WTO and IPR: Implications for R&D Management*

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The World Trade Organization (WTO) and the associated agreements, which guide its role and functions, have put in place a framework for international initiatives which in the long run aim at free trade and removal of trade barriers. The agreements on trade-related aspects of intellectual property, trade in services, subsidies and countervailing measures, technical barriers to trade, and dispute settlement are of particular concern to R&D. The management of R&D would need to understand the issues in implementing these agreements and evolve a considered response in dealing with them. The paper examines some of these issues and considers their implications for R&D management.

In 1944, in Bretton Woods, New Hampshire, USA, an agreement was concluded between Britain and the USA that was designed to lay the groundwork for a co-operative international economic environment following the War. The Bretton Woods Agreement envisaged the creation of three key new international institutions: the International Monetary Fund (IMF), the International Bank for Reconstruction and Development, commonly referred to as the World Bank, and the International Trade Organization (ITO). The mandate of ITO was to oversee the negotiation and administration of a new multilateral, liberal world trading regime. While the IMF and World Bank were duly created, the ITO did not come into existence. Instead, a provisional agreement, was negotiated among some 23 major trading countries, i.e. the General Agreement on Tariffs and Trade (GATT) which became the institutional basis for the multilateral world trading regime. This arrangement continued till its transformation into World Trade Organization (WTO) on 1 January 1995.

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The agreement establishing the WTO envisaged a single institutional framework encompassing the GATT, as modified by the Uruguay Round, all agreements and arrangements concluded under GATT auspices, and the complete results of the Uruguay Round. Of these, the following agreements are important from the viewpoint of R&D policy and management:

- Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs), including Trade in Counterfeit Goods;
- General Agreement of Trade in Services (GATS);
- Agreement on Subsidies and Countervailing Measures;
- Agreement on Technical Barriers to Trade;
- Agreement on Dispute Settlement.

The present paper discusses the salient features and implications of these agreements for R&D and technological innovations.

Strengths in R&D determine the competitiveness of a country in the international trade. The increasing role of technology in the world trade underscores the importance of international trade regulations for R&D. The implications of trade agreements such as under WTO will primarily depend upon the share of a country in the global technological trade.

Table 1 gives the data on India's technology trade and share in the total world trade. Of the total world trade estimated to be of the order of US $8 trillion, the share of hi-tech products is around US $1.6 trillion. The total exports from India during 1995-96 were of Rs 1,06,464 crores, of which, only 6 - 8% were technology intensive exports. Purely technology related exports for India were estimated to be of a very low order of 0.15%. The task force on promoting exports of technology, set up by the Government of India in its report in 1997, envisaged a 2% share of global technology exports from India - a yet distant dream. In contrast technology based products and services total almost 20% of the national trade in USA.

Patenting activity is an important indicator of technological competitiveness of a country. The analysis of the trends in invention based on the patenting activity in India indicates that its domestic technological competitiveness is limited in comparison to

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<th>Table 1 - India's competitiveness in technology and trade</th>
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<tr>
<td>Total world trade</td>
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<td>Global trade in hi-tech products</td>
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<td>India's total exports during 1995-96</td>
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<td>Share of technology intensive exports</td>
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<td>Technology receipts in most developed Countries</td>
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foreign technology. Table 2 gives the data on the number of patent applications filed in India during 1986 to 1997. Of the total patents filed in India, the share of Indian patents in comparison to foreign patents showed an increase during 1991-92 and 1992-93 but later it declined suddenly in 1995-96. It indicates that the endogenous inventive activity has not been able to keep pace with the foreign technology. It is required to accelerate its efforts to keep up with the growing technological competition in the domestic market.

The analysis of data on the Indian patents in US indicates that the Indian inventive activity has continued to hold on to its strength in the areas of drugs and chemical technologies since 1970s. Indian strengths are limited to the areas of synthetic resins and chemical compositions, composite materials, adhesive bonding and hydrocarbon technologies. Recently, some other areas of technology other than chemicals also became important during 1990s, e.g. bioengineering, calculators, computers and data processing systems, information technology, electronics and optics. In terms of emerging areas of technology, there is a long way to go for the country to strengthen its technological base and carve out a niche in the international technology trade and market.

### Agreement on Trade-Related Aspects of Intellectual Property Rights

There is no conclusive evidence in favour of stronger world-wide protection of intellectual property. However, the choice—whether a country should follow stronger or weaker system of intellectual property protection—would depend upon assessment of its com-

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<th>Year</th>
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parative advantage in innovation or imitation. This would require a long-term assessment of one’s strategies for R&D, innovation and global competition.

