

# Changing Technologies and Intellectual Property: The Economic Perspective

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## Introduction

Dynamic innovations in information technologies have made them a strategic resource in the intense competition to control global markets. As a consequence of technological changes, there is a growing concern internationally over the protection of intellectual property as a leading economic and trade issue. The microcomputer revolution accelerated the rate of change, bringing about dramatic effects in the structure and organization of the information industry. Linked with the issue of services trade, the comparative advantage generated by new technologies will determine which country will reap the highest gains from trade in a world market tied together by computer and telecommunications networks. The global efficiency of world trade has increased as a result of technologies like optical fiber, undersea cables, satellites and mobile communications technologies, and integrated systems digital networks which combine voice, video, and data capability all in one channel. The costs of using such technologies are declining on account of deregulation of common carriers even as the new technologies are destroying their natural monopolies.

The rate of change has created a high level of obsolescence in information technology since the world is experiencing an unparalleled explosion of innovative applications of such technologies. These have contributed to an acceleration in the choice available to consumers but have complicated the ability of innovators to control their intellectual property and reap their rewards (Besen 1987). Over the past few years there has been a large-scale decline in the price of computing power and data storage costs so that computing facilities that a decade ago were available only in laboratories and for commercial users are now widely available to the public. This new international trend is oblivious of national frontiers.

Concern for Intellectual Property Protection (IPP) stems from the larger issue of how to provide incentives for new and creative technology, which is essential for competition, and simultaneously keep the free flow of information intact. As the U.S. deficits in the balance of payments grow from year to year, policymakers become apprehensive of technology ownership and the losses sustained by U.S. industry as a result of free riders and piracy of intellectual property.

Even if intellectual property is protected, there is no guarantee that market efficiency will be met with the diversity and rate of current technological innovations. The inherent characteristics of the output, such as software and videotext and video cassettes, make it impossible to ensure market efficiency along with protection of copyright. The existing systems of IPP virtually rule out the possibility of affecting an equilibrium between the interests of producers and consumers of intellectual property in globally integrated

markets (Besen 1987).

In this context, the theoretical underpinnings of intellectual property rights in economic terms vary among the rights of the producers and those of the consumers. They also vary among different forms of protection such as patents, copyrights, and trade secrets. The economic rationale of trade secrets is based on product differentiation, whereas patents and copyright are designed to stimulate invention, which in turn generates competitiveness and promotes economic growth.

The main criterion by which technological innovations proliferate is that knowledge-intensive output should be a "free good" or one whose value does not decrease with use. In other words, one person's consumption of a knowledge-intensive product does not interfere with another person's consumption of the same product. Social welfare would be maximized if no charge were made for such products. A zero price would achieve the optimal allocation of resources. But while the marginal cost of reproduction of an innovation may be zero, the cost of initial creation may be very high. These costs have to be recovered. Once the knowledge of the innovation is in the public domain, there is little chance of appropriating returns from it. Therefore, social welfare can be maximized in a static sense, but dynamic efficiency for future creativity will be wiped out. In such an analysis, the cost of the original is important. Copying software or photocopying books permits knowledge acquisition at less than the cost of purchasing the original. This reduces the number of originals sold and inflicts economic harm on the producer. In the long run, producers may respond by raising the price of the originals. In this case, copying makes both producers and consumers worse off. The implication is that the interests of the producers and consumers diverge significantly. In reality, copying increases as the price of the original is raised. It will then be in the interest of the producer to keep the price lower and use marketing techniques to sell more originals. This is what U.S. publishers of textbooks have done over the years by producing or licensing low-cost copies of American textbooks in Third World countries to reduce the economic effects of indiscriminate copying. Even this preventive measure did not stem the growth of illegal copies.

## Theoretical Basis

IPP is designed to ensure quasi-rents or monopoly profits to the producers and put a damper on copying. The copyright or patent confers economic incentives on the owner of intellectual property by limiting competition. The form of monopoly varies between patents and copyright. Patent protects the invention, whereas copyright protects the expression of an idea and not the idea itself. Each of these is

intended to balance the social costs and benefits.

