abed *et al.* (2012), Note 4.

16 www.saarc-sec.org/areaofcooperation/cat-detail.php?cat_id=46

17 "South-South cooperation between Nepal and India on technology transfer for converting waste agricultural biomass into energy", www.unep.org/SOUTH-SOUTH-COOPERATION/case/casefiles.aspx?csno=63

18 UNDP (2009), Note 7.

19 *ibid*.

Besides keeping their own house in order, exploiting the potential of South-South technology transfer is essential for South Asian countries to enhance their technological capacity.

Technology and Development in South Asia

Ratnakar Adhikari

Although the present growth rate of 6 percent-plus achieved by South Asia as a region is by no means uninspiring, it does not compare favourably with a number of its neighbouring countries. Besides, growth in South Asia has been highly skewed in favour of some countries and some regions, which is attributed to several structural weaknesses that continue to bedevil these countries. One of the prominent factors that distinguishes South Asian countries from their neighbours is the limited technological capacity of the former vis-à-vis the latter.

There are a multiplicity of factors that have contributed to making South Asia a laggard region in terms of technological capacity, although one should hasten to add, there is a substantial variation within the region with countries such as India and Sri Lanka doing relatively better on this front. This also shows that there is a considerable scope for the relatively worse off countries in terms of tech-

nology ladder to catch up with the rest of the countries in the region as well as the rest of the world, provided there is a right kind of policy environment at the national, regional and international levels.

Technological capacity

There are several ways to look at the technological capacity of South Asia. At the macro level, the *Global Competitiveness Reports* annually published by the World Economic Forum and various indicators of science and technology regularly updated by the United Nations Education, Scientific and Cultural Organization (UNESCO) provide some indicators. At the micro level, Enterprise Surveys conducted by the International Finance Corporation (IFC) should be considered. While our analysis is based on various indicators available for as many South Asian countries as possible, we select three close neighbours of South Asia—China (in the North), Iran (in the West) and Thailand (in the East)—in order to facilitate a valid comparison. We start with the indicator for technological readiness (Figure 1).

Based on the figure, Nepal, Bangladesh and Pakistan are technologically least prepared to face the challenges posed by growing competition in the global economy as they rank 129, 125 and 118, respectively, out of 142 countries. This is also reflected in the poor indices of technological readiness. Although one of the neighbouring countries of South Asia, namely, Iran is also not very well placed in this respect, others such as Thailand and China outperform even the star performers of the region—India and Sri Lanka.

Similarly, the micro-level status, presented in Table, is in line with the macro-level status. Even at the firm level, Bangladesh and Nepal are the two laggard countries in terms of their technological and innovative capabilities; in some indicators, they are even worse than Afghanistan.

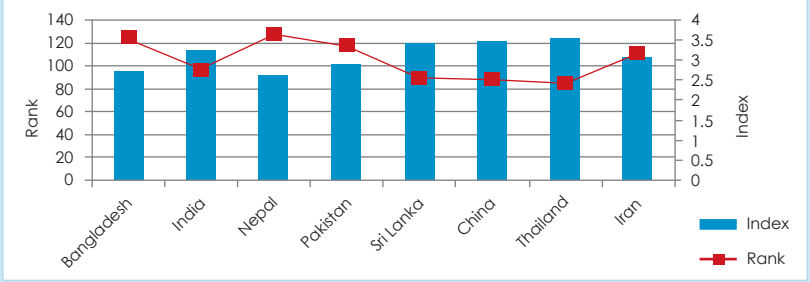
However, these indicators explain only a part of the story because they are mainly intermediate indicators and do not explain the outcomes. Although the real test of technological capability lies in how it can contribute to some development outcomes such as poverty alleviation or improvement in health-related indicators, it would be difficult to identify the causal link. Therefore, a relatively better indicator is to look at the export sophistication of the country concerned, which can be seen from the exports of high-technology products as a percentage of manufactured exports for which data are available for some select, if not all, countries, for the years 2008–2010. As per this indicator, the performance of South Asian countries, including India and Sri Lanka—otherwise considered star performers in the region—pale in significance when compared with their neighbouring countries outside the region, in particular China and Thailand. The figure was 7 percent for India—the highest in South Asia—in

Table
Technology and innovation indicators

Economy	Year	Percentage of firms…			
		…with an internationally recognized quality certification	…using technology licensed from foreign companies	…having their own website	…using e-mail to interact with clients/ suppliers
World	...	16.5	15.2	35.1	64.5
East Asia and Pacific	...	19.2	18.7	29.2	64.1
South Asia	...	9.4	5.6	22.8	43.6
Afghanistan	2008	8.5	10.8	24.1	46.6
Bangladesh	2007	7.8	3.8	15.7	39.7
Bhutan	2009	5.4	6.9	30.1	58.5
India	2006	22.5	5.3	31.1	56.7
Nepal	2009	3.1	0.6	23.3	46.2
Pakistan	2007	9.6	2.7	16.6	26.8
Sri Lanka	2011	9.1	9.3	18.6	30.5
Thailand	2006	39	...	50	74.1

Source: IFC Enterprise Surveys.

Figure 1
Technological readiness, 2012



Source: Calculation based on Global Competitiveness Report 2012–2013.

2010, compared to 25 percent for Thailand and 28 percent for China.

Binding constraints

As noted above, a multiplicity of factors explain the poor performance of South Asian countries on the technological front. However, some of these factors are more binding than the others and here we focus only on those.

Budgetary constraints

South Asian countries generally have extremely limited budget allocation for research and development (R&D), and public sector research organizations are largely under-funded. In some countries, budget allocated for public sector research organizations is barely sufficient to take care of the salaries of the staff, which means that there is no budget left for procuring equipment, chemicals and other critical inputs required for conducting R&D. Although it is not possible to get hard data comparing spending on R&D across South Asian countries, one of the possible indicators to measure the size of investment in R&D is gross expenditure on research and development (GERD) as a percentage of gross domestic product, which is available only for a select number of countries. Based on whatever data are available, Nepal's GERD in the recent period is around 0.37 percent,[1] while the figure for India in 2007 was 0.76. The figures for select developing countries in 2009 were: China (1.7), Iran (0.79), South Korea (3.36) and Israel (4.27).[2]

Human resource constraints

Science and technology (S&T) education is costly and relatively inaccessible for a large majority of population in most South Asian countries. One of the ways through which S&T education is made more accessible in most developed and middle-income countries is through public funding, which makes provision for scholarships to needy and deserving students. Although such practices would be desirable in the context of South Asia, they are not as extensive as required in most countries in the region, barring a few exceptions. Therefore, only an extremely limited number of people are trained in disciplines such as pure science, agriculture science, information technology, engineering, medicines and other areas of S&T. One indicator to measure this aspect of technological constraint is to look at the percentage of S&T graduates among overall graduates in various South Asian countries and compare the same with neighbouring countries. Although there is a serious data limitation to make a valid cross-country comparison, available data of 2010 for select countries prepared by UNESCO show that the figure is 15.5 percent in the case of Nepal and 27.5 percent in the case of Sri Lanka. The corresponding figures for Iran and Thailand, for example, are 51.5 percent and 60.3 percent, respectively.[3]

The above figures only represent a part of the story, not least because the percentage of S&T graduates mentioned above are not always engaged in the technological sectors in the country concerned. A significant number of them migrate to other (relatively more advanced) countries due to several pull and push factors. Major pull factors are the availability of opportunities (in terms of pay, perks, career advancement, working environment and potential for improving life chances of their offspring) coupled with the presence of friends and relatives in the destination countries. Some of the significant push factors include lack of incentives to continue working, including, but not limited to, income level which is not commensurate with the investment made in education and training; and a poor and/or deteriorating quality of socio-political environment in the home country. It is not, therefore, surprising that South Asian countries in general have a relatively higher degree of brain drain, as per the *Global Competitiveness Report 2012–2013*.

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Policy-implementation gap

The objectives of the S&T policies in most South Asian countries are fostering, promoting and sustaining the cultivation of science and scientific research; ensuring an adequate supply of research scientists of high quality and recognizing their work as an important component of the strength of the nation; and assisting in poverty reduction activities by utilizing natural means and resources in a sustainable manner and elevating the country to a competitive position through harnessing the potential of S&T. These fine objectives have, however, remained unimplemented for several inter-

related reasons, some of which are discussed below.