The TRIPs Agreement was negotiated in the GATT mainly at the insistence of the US. The US had felt that its comparative advantage in a number of fields of industrial technology was being lost in the absence of adequate protection to intellectual property in other developed or developing countries. Accordingly, it pressed for stricter protection of intellectual property in other countries.

The Agreement represented a complex balance between conflicting national perspectives and interests with respect to the protection of intellectual property rights (IPR) and those in other areas. Most important are the key principles of National Treatment and Most-Favoured National Treatment (MFN) obligations with respect to IPR.

The principle of national treatment requires each Member to accord to the nationals of other Members treatment no less favourable than that it accords to its own nationals with regard to the protection of intellectual property. The MFN principle states that with regard to the protection of intellectual property, any advantage, favour, privilege or immunity granted by a Member to the nationals of any other country shall be accorded immediately and unconditionally to the nationals of all other Members.

The main elements of intellectual property in the TRIPs Agreement are:

- Copyright and related rights;
- Trademarks;
- Geographical indications;
- Industrial designs;
- Patents;
- Layout-designs (topographies) of integrated circuits;
- Protection of undisclosed information; and
- Control of anti-competitive practices in contractual licences.

Under TRIPS, the patentable subject matter covers inventions, whether products or processes, in all fields of technology. As such inventions of microorganisms *per se* are patentable. The plant varieties are to be protected either by patents or by an effective *sui generis* system or by any combination thereof. The exclusion from patentability may be given to inventions in certain cases, e.g. on the grounds of order public or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment.

The patent rights are enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced. The patent owner’s rights include prevention of the import of the patented products or products obtained directly from a patented process without the consent of the patent owner in addition to preventing the acts of making, using, offering for sale or selling such products. Other use without authorization of the right holder may be permitted, e.g. including use by the government or third parties authorized by the government under special conditions. The term of protection of a patent is to be 20 years counted from the filing date.
Implications

The meaning and scope of the implication of WTO and IPR policies for R&D may vary considerably from one place to another.

To an individual inventor or R&D unit in universities with limited financial resources or lack of proper backup support to facilitate patenting, it may mostly mean obtaining a patent or publish a paper. To others, for example, in organized R&D institutions like national R&D laboratories or in-house R&D laboratories in industry, it may mean the entire process of research from the original conception to the obtaining of patents. It may have quite another connotation to giant multinational corporations who may also be equally concerned with the process of management after the signing of a licence contract leading to transfer of technology and its commercialization.

In a broad sense, the policy and management of IPR covers the administration of all phases of management from the original concept of the invention to the final commercialization of the invention.

An important concern for R&D management is to strengthen the policies and operational systems for the management of R&D at the national, agency and the working scientist levels. The main thrust is to provide an enabling environment to national R&D efforts to protect the intellectual property, integrate IPR into R&D and business strategy, commercialize R&D, compete in the global technology market, acquire and absorb technology from abroad, and develop trade and investment opportunities for Indian business abroad.

In the context of management of intellectual property rights, specific measures may be required on the following aspects:

- strengthening awareness of basic concepts on IPR, timely recognition of patentability of research and taking steps for its protection,
- effectively utilizing patent information,
- establishing appropriate norms for sharing IPR in R&D collaborations,
- resolving issues concerning employer vs employee rights,
- protecting confidential R&D information and know-how,
- establishing norms for naming of inventors / co-inventors,
- establishing a good system of keeping records of research,
- commercially exploiting the patents and know-how, and
- providing adequate incentives to scientists.

Some of these aspects are elaborated below.

Patent Information

Patent documents contain a vast amount of technological information that is not available in other published literature. This information can be used in the state-of-the-art searches in different fields of science and technology and can be an important source for identifying new topics of research. In the absence of adequate knowledge about the patent information, most R&D or business organizations either waste their efforts in duplicating what has already been done or else lose competitive advantage. In India, the level of awareness about patents and utilizing patent information for R&D and business purposes is rather limited. Working scientists are required to be well-versed with the modern ways and means of utilizing pat-
ent information for their day-to-day R&D work.

**R&D Collaborations - Sharing IPR**

R&D collaborations can take either of the forms - contract research, grants or joint R&D projects.

The principal purpose of a contract is to acquire the research inputs as a direct input in well-defined programmes and missions of the agency giving the contract. The principle that should be followed for sharing IPR in contract research is that both tangible and intangible intellectual property are to be wholly-owned by the giver of the money/funds; but the recipient of the money may have royalty-free licence for his non-commercial use.

One of the purposes of a grant is to accomplish a given objective through stimulating or supporting the acquisition of knowledge or understanding of the subject or phenomena under study. The principle of sharing IPR in this case should be such that both tangible and intangible properties are wholly-owned by recipient of money; but the donor of money may have royalty-free licence for his own use.