Technological advances in computerization have enabled the producers of software to put encryption devices or technical methods to safeguard their originals. Such protection raises the price because costs are higher, or alternatively if copying can be technically prevented, lower prices may be a viable option. Even with such safeguards, computer crime is prevalent and "hackers" are able to attack networks with in-built security. For example, in 1987, a group of West German students broke into the Space Physics Analysis Network of the United States. This network developed by NASA connects research centers throughout the world. Despite the level of security, this group of hackers penetrated the system and implanted "Trojan horses," that is, programs that allow rights to unauthorized users. The hackers themselves admitted the infringement after they realized that detection procedures were underway and their position had become vulnerable. The security system of the Digital Equipment Corporation's computers has since been made more stringent.

It is obvious that technological change is speeding faster than the legal structure that governs it. The product's life cycle is becoming shorter, undermining the system of IPP. Voice publishing is a new industry that will create problems of copyrights. It provides user-friendly access to data bases by telephone. There is no need to understand computers. As a mechanism for imparting information, voice publishing is as important as the printing press. Telsis is one of the leading U.K. manufacturers of voice-publishing technology. Intelligent digital systems have contributed to the expansion of this technology. The computer recognizes certain key words from the caller and gives an appropriate response. The calls can be made at premium rates and are likely to bring in \$100 million a year. The revenue is divided between the service vendor and the telephone company. *The Financial Times* supplies business information through voice publishing. Marconi, a subsidiary of GEC, manufactures the digital equipment and plans to exploit the potential of speech-independent systems for accessing data bases. With such a technology that requires no identification of the caller or user, the data base provider assumes the responsibility for providing copyrighted materials. While at present such vice-publishing data bases can be accessed only within the country, there is potential for international usage also. Restrictions on copyrighted materials stored in such data bases will negate the value of using the technology. Closed user groups like multinational corporations will use such a system for transborder data flows. Detection and monitoring of infringement of copyright will be too costly in economic and social terms and will far outweigh the benefits. Freedom-of-information rights will be negated if these costs are incurred, and enforcing copyright laws on

voice-publishing technology may prove counterproductive.

The only alternative to monitoring usage is to make data base information available at a fixed price. Such a price can cover the costs of communications and data storage (which are declining) and provide royalties to copyright holders of information. It is possible that users may value the information differently, in which case price discrimination can be adopted based on demand elasticities. Even so, it is possible for users to download an entire data base and then resell portions of it. The copyright problem would then become more complex. However, the cost of continued upgrading of the data base may prevent such practices.

If the data base information is used as a building block for the creation of new information, then restrictions on its use would generate inefficiency in the process of new knowledge output. The problem in such a case is one of balancing the need to liberalize building upon previous knowledge as against the need to encourage initial creativity. If, however, the data base is for a closed user group such as a multinational firm, then all employees will have free use of the data base in order to create new information. Another form of internalized use of copyrighted work would be the outright purchase of the right to use copyrighted materials. If there are no close substitutes available, the price will be high. The ex ante solution to such a problem can be a price that not only rewards the creator of information in the past, but rewards future creativity also. In other words, a price that serves as an incentive to future knowledge creation would be fair and affordable for further innovators.

Unauthorized duplication of software is another hazard created by rapidly advancing technology. The computer itself has the in-built capability to copy software without detection. Unauthorized software duplication has an impact on the publishers' profits. There has been a growing infringement of software publishers' copyrights as the computer industry expands and diversifies. Despite the copy-protection devices used by software publishers, 50 percent of all microcomputer software in use in 1986 has been pirated. In 1986 major software publishers began removing copy protection from their products. Yet computer crimes are on the increase and unauthorized copying is illegal, because software is considered a creative work worthy of protection under the copyright law.

