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The Institute brings out the bi-monthly Magazine, *FOCUS WTO* exclusively dealing with WTO and WTO-related issues. Each issue is dedicated to a particular theme. A distinct feature of the Magazine is its section, "Lead Articles" focusing on the theme. As the next issue is devoted to the theme "Progress on Doha", we at *FOCUS WTO* invite highly analytical articles focusing on the theme for publication in the Magazine with a word limit between 3000 and 3500.

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From the Director's Desk

K.T. Chacko

In shaping a knowledge based economy, the importance of technology is well recognized. As technology is being increasingly recognized as a key driver of economic development and in securing a fair share of growth in international trade, developing countries have shown deep concerns on issues relating to access to Technology. These concerns were behind the move at the Doha Ministerial in 2001 which set up a Working Group on Trade and Technology Transfer (WGTTT).

Several discussions thereafter in WGTTT and various studies connected with the issue have demonstrated the rising dependence of developing and Least Developed Countries (LDCs) on accessing technologies, whose ownerships lie, in many cases, with large corporations.

As accessibility to these technologies are of paramount importance for improving productivity, promoting growth and achieving the development aspirations of these countries, entering into technology transfer agreements becomes crucial. In negotiations on such agreements, large corporations, by virtue of being the owners, enjoy higher market power, giving them better bargaining power over the seekers of technology. Due to the imperfections in the technology market, Agreements have displayed asymmetry between buyers and sellers of technology. Discriminatory practices, in this sphere, are proving to be a big hurdle in determining the competitiveness of production systems in developing countries.

To narrow down technological gaps, to make technology transactions and the climate of operations more user friendly, several proposals have been discussed in WGTTT. One such proposal has been submitted, jointly, by India, Pakistan and Philippines recently.

These proposals relate to providing assistance to developing countries to improve or implement competition policies capable of monitoring and discouraging restrictive practices by technology owners. *Secondly*, area of concern relates to the inability of developing and LDCs to afford the cost of technology. Development of clear implementation and monitoring process, including financial support may be important to facilitate technology transfer. It has been suggested that mechanisms such as those in multilateral environmental agreements could serve as models. *Thirdly*, members may seek ways of expanding and encouraging the mobility of trained personnel under the GATS to develop science and technology agreements to promote international scientific and industrial R&D collaboration and encourage their firms to employ trained graduates, at least temporarily, and offer consultancy services to facilitate transfer of knowledge. Such measures promise benefit to developing countries.

Issues in Technology Transfer

Biswajit Dhar*

The issue of technology transfer in today's globalized world has assumed critical dimensions. It has gained immense importance since it has been widely recognized that its impact on economic growth and development is enormous. As knowledge is increasingly becoming a key strategic resource for national economic development, and sharing of international trade there is a need to identify the ways and means for facilitating the technology transfer to the developing and least developed countries. This national economic development and sharing of international trade require today's front-end technologies and, they feel with the access of these front-end technologies they would be able to compete in today knowledge based economy. The present paper makes an attempt to understand and emphasize the issues that are involved in technology transfer in WTO and highlight how developing countries can access this technology for their own good.

TECHNOLOGY transfer has been one of the key issues that have prominently figured in the discussions centring on the shaping of the economic relations between developing and the developed countries over the past few decades. The issue gained importance, since it was widely acknowledged that access of developing countries to front-end technologies is a *sine qua non* of enhancing their trade flows, in particular and that of their development, in general. It was in this context that a number of developing countries, including India, had sought to discuss the relationship between trade and technology transfer in several multilateral forums, including the United Nations Conference on Trade and Development (UNCTAD), in order that the multilaterally accepted framework facilitating flows of technology between developed and developing countries can be evolved.

Since the establishment of the WTO, developing countries have been emphasizing that the issue of technology transfer needs to be considered for improving the trade potential of the lesser players in the global economy. It was in the Fourth Ministerial Conference of the WTO held in Doha in 2001 that the issue on trade and technology transfer was finally taken on board, with the Ministerial Declaration stating thus:

> "We agree to an examination, in a Working Group under the auspices of the General Council, of the relationship between trade and transfer of technology, and of any possible recommendations on steps that might be taken within the mandate of the WTO to increase flows of technology to developing countries. The General Council shall report to the Fifth Session of the Ministerial Conference on progress in the examination."

The Working Group on Trade and Technology Transfer (WGTTT), which has been established following the mandate given by the Doha Ministerial Conference, is currently delineat-ing the issues that need to be taken up in order that an agreed solution to the task laid before it can be found in an expeditious manner. In view of the above, it is important to undertake a thorough examination of the various aspects of trade and technology transfer using evidence thrown up by select industries with a view to providing inputs in the process that has been initiated by the WGTTT.

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The dependence of developing countries on modern industrial technology the ownership of which rests largely with the large corporations had led to focused attention being paid in several studies for a proper understanding of the implications of such dependence. Most of these studies have attempted to make assessment of the technology transfer arrangements adopted by the owners of frontier technologies and the impact these have had on the recipient countries.

In owning critical technologies, large corporations are seen to be in the possession of "intangible assets" that provide these entities with superior market power with which they can enter into a bargain over technology with the recipients. This advantage that the corporations can derive through their ownership of technology arises from several imperfections in the technology market which, in turn, is caused by the peculiar nature of technology itself. In a typical bargaining model, the licensor has a floor price which is made up by the costs of effecting technology transfer and also the opportunity costs for doing so (the owner of technology may lose a part of the market for exports which he might have carried on using the facilities of his home protection base if the technology transfer did not take place and the recipient did not start local production). The licensee, on the other hand, has a ceiling price which he is willing to pay. The actual price would generally be between the two prices. The result of this would largely be indeterminate, depending essentially on the relative bargaining strengths of the corporations and the host governments.

The relative bargaining power in these transactions is affected by yet another apparent imperfection in the market for technology which is the so-called "information paradox". In order to bargain effectively, the buyer needs information regarding the characteristics of the technology involved in the bargaining process. But this "information" may pertain to the technology itself. In other words, if the buyer had all the relevant information related to the technology in question he would not need to buy the technology and instead become a free-rider. The differential access to information, as alluded to above, puts the sellers of the technology, who are usually the corporations in an advantageous position.

Technology transfer agreements in more recent years have by and large displayed the same asymmetry as between the buyers and sellers of technology that has been typical of such agreements. This has been corroborated by some limited evidence about royalty rates and payments for technology services which indicate that these may have gone up of late. The increase in payments has been noticeable particularly in cases where transfer of new technologies like biotechnology and telecommunications are involved. Costs of technology imports have also found to have risen in such contractual agreements like turn-key projects when the buyer has insisted upon extensive guarantees in the contracts for the operation and installation of plants from the technology supplier. The buyer's insistence on guarantees has often been responded by the supplier by raising the price of technology, "over-designing" of the plant, installing capital-intensive plant and reducing the use of local personnel, to mention only a few.

The increasing recognition that technology is one of the critical factors in determining competitiveness of production systems has led to an increasing tendency on the part of owners of technology to seek higher economic rents through enhanced protection for their products of R&D. The higher standards of intellectual property protection that has come to be accepted after the Uruguay Round negotiations in the form of the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS), is but an attempt in this direction. The distinguishing feature of the new regime of intellectual property protection is that apart from the strengthening of the more conventional forms of intellectual property rights like patents and copyrights in order to give the owner of intellectual property enhanced rights, the importance of trade secrets has also been emphasized. This implies that contrary to facilitating a process disclosure and hence a greater dissemination of technology which has been the cornerstone of hitherto existing regime of intellectual property protection, the new regime forecloses the option of a better

access to technologies. And, this has happened despite the fact that in its stated objectives, the TRIPS Agreement unambiguously mentions that the protection extended to the various forms of intellectual property rights must balance the interests of the owners and users of technologies through effective transfer of technologies, among others.

Possibly the most flagrant violation of the above-mentioned objective of the Agreement on TRIPS appears in the framework of patent protection as laid down in the Agreement. This appears more so since the patent regime has historically provided the surest mechanism for securing technology transfers, which has now been considerably diluted. The Paris Convention for the Protection of Industrial Property, which was adopted in 1883 as the first multilateral treaty on intellectual property rights, included the compulsory licensing system that allowed the patent granting authorities to issue a licence to anyone seeking to utilize a given patent for commercial purposes in the event of the patent holder not "working" the patent within a stipulated period of time. The term "working of the patent" implied setting up of production facilities and therefore the compulsory licensing system remained as an important instrument that could be used by countries to gain access to frontier technologies. More importantly, non-working of the patent was considered to be an abuse and therefore countries were within their rights to revoke the patents in the event that the patents were not "worked" in the country of grant. As is quite obvious, the compulsory licensing system was particularly significant for developing countries that own very few patents but provide patent protection to foreign patentees (most of the large corporations) in their territories.

The patent system introduced by the TRIPS Agreement considerably dilutes the compulsory licensing system. Two specific provisions have contributed in this regard. First, the patent owners have to be paid "*adequate remuneration* based on the *economic value* of the licence" (emphasis added). And, secondly, the issuance of the compulsory licences can be challenged in the courts.

The former provision clearly swings the balance in favour of the patent owners, who can use their superior bargaining strength to demand unreasonable remuneration from the potential users of the technologies in the developing world. As was mentioned earlier, the costs of technology imports have gone up in the recent decades thus making most technologies unaffordable for most developing countries. The latter provision is equally important for it introduces an element of uncertainty for the potential users. Very few, if any, would be willing to seek compulsory licences for patented technologies since a successful challenge by the patent owner would threaten the future of the production facilities that are set up.

The above-mentioned issues have been alluded to by a number of developing countries in the on-going discussion in the WGTTT. Besides pointing to the asymmetries in the Agreement on TRIPS that could adversely affect the ability of these countries to seek transfer of technologies on terms that they would find affordable, developing countries have indicated that many amongst them do not have the required absorptive capacity for efficient and effective transfer of technology.

Cuba has emphasized that it is necessary to encourage different modes of transfer of technology to the developing countries, in particular to the least developed countries, so as to enable them to establish a sound technological base that would enable these countries to participate harmoniously in the exchange of goods, services, information and knowledge.[1] It was further insisted that the developing and the least developed countries would require capacity building efforts which would ensure proper assimilation of the technologies transferred. And finally, Cuba argued that it is also necessary to eliminate discriminatory practices unilaterally applied against some Third World countries to prevent them from acquiring technologies for the free flow of trade that are

[1] WTO, Working Group on Trade and Transfer of Technology, Proposed Recommendations of the Working Group in the lead-up to the Sixth Ministerial Conference: Communication from Cuba (WT/WGTTT/W/9), July 2005.

essential for their economic growth.

India, along with Pakistan and the Philippines, has suggested a number of concrete measures which would help fulfil the mandate given to the WGTTT.[2] The measures suggested by these countries reflect on the problems that developing countries have faced in securing the area of transfer of technology alluded to above.

The first recommendation that these countries have made is that it was necessary to help developing countries improve or implement competition policies capable of monitoring and discouraging use of restrictive business practices by technology owners and by ensuring firms adopt similar or better practices at home and abroad. Alternatively, it was suggested that developed country competition authorities could consider assuming a commitment to examine business practices in the realm of technology whose effect is felt only outside their own jurisdictions, for instance, in developing countries. Besides, developed countries could encourage licensing and subcontracting, and support firms in developing countries to access technological information and drafting of contracts.

The second area of concern raised by India *et al.* is related to the inability of the developing countries to afford the cost of technology, and this has been the case because most of the provisions in WTO Agreements lack financing, implementation, monitoring and technical assistance mechanisms in this area. In view of these countries, development of clear implementation and monitoring processes, including fiscal support, may be important to facilitate technology transfer. It was suggested that mechanisms such as those in multilateral environmental agreements (e.g. the Montreal Protocol which mentions transfer of technologies needed to phase out the use of ozone depleting industrial substance) could serve as models.

India *et al.* also faces the bottlenecks created by the patent in respect of technology transfer. In this context, it was recommended that technical assistance under the TRIPS Agreement should be expanded by linking Article 67 of the Agreement to Articles 66.2 and 7. As is, Article 67 does not deal with measures or incentives needed to facilitating technology transfer. The support built into Article 67 could then be targeted at facilitating technology transfer to institutions and firms in developing countries, especially LDCs.

Another recommendation made by these countries is that Members should seek ways of expanding or encouraging the mobility of scientists, technologists and technicians under GATS, develop science and technology agreements to promote international scientific and industrial R&D collaboration, and encourage their firms and public institutions to employ, at least temporarily, fresh graduates and offer consultancy services or contracts and attachment to experts from developing countries to facilitate transfer of knowledge.

Measures that have been suggested by developing countries in their submissions to the WGTTT would certainly go a long way in contributing to an effective and efficient transfer of technology. However, given the record of the past decades, do these proposals have a realistic chance of moving forward?

(Reproduced from *Focus WTO*, Sept.-Oct. 2005)

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[2] WTO, Working Group on Trade and Transfer of Technology, Steps that might be taken within the mandate of the WTO to increase flows of technology to developing countries: Submission to the Working Group on Trade and Transfer of Technology by India, Pakistan and the Philippines (WT/WGTTT/W/10), October 2005.

DRDO, US Working on 30 High-Tech Projects

THE Chief of India's Defence Research & Development Organization (DRDO) has made the startling revelation that his organization is in partnership with US entities in developing at least 30 high-technology defence projects.

Addressing a press conference at the Aero India 2011 air show in Bangalore, DRDO Chief V.K. Saraswat broadly described the areas of the joint DRDO-US research. He said they were jointly developing "about 30 programmes related to materials, services, and manufacturing technologies. There are some related to advanced communications systems. There are many (projects) that are related to low-intensity conflict."

This indicates Washington's rapid relaxation of the stringent technology denial controls that the US Congress had placed on DRDO after India tested five nuclear weapons in May 2008. Until 25 January, several DRDO laboratories had featured on Washington's "Entity List", a list of agencies and institutions that are banned from receiving dual-use items from the US. A dual use item is one that has military, as well as civil, uses.

DRDO has worked for years with Russian and Israeli defence companies in developing weaponry, but featuring on the "Entity List" had ruled out cooperation with the US. The US departments of state and commerce, which must grant licences for defence-related export and cooperation, automatically block licences to any agency on the "Entity List". Key DRDO platforms, including the Tejas Light Combat Aircraft, the Akash missile, and the Arjun tank, suffered years of delay after the technology denial regime imposed by the US in 1998.

Shri Saraswat said DRDO had long hankered for partnership with US companies. "A lot of technology areas were identified for working with the US, but because we were on the Entity List… clearances were not coming. I presume that there will be acceleration in our research & development programmes with the US."

Despite the DRDO-US projects under way, Shri Saraswat pointed out that DRDO's removal from the "Entity List" did not mean that automatic clearance was granted for whatever DRDO needed. The US law mandates that all dual-use items, which essentially includes everything related to defence, needs export licences from the US departments of commerce, state and defence.

"That licensing process is the law (in the US) and it will not change. So we have to see in the years to come… what kind of trust is going to develop between [the DRDO] and the US on the issue of licences for dual use items for the DRDO and other defence agencies. That process will become lenient only if there is a level of trust," Shri Saraswat said.

Meanwhile, Washington has stressed on high-tech cooperation that was one of the highlights of President Barack Obama's visit to India last November. The US Commerce Secretary, Gary Locke, with his delegation of 24 US companies – among them a dozen aerospace and defence companies, including Lockheed Martin, Oshkosh Corporation, Boeing and Aero Controls – has dangled high technology as a carrot to induce New Delhi to provide trade incentives to US companies. Shri Saraswat's revelations could ease scepticism among Indian defence policymakers about whether Washington intends to part with high technology to India, or to merely cite the sale of high-tech defence platforms like the C-130J as evidence of its commitment.

Speaking to *Business Standard*, US Assistant Secretary of State for Political-Military Affairs Andrew Shapiro insisted that Washington viewed India as a strategic partner. "The removal of nine Indian entities from the Entities List was a significant accomplishment," declared Mr. Shapiro. "We've just had a successful delivery of the C-130J... and we hope to win the MMRCA competition.

(*Business Standard*, 12 February 2011)

Step Up Investment in Farm R&D: IARI

INDIA needs to step up investment in agriculture R&D, on lines with China and other developed nations, to develop new seeds and technologies to increase farm production, a senior official of Indian Agriculture Research Institute (IARI) said.

"Investment in agriculture R&D is less. It is close to 0.5 per cent of farm GDP. China has close to 1 per cent and it is almost 2.5 per cent in developed countries," the IARI Director, Shri H.S. Gupta, said.

On the issue of foodgrains requirement, Shri Gupta said "the requirement for 2020 would be 130 million tonnes of rice and 110 million tonnes of wheat. We will be able to meet the target of 2020 with the current technology," he added.

