
UNIT 8 TECHNOLOGY TRANSFER

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8.0 OBJECTIVES

After going through this unit, you should be able to:

- explain the rationale of transfer of technology
- describe the recent trends and current issues involved in the transfer of technology
- explain the role of the Transnational Corporations (TNCs)
- describe the role played by small and medium enterprises
- explain the Intellectual Property Rights
- evaluate the costs and absorption of technology and
- describe the Indian perspective of technology transfer.

8.1 INTRODUCTION

You have learnt the globalization, International Investment, and Transnational Corporations in Unit 5, 6 and 7. Another important area is the transfer of technology. Transfer of technology involves the transfer of physical goods i.e. capital goods and the transfer of tacit knowledge. The transfer of tacit knowledge is becoming more important and involves acquiring new skills and technical and organisational capabilities. Needless to say that the innovation of technology requires large amount of investment, hence, Transnational Corporation play an important role in the transfer of technology. In this unit, you will learn the recent trends and issues in transfer of technology, role of Transnational Corporation, non-equity forms of technology transfer and the vital components of the contract related to the transfer of technology. You will also be acquainted with the International agreement for Intellectual Property Rights and the trend in India's technology transfer.

8.2 RATIONALE OF TRANSFER OF TECHNOLOGY

It is important to understand what is meant by technology. Technology normally implies a way of producing goods or establishing services; it manifests itself in production process

and product development. Modern understanding of technology is more comprehensive than conventional understanding. It also includes organizational, informatory and motivatory areas.

Transfer of technology can be defined as the transfer effected from one agency to the other. There are various levels of transfer of technology. First, when the technical knowledge is transferred from the laboratory and scientific establishment to students of technology; it can be called transfer of knowledge. For example, the principles of physics and chemistry are transferred through teaching to the students. An advanced form of transfer of technology in this category is high level seminars where advancements made in a number of basic sciences and their applications are discussed. The same is also published for wider use. It must be noted here that there is no relationship between the costs incurred and price paid by the users.

The second level of transfer is the general knowledge of production of a product. Firms and individuals in this area would be broadly knowledgeable about the process and requirements which constitute part of the general knowledge of a concerned industry. Here again there is no relationship between costs and benefits.

Third, it can be said when a new product is either introduced in the market or imported, one can get an idea of technological possibilities.

Fourth, which is the focus of this unit is the transfer of technology which is commercially successful and this technology normally is owned by a firm with necessary property protection. Therefore, it can be transferred only through the market transaction, i.e., buying and selling.

Before identifying the main features of technology market, it is useful to understand the rationale of technology transfer. We are confining here to technology transfer between two firms which are located in two different countries, i.e., international transfer of technology. Over about a century, firms all over the developed world are buying and selling technology. Over the last thirty years in particular the technology transfer is also taking place between the firms of developed and developing countries. In this context, it is necessary to briefly understand the rationale guiding the buying and selling of technology.

A seller of technology finds that it can earn returns from selling the technology. This is particularly so in view of the fact that life cycle of the technology is short. The advances made in technological innovations are so fast that there is a tendency to sell previous generation of technology. In addition, the proprietary right in a number of cases is short. Hence, the firm is induced to sell technology.

Transfer of technology among various units of TNCs, which are globally operating, that is subsidiaries, affiliates and joint venture partners, also takes place at a price and also enjoys the benefits of total production of products and services.

Buyers of technology have three main reasons for purchasing technology. They are:

- i) Innovating a new process or a product by a firm is costlier than buying technology in the market. It is often said that one does not need to invent a wheel again and again.
- ii) Since a commercially successful technology has already proved its utility the buyer finds it very attractive to buy the technology.
- iii) A firm which has no incentive to become a leader in the market either by innovating a new product or a new process would find it more convenient to buy the most modern technology from the owner which is most often a TNC than taking the risk of innovating a similar technology.

Main Features of the Technology Market

Technology market is a seller's market. The owners of proprietary technology are a few large TNCs, although there are a few medium and small scale enterprises in the market. So the

TNCs control the sale of technology. The buyers of technology are a large number of firms specially from developing countries. Effective purchase of technology can be done only when a buyer knows about the technology. This knowledge includes information on a number of companies owning similar technology like whether it is still subject to proprietorial regulations and what are the terms and conditions under which that concerned technology is traded in the market. In technology purchase knowledge is power. It is, therefore, imperative that a technology buyer makes necessary home work in this regard.