First, there is a lack of involvement of scientists and technologists in the policy- and decision-making processes in matters related to the S&T sector and a clear lack of ownership of the major stakeholders, who do not feel obliged to implement the policy. Second, due to financial and human resource constraints, as discussed above, it is not possible for the institutions involved in promoting S&T to fully implement the ideas outlined in the policy. Third, the incentive mechanism within the public sector in most South Asian countries is not geared towards rewarding top performers as well as penalizing under-performers.[4]

Silo mentality of institutions

It is clear from the S&T literature that due to the positive impact and spillover of technological advancement on economic progress, it is imperative for S&T institutions to establish collaborative links with industries to facilitate technological innovation and economic development.[5] However, the major problem with the institutions involved in the generation, promotion and application of technologies is that their activities are limited to basic routine work and carrying out certain services assigned to them. Most of these institutions lack adequate support services and function mostly in isolation without much coordination and collaboration with other like-minded institutions.[6]

There are no real practical applications of the research findings by S&T institutions for the benefit of the manufacturing or farming sector. These institutions operate in a bureaucratic mode and not in a business-like manner, with a spirit to serve clients in the industrial, commercial or farming sector. Scientists/professionals and industry work in their respective silos without necessarily talking to each other and making efforts to convert research results into marketable products. Barring a few exceptions, the idea of promoting joint and collaborative efforts between the public sector, the private sector and universities to infuse technological dynamism through innovation—a concept known as "triple helix"[7]—is largely absent in most South Asian countries.

Limited involvement of private sector in R&D

The actual demand for technology or research ideas targeted at industrial and commercial use should come from the private sector. However, most firms in South Asian countries, in particular least-developed countries (LDCs), are micro-enterprises that use mature technologies and do not make any significant innovation effort.[8] Moreover, the private sector in some countries within South Asia is apathetic towards the idea of promoting collaboration with research institutions and universities. Although detailed data for private sector investment in R&D are not available to make a valid comparison, data available from a UNESCO report show that in China, nearly three fourths of the investment in R&D is made by the private sector, and in Thailand the private sector accounts for almost half of the investment in R&D. However, among South Asian countries, in India and Sri Lanka, the private sector's investment is around one third and one fifth, respectively. While the private sector's investment in R&D in Iran—another neighbouring country—falls between these two countries' figure, in the case of Pakistan, the private sector's investment in R&D is almost nil.[9]

Limited technology transfer

Neoclassical and endogenous growth theories view that access to foreign technology automatically follows from openness to trade and foreign investment. However, in practice, considerable effort is required on the part of technology-rich developed countries to transfer technology to developing countries, and on the part of the recipient countries to absorb the technology. Moreover, relying solely on market mechanisms for technology transfer may put developing countries at a considerable disadvantage not least because of the quasi-public good nature of technology where market failure is rampant.[10] Since this is an important issue from the perspective of developing countries in general and South Asian countries in particular, we shall discuss this issue in a fairly detailed manner in the next section.

Technology transfer

We discuss two types of technology transfer: the traditional North-South technology transfer and South-South technology transfer. There are various channels through which technology transfer takes place but this article focuses on only a few of them in the context of South Asia and compares them with neighbouring countries where possible. They are: i) trade; ii) foreign direct investment (FDI); and iii) foreign aid.

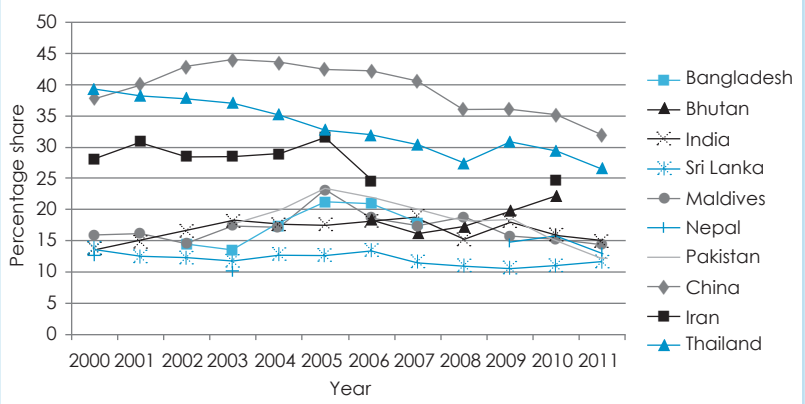
North-South technology transfer

Trade

Trade can be a powerful instrument for technology transfer inasmuch as it provides an opportunity for learning and adapting, not least because technology is embodied in traded products such as capital goods and machinery. Therefore, one of the traditional measures to gauge the extent of technology transfer through trade is to look at the data on the imports of capital goods as a percentage of total merchandise imports. Figure 2 (next page) provides such data for South Asian countries to the extent they are available, and makes a comparison with their neighbouring countries. There is a distinct pattern with countries such as China, Iran and Thailand having the share of capital goods in their total imports above 25 percent during the past 12 years, reaching close to 45 percent (China) and 40 percent (Thailand) in some years. However, these shares have fallen in the recent past.

In the case of South Asia, the pattern as such is rather erratic, but consistently below 25 percent, with some increase seen in the case of Bhutan and Sri Lanka, and hovering below 15 percent in the case of some countries

Figure 2
Share of capital goods in total merchandise imports, 2000–2011



Source: WITS online (accessed 15 December 2012).

(Maldives, Nepal, Pakistan and Sri Lanka) in the recent period. What is surprising is the fact that Sri Lanka, which is considered as a relatively better performer in the region in terms of technological capacity, ranks the lowest in the region in this indicator.

Foreign direct investment

According to Tong (2001), FDI can facilitate technology transfer to developing countries because multinational corporations (MNCs), which are the major investors in developing countries, make up a substantial portion of the world's total R&D investments. When they make investment in developing countries, they also tend to bring cutting edge technology so as to achieve competitive advantage.[11]

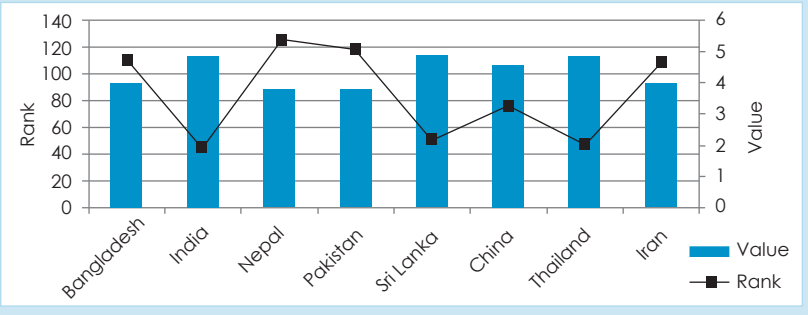
Although East Asian countries made masterly use of FDI to acquire technology and move up the technology ladder, the present rule of the multilateral trading system as provided for in the Agreement on Trade-Related Investment Measures (TRIMs) does not allow the use of any such "performance requirement" as the requirement for foreign investors to transfer technology. The lacklustre performance of South Asian countries in terms of acquiring technology is evidently clear from Figure 3. Only two countries in the region, namely India and Sri Lanka, have achieved some success on this indicator of technology acquisition because the former compares with Thailand and latter has a better indicator than China. However, the other countries in the region, together with their Western neighbour Iran, are at the bottom of the league.

Foreign aid

The major channel through which foreign donor-funded (whether bilateral or multilateral) projects work is pretty much like the trade and FDI channels discussed above. For example, many foreign-aided projects import capital goods or provide technical assistance, which help recipient countries in acquiring technology that could be put to productive use. Technical cooperation/assistance is a form of foreign aid which transfers skills and knowledge. An econometric study conducted in a sample of 85 developing countries finds that technical cooperation can make significant contribution to technology transfer from developed countries to developing countries and help in augmenting total factor productivity of the latter.[12] However, due to lack of country-level empirical evidence, it is difficult to suggest how this channel of technology transfer has helped South Asian countries in technological catch-up.