(*The Hindu Business Line*, 5 February 2011)

India is Developing Good Competition Policy, Says WTO Official

INDIA is developing an effective competition policy and is also making significant efforts to strengthen its intellectual property rights regime. World Trade Organization's Director (Intellectual Property Division) Mr. Antony Taubman said that India is a good example in terms of balancing sustainable development initiatives with Intellectual Property Rights enforcement.

"India is developing a good competition policy. To ensure strong IPR regime, the country has put in very significant resources not just on the legislative side but also on legal and institutional aspects," Mr. Taubman said. He further pointed out that India also has the technology power as well as the platform for innovations, that would help in having a good IPR regime.

(*The Economic Times*, 4 February 2011)

R&D Cess, Tax on Drug Samples and Event Management

R&D cess is levied under the Research and Development Cess Act, 1986, on the import of technology into India. R&D cess is currently levied at a rate of 5 per cent. R&D cess is applicable on import of technology by an industrial concern under a foreign collaboration. "Technology" has been defined to mean any special or technical knowledge or any special service required for any purpose whatsoever by an industrial concern under any foreign collaboration, and includes designs, drawings, publications and technical personnel.

Further, the term "foreign collaboration" has not been defined in the R&D Cess Act, judicial pronouncements have held that a mere one-time import of technology is not liable to R&D cess; but rather the import of technology must be under a collaboration between an Indian entity and a foreign entity; which includes an import of technology under or in furtherance of a JV agreement.

(*The Financial Express*, 4 February 2011)

India's International Trade: A Tech Segregated Perspective

INDIA'S international trade during the recent past has witnessed an increasing trend, save for 2008-09 which recorded a deceleration, essentially due to the global economic meltdown. While this growth has been broad based, spread across sectors and regions, an analysis on the technology intensiveness of India's recent trading patterns throws up some interesting insights.

The technological classification of trade in terms of high, medium and low is based on the Standard International Trade Classification (SITC), Revision 3, as adopted by the United Nations Industrial Development Organization (UNIDO).

India's exports have gradually tended to move away from low technology in favour of medium and high technology products. This is manifested

in the share of low technology exports in India's total exports coming down from 33 per cent in 2004 to 28 per cent in 2008. As against this, the shares of medium and high technology exports have increased from 14 to 17 per cent and from 5 to 7 per cent, respectively. This trend is a consequence of higher growths exhibited by high and medium technology exports.

While exports of medium tech products increased by more than twice from US$11 billion in 2004 to USS$31 billion in 2008, exports of high tech products trebled from US$4 to 12 billion during the same period.

This is in stark contrast to trends in India's tech segregated imports, wherein each of the three technology-intensive categories have more or less maintained their shares in the country's overall exports during the 2004-2008 period, implying that imports have not exhibited any perceptible shift in terms of technology intensity. While imports of low tech products increased from US$5 billion in 2004 to US$14 billion in 2008, imports of medium and high tech products increased from US$16 billion and US$11 billion to US$62 billion and US$32 billion, respectively.

In terms of composition of high tech exports, pharmaceutical products contributed a large share. Thus, medicaments were the largest high tech export item from India in 2008, with exports totalling US$3.1 billion in 2008. Other pharmaceutical products among the top ten high tech exports during 2008 included antibiotics, both as medicaments or otherwise (US$1.9 bn) and hormones used as medicaments (US$0.4 bn). The other major high tech exports included parts of aircraft, equipment (US$1.4 bn), electric generating sets (US$1.3 bn), parts of electric power machinery, diodes and transistors (US$0.6 bn each) and electrical transformers (US$0.4 bn). The encouraging aspect of India's high tech exports is the fact that all the top ten items have shown robust growth with three of them exhibiting average annual growths of over 100 per cent during the 2004-2008 period.

A product-wise analysis of India's high and medium technology exports and mapping them to the world demand patterns during the 2004-2008 period illustrates the list of products within the realm of high and medium technology items that have shown maximum dynamism and where India could focus on to realize potentially higher values, especially when considering that the country already possesses manufacturing capabilities for these products. The import market for these illustrative products amounted to US$240 billion for high tech products (with India's share being less than 1%) and US$437 billion for medium technology products (India's share less than 1.5%) (Tables 1 and 2). These illustrative products have been based on the criteria that during 2008, the world import demand was at least US$10 billion and that India's exports were at least US$50 million (US$100 mn for medium tech products).

The trends in India's technology intensive exports reflect increased investment in R&D, not only by Indian companies but also by a growing number of foreign companies who are establishing R&D centres in India. Simultaneously, more and more Indian companies have been investing in high tech companies overseas, in pursuit of technology. Moreover, the Eleventh Five-Year Plan not only emphasizes innovation but also foresees a massive

TABLE 1

DYNAMIC HIGH TECH PRODUCTS (WORLD MARKET: US$ 240 BILLION)

Products	*World Imports (US$ mn)*	*India's Export (US$ mn)*	*AAGR % of India's Export*
Power Generating Machines			
Electric generating sets	24,136	832	154
Electric motors and generators, both AC & DC	29,970	223	30
Telecom & Sound Equipment			
Electrical apparatus for line telephony	20,527	74	37
Machinery			
Diodes, transistors & semi-conductor devices	73,609	561	54
Electrical transformers	16,685	421	48
Scientific Instruments			
Instruments for checking level, pressure, etc. of liquids or gases	14,945	65	40
Drawing, marking out or mathematical calculating instruments	30,698	70	44
Automatic control instruments	29,615	58	20
TOTAL	**240,185**	**2,304**	**55**

TABLE 2

DYNAMIC MEDIUM TECH PRODUCTS (WORLD MARKET: US$ 447 BILLION)

Products	World Imports (US$ mn)	India's Export (US$ mn)	AAGR % of India's Export
Chemicals			
Poly carboxylic acids & their derivatives	17,622	190	18
Metal Products			
Semi-finished products of iron & steel	35,400	541	82
Ferroalloys (excl. radioactive ones)	36,946	1,431	79
Machinery & equipment			
Internal combustion piston engines, and parts	13,762	224	25
Heating & cooling equipment	43,652	487	46
Air, vacuum pump; filtering, purifying machinery	79,333	495	49
Transmission shafts and cranks	10,477	122	40
Electrical switch apparatus, <1000v; panels	114,797	518	48
Batteries and electric accumulators	37,959	120	28
Transport equipment			
Ships, boats and other vessels	40,432	1,371	102
Invalid carriages, whether or not motorized or mechanically propelled	16,301	300	22
TOTAL	**446,681**	**5,799**	**51**

Note: Data are for 2008; Average Annual Growth Rate (AAGR) is for the 2004-08 period.

***Source*:** Derived from *UN COMTRADE Database* at SITC-4 digit level classification.

outlay on science and technology *via* a budgetary increase of over 200 per cent. Going forward, these initiatives are likely to further bolster India's technology intensive exports, thereby facilitating a movement up the industry value chain.

(Exim Bank, *Export Advantage*, December 2010)

FAQs on Technology Transfer

1. *What is a Technology Transfer?*

It is a process in which specific technology, including related know-how, market knowledge etc., is transferred from one party (the licensor) to another (the licensee), by way of a legal agreement. The licensee is obliged to use the technology in a manner that satisfies the licensor.

2. *Is there a Fee for the Transfer?*

Yes. In an exclusive licence, the fee is paid as a lump sum at the time and/or after the transfer. In a non-exclusive licence, it is paid as a royalty, based on sales.

3. *What are the Regular Deliverables in a Technology Transfer?*

- The right to use the technology to make products or offer solutions in a defined geography for a defined time frame, as specified in the technology transfer agreement signed by the concerned parties.
- Licensing of the patent or intellectual property, as part of the agreement. This licensing is mentioned in the "register of patents" or other relevant official documents.
- Documentation such as engineering drawings, user manuals, process charts, etc. (whatever is relevant and required for the successful functioning and maintenance of the technology).
- Support for trouble shooting and maintenance of the technology. This includes providing trained personnel on site for setting up technology and fixing technical problems.

4. *Is the Technology Validated before a Transfer? What if it does not Provide the Solutions I Need?*

You will need to properly assess the scope and potential of the technology before entering into an agreement. For this, you can analyze documents such as the patent or other form of IP filing, lab test reports, field trial reports, etc. If the technology is operational and available for a pilot test, then that will be the ideal way to determine whether it is the solution your problem needs.

For each, market-ready innovation, we typically make the following documents available to an interested entrepreneur or enterprise:

- Project kit for entrepreneur (PDF)
- Patent application details (PDF)
- Reports - Pilot marketing | Quality Testing | Market Research, etc.
- Term Sheet (Spreadsheet)
- Financial Projections & Workings (Spreadsheet)

- Engineering Drawings & User Manual
- Any classified document such as P&L statement, customer information, etc. (if available)

5. *What is I2E's Role in a Technology Transfer?*
   - Identify entrepreneurs/enterprises for the technology/project
   - Create technology transfer documentation including technology/project details, marketing collaterals, financial projections, lab reports, clientele lists, etc.
   - Share technology transfer documentation and respond to queries
   - Prepare a term sheet to clearly define financial and non-financial expectations and deliverables for both parties
   - Sign an agreement with the innovator detailing the role of each party and agreement to the term sheet
   - Sign an agreement with the interested entrepreneurs/enterprises
   - Facilitate negotiation and enable signing of technology transfer agreement between innovator and entrepreneur/enterprise.
6. *Who Pays for the Execution of the Technology Transfer Agreement, Due Diligence and Legal Advice Required?*

The innovator and entrepreneur pay for all the costs involved in executing their respective agreements with I2E. They also divide the cost of the technology transfer, legal advice, travel and stay, and due diligence equally between themselves.

7. *What are the Obligations of the Entrepreneur/ Enterprise?*

They are to use the technology, expertise and resources available to make the project a success (as defined in the term sheet that will be provided).

(www.villgro.org)

Technology Transfer Agreements in India

EXPONENTIAL growth of technology in India has played a significant role in all-round development and growth of economy in the country. Technology can either be developed through own research and development or it can be purchased through indigenous or imported sources. India has opted for a judicious mix of indigenous and imported technology. Purchase of technology is commonly called "Technology Transfer" and it is generally covered by a technology transfer agreement.

"Technology Transfer" means the use of knowledge and when we talk about transfer of the technology, we really mean the transfer of knowledge by way of an agreement between the states or companies. "Transfer" does not mean the movement or delivery; transfer can only happen if technology is used. So, it is application of technology and considered as process by which technology developed for one purpose is used either in different applications or by a new user.

Technology generally would comprise the following elements:

- Process Know-how
- Design Know-how
- Engineering Know-how
- Manufacturing Know-how
- Application Know-how
- Management Know-how

Policy for Foreign Technology Agreements

RBI accords automatic approval to all industries for foreign technology collaboration agreements subject to:

- The lump sum payments not exceeding US$2 million.
- Royalty payable being limited to 5 per cent for domestic sales and 8 per cent for export, subjected to a total payment of 8 per cent on sales over 10-year period.

Payment of royalty up to 2 per cent for export and one per cent for domestic sales is allowed under automatic route on use of trademark and brand name of the foreign collaborator without technology transfer. In case of technology transfer, payment of royalty subsumes the payment of royalty for use of trademark and brand name of the foreign collaborators.

Payment of royalty up to 8 per cent for export and 5 per cent on domestic sales by wholly owned subsidiaries (WOS) to offshore parent companies

is allowed under the automatic route without any restriction on the duration of royalty payments.

All other proposals for foreign technology agreements not meeting the parameters for automatic approval are considered on merit by the Project Approval Board (PAB). This is chaired by the Secretary, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry.

(http://www.sethassociates.com/technology-transfer-agreements-in-india.html)

US Seeks WTO Mediation with China over Clean Tech Subsidies

THE Obama Administration accused China of violating World Trade Organization rules by subsidizing the manufacturing of wind energy systems and said it may seek a hearing before the international body.

The announcement comes after the US investigated October charges by the United Steel Workers (USW) union, which complained that China is illegally subsidizing Chinese companies that manufacture clean-energy equipment.

"Import substitution subsidies are particularly harmful and inherently trade distorting, which is why they are expressly prohibited under the WTO rules," US Trade Representative Ron Kirk said in a statement. "These subsidies effectively operate as a barrier to US exports to China."

Mr. Ron Kirk said the US has requested talks with China under the WTO dispute settlement process. Should those private negotiations fail, the US may seek a WTO dispute settlement panel to hear the case.

The US said it found that China offers subsidies of between $6.7 million and $22.5 million to domestic manufacturers of wind turbines and components, estimating that total subsidies doled out since 2008 could amount to several hundred million dollars.

China has repeatedly denied that its subsidies are illegal and that it discriminates against foreign companies and goods, saying in a November filing with US Trade Representative that USW's allegations "are factually erroneous and legally unfounded."

It also blasted the US for hypocrisy, saying the 2008 economic-stimulus bill contained massive US government subsidies for clean energy technology.

The USW complaint alleged that China offers "trade-distorting domestic subsidies" to producers of solar, wind, biomass, geothermal, hydropower, nuclear, advanced battery, alternative vehicle and energy-efficient consumer products technology. It further charged that China "imposes technology transfer requirements on investors" and places restrictions on exports of critical materials, including rare earth metals.

Mr. Ron Kirk said the US will continue to investigate USW's complaint beyond the wind turbine allegations. He added that thus far in its investigation, his office was able to determine that China has ended two additional subsidy programmes identified by USW, which addresses "a substantial portion" of the union's complaint.

(http://www.platts.com/RSSFeedDetailedNews/RSSFeed/ElectricPower/6696102)

EU Waives Appeal against WTO High-Tech Product Ruling

THE European Union has decided not to appeal a WTO ruling against EU duties on high-technology goods but called on countries to negotiate a new tariff-free deal on such products.

"The EU has decided not to appeal and will instead focus its efforts on implementation and - in the hope other WTO members will now engage - negotiations of an updated Information Technology Agreement which will be fit for the 21st century," a EU diplomat told a WTO meeting.

The WTO had ruled in August that EU duties on products including television set-top boxes, flat-screen panels and printers with multiple functions violated the ITA, an accord that eliminated duties for high-tech goods. The EU justified the taxes saying that the products in question had taken on multiple functions and therefore did not fall under the ITA.

The EU told WTO member states it was disappointed with the WTO's ruling on the case brought by the US, Japan and Taiwan. At the same

time, Brussels called on member states to negotiate a revised ITA that took into account the fact that many new high-tech products now take on multiple functions.

"The EU remains of the view that it is by negotiation, not by litigation, that the scope of the ITA needs to be extended, and renews its call for an update of the ITA," it said. With the EU's decision not to go ahead with an appeal, the findings by the WTO panel have been adopted by the trade body, thereby requiring Brussels to drop the taxes deemed to have violated WTO rules.

(http://www.eubusiness.com/news-eu/wto-trade-dispute.688/)

China Denies Forcing Foreign Firms to Transfer Technology

BEIJING has denied charges by a US business group that its technology transfer rules for foreign firms constitute "theft" on a massive scale, and defended its policies as meeting global rules.

A US Chamber of Commerce report has accused China of abusing the allure of its vast market to push foreign companies to transfer their latest technologies to Chinese competitors. This was a "blueprint for technology theft on a scale the world has never seen before", the report said.

The Chamber's report is the latest in a chorus of complaints by foreign businesses and governments over perceived unfair policies and market restrictions in the world's third-largest economy.

China committed at high-level Sino-US talks in May 2010 that its innovation policies would be non-discriminatory, protect foreign intellectual property rights (IPR), and ensure open markets and trade, according to Washington. Beijing also pledged to leave the terms and conditions of technology transfer and other proprietary information to individual enterprises, USTR Ron Kirk's deputy Demetrios Marantis said.

China launched its "indigenous innovation" campaign in 2006, officially to encourage the development of domestic technology and reduce its reliance on foreign know-how.

A Commerce Ministry official said the push did not discriminate against foreign companies and pledged China would protest IPR. "China will further strengthen IPR protection, including that of foreign companies, exactly because we encourage homegrown innovation," he said.

Concerns over indigenous innovation extended to security encryption rules, domestic patent laws and preferential policies for domestic companies, the US Chamber of Commerce report said.

Foreign complaints about China's market policies, particularly the indigenous innovation campaign, have intensified in recent months. EU Trade Commissioner Ms. Karel De Gucht said during a visit to China that European companies were increasingly worried about doing business in China, singling out the technology policy and IPR protections. Recent surveys by both the European and American Chambers of Commerce in China expressed similar concerns, with members saying they were increasingly pessimistic about the future of doing business in the country.