In a collaborative arrangement there is a substantial involvement of both the collaborators in making contribution to the technical aspects of the effort. The project would not be possible without extensive technical collaboration. In this case, in principle, the intellectual property is to be jointly-owned by the collaborating nodal S&T institutions. The resulting benefits are to be equally shared.

**Employer vs Employees - Sharing of IPR**

Most scientists working in R&D organizations are governed by the IPR policies of the organization. R&D management is required to balance the interests of the employer who makes an investment in human capital and those of the employee scientists whose skills are a means of their livelihood.

In principle, the employee holds the IPR for an invention made by him, patented or held as a trade secret, unless he transfers the ownership to the employer by the terms of an employment agreement or as a matter of equity. Discoveries or inventions made by the employee before the employment are generally not to be assigned to the employer. Any such inventions should be identified while executing the employment agreement with the employer.

Information received or learnt, by the employee during the term of the employment, that are secret and confidential should not be disclosed without authorization of the employer. For this purpose, employees should be suitably rewarded for the fruits of their intellectual labour. A provision relating to royalty payments should be included in the employment agreements.

**Keeping Records**

The maintenance of proper research records is an essential prerequisite for the protection of intellectual property in R&D organizations. It starts from the stage when an idea is first conceived and should be practised continuously up to the end of the research project. When a researcher first has an idea for solving a problem, he should record the idea in a laboratory notebook as soon as possible. If ideas originate as part of a group discussion at a research meeting, then the group may be considered the originator of the idea.

The data and observations should also be recorded in the laboratory notebook. The
primary purpose of recording research results is to prove that particular specific research was done at a certain time by a particular person.

Possibility of conflicts between employers and employees can be reduced if an acceptable record of events is kept at all stages of the research and development project:
- concerning who instituted research,
- the making of the invention,
- its subsequent development and commercial exploitation, and
- the definition of duties, the contract and employment needs to be clear.

Agreement on Trade in Services

General Agreement on Trade in Services (GATS) reached in Uruguay Round extends multilaterally agreed rules and commitments into the rapidly growing area of trade in services. GATS contains two major across the board obligations of MFN treatment and transparency which apply to the entire universe of services. However, GATS permits members to impose conditions or limitations on market access and national treatment.

Definition of the ‘services’ under GATS is very wide and includes any service in any sector except services supplied in the exercise of governmental authority. GATS also defines a service supplied in exercise of governmental authority as a service which is supplied neither on a commercial basis, nor in competition with one or more service suppliers.

R&D services have been classified as one of the services under WTO classification of services and includes the following services:
(a) R&D services on natural sciences,
(b) R&D services on social sciences and humanities, and
(c) inter-disciplinary R&D services.

Many WTO members including India have filed schedule of specific commitments for R&D services. India’s commitments with regard to R&D services appear in India’s schedule of specific commitments wherein commercial presence is permitted through incorporation with the foreign equity ceiling of 51% for the following R&D services only11:

R&D services on the natural sciences, viz:
- heat, light, electro-magnetism, astronomy but excluding atomic energy and related matters, and
- engineering and technology, including applied science and technology for casting, metal, machinery, electricity, communications, vessels, air-crafts, civil engineering, construction, information, etc.

The definition of services includes services supplied from the territory of one party to the territory of another; services supplied in the territory of one party to the consumers of another (e.g. tourism); services provided through the presence of service providing entities of one party in the territory of another (e.g. banking); and services provided by nationals of one party in the territory of another (e.g. construction or consultancies). This definition extends to include liberalization of movement of persons. However, there is no obligation on the members to negotiate specific commitments.

Implications

In view of the R&D services being opened up for international competition, R&D management would need to take specific measures to enhance business and investment
opportunities in the sector of R&D services through:

- encouraging Indian R&D institutes to enter global markets as commercial collaborators with foreign companies/institutes;
- encouraging individual foreign company initiatives to contract R&D in Indian institutions;
- encouraging foreign companies to establish ‘outward oriented’ R&D centres in India; beginning is already made, e.g. in areas such as software development, chemicals, drugs and pharmaceuticals, advanced materials, telecommunications;
- enhancing export of technology and R&D services by Indian institutions; and
- encouraging user and market orientation among Indian R&D institutions;

Indian R&D institutions could take advantages of GATS to strengthen their comparative advantages in the international technology market.

**Agreement on Subsidies**

The agreement on subsidies and countervailing measures establishes three categories of subsidies, namely, the prohibited subsidies, actionable subsidies, and the non-actionable subsidies.