While intellectual property rights (IPRs), which are mostly held by firms and universities in developed countries, are considered a factor inhibiting North-South technology transfer, a lack of robust multilaterally agreed mechanism for facilitating technology transfer means that the "technology-divide" is not likely to be narrowed down anytime soon. Added to this is the futility of Article 66.2 of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the WTO, which was designed to create a mechanism for providing incentives to enterprises in developed countries to facilitate technology transfer to LDCs. Despite the use of a seemingly binding language and a decision made during the Doha Development Agenda making it obligatory for developed countries to periodi-

Figure 3
FDI and technology transfer, 2012



Source: Calculated from Global Competitiveness Report 2012–2013.

cally report to the TRIPS Council on the progress made in fulfilling the mandate of this clause, things have not moved far enough.[13]

South-South technology transfer

South-South technology transfer is definitely a preferred option due to low cost of transfer and fast diffusion as well as adaptation.[14] The South Asian Association for Regional Cooperation (SAARC) has recognized the importance of technology transfer in relation to areas such as climate change[15] and energy.[16] However, SAARC as an institution does not seem to have any active programme to promote technology in the productive sector such as development of agriculture, manufacturing and services. Second, the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)—as the name suggests—should logically lay more emphasis on the issue of technology in general and its transfer as well as diffusion in particular. This institution too has agreed to "cooperate in expanding the technology base of Member States through collaborations and partnerships targeted towards micro, small and medium scale enterprises", among others, through the establishment of BIMSTEC Centre for Technology Transfer/Exchange Facility in Sri Lanka.[17] Although this decision was made in 2008 in New Delhi during the Second BIMSTEC Summit,[18] the institution itself is yet to come into being.

Bilateral South-South technology transfer mechanisms, however, have proven to be rather more effective, with or without any formal/elaborate agreements being signed. Some of the successful examples include technology transfer for converting waste agriculture biomass into energy, and drought- and flood-resistant seeds from India to Nepal; and threshing machine and rice milling technology from China to various South Asian countries.[19] Kathuria (2011) provides a specific example of technology transfer by helping create requisite human capital, such as through scholarships and fellowships offered by India to Nepalese students to study engineering in various universities and institutes.[20]

Conclusion

That South Asia lags much behind comparator countries in terms of its technological capacity does not mean that it cannot catch up with them anytime soon in the future. As a humble beginning, South Asian countries should keep their houses in order in terms of provision of adequate budget, investment and retention of human resources, taking a collaborative approach and effective implementation of policies that are designed in a relatively inclusive manner.

While South Asian countries should try and harness the potential of the existing channels of technology transfer, including trade, FDI and foreign aid, they should fully exploit the potential of South-South technology transfer. At the global level, they must push for creating a robust monitoring mechanism with milestones and targets to guarantee that TRIPS Article 66.2 becomes more binding and enforceable. Besides, since the Millennium Development Goals do not explicitly cover technology issues, they should collectively work towards ensuring that technology is included as a cross-cutting issue in the post-2015 development framework. These measures can indisputably contribute to technological catch-up in the poorest countries of the world, including those in South Asia. ■

The author would like to thank Prakash Ghimire for research assistance.

Notes

1 Pandey, Posh Raj, Ratnakar Adhikari and Bandita Sijapati. 2012. "European report on development 2013: Nepal case study". Report submitted to Overseas Development Institute (ODI), London.

2 Extracted from UNESCO Institute for Statistics (UIS) estimations, October 2011 (accessed 25 December 2012).

3 *ibid.* (accessed 17 December 2012).

4 Pandey *et al.* (2012), Note 1.

5 See, for example, Bandyopadhyay, M. 2006. "Collaborative links between academic and research institutions and industry for stimulating technological innovation and economic development: Need for Science and Technology Policy initiative and networking amongst NAM and other developing countries." Paper presented at International Conference on S&T Policy Research and Statistical Indicators, November 8–10, 2006, Colombo.

6 See, for example, Pandey *et al.* (2012), Note 1.

7 See, for example, Williams, Logan D. A. and Thomas S. Woodson. 2012. "The future of innovation studies in less economically developed countries". *Minerva*, June 2012, 50(2): 221–237.

8 See for example, Correa, Carlos. 2007. "Intellectual property in LDCs: Strategies for enhancing technology transfer and dissemination". Background Paper, No. 4 for the *Least Developed Countries Report 2007*. Geneva: UNCTAD.

9 UNESCO. 2011. "Global Investments in R&D". UNESCO Institute of Statistics (UIS) Fact Sheet, August 2011, No. 5. Paris: UNESCO.

10 Pandey *et al.* (2012), Note 1.

11 Tong, Sarah Yueting. 2001. "Foreign direct investment, technology transfer and firm performance". April 2001. Hong Kong: Hong Kong Institute of Economics and Business Strategies, University of Hong Kong.

12 Sawada, Yasuyuki, Ayako Matsuda, and Hidemi Kimura. 2007. "On the role of technical cooperation in international technology transfers." RIETI Discussion Paper, No. 07-E-045, Research Institute of Economy, Trade and Industry.

13 See, Moon, Suerie. 2012. "Monitoring mechanism needed to ensure technology transfer to LDCs." *Trade Insight* 8(1): 27–29.

14 Kathuria, Vinish. 2011. "South-South cooperation and market mechanisms for technology transfer". *Tech. Monitor*, (May-June): 12–19.

15 For example, *Thimpu Statement on Climate Change*, issued at the 16th SAARC Summit (2010), mentions "technology transfer" only in the preamble to the Statement.

16 For example, SAARC Energy Centre, established by SAARC, has enlisted technology transfer as one of the five thematic areas of its work.

17 Asia Tribune. 2008. "BIMSTEC Summit declares the need for close cooperation in combating all forms of terrorism and transnational crime", *Asia Tribune*, 13 November.

18 *ibid*.

19 Pandey *et al.* (2012), Note 1.

20 Kathuria (2011), Note 14.

Analysing India-Maldives trade

Vyuptakesh Sharan and Shimoni Sinha

Even as regional economic integration schemes proliferate in view of the expected increase in trade and investment, concerns over the possibility of asymmetric distribution of benefits among members of varied economic strength loom large.[1] This concern is highly relevant to the trade relationship between the Maldives, a small island nation facing critical structural handicaps and which graduated from least-developed country (LDC) status only in 2011, and India, the world's second most populous country and an economic giant in absolute terms.

The beginning

The beginning of economic relations between the two countries dates back to 1975 when India provided the Maldives a grant of Rs. 4 million to set up a fish canning plant after which the Maldives was able to sell processed fish in the international market. In 1977, India was instrumental in the setting up of the Maldives International Airlines which was managed and operated by Indian Airlines under a lease agreement.[2]

The India-Maldives Free Trade Agreement was signed in March 1981 to provide for trade on a most-favoured-nation basis. The payments for trade were to be made in convertible currency. Any party could put restrictions on trade with a view to protecting human, animal and plant life and safeguarding national treasures. The Government of the Maldives was to submit a list of essential commodities that India had to export. It was India's responsibility to meet the demand for essential commodities in the Maldives. The agreement was thus a foundation stone for bilateral trade to grow.

In February 1986, the two countries also signed the Economic and Technical Co-operation Agreement following which a Joint Commission for Economic and Technical Co-operation was set up. Despite these efforts, bilateral trade between the two countries during the entire 1980s remained minimal. India's exports to the Maldives remained confined to around US$0.4 million annually. The value of annual imports of India from

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In India-Maldives trade, while overall trade balance has been in India's favour, the net barter terms of trade has mostly been in favour of the Maldives.

the Maldives was not even one tenth of a million dollars.[3]

Trade after SAPTA

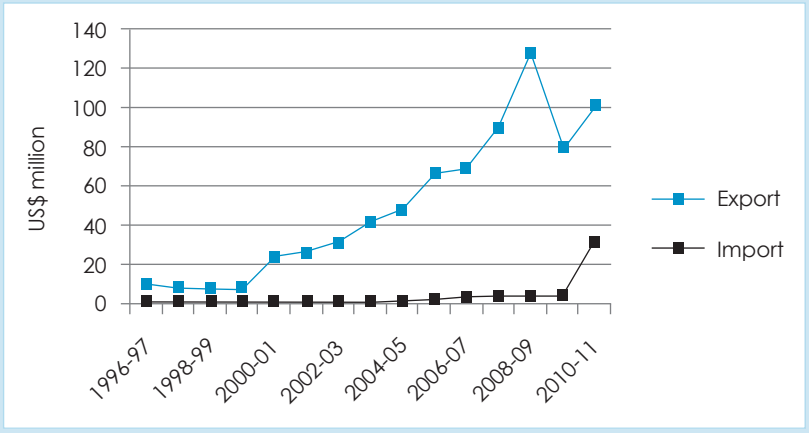
After establishing the South Asian Association for Regional Cooperation (SAARC) in 1985, SAARC Member States put in place the SAARC Preferential Trading Arrangement (SAPTA), which entered into force in 1995. Compared to the 1980s, Indo-Maldives trade grew quite substantially after SAPTA came into being. For instance, during Fiscal Year (FY) 1996–97, India's exports to the Maldives amounted to INR 370 million compared to INR 26 million during FY 1985–86, while its imports from the Maldives were INR 6 million and INR 0.353 million, respectively.[4]