(http://www.physorg.com/news199598366.html)

India Insists on Technology Transfer by Telecom Vendors

INDIA'S Department of Telecommunications (DOT) wants network equipment vendors to transfer technology to Indian manufacturers within three years of selling equipment to any Indian operator, according to documents posted by the DOT on its website.

Network operators must also apply for security clearance for all new equipment not manufactured by Indian companies, and should employ only Indian engineers to maintain the equipment, as part of a series of measures to ensure the security of Indian network infrastructure, the DOT said in letters to service providers.

Service providers must include a clause in purchase orders requiring foreign manufacturers to transfer technology within three years from the date of the purchase order, DOT wrote in the March 18 letter. Both the vendor and the service provider shall be penalized in the event of non-compliance, it said.

The new rule has confused a large number of telecommunications equipment makers who sell to Indian service providers. A spokeswoman for Nokia Siemens Networks said that the company was checking whether the DOT wanted the technology transferred to the local Indian manufacturing operation of the foreign company, or to a third-party manufacturer.

The new order regarding technology transfer is part of an exercise by the Government to have larger control over procurement by Indian telecommunications service providers. The insistence on security clearance is seen as another instance of the Indian Government wanting to keep a check on the use of telecommunications equipment from Chinese vendors..

The Government recently indicated its security concerns about the use of telecommunications equipment from Chinese vendors, particularly in border areas. A large number of Indian service providers buy from Chinese vendors. Huawei Technologies, which had revenue of US$1.3 billion from India last year, plans a 50 per cent increase in revenue from the country this year. The company does not expect any problems from the new security rules, which apply to all foreign equipment makers, a spokesman for Huawei said. "We will also comply with the new transfer of technology rules, and we may accelerate our plans for local manufacturing," he said.

Under the order from the DOT, security clearance will not be required for passive telecommunications equipment such as connecting cables and test & measurement equipment, or for equipment and software manufactured or developed in India by Indian owned or controlled manufacturers. The security clearance for a product of a particular brand and specification for one operator will be considered as "benchmark clearance" for the industry for a period of two years, the DOT said. Telecommunications service providers will not require security clearance to outsource operations to network service providers, but they will have to obtain security clearance for the equipment that the outsourcers use, DOT said.

(http://www.pcworld.com/printable/article/id, 192113/printable.html)

Trade and Transfer of Technology

Developments since the Cancun Ministerial Conference

SINCE Cancun, Members have exchanged experiences and information in the Working Group on the Relationship between Trade and Transfer of Technology (WGTTT) on host and home country measures that could promote technology transfer. Although no consensus has so far been reached on recommendations that could be forwarded to the Hong Kong Ministerial Conference in December 2005, work based on a proposal from ten developing countries provides some potential for practical outcomes. The more concrete the recommendations, the better the chances of "operationalizing" WTO provisions on technology transfer. In Hong Kong, ministers are likely to extend the working group's mandate without much discussion.

Background

The Doha Ministerial Declaration introduced, for the first time in the WTO, a mandate to examine the relationship between trade and transfer of technology (ToT) and established a working group open to all Members to carry out the task.

The main demandeurs for WTO action on this issue are developing countries seeking the full implementation of existing ToT clauses in all WTO agreements and possibly the development of a new agreement to facilitate the transfer of technology. Some developed countries, however, seem to regard the working group as an academic exercise and appear reluctant to move into discussions that might trigger substantive negotiations.

Reaching agreement on an agenda and the process to follow was thus not an easy task. Developing countries preferred to focus discussions on specific technology transfer clauses in the WTO agreements as well as their effectiveness. On the other hand, the EU and other developed countries sought to clarify some definitional issues before engaging in substantive discussions.

To reconcile these differences, WTO Members agreed to the following agenda:

- analysis of the relationship between trade and ToT;

- work by other intergovernmental organizations (IGOs) and academia;
- sharing of country experiences;
- identification of provisions related to ToT in WTO agreements; and
- any possible recommendations on steps that might be taken within the WTO's mandate to increase flows of technology to developing countries.

Mandated Deadline

The General Council was supposed to report to the Cancun Ministerial Conference "any possible recommendations on steps that might be taken within the mandate of the WTO to increase flows of technology to developing countries." As that event collapsed without either a Ministerial Declaration or a specific decision on the matter, the WGTTT will have to present its recommendations to the Hong Kong Ministerial Conference in 2005.

Current State of Play

The WGTTT's draft report to the General Council in late 2004 indicated that the Members would continue the analysis of the relationship between trade and transfer of technology, as well as discuss any possible recommendations on steps that might be taken within the mandate of the WTO to increase flows of technology to developing countries.

Relationship between Trade and Technology Transfer

Members and observer organizations have identified a number of barriers to the transfer of technology, as well as strategies that could facilitate host and home country measures to overcome them. Reacting to a WTO Secretariat note entitled A Taxonomy on Country Experiences on International Technology Transfers (WT/WGTTT/W/3), some Members felt that it focused more on the host country perspective than on identifying policy space, options and instruments that would facilitate technology transfer. They suggested that Members share their experiences and ideas on the types of policy measures and incentives that would facilitate technology transfer.[1]

In response to these concerns, UNCTAD introduced two documents to the working group. The first of these on Transfer of Technology for Successful Integration into the Global Economy (UNCTAD/ITE/IPC/2003/6) provided a general overview of the main findings and conclusions of successful cases of technology transfer compiled by UNCTAD and an analysis of those cases in light of multilateral rules in order to identify policy efforts related to technology transfer and capacity-building. The second document, entitled A Survey of Home Country Measures (UNCTAD/ITE/IPC/2004/5), highlighted measures such as incentives, the role of home country governments and the private sector, and other efforts that could be made to facilitate transfer of technology.

During the discussions, the WGTTT's attention was also called to a study on encouraging International Technology Transfer prepared by Professor Keith Maskus of the University of Colorado for a joint project between the International Centre for Trade and Sustainable Development (ICTSD) and UNCTAD.[2]

According to a number of WTO Members, home country measures could include policies that provide financing for transfer of technology, incentives to stimulate foreign direct investment with a technology transfer component, incentives for small- and medium-size enterprises seeking partners in developing countries, simplification of rules of origin and the establishment of a database to ensure the flow of all relevant information on technology. Members welcomed all three documents and highlighted the importance of partnerships in technology transfer in order to make it a win-win situation for both home and host countries.[3]

The United Nations University, the UN Industrial Development Organization and the World Bank have also contributed presentations on their experiences in promoting technology transfer and the design of national innovation systems.

Possible Recommendations

In 2003, Cuba, India, Indonesia, Jamaica, Kenya, Nigeria, Pakistan, Tanzania, Venezuela and Zimbabwe presented a proposal on Possible Recommendations on Steps that Might be Taken

within the Mandate of the WTO to Increase Flows of Technology to Developing Countries (WT/ WGTTT/W/ 6 and add1). The proposal identified some issues and possible recommendations that the WGTTT should examine, including:

- ToT-related provisions with a view to making them operational and meaningful;
- provisions that might hinder ToT and how to mitigate such effects;
- restrictive practices adopted by multinational enterprises in the area of ToT and how to prevent such practices;
- impact of tariff peaks and tariff escalation on ToT;
- developing countries' difficulties in meeting WTO standards in cases where the relevant technologies are unavailable;
- the need for and desirability of internationally agreed disciplines on ToT with a view to promoting development; and
- ways of helping developing countries to strengthen their technology base.

Members agreed to undertake an examination of the provisions in WTO agreements that relate to technology transfer and to consider which provisions might have the effect of hindering technology transfer to developing countries.

With regard to existing WTO rules related to ToT, various developing countries have pointed to a number of relevant provisions in the TRIPS Agreement that should be made more effective and operational. These include Articles 7 and 8 on the objectives and principles of the Agreement. According to Article 7, the protection and enforcement of intellectual property rights must "contribute to the transfer and dissemination of technology", while Article 8 allows Members to "promote the public interest in sectors of vital importance to their socio-economic and technological development". In addition, Members have raised Articles 40, which deals with the control of anti-competitive licensing practices, and 66.2, which requires developed countries to provide incentives for technology transfer to least-developed countries.

Members have also mentioned technology transfer-related provisions in some other WTO agreements. These include "best-endeavour" technical assistance clauses in the Agreements on Sanitary and Phytosanitary Measures, and on Technical Barriers to Trade, as well as S&D provisions under the General Agreement on Trade in Services, including credit for autonomous liberalization. With regard to the Agreement on Subsidies and Countervailing Measures, Members have seen potential technology transfer benefits in reinstating and strengthening the now lapsed Article 8 on non-actionable subsidies.

Some developed countries have argued that since the WGTTT is not a negotiating body, it is not the appropriate forum in which to amend existing provisions relating to transfer of technology. They have advocated taking up that debate in the relevant WTO bodies. The proponents have, however, indicated that Members should not limit the scope of the discussions in the working group, especially because their proposals are oriented towards the implementation and operationalization of existing WTO obligations rather than the creation of new ones.

The identification of rules that might hinder the transfer of technology is proceeding on the basis of the WTO and UNCTAD documents mentioned in the section on the relationship between trade and technology transfer. Certain developing countries have stressed the need for any proposed recommendations to flow organically from the working group's discussions and analytical work.

Implementation Issues

The TRIPS Council worked specifically on ToT to least-developed countries (LDCs) in light of Article 66.2 of the TRIPS Agreement, which commits developed countries to "provide incentives to enterprises and institutions in their territories for the purpose of promoting technology transfer" to LDC Members.

On 19 February 2003, the TRIPS Council took a Decision (IP/C/28), which requires developed country Members to submit annual reports on actions taken or planned in pursuance of their commitments under Article 66.2. That requirement responds to Para. 11.2 of the Doha Decision on Implementation-Related Issues and Concerns, which requested the Council to put in place a mechanism

to monitor developed country compliance with their technology transfer obligations. The annual reports will provide an overview of the incentive regime put in place; the type of incentives; the government agency or entity making it available; eligible enterprises and other institutions, and any information available on the actual functioning of these incentives. The TRIPS Council will review the reports at its final meeting each year, providing an opportunity for Members to ask questions and discuss the effectiveness of incentives.

NOTES

[1] See draft report (2004) of the Working Group on Trade and Transfer of Technology to the General Council WT/WGTTT/W/8/Rev.1 of 22 November 2004.

[2] See WT/WGTTT/W/M/9 of 16 September 2004.

[3] See note 1.

(ICTSD and the IISD, Doha Round Briefing Series, Vol.3 No.11 of 13, December 2004)

Trade and Technology Transfer: Some Issues for Consideration in the Context of the Indian Automobile Industry

THE automobile industry in India has emerged as one of the more dynamic industries, particularly during the past decade. What is significant about the recent developments witnessed in this industry is that the major players have relied increasingly on infusion of technology. While this approach is in keeping with the imperatives of a technologically-intensive industry like automobiles, it is important to recognize that continued access to frontier technologies can alone enhance the competitive strength of the Indian industry in the globalized economy.

Issues to be Examined

A number of issues have been raised in the on-going discussions in the Working Group on Trade and Technology Transfer (WGTTT), which would merit attention in the context of the proposed study. These are as under:

1. *Conceptualizing Technology Transfer:* This issue holds the key to the understanding of the phenomena of technology transfer. One of the approaches that have been suggested in the WGTTT is that a broad definition of technology transfer needs to be adopted, which reflects the flows of technology in both embodied and disembodied forms along with its diffusion. Thus, while analyzing the channels of technology flows, the possibilities of getting access to the know-how as well as the know-why, needs to be examined.

2. *Channels of Technology Transfer:* The channels of technology transfer have to be examined carefully from the point of view of assessing their effectiveness. This issue needs to be seen in light of the problems that may be encountered both by the recipient and by the transferring entities. An important dimension in this context is the role that foreign direct investment can play in transferring technologies from which developing countries like India can benefit from.

3. *Licensing of Technology:* This issue has particular significance in case technology is sought in an unbundled form. Past evidence has shown that the technology licensing can give rise to anti-competitive practices. These have been in the nature of restrictive and unfair business practices. Another important issue arising in this context is the role of intellectual property rights in determining access to technologies on terms that are affordable. With the WTO Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs) making it obligatory for the Member states of the organization to adopt a strong regime of intellectual property rights, owners of proprietary technology can exercise enhanced control over the technology market.

(http://www.iift.edu/iift/wto/proj_proposed.asp)

WTO Agreements on Trade and the Transfer of Technology

A NUMBER of provisions in the WTO agreements mention the need for transfer of technology between developed and developing countries. However, it is not clear how such a transfer will take place in practice and what specific measures may be taken within the WTO to encourage such flows of technology. Within the WTO, the TRIPs Council is working specifically on incentives for the Transfer of Technology to least-developed countries, while the Working Group on the relationship between Trade and Transfer of

Technology is considering possible recommendations on steps that might be taken within the mandate of the WTO to increase flows of technology to developing countries.

In order to enhance understanding on how to promote transfer of technology (TT), several Members, including Brazil, Canada, China and Switzerland, presented their country experiences. Canada described the type of domestic policies that it has implemented (WT/WGTTT/2) in various fields, which include intellectual property regulations, competition policies, specific programmes on Technology Transfer and general regulatory system underlining the ability to attract, absorb, use and export technology, while Switzerland outlined its experience in creating incentives for the transfer of environmentally sound technologies (WT/WGTTT/W/7).

While stressing the Working Groups importance, Brazil has been critical of the value of the Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPs) as a tool for TT. In particular, it has highlighted the trade-distorting effects of developed countries' public funding schemes in support of research and development and the serious consequences for developing countries' competitiveness.

Various delegations have recognized that IPRs can stimulate innovation and that the TRIPS Agreement can have an impact on TT. The European Community, Canada and Switzerland believe that licensing technology subject to IPRs promote the transfer of certain know-how, skills and application technologies. Developing countries have noted the need to encourage cooperation for establishing appropriate norms and practices that lower the transaction costs of intellectual property and dissemination of technology. They have also identified the lack of will by many countries to engage in effective transfer programmes among the major problems that limit TT.

The European Community strategy on Transfer of Technology to Developing and Least-Developed Countries is based on the assumption that developing countries and least-developed countries need the techniques invented and used in developed countries to acquire technological capacity (WT/WGTTT/W/5). It identifies several channels through which the technologies are usually transferred, and in each case there are some practical difficulties, which the least-developed countries may have to overcome.

Intellectual property rights would be instrumental in making technological knowledge accessible and focus on the importance of FDI by securing business partners and foreign investors. Foreign direct investment is believed to increase the likelihood that transferred technology would be adapted to local needs and be made suitable for the local production environment. However, some members and the Inter-American Association of Industrial Property (Asociación Interamericana de la Propiedad Industrial-ASIPI) feel that the importance of FDI in that regard had been overstated. They remain skeptical about FDI providing a solution to the problem of technology transfer in much of the developing world, especially since in many cases it had only resulted in the transfer of low levels of technology.

Given the lack of development on transfer of technology initiatives in the WTO, African countries should not expect much from the WTO when it comes to transfer of technology in the near future.

(www.atdforum.org)

India Stresses Technology Transfer as the Core of FDI Flows – Multilateral Rules should not Curtail Domestic Policy Options

THE issue of technology transfer should be at the core of the development debate in the context of Foreign Direct Investment (FDI) flows, India has said in a paper on "Foreign Direct Investment and Technology Transfer" which was presented at the meeting of the WTO Working Group on Trade and Investment held in Geneva on 13-14 June 2001 and was welcomed by several members as a useful substantive contribution to the WTO Working Group study process in this area. Highlighting the importance of the issue of technology transfer, the paper points out that development on a self-sustaining basis has as its essential pre-condition development of technological capabilities. Transformation of developing countries from a stage of low technological development to this stage would not be possible except through transfer of

technology. However, documented evidence suggests that market forces do not ensure technology transfer to, and absorption by, developing countries. The paper, therefore, concludes that multilateral rules aimed at curtailing the rights and ability of developing countries to influence the entry and establishment of foreign investment are not desirable.

While the last decade witnessed a veritable explosion in cross border FDI flows, the lion's share of such flows was accounted for by Mergers and Acquisitions (M&As) as compared to the greenfield route. The major reason why countries, especially developing countries, seek FDI is the expectation of getting the much needed state-of-the-art technology. M&As do not always augment the stock of productive physical capital in the host country. At the same time, while greenfield investment, by virtue of new entry, increases competition, M&As most often lead to increases in economic concentration by reducing the number of active players in the market. The effects of M&As, either directly or through linkages and spill-overs, also depend on whether the investment is natural-resource-seeking, market-seeking, efficiency–seeking or created asset seeking. The motive of MNCs behind M&A investment would have an important bearing on the type and quality of the technology transferred. The paper, therefore, urges that it is important for developing countries to not only ensure "whether" technology is being transferred, but also the "nature" of such transfer.