The economic impact of software duplication on market forces and on suppliers, needs to be considered before a decision can be made on whether such unauthorized copies increase the profits of the publishers or harm their interests. Johnson (1985) assumes that unauthorized copies are equal in value to originals, that the marginal cost of unauthorized copying varies between copiers, and that the marginal cost

of an unauthorized copy is higher than the marginal cost of producing an original. These assumptions impose limitations on the application of the Johnson model to computer software. Generally, the quality of the copy is below that of the original. Software used to create unauthorized copies is widely available, and the cost of an unauthorized copy is only the cost of the diskette, which is well below the producer's marginal cost, which includes documentation and product support (Benham and Wagner 1987).

If a group of software users decides to purchase one original each and then exchange these for copying purposes, the exclusion principle bars nonmembers of the club from the privileges of exchanging and copying software. In the Benham-Wagner model, it is assumed that the quality of the copies is not as good as that of the original and that this quality declines as membership increases. It also assumes that the cost of unauthorized copies to the club members is less than the purchase price of the original. Despite the disadvantages of poor quality of software copies, which gets worse with the growth of membership, such clubs generate increased sales, which may not have taken place if copying were successfully prevented. This in turn means that it is possible for the publisher of software to get increased revenue from clubs by charging different prices to different users. Club users could be charged higher prices, but only if nonmembers can be excluded. Producers cannot use price discrimination if nonmembers cannot be excluded from copying. The problem of free riders cannot be avoided. If there are barriers to entry to the club, then the market will be characterized by monopolistic competition. In this case, software publishers will not lose revenue if they can raise prices to cover the cost of copying.

Another innovative technology that challenges the privacy of proprietary information is the storage and exchange of financial data through electronic funds transfer. SWIFT represents an exclusive club of member banks which exchange financial funds through electronic networks. The problem of privacy arises in the case of new technology that permits access to private data. The integrity of the banking system determines the confidentiality of government, business, and individual financial transactions. Therefore, the software used by banks for inputting such information on individual accounts should be protected under strict copyright laws. If such software is pirated or broken into, financial losses will be heavy on a global scale. To avoid such a contingency, membership fees of SWIFT are much higher than the marginal costs of interbank data transfers, and the software program is not open to use by an individuals except the operators of the system. In this case, the patent of the hardware and the copyright of the software are closely guarded. If a few key elements in the program were altered, there would be economic upheaval, but it increases the possibility for computer crime.

When the United States amended its 1976 Copyright Act, it explicitly granted copyright protection for computer software. The amendment involved the definition of a computer program and limitations on exclusive rights. A program written with a readable source code (FORTRAN, COBOL) was implicitly covered under the act. But a program written with object code or machine-readable language is directly processed by a computer and the enactment had to be explicit. In the case of Apple vs. Franklin Computer Corporation, the First District Court ruled that the object code is not readable by persons and therefore is not copyrightable. This was reversed in the Court of Appeals. Technology has had diverse impacts on the copyright act in that decisions for protection have varied.

### The TRIPS Agreement under GATT

During the Uruguay Round of the General Agreement on Tariffs and Trade, negotiations on trade related intellectual property is known as TRIPS. It is widely believed by technologically advanced countries that strong intellectual property rights benefit all countries regardless of their stage of economic development. However, the rise of information-based technologies have altered the nature of competition and negated the concept of comparative advantage. Information technology is vulnerable to imitation which is why innovators need domestic and international measures to protect their investments (Reichman, 1933). Market access to intellectual property for developing countries was the focus of negotiations in the TRIPS Draft Agreement within GATT.