Under SAPTA, tariff concessions were announced during three rounds of negotiations. The Maldives offered non-LDC members, including India, 7.5 percent tariff concession on 17 Harmonized System (HS) product categories during the first round, 10 percent on 5 HS product categories in the second round and 5–10 percent on 390 HS product categories in the third round. In exchange, India provided LDC members, including the Maldives, at least 50 percent concession (even 100 percent in some cases) on 62 HS product categories in the first round, 25–50 percent concession on 514 HS product categories in the second round and 50 percent on 1,874 HS product categories in the third round.

The bilateral trade agreement between India and the Maldives does not mention any tariff preference. In that respect, the regional trading arrangement is better than the bilateral one. However, under the bilateral arrangement, India allows the Maldives to import certain products from India, the export of which is otherwise not permitted. These products include river sand, eggs, potatoes and onions.

Although bilateral trade between India and the Maldives was much higher in the 1990s compared to the 1980s, it was not significant in absolute terms. While India's exports to the Maldives ranged between US$7.3 million and US$10.36 million, imports varied in the range of US$0.05 million and US$0.40 million (Figure). During the 2000s, the effect of tariff concessions was vivid. The quantum of trade—both exports and imports—shot up. In FY 2000–01, the value of India's exports stood at US$24.61 million, which was more than thrice the export value in the preceding year. In the following years, it increased further and reached US$127.91 million in FY 2008–09, although it plummeted to US$100.14 million the following year. India's imports from the Maldives increased too. The value of imports rose from US$0.19 million in FY 2000–01 to US$3.97 million in FY 2008–09, although it fell marginally to US$3.63 million in FY 2009–10. FY 2010–11 was singular in the sense that the value of imports increased abnormally to US$31.38 million compared to US$3.63 million in the preceding year.

Figure
India's trade with the Maldives



Source: www.dgft.gov.in

Trade balance and diversification

There is a huge trade balance in India's favour. India enjoyed a trade surplus of US$123.94 million during FY 2008–09. The import/export ratio varied between 0.6 percent and 31.3 percent during 1996/97–2010/11. The reason for the poor export performance is that the economy of the Maldives is not diversified and faces severe supply-side constraints.

Looking at Indo-Maldives trade in a relative perspective, it is notable that India accounted for barely 2 percent of the Maldives' exports in 2009. The major export destinations were Thailand (49 percent), the European Union (EU) (21 percent) and Sri Lanka (9.5 percent). The United Arab Emirates (UAE) and Japan accounted for 2.9 percent each. However, import sources were more dispersed geographically. India was the fourth major source of the Maldives' imports. Its share was 10.4 percent, only next to Singapore (21.3 percent), the UAE (18 percent) and the EU (11.5 percent).

Product composition

India's exports to the Maldives during FY 1996–97 consisted mainly of cotton, cereals and other edible items (Table, next page). Manufactured products, especially fabrics, pharmaceutical products and plastic products, comprised hardly a quarter of its total exports. By FY 2010–11, cereals and other foodstuffs accounted for around one fourth of the total export value, while manufactures of daily use had risen to prominence. The change in the commodity structure was even more

Table
Commodity composition of India's exports to the Maldives

FY 1996–97				FY 2010–11			
HS code	Commodity group	Amount in US$ million	% share	HS code	Commodity group	Amount in US$ million	% share
52	Cotton	1.44	13.89	25	Salt, sulphur	13.68	13.66
10	Cereals	0.86	8.30	72	Iron and steel	7.57	7.56
11	Malt, starches, etc.	0.73	7.05	30	Pharmaceutical	6.07	6.06
25	Salt, sulphur	0.72	6.95	10	Cereals	5.5	5.49
62	Apparel and clothing	0.68	6.56	39	Plastic	5.47	5.46
30	Pharmaceutical	0.62	5.98	27	Mineral fuels	5.44	5.43
7	Edible vegetables	0.55	5.31	7	Edible vegetables	4.88	4.87
84	Nuclear reactors	0.4	3.86	3	Fish and crustaceans	4.84	4.83
60	Knitted fabrics	0.4	3.86	17	Sugar	4.57	4.56
39	Plastic	0.39	3.76	85	Electrical machinery	3.75	3.74
	Total of 10 products	6.79	65.54		Total of 10 products	61.77	61.68
	Total export	10.36	100		Total export	100.14	100

Source: www.dgft.gov.in

prominent with regard to India's imports from the Maldives. In FY 1996–97, iron and steel alone accounted for 88.24 percent of its total import from India. Animal products had a share of 11.76 percent. On the contrary, by FY 2010–11, the share of iron and steel had dropped to 6.12 percent. Copper products and aluminium products made up 3.28 percent and 1.15 percent of imports, respectively. Mineral fuel accounted for 87.73 percent.

India's imports from the Maldives are highly concentrated over commodities compared to exports to the Maldives. The commodity concentration index of India's exports to the Maldives reduced marginally from 0.056 in FY 1996–97 to around 0.052 in FY 2010–11. The same index for India's imports from the Maldives dropped more distinctly from 0.792 to 0.775.

Terms of trade

One should examine whether the Maldives is a gainer from its trade with India at least on the count of terms of trade. The unavailability of the same six-digit commodities in different years poses a serious problem in computing the terms of trade. Hence, we calculated the weighted average price of the top 100 commodities of India's export to, and import from, the Maldives during 2001–2011. The net barter terms of trade have been highly volatile on account of large-scale volatility in the weighted average price of imports and exports. During the decade between FY 2001–02 and FY 2010–11, there were only three fiscal years when India experienced favourable terms of trade, but with extreme fluctuation.

Conclusion

Immediately after the Maldives became independent of the British rule, India developed its political relations with the Maldives. In 1981, a free trade agreement was signed and then the two countries came closer under the SAARC umbrella in 1985. In 1986, a Technical and Economic Co-operation Agreement was signed.

All this was expected to provide stimuli to trade between the two countries. Trade got a further boost with the creation of SAPTA and SAFTA, but a distinctive boost was evident only from the beginning of 2000s. However, the balance of trade swung heavily in India's favour. As far as the commodity composition is concerned, India's exports consisted mainly of food products in the mid-1990s. The share of manufactures, however, increased over time to account for the bulk of exports in 2011. On the import side, the major items are mineral fuel, and iron and steel products. The commodity structure has been highly concentrated; nevertheless, the concentration has eased over time. Although the trade balance is in India's favour, the net barter terms of trade has mostly been in the Maldives' favour. ■

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Notes

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TRIPS, climate change and agro-biodiversity

Ian Vickers

For many farming communities in South Asia, maintenance of agriculture biodiversity has been essential in ensuring their nutrition and food security. Climate change, through various means such as rising temperatures, declining and unpredictable rainfall, and extreme weather events, is likely to have the effect of altering the environmental conditions beyond the "phenotypic plasticity" (ability to adapt) of many existing plant types.[1] It has been estimated that, by 2050, changes in environmental conditions will lead to a 30 percent decline in crop production in South Asia.[2] Therefore, it is important to maintain crop diversity because greater the diversity, greater the possibility that at least some crops will be able to cope with changes to the natural environment.[3] A number of studies have shown that in environments with changing climatic conditions, fields which maintain crop diversity have continually experienced higher yields than those practising monocultures of genetically identical plants.[4] Moreover, as other case studies have shown, maintenance of agriculture biodiversity is likely to have an impact on the wider ecosystem. For example, in flood-prone areas, maintenance of crop diversity has been shown to prevent soil erosion and deterioration of the natural environment.[5]

Despite such importance of agriculture biodiversity, major crop varieties at the global level have actually decreased by around 80–90 percent over the last century.[6] One of the reasons for such decline is the strengthened system of intellectual property rights (IPRs).