The Indian paper in the WTO highlights the fact that the growth rates recorded by FDI flows in the past few years have been more impressive than those by technology transfer payments, which tends to indicate that the recent spurt in FDI flows may not have been accompanied by technology transfer. More particularly as the share of developing countries in FDI flows has started moving up, their share in technology transfers has come down.

The Indian paper refers to the distinction drawn by economists between the "know-how" and "know-why" of technology transfer and certain findings that technology transfer within MNCs is very efficient for transferring know-how, but less so for transferring know-why. Evidence indicated in the literature, especially with reference to the experience of Korea, shows that M&A type of FDI accompanying MNCs has transferred a high level of "operating and organizational" technology, which is very different from a high level of "production technology". Referring to the experience of South East Asian countries the paper states that low technological capability might co-exist with the capability to successfully use new technologies. The simple act of high technology production in any country does not ensure that efficient learning has occurred, and the latter depends on a host of factors other than technology transfer *per se*. Quoting the World Investment Report, the paper underlines the fact that developing countries attract only marginal shares of foreign affiliate research, and much of what they get relates to production, adaptation and technical support (which is in the form of know-how) rather than relating to innovation (know-why).

In the run up to the WTO Ministerial Conference at Doha scheduled in November 2001, a group of WTO Members are pushing for multilateral rules on investment in WTO. India has been taking the position that while its own FDI policies are very open, any move for multilateral rules could curtail domestic policy options for host countries that would not be in the interests of developing countries.

(http://commerce.nic.in)

TRIPS: Technology Transfer

DEVELOPING countries, in particular, see technology transfer as part of the bargain in which they have agreed to protect intellectual property rights. The TRIPS Agreement includes a number of provisions on this. For example, it says one of the purposes of protecting intellectual property is to promote innovation and technology transfer, and it requires developed countries' governments to provide incentives for their companies to transfer technology to least-developed countries.

More precisely, Article 7 ("Objectives") states that 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.

The obligation for developed countries to provide incentives for technology transfer are in Article 66.2. Least-developed countries want this requirement to be made more effective. In Doha, ministers agreed that the TRIPS Council would "put in place a mechanism for ensuring the monitoring and full implementation of the obligations". The Council adopted a decision setting up this mechanism in February 2003.

This decision is now being implemented, and was reviewed in full when the TRIPS Council met in November 2003. Submissions made and discussions in the TRIPS Council can be found by using the document search facility according to different search criteria.

At the same time, various decisions under TRIPS have raised the question of technology transfer and reiterated the commitment to implement Article 66.2, such as the 2003 and 2005 decisions on TRIPS and Public Health.

Additionally, climate change negotiators have been discussing the link between technology transfer and the TRIPS Agreement.

(www.wto.org)

DSIR: International Technology Transfer Programme (ITTP)

INTERNATIONALIZATION of technologies and production is becoming a common phenomenon for attaining and retaining global competitiveness. At the same time, regional and sub-regional trade blocs are being formed; formation of SAARC is an example. India can and should take advantage of its comparative advantages over other developing countries, particularly in the context of country's need of promoting exports of high value added products and services. Department of Scientific & Industrial Research (DSIR) has established strong technological and industrial capabilities in several areas which could as well be of considerable relevance and utility to other developing countries. A beginning has been made in exporting its technologies directly and indirectly to other developing and also to industrially advanced countries by sending experts and skilled manpower abroad, establishing joint ventures, undertaking turnkey projects, licensing of know-how, providing training to foreign personnel, etc. Although, these efforts have been very useful, there is a vast scope to increase these activities for which a systematic and integrated approach needs to be undertaken. This calls for harmonization of aims and activities of industry, commerce, finance, trade agencies and government. There is a need for structured documentation of India's technological and industrial capabilities and strengths, showcasing and demonstration of technology export capabilities and facilitation of technology transfer and trade at the firm level. Keeping this in view, "International Technology Transfer Programme" of DSIR is aimed at supporting activities relating to promotion of international technology transfer and trade including export of technologies, projects, services and technology intensive products, with India as the focus.

Objective of ITTP

It aims to promote transfer of technologies, projects and services from India with a view to improving the reach of Indian industry beyond the national boundaries. It also seeks to augment the transfer of technologies from other countries to India with a view to enhancing the technology export capability of Indian industry.

Activities

- To compile information on exportable technologies and technology intensive projects, products & services available with Indian industry and R&D establishments;
- To create awareness about India's technology export capabilities among potential foreign buyers or collaborators;
- To support capability building of industries and R&D establishments for technology intensive exports;
- To support research and analytical studies aimed at providing inputs to the Government for technology exports related policy formulation;
- To promote and support Institutional Mechanisms for catalyzing international technology transfer and trade; and
- To facilitate signing of MoUs/Agreements on High Technology Cooperation and Trade between Indian and foreign industrial units.

(www.dsir.gov.in)

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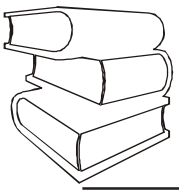

BOOKS/ARTICLES NOTES

BOOKS

Technology Trade and Growth in OCED Countries: Does Specialization Matter?
by Valentina Meliciani, Routliedge, 2001,
pp. xvi+187

THIS book focuses on the role played by the composition of technological activities on countries' international competitiveness and economic growth. In particular it argues that in a process of growth sustained by innovation, the dynamics of specialization assume an important role in affecting the performance of different countries because of differences in technological opportunities and in income elasticities of demand across different activities.

This book further says that at a theoretical level, the areas of research relevant to this study can be identified within the theories of economic growth and international trade. There are two broad areas of investigation that have become increasingly interdependent in the mainstream economic analysis since the development of the *new growth theory* and the *new trade theory*. Thus the introductory chapter highlights the theoretical framework of the book and the methodology adopted. The rest of the work is organized as follows:

Chapter 2 presents a review of the theoretical literature that aims at highlighting to what extent different streams of analysis (neoclassical, Schumpeterian evolutionary and post-Keynesian) can provide a useful framework for shedding light on the impact of specialization on growth and international competitiveness.

Chapter 3 is a thematic review of the empirical literature relevant to the book, in the areas of innovation and growth, innovation and international competitiveness, international competitiveness and growth, and specialization and growth. The aim of the chapter is twofold: to assess the explanatory power of the theories reviewed in Chapter 2 and to provide a framework, in terms of empirically robust relationships, in which to introduce the role played by specialization.

Chapter 4 is a preliminary analysis of the link between the composition of national activities (technology, exports and production) and countries' performance in production, exports and technology. It also aims at assessing the relevance of the concept of technological opportunity by looking at the relative role played by countries and technologies in determining the overall rate of innovation.

Chapter 5 focuses on the impact of specialization in areas of strong technological opportunity and a high degree of pervasiveness on economic growth. It takes into account the direct effects of general technological competitiveness on growth and the process of catching-up, and the impact of the quality of technological specialization on economic growth. As a side question it investigates the evolution of technological specialization at different levels of aggregation in OECD countries.

Chapter 6 focuses on international competitiveness by estimating export equations, taking into account the role played by prices and technology and relating the income elasticities of export to countries' international specialization As a side question it investigates the evolution of trade specialization in OECD countries.

Chapter 7 aims at exploring the effect of specialization on growth through its impact on international competitiveness, also taking into account the direct effects of technological competitiveness on international competitiveness and the feedback effect of growth on investment, within the context of a balance-of-payments growth model.

Chapter 8 examines the effect of economic integration (in terms of increasing openness) on price and non-price (technological) determinants of international competitiveness. By looking at the impact of increasing openness on the elasticity of export with respect to technological factors, it indirectly explores whether the framework adopted in this book (where technological differences across countries are the main determinant of differences in countries' national and international performance) has lost explanatory power as a consequence of increasing openness. This could be the case if this trend has been accompanied to a great extent by technological spillovers and technological globalization.

The last chapter of the book draws the main conclusions and implications of this work for theory and policy, and highlights some unanswered questions that could be the subject of future research.

Trade Specialization Technology and Economic Growth: Theory and Evidence from Advanced Countries by Keld Laursen, Edward Elgan Publishing Inc., 2000, pp. ix+199.

THIS book is split into five parts. The aim of this book is to examine the role of international Ricardian specialization in economic development processes.

A survey of the theoretical literature, classified according to the three parts of the book is given in Chapter 2 (Part 1). The chapter discusses "appreciative theories", neoclassical theories, post-Keynesian approaches and evolutionary approaches in relation to each of issues, dealt with in the three analytical parts.

Chapter 3 is a comparison of different measures of specialization, as applied in the empirical trade literature.

Part II of the book (Chapters 4 and 5) addresses sub-question A, as it deals with different aspects of the development of international specialization pattern over the last 2-3 decades.

Chapter 4 examines whether or not the group of OECD countries are characterized by a high degree of stability of their export specialization pattern at the country level.

The intra-country results show that national specialization pattern are rather sticky, although there is a tendency for countries to de-specialize in the medium to long term.

As mentioned above, Chapter 4 shows that there is a general tendency for OECD countries to de-specialize in terms of export specialization over the last 20-25 years. This finding is in contrast to findings made by other authors working on technological specialization.

Chapter 5 confirms that the OECD countries did in general de-specialization in terms of export specialization.

In Part III of the book, Chapter 6 suggests about the importance of advanced users in home markets as an inducement to technological innovation, providing an explanation for parts of international export specialization. It demonstrates the importance of science based competencies in moving from natural resource based technologies to those of greater specialization of advanced countries. This chapter thus looks at inducement mechanisms to trade specialization in a science based sector. Chapter 7 takes a more general approach in being a statistical analysis of several inducement mechanisms. This chapter statistically investigates the importance of a set of variables reflecting different inducement mechanisms, across 9 OECD countries. The main novelty of the chapter is the combination of the two technology based explanations for international trade specialization, into one single empirical model. The chapter concludes that the two types of technological activities, namely technological activities in the "own" sector, and inter-sectoral linkages are both important in determination of national export specialization patterns.

After having dealt with the direction of trade specialization, Part IV (Chapters 8-10), looks at whether the direction of specialization has any impact on the rate of economic development. Thus, Chapter 8 examines whether the degree to which countries are specialized in initially, or move into, sectors with above average technological opportunities, has any impact on growth in aggregate market shares of exports. The results of this Chapter demonstrate that there is a positive relationship between trade performance and the

individual countries' ability to move (faster than average) into technological sectors offering above average technological opportunities.

Chapter 9 moves on from the issue of trade performance dealt with in Chapter 8 to the (controversial) question of to what extent the growth performance of an economy is determined by its external relations. A novelty of this chapter is the application of principal components analysis in order to compress the abundant information on intra-sectoral specialization. The regression results shown in this chapter indicate that specialization does indeed matter for economic growth.

Chapter 10 extends the previous chapter by resting on the same theoretical discussion and by exploring a very similar research question, namely whether Ricardian specialization matters for growth. However, whereas Chapter 9 examined whether intra-industry specialization matters for growth at the level of the industry. Chapter 10 is an analysis of the effect of inter-industry specialization on macro-economic growth.

Finally, Part V (Chapter 11) contains the conclusion of the book, first the results of the book are briefly summed up. Second, policy implications of the results are discussed. The policy implications concern the importance of acknowledging sectoral differences, when implementing policy. Furthermore, the possibilities and difficulties for enhancing economic growth through a policy effort, attempting to influence specialization patterns are discussed. Finally, some directions for future research are presented and discussed in this book.

International Competitiveness and Technological Change by Marcela Niozzo and Viven Walsh, Oxford University Press, 2006, pp. xiii+325.

"TECHNOLOGY" and "Competitiveness" are two of the most popular buzzwords of recent time. Technology is high up the agenda in both policy and academic debates. The capacity of firms to use new technologies and improved organizational methods is central in explaining industrial leadership and the competitiveness of regions and countries. Nevertheless, authors says that relation between industrial innovation, scientific research, organizational change, and competitiveness is not clear. The extent and manner in which innovation occurs in an economy depends on the development of new production and business capabilities, institutions, and infrastructure – factors which are, in turn, contingent (among other things) on business strategy and government decisions on public research funding.

In recent years there has been a revival of interest in the issue of international competitiveness and a renewed concern with the sources of the wealth of nations, a concern raised 250 years ago by the economist Adam Smith. Authors opine this interest in international competitiveness is accompanied by at least a suspicion that innovation (new technologies and new forms of organization) must play a central role in competitiveness and long-run economic change. Indeed, technological competition is the main form of competition under capitalism (and firms not responding to this demand tend to fail). They say, innovation opens up new business opportunities and sets the stage for economic transformation. Innovation is important to the survival and growth of firms and national economies and ensures a continuing rise in the living standards of the citizens of the region or country whose firms are competitive in world markets.

This book synthesizes the rapidly growing body of research into industrial innovation and its effect on economic change and growth by scholars from a number of disciplines. This body of literature has made an effort to conceptualize industrial innovation, to outline its key features and its outcomes for economic growth. Similarly, there is an understanding that innovation tends to cluster in some industries. Moreover, firms do not innovate in isolation but depend on extensive interaction with network of institutions in the regional and national economy. There is also evidence that the character of the institutional structure for the effective development and exploitation of innovation depends on the underlying technologies, the nature of demand, and the characteristics of the organizations that supply them. These factors, moreover, differ from sector to sector. In addition, research shows that

globalization, which brings increasing interdependence of economic organizations across countries and regions, affects the development and diffusion of innovation across national borders.

Chapter 1 sets the context for the book by developing a perspective on the relation between innovation and economic development, drawing on the work of Schumpeter and Marx. From this perspective, capitalism is seen as a dynamic system, with innovation as its main engine of change. Innovation tends to cluster in certain sectors which grow more rapidly, implying structural changes in production and demand, and, eventually, organizational and industrial change. As such, the basis of competitiveness and shift in industrial leadership are questions of structural change, and, rather than rely on aggregate comparisons between countries, is better explored by examining the efforts to develop technological and organizational changes at the level of firms and industrial sectors. Competitiveness depends on the ability of firms to develop and use new technologies and organization and also on the institutional environment in which firms operate.

Chapter 2 considers the main source of innovation: research and development (R&D) activity. It considers where the inventions and innovations come from in terms of the countries that specialize in their production, the institutions carrying out R&D and the institutions which provide the sources of the relevant R&D funding. Authors examine the evolution of science and technology from being an activity carried out by very few people with a private income or an activity sponsored by patrons, to the professionalization of science and technology and the evolution of the in-house corporate R&D laboratory. The chapter examines the amount and nature of government-funded R&D, defence-related R&D, and industrial R&D in different countries.

Technology Strategy for Managers and Entrepreneurs by Scott Shane, Pearson Education Inc., 2009, pp. xx+401.

THIS book emphasizes how a future manager can use strategic management of innovation and technology to enhance performance. Given the differences in the technology strategy for small new companies and for large, the author identifies and addresses the core issue that arise from these differences, preparing students to take on the role of both an entrepreneur and a manager.

Keeping in view the needs of entrepreneurs/ managers this book is designed to teach student in business, engineering and science as to how to use the strategic management of innovation to enhance firm performance. It is divided into five sections, each reflecting part of an overarching framework that achieves this goal. The first section provides an understating of how technology evolves over time and the implication of that evolution for companies. The second section describes how companies come up with innovations that meet the needs of their customers. The third section explains how companies capture the value generated from their investment in innovation. The fourth section discusses the development of a technology strategy, while the fifth section discusses its implementation. Although the book provides a theoretical framework to guide students, it also provides practical examples and exercises to ground the effort.

Managing Technology and Innovation for Competitive Advantage by V.K. Narayanan, Pearson Education Inc., 2009, pp. viii+510.

THIS book is originated from Narayanan's experiences of strategic view of technology management. The author emphasizes five major themes throughout the book, i.e. technology and innovation are value drivers and that management decisions should be anchored in the fundamental objective of creating competitive advantage. Secondly, an open system view of management have understood the role of environment in management decision. He says, there are three environmental trends: Globalization, Time Compression and Technology Integration, which are emphasized throughout the book.

Thirdly, general manager and fourth one is the importance of organizational learning through scanning by doing, reflecting, and analyzing as important steps in the management of technology.

Finally there is boot strapping between theory and practices. Narayanan believes that concepts are useful to managers and have not shied away from presenting them.

Compendium on Technology Exports: An Illustrative Compilation of Exported & Exportable Technologies from India, DSIR-IIFT, Volume IX, January 2010, New Delhi.

COMPREHENSIVE data on technology exports, in respect of many countries, including India are not readily available. With a view to bridge this gap, Department of Scientific and Industrial Research (DSIR) made a beginning in 1994-95 by presenting the limited data available in the form of a *Compendium on Technology Exports from India*. Eight volumes of the *Compendium* have been published so far in collaboration with Indian Institute of Foreign Trade (IIFT), New Delhi.