8.3 RECENT TRENDS AND CURRENT ISSUES

- i) Technology is increasingly globalized as :
 - a) trade in technology is growing tremendously as measured by increased technological collaboration agreements;
 - b) The research and development activities of the firms are also getting globalized for a number of TNCs are increasingly establishing their R & D units in various countries specially the developed ones.
- ii) The diffusion of technology globally has caused a radical alteration of the world trading system. This has led to an important development. Technology which was considered a strategic factor in national development has now emerged as an equally vital and critical element for achieving control of international markets. In all countries, science and technology policy is thus now perceived as having effects that go beyond national boundaries and having consequences for international trade.
- iii) Technology is considered not only in the national context of industrialization or modernization of agriculture, but also improving the services sector as well.
- iv) Technology is considered as the prime factor in creating comparative advantage and acquiring competitiveness in international markets.
- v) There has been a growing tendency for companies to seek increased governmental protection of intellectual property rights.
- vi) The protection of intellectual property rights is also considered by many a necessary condition for increased flow of foreign direct investment. Therefore, there has been pressure on various governments to build stricter intellectual property rights regimes through unilateral action and multilateral agreements.
- vii) The decade of 'sixties' and 'seventies' had witnessed serious attempts on the part of the United Nations Conference on Trade and Development (UNCTAD) to increase technology transfer to developing countries, reduce the costs of technology transfer and acquire technology on less onerous terms. But there is a reversal of these efforts. It is feared that terms of transfer of technology are becoming stringent and costs are becoming higher. A few developing countries are increasing their R&D expenditure.
- viii) Protection of technology means for the developed countries protection of their market power and prevention of competition from entering the market. Hence they have pursued their objective of protection through various international agreements.

Issues

1. One of the major issues with regard to technology transfer is the proprietorial rights of the owner of technology. They have been made more stringently enforceable by unilateral action of a single country, the United States, and multilateral agreements, e.g., trade related intellectual property rights which has interfered with the national development of technology.
2. Linking of providing protection to the owner of technology to various other international economic transactions, violation of proprietorial regimes by any one country calls for retaliation/cross retaliation affecting adversely various segments of international transaction of a country.

3. If a country desires to attract Foreign Direct Investment (FDI) it is forced to liberalize its technology policy resulting in increased vulnerability of a large number of developing countries.
4. Protection of technology has been extended to not only the manufacturing sector but also agriculture and services sector. Patents of bio-technological inventions and micro-organisms as provided in trade related intellectual property rights of the Marrakesh Agreement (1994) have raised a large number of complex issues.

Check Your Progress A

- 1) What is transfer of technology?

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- 2) Enumerate two features of technology market.

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- 3) Enumerate two recent trends in the transfer of technology.

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- 4) Enumerate two issues in technology transfer.

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8.4 TRANSFER OF TECHNOLOGY, FDI AND TNCs

Since the TNCs are the main actors in technology development, attention is focussed on their role in the transfer of technology. A large proportion of R & D expenditure that forms the basis of technology development in today's world of all global civilian R & D is concentrated within the TNC system comprising a component of 75-80 per cent.

An important mode of transfer of technology is trade. The trade in capital goods is a very important mode of transfer of technology. All developing countries except Africa imported

technology as import of capital goods. Total import of capital goods have risen substantially. Dramatic growth has taken place in imports of Asia and the Pacific region. The share of TNCs in capital goods imports of developing countries is considered to be very big.

A TNC normally undertakes FDI when it possesses certain technological or other economic advantages over its competitors, which it finds in its best interest to exploit internally from a foreign location since technology forms an important part of the competitive advantages of a TNC. Many firms choose to service their foreign markets through FDI not only to exploit that advantage but also to retain the company's control over their technology. TNCs generally transfer their most recent technology to their affiliates, while selling or licensing older technologies to locally owned firms and joint ventures. Hence, it is argued that FDI may be the only way for many developing countries to gain access to the latest technology and especially to certain key technologies.

As noted earlier, the introduction of new products or qualitatively superior old products is one of the ways by which technology promotes growth. One important way of assessing how transfer of technology is taking place by the TNCs is to measure the expansion of the share of sales of high and medium research intensive industries.

The creation of production facilities by TNCs in high and medium research intensive industries can imply technology transfer not merely through a changing product composition but also through the training of host country personnel in new skills and introduction of new management methods and a new way of organizing the production process.

As evidence, an overwhelming proportion of the foreign R&D of TNCs is located in developed countries. However, in countries like India, the Republic of Korea and Singapore, the TNCs have established R&D units of significance. But most often these R&D units are typically confined to adapting the technology of the parent company to local conditions. In a sample of 218 Japanese TNCs, 57 per cent expressed the view that the main objective of their foreign R&D facilities was to develop products tailored to meet local demand. The effects of TNCs on deeper indigenous research and innovation capabilities (know-why) in developing countries is less evident. As TNCs can import all their 'know-why', it is possible local firms may conduct more R&D.

It may also be that a strong presence of TNCs can inhibit the development of an indigenous technology. Foreign competition could also induce domestic firms producing similar products to undertake R&D that otherwise would not have taken place in order to improve that competitive advantage. FDI could also, it is stressed, improve the local innovating capacity in areas in which the host country and its firms are strongest and have a competitive market structure.