Both the U.S.A. and Europe have imposed unilateral trade sanctions on those countries that have infringed intellectual property protection. The Super 301 Clause was imposed on India, Korea, Brazil for such infringement along with warnings issued to China and Thailand. Under the TRIPS agreement, the social costs of increased market access to be offered in agriculture and textiles in return for protection of intellectual property rights in advanced countries. The United Nations Conference on Trade and Development did a study in November 1993 on the implications of the draft TRIPS Agreement for developing countries which would compete in an integrated world market. Simultaneously other regional trade agreements like NAFTA are also concerned with harmonization of patents and copyrights. This study suggests that developing countries will have to rely on their own skills for acquiring technological innovation in a post TRIPS environment. The Draft TRIPS agreement required members of the GATT to protect products obtained from a patented process irrespective of whether it is in the field of technology or whether the products are imported. Even those countries that had not adhered to the Paris Convention after

1967 will be obliged to adhere to the TRIPS Agreement under the new GATT charter. Developing countries are given five years transition period to conform to international standards. However, these restrictions are counteracted by the prospect of higher investments by foreign companies in those countries that adhere to the TRIPS Agreement. The net social costs will depend on the incentives to domestic innovators such as the construction and use by Indian engineers of remote sensing satellites, the use of which result in foreign exchange earnings from sales of frames from the activities of the satellites in competition with LANDSAT and SPOT.

Favorable prospects for some developing countries in the software sector arise from low labor costs, and a fairly adequate supply of software programming skills (see Jussawalla, 1992). As more emerging countries enter into digital and broad band technologies, market niches will open up for them to supply customized software and create export opportunities. Governments will need to stimulate such activity in the software sector. It must be noted that copyright laws cannot directly protect program function or basic components of user interfaces so that copiers can defend their activities even if there is legal protection. Since there is a lack of consensus over the Draft TRIPS agreement, developing countries can feel free to develop their own legal practices. Therefore the agreement under the new GATT charter leaves many uncertainties for both developed and developing countries in the area of copyright protection.

Because of technological progress software copyright laws are in confusion. In some cases, judges have refused to grant copyright protection to how programs look and act on a computer screen, holding that the software's utilitarian nature falls outside the category of artistic expression covered in copyright laws in the United States (Waldman 1988). In other disputes, jurists have extended copyright protection to the "total concept and feel" of programs. Apple Computer took this stand in its suit against Microsoft and Hewlett-Packard Co. Apple's copyright law suit is seen as an effort to lock in a technical lead in software in that it is indirectly challenging the efforts of its biggest rival, IBM, to incorporate fancy display graphics similar to the popular Macintosh. Many computer suppliers view Apple's efforts as an attempt to suppress competition and stifle the growth of graphic standards in the computer industry.

This suit is as much a problem of technology as of copyright. It cuts right to the heart of the most crucial dilemma facing the computer industry, which is the conflict between protecting innovation and the need to follow industry standards. Although inventions and inventors have to be protected, the law has to be flexible enough to promote evolution and competition within the industry. Too extreme protection of intellectual property would have a negative effect on improvement of products and standards. Too little

protection has a negative impact on incentives for invention. The regulators must find the right balance. Rapidly changing technology should be in the public domain, rewarding the inventor by higher prices and government subsidy. In the United States copyrightable material is limited to expressions that may not be derived from common ideas. Therefore, Microsoft and Hewlett-Packard argued that any similarities between their software and Apple's are attributable to the common notion that each program is intended to make computers easier to use. Ambiguous decisions are given in different cases. In 1987 the Atlanta federal court ruled in the case of *Digital Communications v Softklone Distributing Corporation* that copyright protection must be applied to "the placement, arrangement and design" of words on a computer screen. After this decision, the defendant reprogrammed the screen displays and marketed basically the same program.

In transborder trade and exchange of information, protection becomes even more difficult than in a given domestic situation. Most countries in Europe had amended their laws three times before 1987 to keep pace with changing technology. In particular, this is true of Sweden, the Netherlands, Denmark and Austria. The common characteristics are that they cover a wider range of products, hence simplifications of laws is aimed at; a greater amount of differentiation of sectors for data protection; a trend in favor of self-regulation; and an increased use of civil sanctions as a means of enforcing protection.