The TRIPS Agreement

The Agreement on Trade-Related Aspects of Intellectual Property Rights

(TRIPS) is an international agreement administered by the World Trade Organization (WTO) that sets down minimum standards for many forms of intellectual property (IP) regulation. It touches upon the area of biodiversity also. Article 27.3(b) of the Agreement provides leeway to members to get their innovators secure patent protection on new plant varieties. However, members are free to protect plant varieties through an effective *sui generis* system or a combination of patent and *sui generis* systems.

This choice facing member countries—either adopting the patent system or appropriating their own *sui generis* system—is of great importance, and is the subject of much international debate. Till date, no South Asian country has opted for patent protection of plant varieties. Nevertheless, given that a choice still remains open for many South Asian countries, it is worth exploring the potential consequences of implementing patent protection.

Patent protection of plant varieties

The existence of structures in which innovators are rewarded and given rights over the exploitation of their information is arguably necessary to provide incentive for innovation to occur. This is relevant in the development of new plant varieties that depend on biotechnological processes. These processes, in which there is a direct manipulation of the genome of a plant, are far more efficient at developing new plant varieties than traditional trial and error plant breeding techniques, and require considerable amounts of investment. Consequently, for such investments to occur, the existence of appropriate incentives, ensured via suitable rights and reward structures, is paramount. Enforcement of IPR regimes is justifiable also because they serve a perceived end of justice, in which people are adequately rewarded for their efforts.

However, while such a system may be suitable for encouraging innovation, it cannot entirely be applicable to developing countries. In South Asia, farmers have traditionally operated as communities, storing, re-using, sharing and exchanging seeds among themselves. It is these community practices rather than modern methods that have been vital in the region in the breeding of new plant varieties and the maintenance of existing varieties. A patent system, if implemented, would prevent farming communities from engaging in these traditional practices, and would effectively force them to buy seeds from patent holders each year. Such an arrangement would effectively prevent South Asian farming communities from playing their traditional role in maintaining and developing new plant varieties, and, in light of climate change, would make them further vulnerable.

Although patents are often considered necessary to encourage innovation, they can also stifle it. They can act as barriers to the further development of new technologies, particularly in cases where excessively broad patents are adopted, creating what is known as a "patent thicket". In the agriculture and food sector, for example, as of 2003, six largest companies owned 74 percent of the patents for major food crops such as rice.[7] This, in effect, leads to monopolies since there will be fewer incentives for the others to develop new plant varieties. Such a situation is particularly dangerous given the need for innovative responses to climate change.

Benefits of *sui generis* system

Given the negative consequences of protecting plant varieties by patents, South Asian countries should develop their own *sui generis* systems for the protection of their plant varieties. By doing so, South Asian countries could effectively provide legal space to their farming communities to continue their practices of storing, re-using and exchanging seeds. This would essentially empower farming communities

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Compared to traditional breeding practices, genetic engineering offers only limited opportunities in developing new plant varieties.

in developing new plant varieties in response to climate change. Furthermore, given the great decline in plant varieties that is currently occurring, South Asian countries should develop *sui generis* systems which actively reward their farming communities for engaging in such activities.

Scientists are increasingly recognizing that genetic engineering offers only limited opportunities when compared to traditional breeding practices in developing new plant varieties that are essential in the present context of climate change. It has been noted that genetically engineered crops tend only to offer resistance to a single stress (for example drought), while climate change tends to operate through a variety of environmental pressures. But by using traditional breeding and practices such as "Marker Assisted Selection", crops systems can be developed with the diversity of resilience to really respond to climatic effects.[8] Hence, implementation of a *sui generis* system which rewards those engaged in traditional breeding practices could thus potentially play a vital role in better preparing South Asian countries to face climate change challenges in agriculture.

Adoption of the *sui generis* system in this way is often termed as implementing "farmers' rights", which isn't simply an alternative to breeders' rights. Rather, it encompasses two things: i) the right of farmers to receive recognition and rewards for their role as stewards in the maintenance and historical development of plant genetic resources, and ii) the right to continue to engage in traditional practices, free from the dependence and vulnerability caused by patent systems. In many ways, the adoption of farmer's rights is central in ensuring the maintenance and development of plant varieties in South Asia, and thus is an important part of preparing the countries against the potential vagaries of climate change.

Conclusion

In light of climate change, there is a clear need to develop appropriate institutional structures for the maintenance and development of biodiversity, including agriculture biodiversity. However, for South Asian countries, implementation of a patent system even to protect new plant varieties poses potential problems for the realization of this goal, and risks making the region vulnerable. Therefore, while the market, and appropriate incentive structures, can certainly play a key role in ensuring plant diversity, the manner in which such incentive structures are adopted needs to be modified in the South Asian context.

In order to encourage the maintenance and development of agriculture biodiversity, South Asian countries need to effectively strike a balance between giving their farming communities the right to engage in traditional practices, while simultaneously rewarding those, both farmers and breeders, who engage in innovating and developing new seeds.

India has already developed an effective *sui generis* system by enacting the "Protection of Plant Varieties and Farmer' Rights (PPVFR) Act" in 2001. In recognizing farmer's rights, this system is the most far reaching in the world. It incentivizes the development of new plant varieties via traditional processes by offering opportunities to farmers to register their own seed varieties in the same manner as breeders. Likewise, under its National Gene Fund for the conservation of genetic resources, it also offers a means to reward farmers for their role in maintaining biodiversity and preserving traditional knowledge. The Indian system finds a balance between offering incentives to farmers and breeders alike to maintain and develop new plant varieties, and recognizing farmer's rights to save, re-use, share and sell farm-saved seeds, provided that for-sale seed is not branded under a registered name. While breeders, therefore, have control in the commercial marketplace, their rights in this context lack the all-encompassing nature of patent protection, and consequently, the livelihood practices of farmers are not infringed. South Asian countries would do well by adopting the Indian approach, and establishing for themselves similarly balanced structures, which appear necessary to secure a sustainable, empowered, biodiversity-rich and food-secure future. ■

The author recently worked at SAWTEE as an intern and is now based in London.

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Assessing COP11, and looking forward
Time to re-balance the CBD

Faris Ahmed

Many delegates to the Eleventh Conference of the Parties to the Convention on Biological Diversity (CBD COP11) came with mixed feelings. The year 2012 was an intense year, packed with conferences, preparatory meetings and multilateral negotiations on environment, climate, food and biodiversity, including Rio+20; two meetings of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) of the CBD leading up to COP11; and assembly of the International Union for Conservation of Nature. Furthermore, not too long ago, there was hard work at COP10 in Nagoya—not only negotiating the Aichi 20/20 targets, but also what was to become the Nagoya Protocol on Access and Benefit Sharing (ABS).

So, prepared but weary, civil society came to COP11, hoping that there would be more action, not more words, in Hyderabad. Even though they were encouraged by Executive Secretary Braulio Dias' assertions that COP11's top three priorities would be "Implementation, implementation and implementation", they were apprehensive that all the hard negotiated texts of recent meetings—unsatisfactory as they already were—would be re-opened and could be further weakened. They were fully aware of the CBD's many imbalances: between words and action, between the three pillars of the Convention, between the North and the South, between corporate and public interests, and others.

This article assesses the areas where the CBD appears to have lost its balance, and what can be done to restore that balance in this Convention so that it can continue its crucial work dealing with the food, environmental and climate challenges the planet faces today.

Rethinking how the CBD works

As asserted in the opening statement of the CBD Alliance meeting, the CBD has, among its fundamental tasks, the elaboration of decisions, their implementation, monitoring, evaluation, and reporting on their progress. But far too much energy is spent on repeated negotiations (in some cases, leading to regression) and too little on action. Therefore, a shift must occur to refocus energy in implementing COP decisions at the national level, through comprehensive national biodiversity action plans, and measurable, appropriate targets and indicators based on the Aichi goals. This would dispel the efforts made at COP11 to "retire" important past COP decisions such as on genetic use restriction technologies and older decisions on agriculture biodiversity in the name of efficiency. Greater efficiencies are to be found elsewhere.