8.5 ORGANISATIONAL INNOVATION AND MANAGEMENT PRACTICES

Organisational innovation and improved managerial practices are being increasingly viewed as a major aspect of technological development for enhancing productivity and accelerating growth. The principal components of these aspects that have evolved over the last two decades or so can be summarised as follows :

- The underlying philosophy of production has been altered; instead of producing to stock, goods are produced to order. That necessitates a demand-driven system capable of producing a variety of product types in much smaller volumes. Hence, lot sizes have been reduced dramatically.
- The efficient production of different products in small lot sizes requires minimising downtime. That, in turn, requires quick line changeovers and tool set ups. Machinery redesign becomes necessary but, more importantly, production-line workers must be trained to do changeovers rather than having them done by separate teams as in mass production.

- Production layouts need to be restructured, and changes made in the use and management of machines in order to create a smooth flow of smaller lot sizes.
- Inventories have to be reduced to a minimum “just-in-time” level rather than being stocked “just-in-case”, so that the increased number of different product types can be accommodated without large carrying costs.
- Maintaining a smooth flow of production without inventories requires that components have zero defects or be of perfect quality, whether they come from suppliers or from in-house sources further back in the production line.
- Skill and craft demarcations among workers are eliminated and workers are trained to be multi-skilled; they are paid according to their skill level and the quality of their work.

The organizational changes involved extend throughout the firm from design to marketing to production; from senior management to the shop floor and from management’s relations with its work force.

8.6 NON-EQUITY FORMS OF TECHNOLOGY TRANSFER BY TNCs AND SMALL AND MEDIUM ENTERPRISES

There are a number of mechanisms other than equity participation through which technology transfer takes place. It includes outright-sale of technology, sub-contracting of production of parts, components and services, management contracts, franchise exports, strategic alliances and technology collaboration agreements.

Outright Sale/Purchase of Technology: Firms at times prefer outright purchase of technology while the seller also opts for it. The advantage of this mode of transfer to the purchaser is that the buying firm gets technology at one go and has freedom to use the technology without the interference of the seller. Further, it is argued that the buyer can find it economical. But there are certain disadvantages as well. First, outright purchase may not be adequate to transfer technology without the support of the seller. Further, the buyer will be deprived of advances that would be subsequently made. In addition, in the absence of well planned R&D, the technology absorption by the firm may not be adequate. The firm may in the ultimate analysis depend on outside source for all technological inputs.

Sub-Contracting: Many foreign enterprises sub-contract the purchase of inputs to host country’s producer. This is called supplier/user relationship. Under this arrangement the TNC’s affiliate, for instance, not only assists the local firm technically but also provides information which is important in increasing its ability to coordinate the production of components and other intermediate products. (This should not be mistaken for licensing agreements.) Technology passes to sub-contractors or suppliers coming in the form of technical assistance, material handling, product and process technology, and general information with regard to production and finance, etc. This form of technology transfer is widespread in automobile industry, radio, television, shoe, etc. This form of technology transfer has also expanded to highly sophisticated products such as those of the semiconductor industry.

Management Contract: A number of firms also sign management contracts with firms in the host countries. Under these contracts foreign enterprise advises the host company about various management practices which are in use in its parent company. Occasionally, under this contract the entire management is handled by the foreign firm. For this the host company has to pay management fees, either lump sum or in instalments.

Franchises: Under this owner of a specific technology allows a host company under franchise to use its specific knowledge for a franchise fee. This is a widespread practice in food industry, hotels, etc.

Exports and Technology Transfer: National firms will be able to acquire technology through exports. Let us learn this concept with the help of the following case. This case has been taken from World Development Report, Vol. 18, No. 2 (Young Whee Rhee, The Catalytic Model of Development: Lessons from Bangladesh's Success with Garment Exports, pp. 333-346.)

Acquisition of Export Marketing Skill from Transnational Corporations: The Case of Garments Exports from Bangladesh: The phenomenal success of garments exports from Bangladesh vividly illustrates the positive impact of learning through trade in association with TNCs. Starting from virtually zero in 1978, export earnings from garments reached \$ 560 million in the fiscal year 1989-1990 and may have been higher still in the fiscal year 1990-91 (data for the whole year are not available). The average growth rate in garment export-value was over 120 per cent in the 1980s; during that period, the absolute value of exports of garments surpassed that of jute manufactures, traditionally the highest foreign exchange-earning item of the country. The contribution of garment exports to foreign exchange earnings, a vital but scarce resource for the economic development of Bangladesh, was enormous, amounting to 40 per cent of the total by the fiscal year 1989-1990.