As Japan's technology catches up with America's, scientific knowledge has begun to flow in both directions. In an article entitled "Who Are the Copycats Now?" *The Economist* (May 20, 1989) cites data to show that Japan is no longer merely a borrower of other people's technology. Payments made by Japan for purchase of foreign technology have risen over the past two decades from \$2.7 billion in 1970 to \$3 billion in 1985 at constant prices. But in the 1980s Japanese firms have also begun to earn handsome sums in the same way. By 1985 Japanese inventions accounted for 31% in communication equipment and 33% in office computing. There are problems with measurement of the relationship between innovative technology and the establishment of intellectual property rights. The fact remains that as a country becomes more self sufficient in technological prowess, its imports decline and Japan has a surplus in royalty and payment fees in several products like textiles, chemicals, iron and steel and automobiles. It also is pouring more investment in non-military R&D. In design and production of 4 mega bit dynamic random access memories (DRAMs), Japan is competing vigorously with few competitors in the world. This DRAM design and production has formed the memory for the next generation of computers.

U.S. companies are beginning to exercise wider curbs on pirating of some technology but by no

means all. Taiwan and a few other nations have begun to clamp down. After the incident with Apple Computer Inc., Taiwan decided to move away from being the world's pirate capital. China is now providing protection from piracy of imported computer software. In May 1989 a Chinese delegation signed a bilateral agreement with the U.S. Trade Representative to cover computer software by law. China was accused by U.S. computer manufacturers as being the most rampant violator of copyright and even after the agreement was signed, the piracy of computer programs continues. However, Brazil and India have also been marked for infringement under the 1988 Omnibus Trade Act.

Over the last decade there has been an increasing growth in the volume of intangible services exchange at a global level, and many of these services embody intellectual property. A report to the U.S. Trade Representative in 1988 estimated that out of total sales of \$1,114 trillion of information-intensive products in the United States in 1986, 50 percent were directly affected by intellectual property rights. The highest concentration was in computer software and the entertainment industries. Worldwide losses due to inadequate intellectual property protection were estimated at \$23.8 billion in 1986. U.S. firms incurred identification and enforcement costs for global protection amounting to \$271 million in 1986, about 1.14 percent of infringing sales. Whereas these costs appear small as a percentage of sales, in absolute terms they contributed to the U.S. balance-of-payments deficit of about \$40 billion in 1986.

The GATT framework is geared to trade in raw materials, manufactured goods, and merchandise. It has shown no inclination to cover a growing and dynamic part of international trade which is composed of services in general and information services in particular. Even after the commencement of the Uruguay Round of GATT, the focus has been on short-term issues of infringement and dumping in the context of copyright and trade agreements. It may be useful, therefore, to distinguish between the traditional and new forms of intellectual property.

The failure of countries to protect the intellectual property rights of each other's citizens and corporations has to be rectified by an international organization like GATT, failing which several types of losses will be incurred by the originators and might serve as a disincentive to trade in intellectual-property embedded goods and services. Some of these losses represent transfers of intellectual property from legitimate producers to infringers and consumers. To some extent these losses are manifested in the world economy, inasmuch as counterfeit products are considered good substitutes for legitimate products by users, so that there will be losses in sales revenues of firms. These diminishing returns to producers reduce the incentives for investment in new products that can be copyrighted. This involves a loss of social welfare

because new products will be available in smaller numbers in the future. The same principle applies if such infringement affects the goodwill of the company whose copyrighted product is subject to violation. This is considered as economic harm to the exporter and creates a negative effect on the exporting country's balance of payments.

Losses emerging from international trade in copyrighted products increase because the technology available to infringers, such as computer networks, modems, audio and videotapes, very small aperture terminals for receiving data from satellites, and videotext equipment, like Minitel, all offer greater opportunities for the free flow of information-intensive products. Exercise of control over such free flow in favor of copyright protection is frowned upon by political activists who consider such control a denial of individual rights. The political, economic, and technological interests involved in the provision of intellectual property goods and services that are tradeable are less institutionalized and more flexible. While there is competition for the global market among producers and vendors, the outcome becomes uncertain in light of the copying facilities available at low cost on a worldwide scale.