Governance, participation and decision-making processes must also change, and reflect new realities and the many interests and voices at the table. Greater effort to work with existing and innovative local structures will provide extra impetus to achieving lasting results.

Similarly, there is a need to work in line with social and cultural community protocols that have worked for centuries and played a huge role in the community management of biodiversity and natural resources. These encompass a critical and wide array of customary laws, constantly evolving and developing, but with equal bearing on other types of law. This implies creating space and processes for the full and effective participation of indigenous peoples and local communities, and the integration of their traditional, scientific, technical, and technological knowledge.

The recent reforms at the Committee on World Food Security (CFS) have demonstrated that an inclusive participatory model, where civil society, indigenous peoples, pastoralists, fisherfolk, smallholder famers, youth and women, among other groups, can indeed self-organize and provide systematic input to global decision-making on food security. The CFS model was discussed at Rio+20 as the way of the future, not only for Rome-based agencies, but also for other multilateral bodies. The CBD would do well to adopt a similar model of governance and participation.

The tense conclusion of COP11 pointed once again to the North-South divide, and the politics of biodiversity. Even as Parties reached a little deeper into their pockets, quantitative targets for international financial flows

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remained the most divisive issue at COP11. Money from new financial mechanisms such as Reducing Emissions from Deforestation and Forest Degradation—positioned as ways to bridge the financial gap—has not flowed, and the international community has become only too aware of the flaws of financial mechanisms that are not designed or implemented with the free, prior and informed consent of those they were meant to assist.

Rethinking nature

At COP11, as in the SBSTTAs leading up to it, it was apparent how a certain view of nature has become firmly entrenched in the proceedings of the Convention. The signs of the "financialization" of nature were everywhere.

While there is no question that the value of biodiversity should be underscored, when we get into putting a price on life itself, it becomes a slippery slope: that which can be priced can be commercialized, and thus traded in the market. If this thinking is applied to biodiversity, nature and to life itself, it changes the way we approach the problem, and the solution. (In a side event, on the subject of Japan's successful efforts to save the Ibis from extinction, a participant asked the following question: "But what ecosystem services does the Ibis perform?" And, nobody blinked).

The CBD will have to work hard to make sure that the pure financial mindset will not drive the conceptualization of its work. Otherwise, we will see greater infusion of ideas and schemes like natural capital, payments for ecosystem services, and biodiversity offsets—all under the larger umbrella of the Green Economy. We would thus see a continuation in the long tide of corporate takeover and biopiracy, which were the reasons to create the CBD in the first place. Let us, however, insist that ecosystem functions be valued for their priceless contributions to economies, societies, and cultures.

Rebalancing the pillars

When the CBD was created two decades ago, it rested on three pillars: conservation of biodiversity, its sustainable use, and the equitable sharing of benefits derived from the use of genetic resources. At COP11, it was apparent that it has become imbalanced—even with the recent emphasis on the third pillar in Nagoya.

Currently, the attention seems to be tilted towards conservation, with much less attention paid to sustainable use and the ecosystems approach. In practice, this means that the experience and knowledge systems of those who are at the front lines of sustaining biodiversity through use—smallholder farmers, fishers, pastoralists, women and indigenous and local communities—stay marginalized. It means that more attention is paid to restoring degraded ecosystems, rather than conserving ecosystems through sustainable use, *in situ* (on farm).

Another sign that sustainable use is getting less attention is that agriculture biodiversity and knowledge *in situ*, which embodies sustainable use, received very little attention at COP11. It is hoped that COP12 will see a much needed focus and consolidation of agriculture biodiversity as, it may be argued, the majority of the Aichi targets cannot be met without addressing agriculture biodiversity.

Furthermore, one of the central tenets of the CBD, the Precautionary Principle, has seen alarming erosion and needs to be re-instated. This principle of sober second thought and assessment is greatly needed in a world where science and technology are changing faster than we can grasp. The Precautionary Principle must govern technology assessment and our approach to new and emerging issues such as synthetic biology.

Road to Korea

The next COP is going to take place in South Korea. Although two years away, the road to COP12 is long. Its stakeholders, including civil society, must work towards meeting the many important milestones on the way. In order to regain balance, the CBD will need to address the content, structures and processes of the Convention, working from both within and with stakeholders. And that work should begin now. ■

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Making SAARC Seed Bank work

for local farmers and seed system

Kamalesh Adhikari

Seed and food insecurity is a major policy concern for South Asia. The challenges to the seed sector in the region range from identifying effective strategies to conserve seeds in *ex situ* (gene banks) and *in situ* (farm fields) conditions to promoting exchange of seeds for breeding of plant varieties important for food security and climate change adaptation. Member States of the South Asian Association for Regional Cooperation (SAARC) have been undertaking regional efforts to address some of such challenges. For example, in the Fifth SAARC Summit, held in Male in November 1990, South Asian governments had decided to cooperate on the exchange of expertise in genetic conservation and maintenance of germplasm banks. They had also agreed that cooperation in the cataloguing of genetic resources stored in different SAARC countries would be mutually beneficial. In addition, they had expressed their consent to support the proposal made by the Group of Fifteen Developing Countries for the establishment of a gene bank for developing countries.

A 2008 report of the SAARC Secretariat and the Food and Agriculture Organization of the United Nations (FAO) indicates that Bangladesh had suggested setting up a common regional gene bank in South Asia. The idea was to mobilize this bank to develop new varieties, hybrids, livestock breeds, and promote exchange of germplasm on the grounds of improving coordination among Consultative Group on International Agricultural Research (CGIAR) centres, the FAO and national laboratories. In April 2010, South Asian governments, in their declaration of the 16th SAARC Summit, agreed to promote cooperation for a regional seed bank in South Asia. Consequently, at the 17th SAARC Summit held in November 2011, they signed onto the SAARC Seed Bank Agreement, and the Framework for Material Transfer Agreement. The latter would be applicable to the operationalization of the SAARC Seed Bank Agreement, mainly for facilitating easy movement of seed and planting materials across South Asia.

As farming in South Asia is characterized by fragmented lands and small landholdings by poor farmers who rely significantly on informal (traditional) system of farmer-to-farmer exchange of seeds, any decision to make regional institutional arrangements to exchange seeds and genetic materials should not neglect the role of the traditional seed system in strengthening farmers' rights to seeds and traditional knowledge. In this regard, the following policy concerns are important for SAARC governments and stakeholders in order to operationalize the SAARC Seed Bank Agreement and the Framework for Material Transfer in favour of the rights of local, indigenous and farming communities.

Policy concerns

First, do South Asian governments view the Seed Bank system only for improved (modern) varieties or will they also mobilize this system as a reliable mechanism to promote the conservation of local varieties? The current objective of the Seed Bank Agreement only focuses on increasing the seed replacement rate with appropriate varieties at a faster rate. Other provisions of the Agreement are also not necessarily concerned about how conservation of genetic resources can be promoted to empower local farmers to benefit from local seed systems.

Second, while developing a list of common varieties, Article IV of the Seed Bank Agreement recognizes that there is a need to preserve local/indigenous varieties but it is not clear how and through what mechanisms they will conserve such varieties. The SAARC Seed Bank Board, as envis-


Prakash Ghimire

aged in the Agreement, will have to work on this issue and come up with a plan of action to promote the conservation of such varieties.

Third, the Agreement calls for maintaining quality standards of seeds under the Seed Bank system but it remains a major constraint for local and poor farmers in the region as they lack the capacity to meet high standards of the formal seed system. Under what terms and conditions of quality standards will farmers' varieties be included within the Seed Bank system is, therefore, a major issue of concern. Harmonized seed testing and certification, and facilitation of seed trade within the region are two important features of the Seed Bank Agreement. However, whether these will only focus on modern varieties or there will be special measures for the consideration of local varieties of seeds is an important concern that the region's governments must address.

Fourth, there are provisions for the withdrawal, release and replenishment of seeds in the SAARC Seed Bank Agreement. But how country-specific situations—mainly in view of the state of agriculture, farmers, and seed and food insecurity—would be considered is critical to addressing the issue of fair pricing and adequate supply of seeds. The Seed Bank Board, based on country-specific assessments, will have to make strategic decisions in this regard.