The process started in 1979 with a non-equity arrangement with a developing country TNC, the Daewoo Corporation of the Republic of Korea. That company signed a five-year collaboration agreement with the Dosh Garment Company of Bangladesh, under which Daewoo provided: six months of training for Dosh workers in the Republic of Korea (later extended to seven months); assistance in start-up activities, including the installation of machinery purchased from Daewoo; supervision of production managed by Dosh; and marketing services. In December 1979, 130 Dosh workers trained by Daewoo in the Republic of Korea returned to Bangladesh, along with three Daewoo engineers assigned to assist start-up activities. In April 1980, production of garments began with 500 employees and 450 machines. Dosh exported its first products in 1979-1980, amounting to about \$ 56,000.

It was initially impossible for Dosh to sell garments in the international market without Daewoo's expertise. As so-called "triangular trade" arrangement was established: first, Daewoo received a letter of credit from an overseas buyer; second, it opened a back-to-back letter of credit addressed to Dosh; and, finally, Dosh shipped its garments under the Daewoo brandname directly to the overseas buyer, while it received payment from Daewoo. In this triangular trade, Daewoo assured product quality through production line supervision and quality inspection, while Dosh could fully utilize the established marketing networks of Daewoo and learn the necessary marketing techniques.

The speed of learning was so rapid that Dosh cancelled its collaboration agreement in June 1981, after only about one-and-a-half years of factory operation, long before the expiration of the agreement. Export performance following the cancellation was impressive, as Dosh acquired the ability to handle all its export marketing and to purchase all its inputs from abroad, including from non-Daewoo sources. Its exports reached \$10 million in 1987-1988.

Meanwhile, 115 of the 130 Daewoo-trained workers left Dosh to set up their own, or to join other newly established, garment companies. Those workers were major agents for imparting export skills throughout the whole garment industry, leading to its dramatic success in foreign exchange earnings. Indeed, many new garment companies did not need the expertise of foreign companies because of the existence of those workers. The remarkable speed with which the ex-Dosh workers transmitted their production, marketing and management know-how to hundreds of their factories demonstrates the potential for learning through initial exposure to trade in association with a TNC. It should also be noted that the spread of learning was facilitated by government policies that permitted automatic access to inputs at world prices, provided adequate trade financing at reasonable costs and exempted the industry from investment licensing.

Strategic Alliances and Technology Transfer: High risks and rising R&D costs (especially in the area of new technologies) and the rapid obsolescence of new products have forced many TNCs to form technology-related strategic alliances to share development costs, acquire new technologies and make better use of scarce qualified personnel. The substantial number of

strategic alliances in existence now is a relatively new phenomenon. There are indications, however, of an emerging trend towards a very high proportion of agreements involving the development of and access to technologies. The alliances of IBM with several other corporations for the purpose of developing its personal computer are an example: the Lotus Corporation provided the application software, and Microsoft wrote the operating system, for a micro-processor that was produced by Intel. IBM (traditionally reluctant to conclude alliances) has now created alliances with more than 40 partners around the world, pooling technology and customer bases in the telecommunications and related fields. As a response to competition from IBM, the Japanese computer firm Fujitsu formed alliances with Texas Instruments, Siemens and Hitachi. Such alliances are often undertaken for the joint development of new generations of products and to set industry standards. Transnational Corporations from the United States and Europe are the most active participants in strategic alliances, most of which take place in information technologies.

Technological alliances can be viewed as a way of providing collective protection to technological advances among a few partners. The increasing incidence of such alliances combined with the current pace and cost of technological development makes it more difficult for developing countries to acquire technology through traditional non-equity arrangements. Many alliances also involve common actions for setting international standards that increase the barriers to entry (including, for new products from developing countries) in the international market. Some developing countries, have the potential and capability, however, to become partners in technology alliances.

A typical example to use is in the area of computer software, where the Government has set up two software engineering firms in cooperation with IBM. Taiwan Province of China, provides good quality engineers at a relatively low cost while IBM provides experience in software research and development. Similarly, the Sony Group is to transfer advanced technology to the electronics industry in Taiwan Province of China. Sony has announced that it has entered into alliances with 130 electronics companies from that country working with a "technology development centre" to create a production base for export to Japan and affiliated companies of Sony world-wide. Similarly, several firms in the automobile industry in the Republic of Korea have entered into alliances with TNCs from the Triad. Examples are those of Hunday with Mitsubishi and Chrystler, Daewoo with General Motors, Suzuki and Isuzu; and Kia with Ford and Mazda.

These examples, however, represent only a small number of alliances that include developing countries. Indeed, only 2 to 3 per cent of technology alliances in the 1980s were between companies from the Triad and firms from newly industrializing economies, and less than two per cent included firms from other developing countries. For most developing countries, then, the acquisition of new technologies is likely to rely — at least for the present — on intra-firm transfers by TNCs, rather than on inter-firm alliances between independent firms.

In services, non-equity arrangements have played an important role. There are some groups of services which have used non-equity firms.