This *Compendium*, containing data for the period 2002-03 to 2007-08 is the ninth in the series, presenting data on 418 organizations. The publication also captures the list of all the 654 companies that have responded to either of the nine surveys done in the past, many of them, of course responding to more than one survey. Out of these, export data of 581 companies from 2000-01 to 2007-08 have been given and remaining 73 companies, who stopped responding to the survey beyond the year 2000 have been just listed. Out of 418 organizations covered by the recent survey, 367 organizations have reported technology-intensive exports that increased from ₹387.49 billion in 2002-03 to ₹1,856.78 billion in 2007-08.

UNCTAD classifies technology exports into high, medium and low technology exports and according to this survey, the share of high technology exports in technology-intensive exports is in the range of 25-35 per cent and the balance share being of the medium technology and low technology exports. High technology exports reported by the survey include exports of precision machine tools, active pharmaceutical ingredients, specialty chemicals, petroleum refining technology, bio-pharmaceuticals, engineering & construction projects and electronics products. Among the 367 exporting organizations covered by the survey, 180 organizations have reported foreign collaborations. Exports of these 180 organizations grew at 19.16 per cent over 2006-07 to 2007-08 and export of 187 companies without foreign collaborations grew at 25.21 per cent over the same period, signifying that foreign collaborations did not have a positive impact on technology intensive exports. However, the R&D expenditure of these 367 firms show that they have a multiplier effect on exports, with exports almost doubling during 2005-06 to 2007-08, whereas increase in R&D expenditure was just 36 per cent during the same period.

The DSIR has been implementing an International Technology Transfer Programme, which aims at promoting transfer of technologies, projects and services from India with a view to create Indian brand image and enhance the reach of Indian industry beyond the national boundaries as well as promoting transfer of technologies from other countries to India with a view to enhance the technology export capability of Indian industry.

Transfer of Technology in Environmentally Sound Technologies, Centre for WTO Studies, IIFT, New Delhi.

THIS publication is based on the FAQ on Transfer of Technology in Environmentally Sound Technologies required to, as well as for mitigating climate changes. The developing countries realize that climate change related adaptation and mitigation measures would have significant impact in their economy and affect their growth potential.

It is important to understand the requirements of the developing countries and understand how their perspective differs from that of the developed countries in this regard. This would help the reader develop a better understanding of the issues involved and appreciate the changes that may be required to give the developing countries access to green technologies. This publication, through FAQ, attempts to give snapshot of the issues involved and suggests suitable mechanism through which the environmentally sound technologies could be transferred.

ARTICLES

A Balanced IPR Regime - Key to Promote Technology-Driven Agriculture by Rana Kapoor, *The Hindu Business Line*, 21 February 2011.

PROTECTION of intellectual property rights (IPR) has the potential to dramatically increase agricultural production. In a country like India, IPR needs to be finely balanced so as to protect the interests of farmers and the food security needs of a billion people. Potential concerns include a number of socio-economic and environmental impacts specifically with regard to loss of bio-diversity and bio-safety. In this context, this article critically review the IPR framework being followed in India, and develop innovative models that address a larger stakeholder paradigm.

The last few decades have witnessed remarkable innovations in agriculture – such as genetically-modified plant varieties, and specialized insecticides for pest control – that have warranted a review of the IPR regime of developing nations so as to foster introduction of innovative agricultural technologies into these countries.

Historically, protection of plant varieties in India through IPR was banned. Until the mid 1990s, the Indian Patents Act excluded the patentability of "life forms" including methods of agriculture and horticulture. Further, while allowing "process patents" for substances used as food, it rejected "product patents" for food items. This was intended to foster the availability of essential food items by keeping the prices as low as possible.

The absence of patents in agriculture resulted in low private participation in agricultural research and technology development. As a result, the public sector was the major contributor in agricultural development. The author says signing TRIPS (Trade Related Aspects of Intellectual Property Rights) Agreement in 1994 triggered significant changes in the IPR related legal framework of the country. Since then, several legislative and institutional adjustments have been made to protect the intellectual property. Some of the major changes include introduction of the Geographical Indications of Goods Act, 1999, to preclude misappropriation of traditional knowledge and patenting of products of Indian origin including "appellations of origin", such as, Darjeeling tea and basmati rice, and promoting them in international markets. The Enactment of Protection of Plant Varieties and Farmers' Rights Act (PPV&FRA), 2001, which has established a unique system by expanding plant variety protection (PVP) to varieties registered by farmers, NGOs and public sector institutions while also protecting the rights of plant breeders.

The Amendment of Patents Act, 1970, in 2005 which has extended patents to innovative products from all industries including agrochemicals, thereby, closing the option of reverse engineering or development of "me-too" products thus promoting investment in cutting edge R&D. Strengthening of the IPR regime has significantly improved investment in agricultural technology development. The private sector has not only invested heavily in crop genetic improvement and farm technologies, but has also pursued legal IPR protection under various Acts. For instance, in 2008–09, 64 per cent of the 460 PVP applications received by the PPV&FR Authority were from the private sector. This is also reflected in the fact that, the number of patent applications in India has increased more than eight folds between 2005 and 2009.

On *misappropriation of traditional knowledge* Rana Kapoor says that acts of "bio-piracy'" such as patenting of medicinal properties of turmeric and neem in the US have aggravated concerns of misuse of IPR laws. While policy-makers have efficiently balanced socio-economic concerns with international requirement of IPR till date, some of the key areas that require further improvement to facilitate seamless transfer of technology include:

1. Strengthening institutional mechanisms for protection of IPR – regulatory, legal and administrative through assigning a high priority towards completion of required legislative provisions to harmonize IPR regime with international laws; simplifying regulatory and administrative procedures for seeking IP protection and defining time frames for the same to reduce lead time; and reinforcing parallel laws supporting IPR regulation to bolster their application and enforcement. For instance, the Seeds Act needs to be fortified for effective implementation of PPV&FR Act, 2001.

2. Harnessing IPR linked technical opportunities in Agriculture through – judicious application of various forms of IPR by linking protection to commercialization; and augmenting traditional knowledge digital libraries (TKDL) and documentation of farmers' varieties to give legitimacy and protection to domestic knowledge systems.
3. Strengthening public-private R&D interface by adopting mechanisms such as an "innovation bill" to enhance public R&D base wherein public researchers, research organizations and universities would be incentivized for commercialisation of their innovation; and competitive funding schemes to encourage links between public and propriety R&D.
4. Enhancing IPR literacy by disseminating IPR-related information to all relevant stakeholders, specially the farmers.

Summing up this article, the author says the current IPR protection framework has the potential to foster introduction of new agricultural technologies that would largely benefit growth in agricultural production. However, there is a need to improve the efficiency of the process and also balance the objective of technological progress with that of social, economic and food security concerns. This would not only require structural and institutional adjustments in the current IPR framework but would also require development of innovative and out of box IPR protection models that go beyond the TRIPS Agreement and effectively address important issues such as protection of farmer's rights and protection of traditional Indian knowledge.

Technology Diplomacy: Historical Perspective and Approaches by Deepak Bhatnagar, *CUTS International*, 2009.

THIS paper explains the concept of science and technology diplomacy which is helpful to multilateral negotiations and the implementation of the result of such negotiations at both international and national levels pursuant to international commitments.

In a global context, a major S&T issue of discussion is the *conversion of military to civil technologies* and the new concept of *dual-use* technologies, rather than "spin-offs". Arguments of the past against a defence-led mode of technology innovation have now given way to economic arguments, based on the successes of the industrial policies of Japan and Europe led by explicit civilian technology.

The article says that new emergent forms of international diplomacy are developing to deal with a number of emerging issues where science and technology plays a central role. These issues include, *inter alia*, infectious diseases, environmental degradation, electronic crimes, weapons of mass destruction and the impacts and applications of new and emerging technologies, particularly, bio-technology. The influence and effectiveness of diplomats and international civil servants increasingly depend on the extent to which they can mobilize scientific and technical expertise in their work. Substantial benefits can also be derived from linking S&T diplomacy with trade, enterprise development and investment policies, the author suggests.

He observes that science and technology-related issues are often at the root of many trade controversies/disputes. Successful trade negotiations therefore demand a greater understanding by trade diplomats and policy-makers of the scientific underpinnings of trade issues. However, many developing countries tend to thinly spread their limited financial and human resources that deal with international diplomacy in science and technology. As a result, the author opines that negotiations and discussions leading to the signing of treaties and protocols are often concluded without having access to accurate and informed policy advice. Moreover, policy-makers, especially from developing countries, often miss out or do not take advantage of initiatives and programmes that are designed to assist and advise them on emerging issues of science and technology.

A Science and Technology Diplomacy Initiative was established at UNCTAD in accordance with Resolution 2001/31 of the United Nations Economic and Social Council (ECOSOC), adopted in July 2001, following recommendations of the United Nations Commission on Science and Technology for Development (UNCSTD) and consultations with the Secretary-General of UNCTAD. This Initiative is being implemented by UNCTAD in collaboration with the Science, Technology and Innovation

Programme of Harvard University's Kennedy School of Government.

The Initiative will also seek to partner with other international organizations, most notably FAO, UNEP, UNESCO, WHO, WIPO, WMO, WTO and the United Nations University, as well as other international scientific organizations, such as the Third World Academy of Sciences.

The main objective of the Science and Technology Diplomacy Initiative is to mobilize scientific and technological expertise to enable developing country diplomats and representatives to participate fully and to make informed decisions on emerging issues, where science and technology play an important role, particularly in the aftermath of the Doha WTO Ministerial meeting.

The Science and Technology Diplomacy Initiative seeks to provide training and workshops for diplomats, scientists and policy-makers to assist them in international negotiations, particularly those that take place at the TRIPS Council, with respect to the Convention on Biological Diversity, biotechnology, and transfer of technology.

The Initiative also provides succinct technology diplomacy briefs on emerging science and technology issues as well as information on international treaties, protocols and international initiatives and events.

The above-mentioned Initiative offer an excellent opportunity for developing countries to narrow the development gap with industrialized countries, especially in the new and emerging technologies like ICT and Bio-technology. They have the potential to assist developing countries "leapfrog" entire stages of development. However, there is considerable concentration of technology and technological know-how in a limited number of companies and large transnational corporations. This reality renders many developing countries dependent on technology transfer. Therefore, without a greater policy focus on the transfer of technology and its links to international trade and foreign direct investment, and without a more determined strategic approach by governments, the private sector, regional and international organizations, technology may also perpetuate the development gaps between developed and developing countries.

The fourth WTO Ministerial Conference recognized this challenge and has called for setting up the WTO working group on Trade and Transfer of Technology to address related issues. The aim of this working group is to provide the General Council with recommendations on steps that may be taken to improve the flow of technologies to developing countries. Successful participation in the working group, as well as in other international forums, will demand a greater understanding by trade diplomats and policy-makers of the scientific and technological underpinnings of trade, investment and environmental issues. It will also depend on renewed interest in implementing tech-transfer provisions that already exist within the various WTO agreements.

The author says that it has been observed that many developing countries tend to spread thinly their limited financial and human resources that deal with international diplomacy in science and technology. As a result, negotiations and discussions leading to the signing of treaties, protocols and agreements are often concluded without having access to timely and reliable policy advice. Moreover, policy-makers, especially from developing countries, often fail to take advantage of initiatives and programmes that are designed to assist and advise them on emerging issues of science and technology.

It is felt that the Science and Technology Diplomacy Initiative, established by UNCTAD, will assist decision-makers acquire the requisite knowledge needed to participate effectively in international negotiations. The Initiative will not undertake new research, but will draw upon existing information and present the analysis in a way that is relevant to the diplomatic and policy making community, through the use of policy briefs. The initial focus of this Initiative will be on:

(a) International arrangements on technology transfer and FDI,

(b) Bio-technology and trade, and

(c) Managing technological risks, market access and standards setting.

Indian planners who support a massive domestic R&D system also value international scientific collaboration.

The latter has, in some cases, speeded up the development of advanced technologies, high tech equipment and new materials. India has also opened the doors of its scientific and educational institutions to train scientists from developing countries. This interaction leads to a "win-win" situation for all. The researchers divide various components of the problem among themselves to achieve better solutions within a short period of time.

India's international S&T cooperation programmes may be broadly classified into three categories, which are based on the mode of funding and relative scientific and technical strengths of the collaborating partners. The first two categories relate to whether India is a beneficiary or a benefactor. India receives grants and some of the advanced countries support science, generally from the local intellectual and natural resources.

As a donor, India funds R&D in another country as a gesture of goodwill and also provides consultancy services. In the third category, the programmes are implemented on the basis of equally shared costs. The responsibility of negotiating S&T cooperation agreements and coordinating programmes rests with the Department of Science and Technology (DST). The other scientific agencies deal with subjects related under their charge, for example, Department of Biotechnology takes care of projects in this area, like International Centre for Genetic Engineering and Biotechnology (ICGEB).

International S&T cooperation agreements have been signed with around 80 countries as well as with regional groupings like ASEAN, BIMSTEC, SAARC, etc. A few notable programmes which have resulted in tremendous impact by way of joint projects are:

- Indo-US S&T Forum and the DST-NSF arrangements
- An integrated long-term programme of cooperation with Russia (ILTP)
- Indo-German experience started in the 1960s with atomic energy and space and has now extended in other areas, including academic exchanges through DAAD, Humboldt, Max-Planck-Gesselschaft and others
- Indo-French Centre for the Promotion of Advanced Research (CEFIPRA)
- Indo-British exchanges – seeds were sown in the academic institutions
- DST-Japan Society for Promotion of Science (JSPS) and Science & Technology Agency (STA)
- ASEAN-India S&T Forum.

These and interactions with several other countries have centered around exchange of scientists for carrying out joint research projects, based on mutuality of interest and equitable sharing of research results. Scientists have not only learnt about common research topics from each other, but also absorbed each other's cultures, food habits and have become more "global" in their outlook.

Often, when Indian scientists are felicitated for their achievements and contributions abroad, one has a feeling that they are truly the "*brand ambassadors*" of our country, the author concludes.

New Trends in Technology Transfer: Implications for National and International Policy by John H. Barton, Issue Paper No.18, Intellectual Property and Sustainable Development Series, ICTSD, February 2007.

THIS paper describes how technology is today transferred to developing countries and the barriers that affect that transfer. It then identifies policy approaches that might overcome those barriers. It covers (1) the flow of human resources, as through international education, (2) the flow of public sector technology support, as through research and licensing by international organizations, and (3) the flow of private technology, as through the sale of consumer products (e.g. medicines) that may incorporate embodied technologies through licensing, and through foreign direct investment. After an introduction, the paper looks at these three areas in turn. It concentrates on policy approaches directly associated with technology transfer, thus avoiding issues of the overall investment, legal or political climate in specific developing nations.

The world is quite different, the author explains, because of two key changes: *First*, a number of developing nations have become much more technologically sophisticated. The comparison from

1976 say to 2006 is incredible in terms of the numbers of trained scientists and technologists, the level of science-based industry, and the magnitude of national scientific research and financing programmes. This change is, of course, greater for the middle income and largest nations such as Brazil, China, and India and much weaker for the poorest nations, such as many of those of Africa. Ever the less, there is an enormous change in the skills available to a large portion of the developing world.

Second, he says, the world is now globalized in the sense that free trade has spread and that, in many industries, economies of scale now favour production facilities that serve more than one nation. The result has been increasing specialization and trade, both in components and in finished products that may have origins in a number of nations. A multinational, in general, now invests in a developing nation in order to obtain a basis for export to a global market or production process. China is in part an exception because its domestic market is so large — but much of the investment and production in that nation is for export as well.

These developments have changed the incentives and barriers for indigenous developing world firms, what the author emphasizes, one those that are organized with primarily developing nation ownership and management (although they may enter into alliances and joint ventures with global firms). Such a firm must face global competition, not just local competition and it may have to find a place in an already elaborate international production structure. Moreover, not every nation can have firms leading in every area of technology – for many areas of technology, there can be only a few centres of excellence anywhere in the world.

The international regulatory structure is also different. An indigenous firm in the developing world may be less able to begin through a protected market, as did the US industrial firms of the early 19th century. And because of intellectual property (IP) protections in WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), the firm may be less able to begin by imitating existing technologies, as did Japanese firms in the middle of the 20th century. Moreover, technological flow has become strongly political, not only because of the global move towards IP but also because of technological protectionism. As one author states:

> While policy-makers regard science and technology as a race between nations in a zerosum game, businesses see themselves as part of a global information network … Government officials are more concerned about stemming the flow of technologies to competitors and possible rivals who might use it for military objectives … However, firms and businesses prefer a system that leads to the dissemination of knowledge, including to political rivals.