The prohibited subsidies are those contingent upon export performance and those contingent upon the use of domestic over imported goods. If it is found that the subsidy is indeed prohibited, it has to be immediately withdrawn. If this is not done within the specified time, the complaining member country to the agreement is authorized to take counter measures.

The second category is actionable subsidies. The agreement stipulates that no member should cause, through the use of subsidies, adverse effects to the interests of other signatories, i.e. injury to domestic industry of another signatory or nullification of benefits accruing to the other signatory under the agreement. In the event it is determined that such adverse effects exist, the subsidizing member must withdraw the subsidy or remove the adverse effects.

The third category involves non-actionable subsidies.

Non-actionable subsidy includes assistance for research activities conducted by firms or by higher education or research establishments on a contract basis with firms if the assistance covers not more than 75% of the costs of the competitive development activity and provided that such assistance is limited exclusively to:

- personnel costs (researchers, technicians and other supporting staff employed exclusively in the research activity);
- costs of instruments, equipment, land and buildings used exclusively and permanently (except when disposed of on a commercial basis) for the research activity;
- costs of consultancy and equivalent services used exclusively for the research activity, including bought research, technical knowledge, patents, etc.;
- additional overhead costs incurred directly as a result of the research activity; and
- other running costs (such as those of materials, supplies and the like), incurred directly as a result of the research activity.
The provisions of this Agreement do not apply to fundamental research activities independently conducted by higher education or research establishments.

**Countervailing Measures**

The agreement provides for the use of countervailing measures on subsidized imported goods. In such a case, all relevant economic factors are to be taken into account in assessing the state of the industry and a causal link is to be established between the subsidized imports and the alleged injury.

Least developing countries and the developing countries that have less than $1,000 per capita GNP are exempted from disciplines on prohibited export subsidies. For other developing countries, the export subsidy prohibition would take effect 8 years after the WTO agreement. Countervailing investigation of a product originating from a developing country member would be terminated if the overall level of subsidies does not exceed 2% (and from certain developing countries 3%) of the value of the product, or if the volume of the subsidised imports represents less than 4% of the total imports for the like product in the importing signatory.

Where another member believes that an otherwise non-actionable subsidy is resulting in serious adverse effects to a domestic industry, it may request consultations with the member granting the subsidy and initiate measures stipulated in the agreement for stopping such adverse effects.

**Implications**

The salient implications of the agreement on subsidies for R&D management are the following.

- Mechanisms would need to be established by R&D organizations to monitor R&D strategies / subsidies of competitive products,
- Industrial R&D should be cost and quality competitive, specially, for technology intensive exports,
- Policies and programmes of R&D funding would need to be examined under the proposed definitions of subsidy, and measures taken to overcome the constraints, if any.
- Evolve suitable strategies to take countervailing measures in specific cases of subsidies.

**Agreement on Technical Barriers to Trade**

The agreement on technical barriers to trade seeks to ensure that technical negotiations and standards, as well as testing and certification procedures, do not create unnecessary obstacles to trade. The agreement encourages the countries to use international standards where these are appropriate, but it does not require them to change their level of protection as a result of standardization. A code of good practice for the preparation, adoption and application of standards by standardizing bodies is included as annexure to the agreement. Any restriction on account of environmental regulations are considered under technical barriers to trade.

The issues of technical barriers are crucial for R&D and the technology intensive exports from the developing countries. The developed countries may restrict their markets for products from developing countries on grounds of certain technical standards to be met. For example, a developed country may require only specific dyes to be used while importing garments from developing countries.
The comparative advantage of the products from the developing countries may have to be supplemented by more and more R&D inputs.

There is a need to evolve a comprehensive response to such issues. This will require a close interaction among the S&T departments, Ministry of Commerce and the other concerned organs of the government. In particular, the Department of Scientific and Industrial Research may have to take a lead in examining these aspects and shaping the R&D and technology policies to circumvent such barriers.

**Agreement on Dispute Settlement**

The treaty establishes an integrated dispute settlement mechanism under which action may be initiated in one sector for the non-compliance of the treaty in another sector. For example, any default in implementation of IPR may be retaliated in terms of action in trade and other aspects.

**Conclusions**

The paper observes that India's share in the global technological trade is rather limited. The analysis of patenting activity and the technology trade data indicates that there is a long way to go for the country to strengthen its technological base and carve out a niche in the international technology trade and market. In this context, the implications of the various agreements under WTO are examined for strengthening indigenous R&D and technological capabilities. In particular, it considers the agreements concerning intellectual property protection, trade in services, specially, R&D services, subsidies and countervailing measures, technical barriers to trade, and dispute settlement mechanism.

**References**