### Software Protection is Eroding

The field of copyright law is quite fickle. The judiciary in the United States is narrowing software copyright protection. For example, in 1992 in the case of *Computer Associates vs. Altai*, the judge flatly rejected previously held rulings that copyrights protect both the structure of a computer program and its lines of written code. In the case of *Altai*, it is not a copyright violation. In the case of *Whelan vs. Jaslow* in 1986 the U.S. Court of Appeals ruled that the basic structure of a computer program cannot be copied. In 1990 in the case of *Lotus vs. Paperback*, the district court in Boston ruled that software makers cannot copy screen layouts, menu sequences and commands. But in the case of *Apple vs. Microsoft and Hewlett-Packard* in 1992, the district court in San Francisco ruled that only specific screen elements are copyrightable, not the overall "look and feel." In 1990 *Lotus* sued *Borland* for illegally copying commands, menus, and sequences of 1-2-3. As the law gets narrower programmers in corporate research departments from Armonk to Nagasaki will be able to steal the work of those who innovate. However, in a similar case of *Sega vs. Accolade*, the judge made *Accolade* pull of six computer games when *Sega* charged they had been copied. As such, there is uncertainty in protection of computer software.

It is internationally known that California's Silicon Valley is the bulwark of cutting-edge technology and science that keeps America competitive in trade and defense. But in 1993 when the FBI did

a study of 73 countries to find out which countries were pirating high-tech innovations from Silicon Valley, it found that 57 countries are acquiring copyrighted technology. Asian governments and multinationals, particularly in Japan, Taiwan, and South Korea attempt to pirate Silicon Valley secrets (*Far Eastern Economic Review*, February 17, 1974, p.28). The United States has not been particularly strict about industrial espionage and it is estimated that \$1 billion a year is lost from Silicon Valley companies through software piracy alone. The International Trade Commission puts the figure for all industrial theft from U.S. companies at between \$40 billion and \$50 billion which is 40% of the U.S. trade deficit. Industrial espionage and software theft are too difficult for law enforcement agencies to investigate and prosecute specially if friendly governments are involved.

Increased international competition in computerized, value-added services and products embodying copyrights will lead to a greater incentive for newer forms of research dissemination and thereby reduce the demand for protection of copyright in trade. The degree of competition for supplying copyrighted products and services internationally will determine the degree of liberalization of rules governing such trade, thereby making it less cumbersome for GATT to negotiate multilateral agreements.

With most computers attached to the world's high-speed telecommunications network, and through integrated systems digital networks (ISDN), intelligent terminals will be found on millions of office desks and in many homes linked to each other. In such a case, the information in a computer file will either take the form of a "club good" (explained earlier) or a public good with no exclusion. When such a file enters the trading system and is accessed across territorial boundaries, at what point a tariff or nontariff barrier can be raised becomes debatable. Within such an electronic trading system, in which pricing is practically nonexistent, the designing of an appropriate royalty system is next to impossible. The only time a charge could be effectively levied upon would be copiers is when there is a user willing to pay for getting the material out of the system. Therefore, liability for copyright is incurred within the computer network itself. Physical control of the material is required to prevent reproduction. Computer copying is easier than photocopying, which makes evasion of royalty payments equally easy.

The only other alternative for protection of copyright is through the communications industry. The vendor of a database can do no business if he does not sell the data. To make his database more competitive, the vendor has to update his information faster than his rivals or offer unpublished content. In the absence of agreed definitions and in view of exchange-rate fluctuations, many businesses do not bother to keep a record of their trade in information services or are unwilling to disclose data regarding purchases

and sales. The common carriers and the multinational corporations are unable to account for the various types and densities of traffic being transmitted over leased dedicated circuits.