Fifth, the SAARC Seed Bank Board has been conceptualized for administering the Seed Bank Agreement. Its role ranges from policy making and ensuring compliance to developing a list of common varieties and setting common standards and certification rules. The provision for farmers' representation in the Board is a welcome move and in line with the principle of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). But in South Asia, farmers' participation in decision making is a political issue and thus the governments need to find a proper institutional system to ensure that a real farmer participates in all processes of decision making and implementation of the Seed Bank.

Sixth, the Framework for Material Transfer has been conceptualized to be in accordance with the ITPGRFA. While recognizing the need to be supportive of the implementation of global intellectual property agreements, the ITPGRFA provides its Contracting Parties certain flexibilities to implement farmers' rights to plant genetic resources for food and agriculture and traditional knowledge at the national level. This essentially means that for the purposes of the operationalization of the Framework for Material Transfer Agreement, SAARC governments, though recognizing farmers' rights to seeds and traditional knowledge, also agree to abide by the global rules of intellectual property on seeds. Hence, South Asian governments will have to take a balanced approach to safeguard the interests of farmers from the impacts of intellectual property. In this process, the Seed Bank Board also has to reflect upon the equity principles of the Convention on Biological Diversity, mainly in terms of provisions for the protection of traditional knowledge, and access to genetic resources and benefit sharing.

Seventh, there is limited focus on agriculture research and development, including breeding of varieties that enhance food security and ensure effective climate change adaptation. The role of the Seed Bank in the expansion of agriculture research and development, including breeding of varieties for food security and climate change adaptation, needs to be strengthened through programmes such as participatory plant breeding and variety selection of local and, if required, other varieties.

Finally, the operationalization of the Seed Bank and the Framework for Material Transfer Agreement is at the formal level and it is important to note that the informal seed system in the region has a major role to play in advancing farmers' rights to seeds and traditional knowledge. Most of the seed demands of farmers in the developing world, including in South Asia, are still being met through local exchange and use of farm-saved seeds. Such exchange and use system still contributes 70–90 percent to total seed supply. Thus, SAARC should not undermine the community seed system but should strengthen it with adequate policy, legal and institutional measures for an enabling environment for the realization of farmers' rights. In this respect, the Seed Bank Board will have to develop a set of guidelines to promote linkages between the SAARC Seed Bank and community seed banks. How farmers in the region can use the SAARC Seed Bank and the Framework for Material Transfer Agreement for the benefit of community seed systems, including community seed banks, needs special attention. ■

This article has been drawn from a Policy Brief (No. 24, 2012) titled "Seed banking in South Asia for protection of farmers' rights" written by the same author and published by SAWTEE. The author is Doctoral Candidate, Australian National University, Canberra.

Multilateral mechanisms for technology transfer

Neither multilateral mechanisms nor strong IPR laws or international trade alone are able to adequately bridge the technology divide between developed and developing countries.

Apurba Khatiwada

Since the origin of the concept, technology transfer has become a symbol as well as a substance of the North-South divide. While there has been almost universal agreement that technology transfer is essential for developing countries and that developed countries should assist the process, the division lies mainly in regard to the manner in which such transfer is to be ensured. After initially focusing on the regulation of foreign investment, and establishment of government enterprises and research institutes, developing countries started to take multilateral initiatives to attract technology. The Code of Conduct on transfer of technology of the United Nations Conference on Trade and Development (UNCTAD) was one such example. Developed countries, on the other hand, tried to promote the idea that effective protection of intellectual property rights (IPRs) would automatically ensure technology transfer, and resisted multilateral mechanisms. The present multilateral mechanisms that address technology transfer are, therefore, results (compromise) of those two contrasting positions. This is also reflected in the nature of the existing multilateral mechanisms, which are characterized by the intertwining of issues such as protection of IPRs, multilateral trading rules, and environment protection measures with technology transfer.

Be that as it may, the obligations to transfer technology under multilateral mechanisms do not reciprocate with other obligations negotiated in return for the promise of technology transfer. They address technology transfer in the form of vague concessions granted to developing countries in return for their acceptance of clear and strict standards of protection of IPRs, multilateral trading rules, and environment protection measures. Similarly, obligations to transfer technology have been defined in the form of best effort obligations, in effect, making strict enforcement difficult. Moreover, recent developments suggest that the policy space available for developing countries regarding technology transfer is also shrinking.

Technology transfer according to the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) evidences this trend. Developed countries that wanted strong IPR regimes under the World Trade Organization (WTO) advocated TRIPS as an instrument that would promote technology transfer in developing countries (TRIPS Article 7). However, the obligation to transfer technology to the least-developed countries (LDCs) according to the same Agreement (Article 66.2) has, apparently, not become possible because it is unclear which countries are developed or what is meant by technology transfer!

TRIPS Article 66.2 defines an obligation of developed countries to provide incentives to enterprises and institutions for the purpose of promoting and encouraging technology transfer to LDCs. Despite a clear and mandatory obligation, developed countries have failed to abide by the provision. According to the TRIPS Council, only 21 countries have reported that they have abided by the obligation under Article 66.2. On an average, 13.5 developed countries have submitted yearly reports during the period 1999–2010. Moreover, according to Moon (2011), among the reported policies and programmes, a mere 42 unique policies and programmes qualify as transfer of technology to LDCs during the said period.[1] Such a poor state of technology transfer is disappointing and represents the failure of developed countries to uphold their side of the promise. In addition, insertion of TRIPS-plus mechanisms in regional trade agreements and impending TRIPS-plus multilateral mechanisms, such as the Anti-Counterfeiting Trade

Agreement, threaten to reverse the compromise and whatever successes developing countries have been able to garner in regard to technology transfer. Consequently, they will also further shrink the policy space available for developing countries to attract technology in the future.

Multilateral environment agreements (MEAs) have also been largely ineffective on this issue. Unlike TRIPS, MEAs provide vague provisions in the form of best effort obligation. The United Nations Framework Convention on Climate Change (UNFCCC) and the Montreal Protocol on Substances that deplete the Ozone Layer (the Montreal Protocol) have tried to ensure firm commitments from developed countries to transfer technology by making substantive obligations of developing countries conditional upon technology transfer by developed countries. Again, the obligation to transfer technology has been couched in vague terms, making it difficult for developing countries to demand reciprocal fulfilment of obligations. On the other hand, due to the best effort nature of the obligation, the enforcement of the provision depends upon the discretion of source countries. Moreover, given the nature of the technology involved and the vastness of the problem, in respect to the UNFCCC, it is extremely difficult to specify the exact nature of technology. In short, even with conditional obligations, technology transfer has not been possible.

The technology transfer arrangement under the Montreal Protocol is often cited as a success. However, authorities are still far from clear in establishing causation between technological development in the post-Montreal Protocol era and the Montreal Protocol. Other MEAs that have dealt with the issue of technology transfer include the Convention on Biological Diversity, the Stockholm Convention on Persistent Organic Pollutants, the United Nations Convention to Combat Desertification, the International Treaty on Plant Genetic Resources for Food and Agriculture, the Basel Convention on Hazardous Waste, and the Convention Strengthening the Inter-American Tuna Commission. Again, the provisions in those instruments are uncertain and their enforcement is difficult.

The failure of negotiations on the UNCTAD's Code of Conduct, perhaps, marks the biggest setback for a multilateral regime on international cooperation and standards of technology transfer. Such a regime could have, at least, avoided the present uncertainty regarding international obligation by elevating technology transfer as the primary objective of a multilateral regime rather than a by-product of acceptance of other multilateral regimes by developing countries. Similarly, such a specialized regime could have also ensured, *inter alia*, predictable and substantive minimum standard of technology transfer, institutional arrangements to ensure proper implementation of the obligations, management of resources, and identification of priorities.

Multilateral mechanisms singularly, however, cannot ensure technology transfer. But neither strong IPR laws nor international trade alone are able to adequately bridge the technology divide. Similarly, a purely bilateral or *ad hoc* system cannot be sustainable for technology transfer owing to the high costs involved and the range of technologies needed. An effective multilateral mechanism coupled with strong domestic policy, investment environment, absorptive capacity, international trade, IPR laws and effective competition policies, among others, is essential to remedy the present poor state of technology transfer.