He opines that free trade provides mutual benefit which is widely recognized, even if politically difficult to implement. Less recognized, at least among politicians, is the parallel point that exchange of knowledge leads to an equally — if not more — beneficial cross-fertilization and acceleration of the benefits of free trade.

Whether from basic research to applied technology or from one firm to another, the transfer of technology is fundamentally a matter of the flow of human knowledge from one human being to another. This can be through education, the scientific literature, or direct human contact. At the legal level, one thinks about licences dealing with legal rights to use the particular technologies in the particular context — but it is the human level that dominates the managerial and economic reality. And the classic view of a flow from basic to applied technology is a great over simplification sometimes, for example, problems or insights arising at the production level give rise to new ideas that contribute to fundamental basic advance. At least in some sectors, close links between the basic researchers and the manufacturing experts, and even marketing personnel contribute to competitiveness and advance.

Human resources are crucial both to the development and application of technology. Certainly, some inventions have been made by individuals with little education — but today the majority of inventions are made by those with substantial education in science or technology. The reduction of inventions to commercial application usually also requires skilled entrepreneurs and, depending on the particular field, skilled

mechanics, lab technicians, or software writers. Many of the same skills are needed for the thoughtful adaption and application of a technology developed elsewhere. Hence, a broad range of scientific and technological skills is absolutely crucial for a nation to participate effectively in the international technological economy.

A summary of possible topics for international consideration on human resources issues includes:

- Improved support for developing-world technical education, whether through international lending and financing programmes or through stronger linkages between developed and developing nation institutions.
- Possible international clinical programmes to assist developing nation science and technology graduates to obtain experience in business. Both this and the previous point might be discussed at UNDP or at UNESCO.
- Arrangements to ease access to visas for students and scientists. This might appropriately be considered in follow-on discussions on the flow of professional services in the context of the WTO General Agreement on Trade in Services (GATS).

In the United States, overall, the government, universities, and non-profit institutions fund roughly $95 billion on research and industry funds approximately $181 billion. This is 34 per cent public and 66 per cent business. In many developing nations, the balance between public and private sector expenditures is more weighted in favour of the public sector.

The numbers almost certainly show that developing world public sector research far outweighs developing world private sector research. But it is probably also the case that the developing world public sector supplies far less technology to the developing world economy than does the international private sector. Thus, the role of public sector support is generally more one of building a capable infrastructure than of creating new developing world industries. There is an obvious exception in areas like agriculture, where much of the research is carried out in the global and national public sectors.

There are many points the author observes, that might serve as the basis for negotiations. Among those particularly deserving attention are:

- Improving mechanisms for access to technology held by global agricultural biotechnology firms. This may involve opening markets to private sector products, licensing in technology, or possibly compulsory licensing. The international agricultural community is facing this issue for Africa; the issue is more complex in wealthier developing nations where the markets are of interest to the private sector.
- Increasing developed- and developing-nation government support for medical research of importance to developing nations and, particularly, for covering the costs of distributing the products of that research in the developing world. This is happening in the international medical community, but more is needed.
- Recognizing, in international technology support programmes, such as those for energy and environmental technologies, the possible need for major public sector involvement in recipient nations and, where appropriate, organizing these programmes so that developing nation firms are encouraged. This is particularly an issue for donor institutions like the World Bank.
- Organization, perhaps by the World Bank, of a global research inventory, by sector, to assist in defining areas, e.g. pharmaceuticals for the developing world or more efficient energy sources, in which increased public-sector research investment is needed.
- Clarification or modification of patent law to expand research exemptions and to minimize the negative impact of patents on research, an issue for the World Intellectual Property Organization (WIPO).
- New negotiated arrangements to minimize the impact of national security restrictions on the freedom of science and of international technological development, perhaps an issue for the WTO services discussions.

- New mechanisms of funding research for global public goals.
- A treaty on access to knowledge and technology including reciprocal commitments in a number of the above areas. This is perhaps a WTO issue, but both it and the previous issue might best be dealt with at the political level, as at the G-8 discussions that considered the concept of advance purchase commitments for medicines.

As noted above, outside a few specific sectors such as parts of agriculture, the primary means of technology transfer to developing nations is probably through commercial transfer from the developed world private sector through licensing or FDI. Participation in this private-sector network is the normal way for a developing nation firm to gain its first technology. Depending on the sector and the nation, the firm may go on to gain a substantial role in the international production chain, sometimes with its own technology, and may ultimately produce its own product for the domestic market for export.

The author of this study identifies the following most important topics to be considered for further international negotiations:

- International arrangements guaranteeing that trade secret law not infringe the rights of employees to change jobs (including changing jobs internationally) or the rights of firms to reverse-engineer products, provided that the rights of the former employer or of the original designer of the product are respected. There is an important strategy issue as to whether it is best to raise this group of issues diplomatically, or in developed-world judicial proceedings, or simply to proceed with local legislation that reflects the principles.
- Consideration of the purchasing policies of global health (and other) procurement entities to determine whether they are adequately open to developing nation supply tenders (and it is possible that these entities might provide additional assistance in helping firms meet necessary quality standards).
- Development of a mechanism to discourage bilateral agreements that modify the balance struck in TRIPS. This could be a requirement of some form of review or impact statement — the WTO Article XXIV or Trade Policy Review mechanisms might provide a starting point for designing a response.
- Negotiation of provisions like the WTO Agreement on Trade-Related Investment Measures (TRIMS) to ensure that developing-nation firms can buy developed-nation firms as well as the reverse.
- Evaluation and possible renegotiation of the technology-related provisions of the WTO antidumping codes, subsidy codes, and possibly of TRIMS and of Bilateral Investment Treaty provisions.
- Consideration of additional provisions or commitments in the services area to ensure the ability of developing nations to compete in the offshoring sector and in other forms of international delivery of services.
- Antitrust issues associated with the international flow of technology and with the international competitive structure of technology-based industries.

The Role of Green Technology Transfer in Climate Policy by David Popp, http://www.energyportal.eu

THIS article focuses on the role of green technology transfer in climate policy for clean energy technologies developed in industrialized nations. It discusses how does international technology transfer come about and what is the appropriate role for governments in promoting such transfers?

Economic growth in developing countries brings the promise of a better life to much of the world's population. With growth, however, comes pollution, particularly carbon dioxide (CO2) and other greenhouse gas (GHG) emissions. The need to reduce these emissions comes just as the share of global emissions from developing countries is rapidly growing. Much of this increase can be attributed to economic and population growth in China and India. In 1990, these two countries accounted for 13 per cent of world CO2 emissions; by 2030, that figure is projected to rise to 31 per cent.

Reducing GHG emissions will require new technologies, such as cleaner energy sources, like wind and solar, and energy-efficient technologies, such as hybrid vehicles and high-efficiency lighting. As concern mounts over developing country emissions, the author observes that policy-makers now face an important question as they negotiate climate stabilization protocols, namely how to encourage the development, diffusion, and deployment of alternative energy and energy-efficiency innovations in the developing world.

According to classic economic theory, market forces provide insufficient incentives for investment in the development of climate-friendly technologies. The cost of carbon emissions associated with the production of goods is not normally included in their price, so neither firms nor consumers have any incentive to reduce emissions. Technologies with benefits that are immediately apparent to the consumer are exceptions: for example, when people switch to more fuel-efficient cars, they can cut their gasoline costs, although they are not rewarded monetarily for the emissions-saving benefits of their actions, David Popp opines.

With mounting concerns over climate change, both national climate policies and international efforts to combat climate change have begun to provide incentives for climate-friendly innovation in developed countries, addressing the lack of a market for emissions-saving innovation. As a result, he says, patent activity for renewable energy technologies has increased dramatically in recent years. Similarly, the prospect of increased energy prices under carbon taxation or emissions-trading schemes spurs innovation in both energy efficiency and alternative-energy sources.

The new emissions-reduction technologies, such as wind energy and hybrid vehicles are available for adoption, the challenge becomes one of technology transfer. Technology transfer may be "embodied," as when high-tech equipment is physically transported to another country through international trade, or "disembodied", involving the flow of know-how or experience via demonstration projects or training of local staff. This is more likely when a multinational firm licenses its technology to a locally owned firm than when a firm retains control of its technology through foreign direct investment.

When a new technology is introduced, some of the knowledge embodied in the invention becomes public, inspiring further innovations from which the inventor does not benefit. David Popp says such "spillovers" are even more likely in the case of disembodied technology transfer. Because firms cannot be fully compensated for these knowledge spillovers, firms will provide less than optimal levels of climate-friendly R&D, even if policies to correct the environmental externalities of emissions, like carbon taxes, are in place.

While spillovers are an issue for technology transfer in every sector, he says the incentives for developing countries to adopt climate-friendly technology also depend on the nature of the technology and the extent to which environmental externalities are corrected by environmental policy. While some technologies will spread even without climate policy, others need the incentives provided by policy to encourage adoption.

The author says, considering environmental policy, countries must weigh the benefits of a cleaner environment against the costs of complying with the regulation. Technological advances can lower the cost of compliance, making regulation more likely. This suggests that advances in technology within developing countries can shorten the time by which they will agree to binding emissions reductions.

While often frowned upon by environmental advocates, globalization – defined as the opening up of economies to international competition – can help move green technologies to developing countries. These countries gain access to the technologies of the world's leading economies through international trade and foreign investments. Once the technologies have lowered abatement costs, developing countries will be more willing to adopt environmental regulations.

Technology and policy play a dual role. Stronger environmental policies stimulate new green technologies. At the same time, better technologies make it easier to regulate. While climate policy negotiators fret over non-participation by developing countries, the pattern is the same as for other environmental regulations. Developed countries have traditionally acted first, and the resulting technological innovations have made it

easier for developing countries to adopt regulations at a later date.

Another frequently discussed option for increasing the spread of clean technologies is relaxing intellectual property protections. Intellectual property rights (IPRs), such as patents, reward inventors for the fixed costs of innovation. Patents provide inventors with a temporary monopoly, lasting 20 years from the initial application date, in return for disclosing information on the innovation in the patent document, which becomes part of the public record. By granting this monopoly, which enables patent holders to charge higher prices, IPR help mitigate potential losses from knowledge spillovers and encourage innovation.

Although technology transfer may be slower when IPRs are in place, it's not safe to assume that the level of innovation would be the same if it was not available. While little work has been done on the effect of IPR on technology transfer of clean energy technologies, the few studies that exist suggest that the high costs of renewables are due more to their immaturity, rather than the existence of IPR.

In related studies within the health sector, current research finds that lack of income, national regulatory requirements, and insufficient international aid are the main barriers to the spread of AIDS treatments in Africa, rather than IPR. Similarly, with climate-friendly technologies, one would expect demand (or the lack thereof) for clean technologies to be a primary constraint on international technology transfer. Focusing efforts on policies that increase this demand is likely to be more effective than enacting restrictions on intellectual property protection for clean technologies.

Transfer of Technology by UNCTAD, Series on Issues in International Investment Agreements, New York, 2001.

THIS paper discusses the issue of technology transfer in the context of international investment agreements (IIAs). It is an issue that has generated debate for many years. Given the centrality of technology to development, and the necessity of technology acquisition by developing countries as a means of furthering development, it is desirable that such countries should be able to benefit from the generation, transfer and diffusion of the best available technology. Unfortunately, this has not always been the case. In particular, the fact that most of the world's advanced technology is generated privately by transnational corporations (TNCs), whose principal research and development (R&D) activity is located in developed countries, creates an asymmetry between technology possession and the location of technological need. The result is a gap between the technology developed and owned by firms in developed countries and that which can be obtained and utilized by developing countries. This reality has generated numerous policy responses. In particular, policies for the encouragement of technology transfer have evolved over the years and have been the subject of provisions in IIAs.

This paper places such policies in a wider context, divided into four sections. As shown in Section I, the encouragement of technology transfer cannot be seen in isolation; it is a policy that is closely related to the broader treatment of proprietary knowledge through intellectual property laws; to the structure of the market, and the conduct of transactions, which may impact on the competitive process in relation to the generation, transfer and dissemination of technology; and to host country measures designed to control the process of technology generation, transfer and diffusion through performance requirements.

In the light of the above, two broad policy approaches to technology issues are identified in Section II. One is a regulatory approach, which, though preserving the essential characteristics of intellectual property rights, seeks to intervene in the market for technology so as to rectify perceived inequalities in that market as between the technology owner and the technology recipient. The latter is seen as the weaker bargaining party. This can be remedied through regulatory intervention in technology transfer transactions, through, for example, the outlawing of provisions in technology transfer transactions that may be seen unduly to favour the technology owner. Coupled with such policies may be a discretion on the part of the receiving country to impose performance requirements on the technology owner as a

condition for the transfer transaction to take place. Such policies have, in the past, been adopted by developing host countries and have informed the content of a number of international instruments. These are surveyed in Section II.

A contrasting approach sees the transfer of technology as being best undertaken in a market-based environment. Thus the emphasis is not on regulation or intervention in the technology transfer process, but more on the creation of conditions for a free market transfer of technology. The principal features of this approach are a reliance on the protection of private rights to technology based on intellectual property laws; the absence of direct intervention in the content or conduct of technology transfer transactions, save where these violate principles of competition law by reason of their market-distorting effects and/or by their use of unreasonable restrictive trade practices; and by the prohibition, or highly proscribed use, of technology-related performance requirements. More recent IIAs display such an approach and are also covered in Section II.

Section III considers the interaction of technology transfer issues with other issues covered by IIAs. In particular, there is strong interaction between technology transfer and scope and definition questions, admission and establishment, the most-favoured-nation standard, national treatment and fair and equitable treatment, taxation, environment, host country operational measures, funds transfer and competition.

Section IV concludes by outlining seven possible options concerning the role to be played by provisions on technology in IIAs. These are considered in the light of the market for technology and the position of developing countries therein. The seven options are: no coverage of technology issues; limited coverage of technology issues: control over technology-related performance requirements; limited coverage of technology issues: permissible technology transfer requirements; wide "regulated" coverage of technology issues; wide "market-based" coverage of technology issues; a "hybrid" approach; and the regional industrial policy approach.

Technology Exports from India: An Overview, *Foreign Trade Review*, January-March 2010, IIFT, New Delhi.

THIS paper is adapted from the IIFT-DSIR publication *Compendium on Technology Exports, 2009*. Compilation, analysis and dissemination of information about India's capabilities in technology intensive exports including sources of such exports, is important for enhancing awareness among the prospective importers, industry & trade, policy-makers, R&D and academics, consultants, etc.

As per international technology indicators, world merchandise exports in dollar terms rose by 16.29 per cent to US$15.78 trillion in 2008 from US$13.57 trillion in 2007. Similarly, world exports in commercial services rose by 14.42 per cent to US$3.73 trillion in 2008 from US$3.26 trillion in 2007.

India's merchandise exports valued at US$169 billion in 2008-09, showing an increase of 3.68 per cent over US$163 billion in 2007-08. Country's share in world merchandise exports remaining unchanged at 1.0 per cent between 2005 and 2006, reached 1.1 per cent in 2008.

India's commercial services exports comprising travel, transportation, insurance, software and other commercial services, rose by 12.32 per cent to US$101.2 billion in 2008-09 from US$90.1 billion in 2007-08, having a share of 2.7 per cent in world export of commercial services.

As per the *Global Competitiveness Report 2009-10*, India has improved on its GCI position by one rank to the 49th slot from 50th in 2008-09. Among BRIC countries, China has the best ranking at 29th place. Brazil occupied the 56th slot, and Russia came in at 63rd.

India's competitive performance continues to exhibit a rather reversed development pattern. It precedes many advanced economies in terms of business sophistication and innovation capacity. India also boasts of bustling financial markets and a sound banking sector, supported by well-functioning institutions, World Economic Forum (WEF) said.

In terms of well-functioning institutions, India is at the 54th place while at 16th and 25th spots in terms of bustling financial markets and a sound banking sector supported by a vast domestic market was at 4th slot.

On the other hand, the WEF Report noted that India underperforms in some of the basic determinants of competitiveness, in particular infrastructure, health and primary education. In addition, penetration rates for mobile telephony (116th), the Internet (104th) and personal computers (96th) remain among the lowest in the world, while inefficiencies in the labour market (83rd) prevent an optimal allocation of human capital. Improvement in these areas would place India on a stronger growth trajectory going into the future.

Expenditure on research and development (R&D) is a key indicator of government and private sector efforts to obtain competitive advantage in science and technology. Evidently, R&D comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including of man, culture and society, and the use of this stock of knowledge to devise new applications.