The problem for GATT is accentuated by the fact that the ITU's International Consultative Committees have developed necessary standards for interface among computers and between computers and satellites that have enabled speedy extensions of networks across national boundaries. The reason for the problem is that a trade agreement under GATT could lead to additional rules over telecommunications providers even though the agreement is intended to liberalize the situation. As GATT becomes involved in telecommunication services, it will have to coordinate its activities with ITU. What then is the common ground between trade in services and telecommunications? Governments generally intervene to a greater extent in services than in goods (Richardson 1988).

Liberalization through GATT should cover access to domestic markets, but this has to be balanced with the policy objectives of national governments. The concept of trade in services recognizes that the establishment of a commercial presence and direct foreign investment may be vehicles for the delivery of a service across national frontiers. The temporary movement of business persons across borders may become necessary for trade in services to take place. The key underlying principle for trade in services is "national treatment," which means that domestic and foreign firms will be treated on the same basis.

Therefore, reaching any consensus in GATT on new trade rules for computer networks inevitably will mean that policymakers will lose their power to design domestic regulatory policies that meet their unique national requirements. The consensus will depend on the ability of governments to adjust their own policies to suit international requirements. For this purpose, both GATT and ITU will have to allow for a preconsensus phase to harmonize regulations in member countries.

The significant point that emerges is that if adequately and effectively protected, intellectual property will promote international trade and transfer of technology. If it is not effectively protected, then it is better to permit free access to information despite the fact that intellectual property is the basis for international competitiveness. At present, owners of intellectual property find themselves encumbered by laws and regulations limiting market access and repatriation of profits (Keidanren 1988). GATT's role should be the reduction and eventual elimination of trade distortions due to the absence of a settlement mechanism for intellectual property disputes.

The present international regimes for protecting intellectual property rights that is, the Berne Convention, the Paris Convention, and the Universal Copyright Convention, have not reduced the extensive

losses to industry worldwide. The conventions were never intended to be used as enforcement mechanisms for intellectual property rights and have not provided bilateral or multilateral dispute-settlement provisions. The United States uses section 301 of the Trade Act of 1988 to encourage countries to improve their protection of intellectual property rights. The European Economic Community (EEC) instituted proceedings against Indonesia for record piracy and withdrew Generalized System of Preferences (GSP) privileges from Korea for discriminatory intellectual property protection for European companies.

In the ultimate analysis, even with a GATT charter on IPP, the effectiveness of the system will depend on how individual owners of intellectual property will have to monitor markets and detect infringement. However, it is obviously impossible for the owner of copyrighted literary works, scientific information, and computer software to monitor their piracy in a global market where transmission is discrete over computer networks. No matter how stringent a code is devised under GATT's IPP, its enforcement will depend on national governments. The United States and Japan have adopted sui generis forms of chip protection. The Council of Europe also adopted a directive in December 1986 for the legal protection of topographies of semiconductor products. WIPO has prepared an international convention under which semiconductor integrated circuits could effectively be protected through the national laws of treaty members. Continued innovation in this industry is threatened by the pirating and copying of layout designs. The technology of pirating is so low-cost that it is difficult to prevent its use. But R&D investment in developing an efficient design involves considerable investment. Front-end costs are so high that piracy inflicts economic harm on the person or firm that originally produces the design.

Likewise proprietary information is also being considered for protection under GATT. This is the information generated by businesses or individuals that is required by a government to be disclosed as a condition for registration of a product, including secret technical know-how and records of secret business information. In the United States the freedom of information law requires disclosure of such information in part to the public or to environmentalist groups in Japan. Such information is disclosed as a part of product registration. All such information needs to be protected according to the proposed GATT principles.

The U.S. Copyright Office ruled in June 1988 that computer software copyrights also protect the way information is presented on a computer screen. This helps companies that, like Apple and Lotus, find their products appearing in rival programs. Conflicts emerging from copyright protection have an impact on trade rules, as witnessed by the European Economic Community's trade sanctions against Korea for

refusing to extend the same protection for intellectual property rights that it accords to the U.S. This means South Korea will pay an additional 5 percent customs duty on its exports to the EEC, costing the country \$50 million extra each year. While economists continue to debate whether IPP reduces or enhances competition, the justification to uphold it lies in the fostering of innovation.