1. **Hotels, restaurants, fast food and car rental companies :** Their preferred way to produce abroad is a management contract or franchising. In most cases, the agreement is sufficient because it protects the contractor's assets related to technology, operating methods or information and with respect to the performance of the contractee.
2. **Business and professional services such as accounting, consulting and legal services whose main assets are human capital, reputation, connections and brand names :** They do not require expensive fixed assets that could be the basis for capital equity, but their key competitive advantages can be codified and easily transferred through non-equity arrangements, such as partnership.
3. **Business services such as engineering, architectural and technical services, and some advertising requiring adaptation to local tastes, accounting and legal services.** Partnerships or minority of joint ventures with local partners provide access to local knowledge. This can also lead to preliminary transfer of technology.

1) What is sub-contracting?

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2) What do you mean by franchises?

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3) Enumerate two examples of organisational innovation and management practices

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4) State whether following statements are **True** or **False**.

- i) Protection of technology has not been extended to services sector.
- ii) TNCs generally transfer their most recent technology to their affiliates.
- iii) Subcontracting is widespread in the automobile industry?
- iv) In services, equity arrangements have played an important role.
- v) Outright purchase of technology may not be adequate to transfer of technology without the support of the seller.

8.7 VITAL COMPONENTS OF CONTRACT

Technology Collaboration Agreements is a specific mechanism of technology transfer. In India it has been an important mechanism. Even with subsidiaries and affiliates some TNCs have technology collaboration agreement spelling out the details of technology to be transferred and price to be paid. Technology transfer agreement is a legal agreement enforceable by the courts of law. Some of the main components of the technology collaboration agreements are highlighted. This listing has been done keeping in view the interest of the buyer. Let us now learn the vital components of contracts.

- i) **Patent and Secret Technology** : Every transfer of technology, through whatever mechanism, has the following components to effect transfer: (a) patent and (b) knowledge of the process or the secret knowledge of the firm which the owner shares with the buyer. The knowledge means know-how which is industrially useful, secret, novel and valuable information including associated technical and other information.
- (ii) **Trade Mark**: Although it is not a part of technology and hence not an integral part of transfer, trade mark from the buyer's point of view identifies the given level of

product quality including certain continuation of product features. From the seller's point of view trade marks identify exclusive source thereby serving as a repository for a 'good-will', a repository which is protected from the unfair competition of imitators.

Brand Name: Very often technology transfer also includes brand names of the product which is believed to enhance the value of the product and marketing.

Royalty, Management and Technical Fees: Technology transfer is made on specific payment, royalty for patent and various fees for management technology and technical fees. Royalty is paid for patented knowledge which is normally a proportion of the sales value. Management and technical fees could be lumpsum to be paid in one instalment or in a number of instalments. There is also separate payment for buying trade mark and brand name.

Duration: Technology transfer agreement is normally for a period of time, for example, five years.

Establishment of R & D: The seller of technology is expected to help the buyer to establish an R&D unit.

Performance Guarantee: The clause of performance guarantee is very important from the point of view of the buyer since it goes into the roots of the technology transferred or acquired. It ensures that technology transferred will be able to produce expected quality products at expected costs. This is very important in a large number of industries specially chemicals and pharmaceuticals.

Design Conference: It is normally between the proposed buyer and seller to understand the nature of technology and its components which is expected to be transferred. This conference provides a beginning for effective negotiations on both sides.

Restrictive Practices: One should be careful about restrictive business clauses such as export restriction, importing from sources specified by the seller of technology where there is a possibility of transfer pricing.

Latest Technology: Technical collaboration agreement must also include provision for transfer of latest technology.

Technical Assistance and Training: No transfer of technology can be said to be complete unless the technical knowledge, information and skills are properly communicated by the licensor to the licensee. Technical assistance or the training are the only and the most effective mechanisms in this regard.

Training of Labour Force: Training is regarded as an important channel through which TNCs impart synergistic ownership-specific advantages to the host country nationals. Training tends to raise both the technical and managerial capacity of the host country, enabling it to apply knowledge and skills in production without assistance. There is also a spillover effect of this on labour mobility and increases overall productivity.

Training programmes are carried out either within the country or abroad. Within the country, this may take the form of on-the-job training, training in a formal institution, or an institution established by TNCs. Training abroad is normally restricted to specialized areas and limited to the top management cadre.

Small and Medium TNCs and Transfer of Technology

The emergence of small and medium-sized TNCs is a later phenomenon. They are normally hesitant to engage in international business because they are unfamiliar with foreign markets. However, recent technological developments in communication, transportation and financial services have enabled small and medium enterprises to exploit opportunities in international markets.

The small and medium TNCs have contacts with enterprises abroad through trade and various other contracts. Yet most of the investment overseas by the small and medium-sized companies are greenfield in nature. Some of them are technically advanced and are willing to establish overseas affiliates. Hence technical advantages are a key element in explaining their transnationalization. They also exploit low cost labour, local markets and exports to third countries. Regarding technology nearly 70 per cent of the enterprises belonging to this category do have R&D activities. Their unique advantage is flexibility in management.