Liberalization of economies, breaking of barriers, movement from suppliers of material parts to suppliers of intellectual inputs, and aggressive investments in science and technology capacity by both government and industry have all contributed to a major shift in the global R&D picture. In addition, industrial support of R&D has been relatively stable, growing steadily as the tie-in between technical advances and profitability and economic growth became more evident. Industrial investment in R&D — quite often prompted by the spin-off benefits that arose from government-sponsored efforts — helped to strengthen companies, expand markets, and support networks of internal and external research capacity. The overall R&D activities have been changing rapidly over the last one decade.

The past few years have witnessed rather considerable growth in the amount of R&D that has been funded by US companies but performed in other countries, mostly in China and India. The rapid growth of R&D activities in these two countries, in addition to accelerated programmes in South Korea, Singapore, and other Asian countries, have resulted in a negative balance of trade.

In a recent Booz report on the flow of R&D investments between countries *(Beyond Borders: The Global Innovation 1000)*, the authors note that "a number of countries have significant two-way flows of inward and outward investment. The US is the greatest example of this; among the 184 companies subset, US companies invested US$80.1 billion in overseas R&D, while US$42.6 billion was invested in the US by overseas firms. In fact, about 40 per cent of the R&D in the US comes from firms headquartered outside the country.

Several new initiatives have been taken or proposed to be taken to promote and strengthen S&T capabilities and outputs in India. These include technology venture capital funds, public-private partnerships, centres of excellence for higher studies, improving quality of education and developing human resources in S&T, forging foreign alliances and partnerships, modernizing and expanding Indian Patent office, sectoral R&D and testing facilities in areas such as automotives, food processing, textiles, pharma, etc. Innovation and R&D in industry is also being encouraged and special attention is being given to medium and small enterprises.

India has been ranked 76th in global enabling trade index (ETI) reflecting a mixed performance on four pillars, i.e. Market Access, Border Administration, Transport & Communication Infrastructure and Business Environment. Consequently, India is ranked 116th in market access among the 121 countries surveyed in the *Global Enabling Trade Report 2009* with tariff barriers representing more serious impediments than non-tariff barriers. Trade-related transport infrastructure and the relevant services are equally well developed in India, ranking it 64th among nations. The country is well connected through maritime routes although it is developing more airports and high quality roads. On Business environment, India ranks at 53rd.

World's high technology exports increased from US$1,149 billion in 2002 to US$1,419 billion in 2006, registering an increase of 23.50 per cent. The percentage share of high technology exports in manufactured exports also remained at 20.4 per cent during the same period.

In 2006, China with US$271 billion was the leading country, followed by the US (US$219 bn), Germany (US$155 bn), Japan (US$127 bn), Singapore (US$124 bn) and the UK (US$115 bn). But two countries, namely Philippines, and Malaysia had much more percentage share in manufactured exports, i.e. 68 and 54 per cent in comparison to other countries in 2006. The Philippines' export of

high technology products was valued at US$28 billion, and Malaysia's at US$63 billion.

India's exports of high technology products increased from US$1,788 million in 2002 to US$3,511 million in 2006, registering an increase of 96.36 per cent. Its average percentage in manufactured exports remained at 5. Comparatively, China has emerged as the leading country for export of high technology products. Although as per percentage share in manufactured exports, it remained fifth at 30 per cent in comparison to select Asian economies. The Philippines (68%), Singapore (58%), Malaysia (54%) were the other Asian economies. These data clearly show that India needs to raise its share of high technology exports in manufactured exports from about 5 per cent towards the world level of 20 per cent though some of the Asian countries have a level of more than 50 per cent.

Sustainability-oriented Innovation Systems: Towards Decoupling Economic Growth from Environment Pressures? by Andreas Stamm, Eva Dantas, Doris Fischer, Sunayana Ganguly, Britta Rennkamp, DIE Research Project "Sustainable Solutions through Research", www.die-gdi.de, November 2009.

THIS paper sketches a research agenda linking innovation system research, environmental sustainability research, and development research. It argues that to reconcile various development goals, ways have to be found to effectively decouple economic growth from environmental pressure, in ways that allow for high value addition and welfare creation, while at the same time minimizing the impact on the resource base and sink capacities of the environment.

Technology transfer plays an important role in innovation-driven decoupling efforts. This instrument must be embedded in more comprehensive strategies. These will have to involve efforts to strengthen technological capabilities in the anchor countries as well as joint R&D efforts between industrialized and developing countries. Following are the three main factors that explain why technology transfer is only part of the solution:

- *First*, technology transfer can only be effective where a reasonable degree of technological capability is already in place.
- *Second*, a number of technologies crucial for an effective decoupling are still not ready to be rolled out on a large scale.
- *Third*, anchor countries are less and less willing to accept traditional modes of transfer that imply continued dependence on international technology providers.

For developing countries with restricted public budgets, the authors suggest that market-creating policies appear to be of special significance, as they do not necessarily call for increased government spending or lower revenues. Public procurement is an opportunity to increase the diversity of technologies available and give cleaner technologies the opportunity to mature through learning-by-doing and learning-by-interacting (strategic niche management). Other options discussed to create markets for environmental technologies include: awarding prizes for high-performance sustainable solutions and setting long-term, outcome-based targets or obligations for cleaner technologies to gain a certain share of the market.

Patterns of technological expertise in anchor countries, including Brazil, China, India and South Africa, have in the past sought to spur high-technology development on the basis of large government-sponsored programmes, often organized in the form of technology missions. This implies that the technological knowledge base should be greater in these countries than in other parts of the developing world. Anecdotal evidence indicates that this may be relevant for sustainability-oriented technology fields like wind energy or hydrogen technology.

One research task lying ahead is to gain a deeper understanding of the role of past or ongoing technology missions for today's knowledge landscapes in anchor countries:

- How significant (in terms of capabilities and capacities) is the technological knowledge built up through these policies?
- What has happened with embodied and disembodied knowledge in cases where technology missions have been discontinued or political ruptures have occurred?
- To what extent are knowledge clusters contributing to the formation or strengthening

of Sustainability Oriented Innovation Systems (SoIS) in the anchor countries?

- Can they be made functional through policy intervention?

On building technological capabilities under conditions of globalization, the authors say that early industrialization in today's most advanced countries and the related build-up of technological expertise was accompanied by rather strong government intervention, including tariff protection for domestic markets. Today's catching-up processes are taking place under conditions of a regulated globalization, and this implies a different and narrowed scope for policy making. Some aspects have clearly to be seen as disadvantages for current technological catching-up processes:

- Local efforts geared to technological upgrading and innovation encounter fierce competition in global markets, affecting international as well as local markets.
- Market liberalization today restricts policies designed for selective infant industry protection or market reservation.
- International regulations affect the ways in which technological knowledge can be accessed, e.g. stricter Intellectual Property Rights (IPR) protection regimes severely restrict options for reverse engineering.
- Instruments of industrial policy, common in many countries in the past, have today largely been ruled out, including measures designed to link local companies to FDI on the basis of local content requirements.

On the other hand, globalization is also opening up new opportunities for catching-up countries, which were available for early movers. Technology development and innovation can fall back on huge stocks of available information and knowledge, partly in the public domain and accessible through Information and Communication Technology/ Technologies (ICT). Technology corporations are increasingly relocating knowledge-intensive activities to some developing countries.

Organizations and companies in developing countries have the opportunity to use global research networks to access international know-how and merge it with local knowledge. Developing countries can learn from the OECD countries regarding effective innovation policies and efforts to abbreviate learning processes and minimize the risks of costly policy failures.

The research group at the DIE is looking forward to receiving comments on the paper and is very interested in linking up with researchers and research groups working in the same or related fields.

Technology – A Driving Force for Global Trade by Madanlal, Ajay Chauhan, Pravin Jadhav and Deepak Bhatnagar, *Perspectives on Business Vision 2020*, Acharya's Bangalore B-School, 2010.

THIS paper attempts to focus on trade and technology as a driving force for global trade and its vision for the 2020. Global trade is integral to the process of globalization. Trade and globalization have given myriad opportunities to many countries. Trade has allowed countries to benefit from specialization and economies of scale to produce at a more efficient scale. New technology has raised productivity, supported the spread of knowledge, and enriched the range of choices available to consumers. Export capabilities are obviously reflections of technological capabilities, competitiveness and business growth. R&D, innovation and technology are becoming increasingly critical for growth, exports and competitiveness of firms in a globalizing economy like India. Corporate, small and medium enterprises are continuously emphasizing on innovation and technology capabilities building through in-house R&D efforts, networking with external organizations, foreign direct investment and technology transfer, etc.

The authors observe that firm level technological capacities strengthened through absorption and upgradation of acquired foreign technologies and internal business innovations seemed to have positively influenced the competitiveness and business growth of Indian firms. The R&D expenditures in industry have considerably increased in several sectors over the last five years, and so have exports. R&D has been more of applied and incremental in nature.

The research studies tend to show increasing realization in industry to leverage technology and innovation for business growth at firm levels as reflected in the growth of exports of technology based

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DOCUMENTS

Report (2010) of the Working Group on Trade and Transfer of Technology to the General Council

I. Introduction

1. At the Fourth Ministerial Conference in Doha in November 2001 Minister agreed to "an examination, in a Working Group under the auspices of the General Council, of the relationship between trade and transfer of technology, and of any possible recommendations on steps that might be taken within the mandate of the WTO to increase flows of technology to developing countries".[1] Paragraph 43 of the Hong Kong Ministerial Declaration of 18 December 2005 reaffirmed the Ministers' commitment to advance the work of the Working Group.

2. Since the November 2009 Report of the Working Group on Trade and Transfer of Technology to the General Council, the Working Group has held four sessions during 2010. The reports of the meetings are contained in documents WT/WGTTT/M/31-34.[2] As in previous years, at these meetings, Members continued the analysis of the relationship between trade and transfer of technology, as well as considered any possible recommendations on steps that might be taken within the mandate of the WTO to increases flows of technology to developing countries. At its 34th Session the Working Group adopted its Annual Report to the General Council.

3. At the 32nd Session of the Working Group, the Chairman briefed the Working Group on his informal consultations with Members on ways/ approaches that could help make progress in the work of the Working Group. The Chairman informed the Members that a number of ideas were discussed in those consultations. Some Members felt that the Working Group should now focus on the result-oriented part of the mandate. Other Members felt that the work in the Working Group had not yet reached a point where they could have a complete comprehension of the relationship between trade and transfer of technology.

II. Relationship between Trade and Transfer of Technology

4. During the year 2010, Members continued their analysis of the relationship between trade and transfer of technology largely on the basis of two presentations - the first entitled "The linkage between technology transfer and productivity gains in agriculture'' was made by the Food and Agriculture Organization (FAO) at the 30th Session, and the second by UNCTAD, was based on their report entitled "Technology and Innovation Report 2010: Enhancing food security in Africa through science, technology and innovation" at the 32nd Session of the Working Group. In addition, under this agenda item Switzerland provided briefings and regular updates on the Lausanne Group Initiative - a private initiative that the École Polytechnique Fédéral de Lausanne (EPFL), in collaboration with SMEs and other actors in the field of innovation and technology generation, had taken with a view to filling the gap between Swiss technology holder SMEs and firms in the LDCs and the developing countries.

5. At the 31st Session of the Working Group, Members continued with their discussion of the FAO's presentation on "The linkage between technology transfer and productivity gains in

agriculture''. The presentation highlighted the important role technology had played in increasing crop yields of a number of selected crops in developing countries, including wheat, maize, rice (paddy), sorghum and cassava during the period 1965-2000. It found that the Green Revolution had helped increase per capita food availability by over 18 per cent. That had improved the livelihood of several million farmers and had helped increase crop yields on fixed-land areas. The presentation also noted that despite these positive changes, one out of every six people in the world still went hungry daily. The food crises in the recent past and the current economic downturn had only served to exacerbate this situation. It further noted that not all countries had benefited from the Green Revolution and that, in many instances, the natural resource base had been negatively affected. The presentation also underlined the need for substantially improving crop yields through improved technology in view of the future growth in food demand which was expected to increase by 70 per cent.

6. In the discussion that followed, Members highlighted the fact that technology advancement was at the centre of globalization and economic interdependence and that its transfer could play a crucial role in developing countries' efforts to enhance their trade opportunities and realize growth and development aspirations. Constantly changing market demands with consumers requiring high product and service standards could become prohibitive and thus deny market access to products originating from countries that did not meet such requirements. It was, therefore, necessary that countries kept pace with technological advancement and innovations so as to meet those new market requirements. In that context, some Members felt that effective transfer of technology was critical to the growth and development of developing and least-developed countries. References were also made to the need for common but differentiated responsibilities within the context of the climate change debate and the need to find appropriate solutions to the technological challenge faced by developing countries and LDCs if they were to play a critical role in combating environmental degradation and the effects of climate change.

7. Members also felt that the presentation by several international organizations, including the FAO, had highlighted the positive linkage between technology transfer and gains in trade and productivity. Members, therefore, requested the continuation of such presentations by Members and other international organizations, including if possible, the World Intellectual Property Organization (WIPO), UNCTAD and, in particular, the United Nations Environmental Programme (UNEP) as most of the Multilateral Environmental Agreements (MEAs) contained elaborate technology-transfer provisions.

8. Underscoring the usefulness of country-specific presentations on national experience with technological advancement, some Members also stated that the dramatic transformation of some countries in Asia, particularly in East and South-East Asia, that had climbed a steep industrialization curve in a very short span of time, could provide good lessons for developing countries to emulate. They felt that such experience-sharing would not only enrich discussions in the Working Group but would also provide useful lessons which could allow the developing countries to make more informed choices.

9. In the course of discussions, Pakistan shared its experience as a beneficiary of the Green Revolution and stated that the Green Revolution had had a positive impact on crop yields such as rice, maize and wheat. Between the period of 1967-77, Pakistan's production had increased from 4 million tonnes to 9 million tonnes and had, at present, reached 23 million tonnes. More than a 100 per cent increase in one decade and a 400 per cent increase in four decades was a result of active collaboration with international research organizations like the Consultative Group on International Agriculture Research (CGIAR) and effective bilateral cooperation with USAID which ensured, among others, the availability of plant nutrients (fertilizer). The research breakthrough in wheat crop yield was the development of so-called, short-straw varieties. The international flow of germ-plasm through CGIAR had played a crucial role in spreading the benefits of the Green Revolution. Despite those productivity gains, gaps still existed between the per-hectare yield of a progressive farmer (60 monds per hectare) and the average yield (27 monds per hectare) of wheat in Pakistan. Notwithstanding

these achievements, challenges remained for policy makers in Pakistan in ensuring availability of plant nutrients, quality seed, mechanization of farms and in bridging the gap between progressive farmer and average yield.

10. In highlighting its Government's efforts in building capacity in developing countries to conduct and apply agricultural research through training and exchange programmes for scientists and educators, the United States particularly mentioned the US Department of Agriculture's (USDA) "cold chain" programme, which provided technical assistance to emerging economies in building their capacity to move perishable agricultural products from farm to consumers, and maintaining safety and quality of these products by temperature control. In addition, the USDA programme also aimed at fostering public-private partnerships in these countries by providing technical assistance in designing and implementing a supportive regulatory environment for the cold chain infrastructure.

11. A short briefing was made by Switzerland on the salient features of the Lausanne Group Initiative, a private initiative that the École Polytechnique Fédérale de Lausanne (EPFL) had taken on innovation and technology generation. The project aimed at building and maintaining a small group of competences in which people would meet to develop new methodology and operational procedures to be made available to governments and other stakeholders. The project aimed to involve four key types of competences to address the technology-related issues: (i) practitioners of technology and its transfer; (ii) academics; (iii) related federal agencies; and (iv) networks/ associations of firms. The initiative was timely as increasing obligations were anticipated for developed countries to perform technology transfer towards developing countries and the LDCs in the: (a) post-Copenhagen period in the field of climate change; (b) global health area as envisaged in the World Health Organization Guidelines; and (c) fields and sectors like water, food and urban development as new global crises continued to emerge.

12. It was mentioned that the Lausanne Group had realized that an underutilized extraordinary competence and potential existed in Switzerland. It could be realized at "low costs" to contribute to global technological advancement. Small and Medium Enterprises (SMEs) that were specialized in developing technological solutions could be encouraged to modify and transfer technology at low costs and yet allow for a margin of profit. In order for the technology to meet real entrepreneurial needs and initiatives in the LDCs, support was needed to adjust and configure technology with the host-country environment. The fundamental goal of the Lausanne Group was to finalize an operational methodology to help governments fulfil their technology-transfer obligations which would be amplified in the near future in an effective and efficient way for the mutual benefits of the SMEs in the North as well as the local economies in the South.

13. Members welcomed the briefing by Switzerland and expressed their desire to have a more detailed presentation on the Lausanne Group Initiative at the future meetings of the Working Group.