But cultural differences make trade distortions difficult to ease in the realm of IPP. For example, the U.S. system sets up a legal monopoly to give the innovator and his or her company a chance to obtain a comparative market advantage. The Japanese system, on the other hand, is aimed at avoiding conflict and promoting cooperation, which is part of the Japanese culture. Cross-licensing is a disadvantage for small companies competing with large ones (*Wall Street Journal*, July 12, 1988, p. #27). Therefore, the United States and Japan have formed a working group to review U.S. complaints about infringement. Similarly a copyright agreement emerged on May 17, 1988, between European, U.S. and Japanese industry representatives to stop the theft of intellectual property. Their recommendations to the GATT, if adopted, will go a long way in reducing international trade distortions.

There are potential difficulties in achieving an intellectual property code in the GATT. The first concerns the issue of standards setting. GATT has not traditionally been a standards-setting body. It has relied instead on national treatment and most-favored-nation (MFN) principles to achieve its goals. National treatment achieves nothing in the absence of standards. For that reason, the United States has stated its intention to bring standards-setting duties, particularly in the industrial property area (patents), to the GATT.

Preliminary recommendations from a number of business organizations suggest that standard negotiations in the industrial property and copyright areas should not rely exclusively on existing WIPO conventions or the UCC. Instead it has been argued that countries use the GATT negotiation opportunity to build a consensus for stronger, more uniform principles and standards. This process must include safeguards, however, to ensure that existing standards are not reduced. Once these principles and rules are established, negotiators must then determine how they will interact with existing intellectual property conventions. The relationship between GATT and WIPO must further be clarified. The United States, of course, must also confront the possibility that consensus standards might conflict with - and thus require changes in - U.S. law. Although the standards issue poses many difficulties, it also holds great promise for improving world protection.

Intellectual property rights also pose a conceptual problem for GATT. Since its origin after World

War II, GATT has been in the business of breaking down barriers to trade to create a level playing field for all countries. Intellectual property rights in some sense do the opposite. Whatever one thinks about their legitimacy, intellectual property rights establish special privileges, indeed monopoly privileges, for a selected few. This constitutes a rather dramatic shift in orientation for GATT and makes it all the more pressing to establish how intellectual property protection is in the interests of all members and of the global economic system.

This brings us to the most difficult problem confronting supporters of a GATT code for intellectual property rights - how to convince all concerned that such a code is in their interests. Not all, of course, accept the economic rationales for intellectual property rights. The South, or underdeveloped countries, in particular raise serious questions about protection of technologies that promote social welfare.

Similar differences occur over copyright protection. The developed countries have acceded to some cultural and developmental arguments and priorities by permitting, in effect, global "fair use" clauses in the Berne Convention and the Universal Copyright Convention. Commercial pirating remains rampant, however, and many in the developing world still view such activities as legitimate in a developmental context.

Neither side, however, has amassed much evidence to support its claims, and it is unlikely that these arguments will ultimately determine the fate of a code. Arguments and divisions of this sort do, however, illustrate one important reality about the coming negotiations. An intellectual property code cannot be successfully negotiated outside the broader goals of the Uruguay Round.

Professor Jagdish Bhagwati, who served as an aide to Arthur Dunkel at GATT believes that agreements made on intellectual property and services may have pushed the GATT toward success (*The Journal of Commerce*, Nov. 14, 1993). In principle the TRIPS agreement and the Telecom Annex were accepted by negotiators much earlier than the other parts of the Services Charter. These preliminary agreements reconciled serious points of confrontation between developed and developing countries. With emerging trade blocs like NAFTA and AFTA, intellectual property agreements will have a greater impact on international trade. However, the fact remains that it is an issue that eludes monitoring and enforcement and tips and balance in favor of free flow of information globally.

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