Small and medium sized enterprises are more circumspect in their transfer. They are also less inclined to formalise their technology transfer because of lack of personnel and other resources but also because their know-how is often acquired through personal experience which is difficult to formalise. They are less able to send technical experts and blueprints. Technical training other than on-the-job training was connected only by 40 per cent of small and medium enterprises. The significant aspect of their technology is suitable to small enterprises. Labour capital ratio is 1½ times higher in small and medium enterprises than large TNCs. Hence, they are expected to transfer labour intensive technology.

8.8 INTELLECTUAL PROPERTY RIGHTS

The concept of intellectual property rights refers to the exclusive privilege granted to individuals or institutions to make, use or sell goods and services that embody the ideas, techniques and inventions that they have appropriated. "An intellectual property rights system thus can be defined as the interrelationship between a set of incentives and rewards designed to stimulate the creative, inventive activity of people and institutions for the achievement of specific goals and the mechanisms that regulate and permit the enforcement of the exclusive rights." The most important intellectual property rights in existence are patents and copyrights. The patent is the exclusive right to make, use or sell a particular application of a new idea. It is thus a mechanism for the disclosure of new knowledge and it encourages entrepreneurs to invest on patents that in turn covered not only industrial processes and products but is now extended to services and agriculture. Copyright is the exclusive privilege to make copies or to reproduce a particular tangible expression or information. Other intellectual property rights are certificates of invention, trade secrets, trade marks, plants' patent and plant breeding rights. The most recent type of intellectual property rights is for semi-conductor chip layouts.

The growing international concern over the intellectual property rights stems from four major considerations :

- a) "It is intangible and easily leaked out. Intellectual property can transcend national boundaries and legislations in a way that is not possible for real property. New technologies, particularly the cluster making up information technology, have enormously enhanced the characteristic of intellectual property. Hence the protection of IPRs on the basis of national laws and the dissemination of information which those laws are designed to protect is considered to be a matter of international concern.
- b) "Since national legislation has not kept pace with technological progress, new questions have arisen, the solution to which requires new mechanisms and regulations. These need to cover not only the legal aspects of property rights but also the economic, ethical and political aspects.
- c) "Since existing legislation is national in character, its enforcement depends upon national procedure and mechanisms. In turn, new technologies facilitate dissemination, imitation, and infringement, they also make it more difficult to identify the infringement and consequently more difficult to enforce rights., and
- d) "It is now recognized that the economic dimension of intellectual property rights has a far greater relevance than was traditionally assumed. This is perhaps the most important of the four considerations."

8.8.1 International Agreements for Intellectual Property Rights

There are a large number of international agencies and international agreements which are expected to manage intellectual property rights protection. Let us learn about few important agencies.

World Intellectual Property Organisation (WIPO): It is a specialised UN agency established in 1967 which came into force to deal with intellectual property protection, specially patent and copyright, all over the world. It cannot effectively enforce the intellectual property rights and is considered to be toothless.

Paris Convention: International Union for the Protection of Intellectual Property Rights, Paris Convention, was signed in Paris in 1883. In 1989, it had 100 member states. India was not a member. Under this convention, member states must accord to nationals and residents to other member states the same advantages under their law relating to the protection of inventions, trade marks and other subjects of industrial property as they accord to their own nationals.

Berne Union: This treaty was signed in Berne in 1886. It is the international union for the protection of literary and artistic works. Under this, members must accord the same protection to the copyrights of nationals to other nationals. It also prescribes minimum protection of 50 years. India is a party to it.

Washington Treaty: It covers the protection of layout designs of integrated circuits. This treaty was signed in 1987. India has signed this treaty.

Under the Uruguay Round of Multilateral Trade Negotiations, regime of intellectual property rights was negotiated under trade related intellectual property rights which became an important component of the Marrakesh Agreement. Development and enforcement of intellectual property rights regimes was removed from other international agencies and was brought under Uruguay Round of Multilateral Trade Negotiations under the auspices of General Agreement of Tariffs and Trade (GATT). The inclusion of intellectual property rights in the agenda of the GATT was to not only enable negotiations set to achieve uniform and higher standards of protection and enforcement, but also empower concerned organization to take recourse to "cross retaliation" in the goods sector to ensure compliance. The appellation "trade related aspects" is only a thin veil to confer legitimacy on the inclusion of the subject on the agenda of Uruguay Round. The USA had similarly done unilaterally under Super and Special 301 provisions of its trade laws.

TRIPS Agreement, covers seven categories of intellectual property, viz., copyright and related rights, trade marks, geographical indication, industrial designs, patents (which include micro-organisms and plant varieties), integrated circuits and trade secrets.

- i) Protection will be available for 20 years for patents and for 50 years for copyrights. Patents shall be available for any invention, whether product or process, in all fields of technology. Further, patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology whether products are imported or locally produced. Patent will be available in the area of computer development and information technology.
- ii) Protection of intellectual property rights provided in the agreement will be enforced through the Common Dispute Settlement Mechanism of World Trade Organization (WTO) which provides for retaliation and cross retaliation.