Notably, the obligation of technology transfer is clearer and mandatory under the TRIPS Agreement than in other WTO Agreements, such as the Agreement on Technical Barriers to Trade, the Agreement on Sanitary and Phytosanitary Measures, the General Agreement on Trade in Services, the Agreement on Subsidies and Countervailing Measures, and MEAs. Despite this, the equally poor state of technology transfer across the multilateral mechanisms, in which developing countries had invested their hope and compromised their positions, demonstrates fundamental problems regarding the seriousness with which developed countries have perceived and implemented their obligations to transfer technology, and the effectiveness of such mechanisms.

Due to the best effort nature of Article 66.2 of TRIPS, its enforcement depends upon the discretion of source countries.

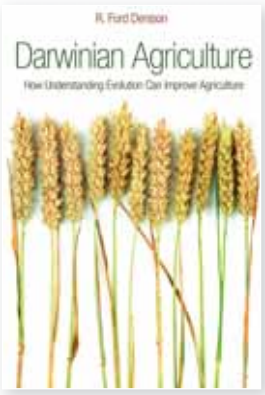
Although supported by the WTO dispute settlement rules and the UNFCCC, legal remedy in the form of retaliation in the case of the TRIPS Agreement and avoidance of substantive obligations under the UNFCCC may not be practical and effective. There is no other option than to abide by the obligations under multilateral mechanisms in good faith. Bringing clarity and predictability to the concept and standards of obligations can assist the process. This, in turn, can be done by agreeing on minimum standards of technology transfer, and as recommended by Moon (2012)[2], in the context of the TRIPS Agreement, a robust monitoring mechanism in the form of a small international expert group can assist in bringing clarity to obligations as well as in setting up institutional/expert support in the transfer process. ■

The author is an Advocate based in Kathmandu.

Notes

1 Moon, Suerie. 2011. "Meaningful technology transfer to the LDCs: A proposal for a monitoring mechanism for TRIPS Article 66.2". *Policy Brief* 9. Geneva: International Centre for Trade and Sustainable Development (ICTSD).

2 Moon, Suerie. 2012. "Monitoring mechanism is needed to ensure technology transfer to LDCs". *Trade Insight* 8(1).



Understanding evolution can improve agriculture

Title: Darwinian Agriculture: How Understanding Evolution Can Improve Agriculture
Author: R. Ford Denison
Publisher: Princeton University Press
ISBN: 978-0691139500

Sajal Sthapit

R. Ford Denision, currently at the Department of Ecology, Evolution and Behaviour in the University of Minnesota, has crafted an engaging book that uses plenty of examples to explain the implications of past and future evolution for agriculture research. It gives concrete suggestions on new areas in agriculture research with great potential after calling out research areas likely to lead to dead ends. For any researcher in the field, this book is a real contribution.

A good understanding of evolution and the process of natural selection is crucial for making genuine progress in agriculture. Yet, as this book points out, deeper implications of evolutionary biology, or Darwinian Agriculture, have not been internalized widely by researchers in the field. These implications follow from three core yet simple principles for Darwinian Agriculture espoused by the book: i) prolonged natural selection rarely misses simple, trade-off-free improvements; ii) competitive testing is more rigorous than testing merely by persistence; and iii) we should hedge our bets with a great variety of crops—and ideas.

The first principle raises serious questions about the approach in biotechnology. Biotechnology promises crops with drought tolerance and with higher toxin production to repel pests. Traits like drought tolerance and toxin production are simple enough to have arisen several times in the history of plant evolution. Yet they do not persist in all plants because there are trade-offs in having these traits in terms of the plants' overall energy budget. So trade-off-blind biotechnology is likely to fail spectacularly.

Likewise, the second principle implies that one should refrain from mimicking nature blindly, especially when it comes to assemblages of different species in ecosystems. Natural selection works on individuals and not on composition of species in an ecosystem. It is just as easy to find monoculture in nature as is polyculture. So simply copying the assemblage of species in a natural ecosystem is not a good guide to how we should manage our agriculture systems.

Where Darwinian agriculture has promise is in areas that have not been subject to natural selection. In agriculture, we are concerned about the yield of an entire field and not the production of a single plant. While natural selection pits one plant against another of the same species, in agriculture we need crop plants to collaborate rather than compete. So the adaptive trait of stem elongation in the wild that allows individual plants to outgrow its neighbours and get more sunlight limits its own potential for production as well as of the neighbours it shades. In a field, what we want are dwarf plants that maximize the solar energy across the field rather than individually. Hence, working on plant-to-plant cooperation as well as learning from symbiosis in nature are important.

Finally, the book argues for the need for hedging our bets by diversifying the crops we use, instead of relying only on a few major cereals. The book also recommends research in a diversity of ideas rather than a few silver-bullet solutions such as biotechnology. Denison expresses grave concern on the disproportionate amount of funding in biotechnology at the expense of other fields such as agronomy, crop physiology, weed ecology and traditional plant breeding that have had a better track record in agriculture development. If biotechnology fails, what else will we have to revert back to?

Readers from either side of these divisive issues will find their beliefs challenged and undermined. A little bit of discomfort is expected. But after shaking these beliefs, Denison proceeds to do something more productive and suggests some really practical ways to improve the way we should think about the problems in agriculture research. And that is the true achievement of this book. ■

The reviewer is Coordinator for Programme on Biodiversity & Ecosystem Services for Sustainable Livelihoods at Local Initiatives for Biodiversity, Research and Development, Pokhara.

Regional Consultation on Trade, Climate Change and Food Security

SAWTEE and Oxfam Novib organized a two-day Regional Consultation on "Trade, Climate Change and Food Security in South Asia" in Kathmandu on 20–21 December 2012. Participants from around the region called for policies and strategies to cope with the impacts on agriculture and food production from high temperature increase. They also called for simplifying the operational modalities of the SAARC Food Bank and making them more pragmatic for member countries to benefit from it in times of need. They stressed the need for effective enforcement of competition laws in the region to curtail anticompetitive practices that are fueling food-price inflation, and increased cooperation on trade, technology transfer and climate change adaptation. About 50 experts from Bangladesh, Bhutan,

India, Nepal, Pakistan and Sri Lanka participated in the programme. The discussions during the programme covered issues such as the Doha climate conference and global climate negotiations; SAARC Food Bank; SAARC Seed Bank; liberalization of environmental goods; regional trade in agriculture and food products; biofuel and food security; and technology transfer, among others. The event was part of the Regional Programme "Trade, Climate Change and Food Security in South Asia" that SAWTEE is implementing with the support of Oxfam Novib. ■

Panel discussion at CBD COP11

A panel discussion on "Climate change, agriculture biodiversity and food security" was organized by SAWTEE on the sidelines of the 11th Conference of the Parties to the Convention on Biological Diversity, held in Hyderabad, India in October. More than 100 participants representing governmental, inter-governmental and non-governmental organizations participated in the panel discussion. The conclusion of the discussion was: Biodiversity is a natural insurance policy against climate change and crop biodiversity plays an important role in climate adaptation as well as mitigation; therefore, at the present time when increasing importance is given to modern agriculture that emphasizes mono-cropping and use of chemical fertilizers, among other things, it is important to put greater emphasis in the conservation and sustainable use of agro-biodiversity. ■

Future of sustainable development

THE Sustainable Development Policy Institute's 15th Sustainable Development Conference was held in Islamabad from 11–13 December 2012. The theme of the Conference was "Sustainable development in South Asia: Shaping the future". Delegates from South Asian countries as well as from 15 other countries around the world deliberated on various issues, including food and energy security, impact of climate-driven migration on women, sustainable enterprises, environmental risks, non-tariff barriers, livelihood options in fragile and conflict-affected situations, and climate change. ■

Capacity building on eco-labels

IN view of the growing importance of and challenges posed by eco-labels in the textiles and clothing (T&C) sector and possible impact on the export interests of the sector, CUTS International, along with its knowledge partner Nimkar Tek Services Pvt Ltd., conducted capacity building programmes on this issue in five major textile centres in India, namely Delhi, Mumbai, Coimbatore, Ahmedabad and Ludhiana from October through December 2012.

The purpose of the programmes was to create greater awareness on the subject and to better equip Indian T&C firms on eco-compliances/standards, which is expected to enhance their market access opportunities. ■

Discussion Paper: Anticompetitive practices and food-price inflation: The South Asian context
Author: Anusree Paul
Publisher: SAWTEE

Briefing Paper: Greening the economy: What it means for South Asian LDCs
Author: Puspa Sharma
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