14. At the 32nd Session of the Working Group, before taking up the regular agenda for the meeting, the Chairman briefed the Working Group on his informal consultations that he had had with Members in order to solicit views on ways/ approaches that could help make progress in the work of the Working Group. He informed Members that in the invitation fax, dated 8 July 2010, he had requested interested delegations to meet him and provide guidance on how they wished to structure the work of the Working Group so as to achieve meaningful progress. The EU, Japan, Canada, US, Brazil, China, India, Indonesia, Pakistan and the Philippines, expressed interest and attended those one-on-one consultations.

15. The Chairman informed the Members that a number of ideas were discussed in those consultations including the importance of South-South cooperation in technology transfer, importance of country/national presentations in highlighting experience with technology generation, innovation and its transfer, and the role of incentives for technology transfer-initiatives. Some Members felt that the Working Group had done enough work in exploring the relationship between trade and transfer of technology and that it should now focus on the result-oriented part of the mandate, i.e. the recommendations on possible steps

that might be taken within the mandate of the WTO to increase flows of technology to developing countries. Other Members felt that the work in the Working Group had not yet reached a point where they could have a complete comprehension of the relationship between trade and transfer of technology. They insisted on the need for an organic link between the analysis part of the mandate and subsequent recommendations.

16. In those consultations, the Chairman informed the Working Group, that he had suggested that Members make national presentations to enrich the discussions in the Working Group as it would be instrumental in enhancing understanding of the linkage between trade and transfer of technology. The Chairman stated that he hoped to continue with his informal consultations with Members with the objective of ensuring meaningful progress in the work of the Working Group.

17. A presentation by UNCTAD based on its report: "Technology and Innovation Report 2010: Enhancing food security in Africa through science, technology and innovation" generated a useful discussion. The UNCTAD report focused on the challenges of improving agricultural performance in Africa and the role that technology transfer and innovation had played in raising agricultural production and incomes of all farmers, including small-scale farms. In raising key issues relating to the development of African agriculture farming and post-harvesting techniques, the report argued that the main challenge facing the agriculture sector in Africa was to strengthen the innovation capabilities of African agricultural systems as a means of addressing poverty, improving food security and achieving broader economic growth and development. The report also highlighted the need for building innovation capabilities, national food security, transfer and diffusion of agricultural technology, the technology mixes for small-scale farming and the need to adapt existing technologies to the local environment in ways that would enhance productivity and lower costs. In that context, the report also underscored the importance of enabling environment, knowledge through learning, research or experience and the need for acquiring certain technological capabilities so that they could be applied in the production of products across sectors, including agriculture.

18. While making some specific recommendations, the UNCTAD presentation, among others, underscored the need for strengthening the policy-making capacities, the importance of targeting agricultural investment, reinforcement of agricultural innovation systems, capacity building and building linkages between national, regional and international research as well as revitalizing funding for Research and Development (R&D). In addition, it pointed towards the need for reinforcing international cooperation in the areas of R&D, technology and innovation.

19. In the discussion that ensued thereafter, Members found that in providing a specific regional and sectoral perspective, the UNCTAD presentation helped to facilitate a better understanding of the significance of innovation and technology in addressing some of the challenges related to productivity and post-harvest issues in the agriculture sector. Members also felt that the presentation shed light on the central role of the state in creating an enabling environment as well as on the importance of adapting models to national and local needs. In highlighting various facets of the technology transfer process as a whole, the report was seen as an important contribution to the discussions in the Working Group. Some Members stressed on the need for exploring international cooperation and multilateral solutions to technology transfer and invited UNCTAD to examine that aspect in its future studies.

20. In addition, Switzerland provided an update on the Lausanne Group Initiative on innovation and technology generation by the EPFL and the Swiss SMEs. Switzerland stated that the Lausanne Group had set itself the objective of developing a methodology and operational procedures to facilitate the exchange of technology between private companies in the developed countries and their counterparts in the LDCs. It had often been experienced that the SMEs in the least-developed world found it difficult to find a foreign partner to provide the needed technology. Consequently, one of the main areas of work for the Lausanne Group was to bring together the SMEs that needed technology with those Swiss SMEs that could provide the same. It was also stated that the Group was also working on how to help both sides to overcome the obstacles of the pre-commercial phase

in order to be able to organize the cooperation as efficiently as possible. In that context, the Lausanne Group perceived a very active role of specialized entities such as the business associations. The Working Group was also informed that the Lausanne Group had agreed, as a next step, to focus on the operationalization of the methodology and on the analysis and illustration of concrete cases in which the transfer process had functioned well. Switzerland offered to keep the Working Group informed of future developments in the work of the Lausanne Group.

21. At the 33rd Session of the Working Group, Members continued with their discussions on UNCTAD's presentations made at the previous meeting. The discussion emphasized the importance of focusing on the full range of issues that affect agricultural development, from increasing agricultural productivity in the field to supporting good governance and policy reform in capitals. Some Members felt that it would be useful to learn more about developing countries' strategies for improving their absorptive capacity, attracting, developing and disseminating technology. They saw great value in exchanging information and sharing experiences on innovation and technology development as lessons could be learnt from the real-life experiences. Members felt that such an exercise would prove useful to help move forward the work in the Working Group. It would also contribute to a better identification of the areas where trade plays a critical role in technology transfer, and would also help highlight the role technology has played in enhancing trade and ultimately impacting on growth and development.

22. Members expressed their disappointment with the OECD's inability to make a presentation at the meeting of the Working Group. Highlighting the usefulness of past presentations by Members and international organizations including UNCTAD, UNDP, the World Bank, and the FAO on the technology transfer work they have been undertaking, Members noted that experience sharing on those issues would be very useful, and in fact essential, to the work in the Working Group. Members felt the need to continue to have presentations on national experiences with technology-transfer programmes, since such presentations were useful in encouraging technology transfer. Some Members repeated their earlier request that those Members which had undergone rapid industrialization in the last few decades might be asked to share their experiences. They also cautioned that if the work of transfer of technology was not taken seriously, the divide between technology haves and have-nots would further widen. Accordingly, Members requested the Chair to continue encouraging Members and other international organizations, such as the WIPO and others to share their experiences and work on innovation and technology with the Working Group. Without a better understanding on what mechanisms and tools already existed, it would be difficult to envision how Members' understanding of the technology-transfer process and, therefore, the work in the Working group could proceed effectively.

23. With respect to WIPO, it was stated that WIPO was proceeding with several proposals to improve information and coordination on technical assistance, including an "IP Technical Assistance Database" (IP-TAD) and an "IP Development Matchmaking Database" (IP-DMD) which could serve a technology transfer purpose. Accordingly, Members agreed to invite WIPO to share its work in the area of technology transfer at one of the future meetings of the Working Group.

24. Some Members felt that since most of the Multilateral Environment Agreements had fairly detailed provisions on technology transfer, it could be educative to invite UNEP to share its experiences in this area with the Working Group. One Member, however, sought additional clarification on what precisely Members had in mind with respect to the invitation to UNEP and the value addition of such a presentation.

25. Members also requested the UNCTAD representative, present at the meeting, to consider sharing UNCTAD's work on the role of South-South cooperation in technology transfer. Some Members further requested UNCTAD to prepare a paper on policy guidelines for technology transfer and the kind of incentives provided by the developed countries to their firms to encourage technology transfer to developing countries and the LDCs.

26. In providing an update on the Lausanne Group Initiative, Switzerland stated that the "Group"

sought to identify best ways to overcome the mismatch between a private company's demand in LDCs and a private company's offer in developed countries, like for example Switzerland. In order to understand the mismatch and the needed remedies, the Lausanne Group had initiated a ''pilot case study'' with a Tanzanian company. In elaborating upon the details of the "pilot case study" on the use of waste wood from forestry operations, it was stated that the Tanzanian firm was looking for appropriate technology to process waste wood. The ''pilot case study'' would also demonstrate the importance of identifying potential issues related to innovation and technology transfer in the LDCs and the developing countries as well as building inter-linkages and supporting the whole process of knowledge exchange and know-how through an appropriate funding and coaching mechanism. The Working Group was informed that the results of the "pilot case study" were expected to be ready in the spring of 2011 and that, at that time, an update on its results could be provided to the Working Group.

III. Any Possible Recommendations on the Steps that might be Taken within the Mandate of the WTO to Increase Flows of Technology to Developing Countries

27. During 2010, under the standing agenda item on possible recommendations that the Working Group could make in the future, Members continued their discussion of an earlier submission by India, Pakistan and the Philippines entitled ''Facilitating Access to Information on Appropriate Technology Sourcing''.

28. At the 31st Session of the Working Group, while supporting the submission by India, Pakistan and the Philippines, some Members emphasized the importance of access and dissemination of information on appropriate technologies as the cornerstone of the transfer of technology process and its adaptation to suit national needs for the purposes of its effective application. They stressed that the Working Group should intensify its work towards finalizing appropriate recommendations that would increase flows of technology to developing countries. That, in their view, could be a significant contribution to the Doha Development Agenda. It was also felt that the promise of development through sharing and transferring the fruits of technology, could only be materialized through sustained international cooperation and the participation of the public and private sectors.

29. In addition, some Members reiterated their earlier request that the WTO develop a web-page on technology, its transfer requests and on specific technology needs and/or technology offers, as well as links to intellectual property clearing houses, etc. It was pointed out that similar web-pages had already been launched in the WTO in the past year on Regional Trade Agreements and on the Enhanced Integrated Framework. By doing so, the WTO could play an important role in promoting and disseminating information on technology transfer.

30. These Members also recalled that the Working Group had received, in 2003, contributions from other WTO bodies on their work pertaining to transfer of technology. Given that it had now been seven years since that reporting, they felt that the Working Group should receive updates from those Committees on their work on technology transfer.

31. These Members also requested the Secretariat to prepare a compilation of all transfer of technology-related provisions in the WTO Agreements and also compile an analysis of the impact of technology transfer to LDCs of Members' fulfilment of their obligations under Article 66.2 of the TRIPS Agreement with a view to better understanding the extent to which the transfer of technology to LDCs had actually contributed to an increase in their trade.

32. While cautioning against substituting the expertise other WTO bodies had built up over many years in the area of technology, some Members did not favour the proposal made on undertaking an impact assessment of technology-transfer activities under Article 66.2 of the TRIPS Agreement. They also wanted more time to examine the proposal concerning an update from other WTO bodies on their work on technology transfer. Those Members also reiterated their reservations about the creation of a WTO web-page on technology transfer on the grounds that the establishment of a WTO web-portal on technology transfer would raise a host of legal and commercial issues and that such a website

would be outside the core functions of the WTO as a "rule maker" on trade issues. These Members also requested clarification on how specifically the recent WTO websites related to RTAs and the EIF might be relevant to the question of trade and technology transfer.

33. At the 32nd Session of the Working Group, some Members felt that while the Working Group had been focussing for some time now on the relationship between trade and transfer of technology, it had yet to start looking at the issue of making any possible recommendations on steps that might be taken within the mandate of the WTO that could improve flows of technology to developing countries. The other opposing view was that, although a lot of useful analytical work had been done in the Working Group, it was far from complete and hence it would be premature to start looking at making any recommendations. During the course of discussion, some Members underscored the need for examining ways to improving international cooperation and finding multilateral solutions to problems facing technology transfer.

34. In addition, Members considered a draft compilation of provision relating to technology transfer in WTO Agreements that had been prepared by the Secretariat at the request of Members. The Chairman was asked by the Working Group to request other WTO bodies to provide an update on the work done by those bodies on technology and its transfer since they last reported in 2002.

35. At the 33rd Session of the Working Group, the Chairman reported to Members on the inputs received from other WTO bodies on their work on trade and transfer of technology. With the exception of four WTO bodies, all other bodies had reported that they had not done any substantive work in relation to trade and transfer of technology since their last reports in 2002. Only the Committee on Trade and Environment, the Committee on Sanitary and Phytosanitary Measures, the Committee on TRIMS and the Council for TRIPS had reported that some work on the issue of technology and its transfer had been undertaken. Most notably, the Council for TRIPS had reported on its continuous work on the ''Implementation of Article 66:2" of the TRIPS Agreement.

36. Commenting on the report by the Chairman, some Members said that the lack of appropriate attention by some WTO bodies to an important issue like technology transfer ran counter to the imperatives of development. It put an added responsibility on the shoulders of the Working Group to intensify its efforts in coming up with appropriate recommendations to facilitate technology transfer to developing countries. Other Members stated that the inputs clearly showed that the system was working as intended. Members raised issues in the WTO bodies where these were discussed and, where appropriate, actions are taken within the mandate of the relevant body. In addition, some Members also stated that the Secretariat's compilation on technology transfer provisions contained in WTO Agreements highlighted that such provisions were spread out horizontally across WTO Agreements. However, in their view, the focus of discussion in the WTO, in the context of technology transfer, had largely been on Article 66.2 of the Agreement on TRIPS. These Members felt that it would be interesting to understand how transfer of technology provisions were being implemented elsewhere in the WTO. On Article 66.2 of the TRIPS Agreement, some Members believed that while it was an obligation on developed country Members to report to TRIPS Council on their efforts on transfer of technology, it would also be useful to undertake an impact analysis of such transfer of technology activities. Accordingly, those Members requested the developed country Members to present an impact assessment on the extent to which transfer of technology to LDCs had actually contributed the increase in LDC's trade. Other Members felt that, in their view, such activities would be duplicative of the work done in other WTO bodies and in any case fall outside the mandate of the Working Group.

37. Members also considered a compilation of provisions relating to technology transfer in WTO Agreements that had been prepared by the Secretariat, on its own responsibility and without prejudice to the views of Members, at the request of Members. The Working Group agreed that the Secretariat would issue the compilation as a JOB document.[3]

IV. Future Work

38. Pursuant to the mandate contained in paragraph 37 of the Doha Ministerial Declaration, and subsequent affirmation, in paragraph 43, by Ministers in the Hong Kong Declaration, Members proceeded with the examination of the relationship between trade and transfer of technology and also continued consideration of any possible recommendations on steps that might be taken within the mandate of the WTO to increase flows of technology to developing countries. The discussions largely progressed on the basis of contributions by various intergovernmental organizations and covered a number of issues. Understandably, the analytical work undertaken thus far, contributed to enhancing Members' understanding of the complex nexus between trade and transfer of technology. Nonetheless the work on this issue is far from complete. A lot still remains to be done. In the coming months the work will continue on the basis of Members' submissions, contributions by international organizations and sharing of national experiences on innovation and technology generation and its transfer with the objective of fulfilling the Ministerial mandate.

REFERENCES

[1] Paragraph 37 of WT/MIN/(01)/DEC/1.

[2] The Minutes of 34th Session of the Working Group will be issued as WT/WGTTT/M/34 after the Working Group's meeting on 10 December 2010.

[3] JOB/DEV/10.

(www.wto.org WT/WGTTT/12, 13 December 2010)

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products and sales. However, to sustain this growth and move to higher value chain, the capacity to generate new technologies and innovations in select sectors, need to be enhanced through increased R&D expenditure a more conducive policy environment and more effecting supporting structures.

A key lesson which could be learnt from the findings of this survey on technology exports, undertaken by the authors at a national level in India for the last eight years or so clearly brings out a key imperative to shift the focus towards catalyzing technology led exports during the next decade. If India has to position itself as a leading exporter of technologies by 2020, the authors advocate that there is need to adopt pro-active mechanisms by which high-value, high-technology exports will take a lead over export of mere products or low technology items. This can only be achieved by sustained efforts to nurture innovation and bringing new technology in all sectors of the economy.

The authors say that trade leads to the spread of international technology for three major reasons. *First*, technologically more sophisticated intermediate goods become available for production. *Secondly*, the technological specifications of intermediate and final goods developed abroad can be studied and the intrinsic knowledge can be acquired. *Thirdly*, trade favours person-to-person communication as an important vehicle of knowledge transfer.

Studies that focus on international knowledge spillovers find that knowledge developed in one country has positive effects on other countries through trade. However, countries have different abilities to absorb technology developed elsewhere. These have emphasized several factors determining technology is successfully absorbed across countries. These factors are associated with the idea that a country needs to have certain types of skills (e.g. human capital) and institutions in order to be able to adopt foreign technological knowledge.

Evidently, a wide range of policies can be used to foster technological progress at the national level. Thus the international organizations can play a role in facilitating international technology transfer. Policies to improve a country's ability to adopt technological innovations must be targeted at its educational system as well as its business and regulatory environment, the authors opine.

One particular problem related to the transfer of technology is that innovations produced in advanced economies may not respond to the needs of developing countries. Such a mismatch may result from insufficient rights protection. This suggests a role for international organization in promoting international technology diffusion through adequate property rights enforcement. Other areas where international organization can help include the coordination of development aid to build infrastructure and human capital. ●

SELECT PUBLICATIONS

PUBLICATIONS

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