8.8.2 India and Intellectual Property Rights

It is the most controversial aspect of ratification of Marrakesh Agreement by India, the real contentious issue being patent protection. India has been a member of Berne Convention for the protection of literary and artistic works. Computer software is protected as a literary work under our copyright laws since 1983, three years before the launching of Uruguay Round of Negotiations in 1986. Indian laws relating to trade marks, trade secrets and industrial designs

are on par with generally accepted international standards. Necessary adaptation in keeping with the agreements are under way.

The Indian Patent Act, 1970 permits only process patent in food, pharmaceutical and chemical sectors. The duration of patent under this law is only 7 years in food and pharmaceutical sectors, while it is 14 years in other sectors. The patent granted in these three sectors will be deemed to be endorsed with the words "licence of right" so that any person can work on the patent without the authorization of the patent owner. Compulsory licensing provisions of the Act have also been broadly worded including the grant of compulsory licence. Virtually, this Act does not provide protection in food, pharmaceutical and chemical sectors.

8.8.3 TRIPS and Developing Countries

The TRIPS Agreement provides for a general transition period of five years to developing countries for implementation of all provisions of the agreement. It also provides for an additional transition period of five years to those developing countries which do not presently provide for product patents in any field of technology. However, in respect of pharmaceutical and agro-chemical products alone, the TRIPS agreement requires that applications for product patents must be accepted as from the date of the agreement itself. If those products are granted patents and marketing approval in any country and the patent owner desires to introduce those products in the Indian market, he should be given exclusive marketing rights for 5 years or till the pending patent application in India is approved or rejected, whichever is earlier. The provision for pipeline protection virtually erodes the transition period in the case of pharmaceutical and agro-chemical products.

Indian Patent Act of 1970 has not yet been amended incorporating the Marrakesh Agreement's commitment with regard to intellectual property rights. The USA has complained to the Panel on Dispute Settlement of WTO regarding supposed failure of the Government of India to implement the Marrakesh Agreement, stating that India has violated the Marrakesh Agreement without implementing provisions of the trade related intellectual property rights as agreed to under it. India is reported to be going for an appeal stating that it has five years to implement it.

Costs of Technology Transfer

There are two types of costs of transfer of technology. First, direct costs and second, indirect costs.

Direct Costs: Transfer to technology takes place at a price. This price includes royalty, technical fees, management fees and other such expenses. Sometimes these costs are very high. In the absence of adequate knowledge the buyer may pay more price than what the market demands. The cost of training personnel is also included very often in direct costs. The visits, stay and other expenses of expatriates who effect the transfer of technology from their company to the buyer's firms will also be included in the costs.

Indirect Costs: There are two types of indirect costs: (a) Restrictive clauses specifying that the firm should buy the needed machinery, equipment and raw materials from the source identified by the technology seller most often traded under transfer pricing. This one can expect to be invariably higher than the market price.

If no legal precaution is taken, the buyer may pay additional fees, royalty for any improvement of technology effected over the period of contract.

Failure to transfer of technology due to inadequate performance or limited support from the buyer could be very high.

8.9 INDIA AND TRANSFER OF TECHNOLOGY

In the 'eighties, India entered into a large number of technology collaboration agreements. It was considered that the Government should take active measures to facilitate the transfer of

technology. Government of India had guidelines. These guidelines included provisions for fully exploring alternative sources of technology and provided that Indian party should be free to sub-licence the technical know-how, product design and engineering design.

On 24 July, 1991, the Government of India liberalized its policy. Under this policy the commercial judgement of the entrepreneur regarding technology and terms were to be negotiated for such transfer of foreign technology. Technology collaboration agreements are normally approved automatically by the Reserve Bank of India within the prescribed monetary and royalty limits.

Table 8.1: Foreign Technology Agreements from 1991 to 1998

Year	No. of Technology Agreements
1991	661
1992	828
1993	691
1994	792
1995	982
1996	744
1997	660
1998	595

Source: Ministry of Industry, Annual Report, 1998-99.

As a result of liberalised policy, the number of technology agreements increased from 661 in the year 1991 to 982 in the year 1995. This number further decreased to 595 in the year 1998. Look at Table 8.1 which shows Foreign Technology Agreements from 1991 to 1998. The countrywise analysis of technology agreements shows that the largest number of technology agreements was made with USA in the year 1998 followed by Germany, Japan and UK.

There are a few main limitations in transfer of technology to Indian firms :

- i) Indian firms normally do not prepare sufficiently while they enter negotiations for technology transfer;
- ii) Indian firms, as evidence has shown, do not build a team of experts to enable the management to negotiate an effective transfer of technology agreement. They do not normally take recourse to design conference;
- iii) Very often, there are many legal loopholes in the technology collaboration agreements such as lack of performance guarantee, lack of differentiation of technology from the changes of brand name and trade mark;
- iv) Indian buyer tends to subject himself to restrictive business clauses which include ban on exports, areawise restrictions for exports, buying machinery and equipment from the sources specified by the seller of technology which tends to increase the costs of production;
- v) Since Indian firms do not normally spend money on R&D, the seller of technology is very often not obliged to provide R&D facility to the buyer. This has landed Indian buyers into a situation of repetitive import of technology.

Check Your Progress C

- 1) Enumerate four vital components of contract of technology transfer.

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2) What is Intellectual Property Rights?

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3) What is WIPO?

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4) State whether following statements are **True** or **False**.

- i) Labour capital ratio is 1½ times higher in small and medium enterprises than large TNCs.
- ii) Intellectual property can not transcend national boundaries.
- iii) India has not signed Washington treaty.
- iv) TRIPS Agreement covers seven categories of intellectual property.
- v) TRIPS Agreement provides for a general transition period of five years to developing countries for implementation of all provisions of the agreements.

8.10 LET US SUM UP

International transfer of technology refers to transfer of technology among firms located in different countries. Technology transfer includes transfer of rights to use the patented knowledge, secret knowledge, trade mark and brand name. Technology market from the point of view of developing countries is a seller's market where a few sellers specially TNCs dominate. The reason for transfer of technology is that firms would like to use the commercially successful technology and do not intend to take recourse to inventions of already known knowledge. Transnational Corporations own 75-80 per cent of technology handled in the market. No doubt, small and medium-sized firms also transfer technology. FDI is an international mechanism of transfer of technology. Non-equity form of technology transfer has also become important. They include outright purchase/sale of technology, licensing, sub-contracting, management consultation, etc. Technology collaboration agreement consists of patent rights transfer, secret knowledge, R&D establishment, performance guarantee, use of trade mark and brand name and training of personnel. Further exchange of new technology as well.

Intellectual property rights have become an important issue. Now we have under the Marrakesh Agreement trade related intellectual property rights regime agreed to by nearly 130 countries. India is also a signatory. It is, however, taking time to implement it in accordance with the Marrakesh Agreement under which developing countries get 5 years to implement the Agreement. Under this Agreement all the signatories have to provide protection to product patent and process patent. Twenty years is the period of protection. Copyright protection is for 50 years. The protection has been extended to a number of areas which include computer software and bio-technology, etc.

Costs of transfer of technology include royalty, technical fees, management fees. These are direct costs. There are also indirect costs. India has liberalized import of technology since 1991. Firms are free to import technology based on their commercial judgement. Of course, there are a few areas where government's approval is required. USA, Germany and Japan are among the main countries with whom India has technology collaboration agreements. There are a few limitations of Indian purchase of technology: (i) inadequate understanding of technology market; (ii) lack of team work; (iii) tendency to accept restrictive business clauses; (iv) no R&D effort; (v) repetitive purchase of technology.

8.11 KEY WORDS

Restrictive Business Practice: This is an imposition by the seller on the buyer to adhere to certain practices which are obstructive in effective functioning of buyers. For instance when a seller of the technology imposes restriction on export of products/services produced by the use of technology transferred then the buyer cannot exercise the option of exporting the product despite the fact of his having advantages to do so.

Strategic Alliance: It is an alliance between/among specific independent firms to achieve certain objective of technology development/innovation.

Non-Equity Forms of Technology Transfer: Firms which transfer technology do not invest in a firm which is a recipient of technology. Instead of investing the firm uses various other mechanisms to achieve the same objective.

8.12 ANSWERS TO CHECK YOUR PROGRESS

B4	i) False	ii) True	iii) True	iv) False	v) True
C4	i) True	ii) False	iii) False	iv) True	v) True

8.13 TERMINAL QUESTIONS

- 1) What do you understand by international transfer of technology? What are the main assets transferred in transfer of technology?
- 2) Why an enterprise decides to import technology?
- 3) Identify various mechanisms of transfer of technology.
- 4) Evaluate the role of Transnational Corporations in transfer of technology to developing countries. Is there any difference between the transfer of technology by the TNC to an enterprise in developing countries from that of small and medium-sized companies? Discuss.
- 5) Assess the costs of transfer of technology.
- 6) Analyse the issues raised by intellectual property rights as agreed to under the Marrakesh Agreement.
- 7) Briefly describe India's policy on import of technology.

SOME USEFUL BOOKS

Anant K. Sundaram and J. Stewart Black, *The International Business Environment—Text and Cases*, Prentice Hall of India (Recent Edition), New Delhi.

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Donald A. Ball and Wendell H. McCulloch, Jr., *International Business—Introduction and Essentials*, Business Publication Inc. (Recent Edition), Texas, USA.

John D. Daniels and Lee H. Radebaugh, *International Business—Environment and Operations*, Addison Wesley, 1998, New York.

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