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Intellectual Property in the Western Hemisphere

Robert M. Sherwood

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INTELLECTUAL PROPERTY IN THE WESTERN HEMISPHERE

ROBERT M. SHERWOOD*

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* A consultant and author specializing in the economic implications of intellectual property for developing countries. The author wishes to thank Dale Weigel of the Foreign Investment Advisory Service of the World Bank Group for permission to adapt for use here portions of a paper written in analysis of the influence of intellectual property in the electronics industry of a developing country.

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I. INTRODUCTION

Bright minds with inventive capacity are present everywhere. Whether their work is encouraged or frustrated, and whether the country benefits from their activity, will depend heavily on the nation's intellectual property infrastructure.

Case One: In the 1940s, Ecuador's intellectual property system was too weak to deserve much attention by its citizens. An Ecuadorian engineer then studying automobiles invented an improved transmission. He met an executive from General Motors and described his new technology in detail, without considering the intellectual property ramifications. His information must have been quite useful to General Motors because a new Buick was sent to him in gratitude for his disclosure. Had the inventor thought to obtain a patent or to disclose his invention as a protected industrial secret, he might have subsequently owned many Buicks or even a portion of General Motors.¹

As developing countries in the Western Hemisphere upgrade their intellectual property protection, the resulting benefits will become more evident to many local interests. As appreciation of these benefits grows, the view of intellectual property increasingly will be that of a critical part of the national infrastructure for the competitive twenty-first century.²

Analysis of intellectual property policies in the Western Hemisphere is timely, not only because important reforms mandated by the World Trade Organization's Agreement on Trade-

1. This case and those presented later were identified by the author during interviews in the indicated countries.

2. See generally Carlos Primo Braga, *Trade-Related Intellectual Property Issues: The Uruguay Round and Its Economic Implications*, World Bank Discussion Paper No. 307, World Bank (1995).

Related Aspects of Intellectual Property Rights (TRIPS)³ must take effect by January 1, 2000, for most developing countries, but also because nations are shifting the control over economic decisions from the state to the private sector. The relentless pressure of new technology surging through global markets creates greater competition among global regions and blocks. The attempt to create a free trade arrangement for the Western Hemisphere, which has been named the Free Trade Area of the Americas (FTAA),⁴ is in part an attempt to address this global phenomenon.

This Paper offers a policy analysis in this global context. It comments briefly on the relationship between investment and technology, then notes the role intellectual property plays at various stages of industrial activity, using the electronics industry as an example. A summary of the intellectual property systems in selected countries helps assess their ability to stimulate private investment in new technology. This assessment is then correlated with options for possible FTAA intellectual property arrangements. Suggestions for the conduct of those negotiations are offered, and the importance of judicial systems for reliable intellectual property protection is noted. The Paper concludes with further case examples.

II. INVESTMENT: DRIVEN BY TECHNOLOGY

Twenty years ago foreign investment was the leading actor on the international business stage, and technology played a supporting role. The image itself was static. Today, however, the image is dynamic, and it is technology which drives investment. Technology surges forward, subdivides into new streams, and darts off suddenly in new directions.⁵ To think primarily of investment today is to circumvent some core issues.

3. Agreement on Trade-Related Aspects of Intellectual Property Rights, *opened for signature* Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, Results of the Uruguay Round vol. 31, 33 I.L.M. 1125 (1994) [hereinafter TRIPS].

4. Summit of the Americas: Declaration of Principles and Plan for Action, Dec. 11, 1994, 34 I.L.M. 808 (1995).

5. See generally John A. Armstrong, *Trends in Global Science and Technology and What They Mean for Intellectual Property Systems*, in GLOBAL DIMENSIONS OF INTELLECTUAL PROPERTY RIGHTS IN SCIENCE AND TECHNOLOGY (Mitchel B. Wallerstein et al. eds., 1993).

Networks of companies now manufacture some of the world's products. Technology, not ownership, is the key to these networks. The automobile industry is an example of this phenomenon. The American, European, and Japanese auto companies practice different approaches to sourcing, but all look to places like Mexico and Brazil for components. The same is true for television sets, computers, and chemicals, although smaller countries are often involved. These sources are chosen partly because of competitive costs. However, the ability to meet technical specifications for components and supplies is a key factor and is becoming increasingly so for future sourcing choices.

Small new companies produce other modern products. These companies spring up quickly and some go on to become major producers. Computing and biotechnology are examples of these fields in which emerging technologies, not investment choices, are the driving force. Stated another way, money now flows to support good new technology, rather than the reverse.

Technology itself flows or moves from point of origin to other locations. Knowledge, in one sense, knows no boundaries. There is, however, increasing awareness of a new rule of conductivity that applies to technology. Proprietary technology will move along paths where its conductivity is protected from loss. It is reluctant to flow where it is not protected. Sound protection for new technology through such devices as patents, copyright, and trade secrets enhances conductivity. This, in turn, conditions secondary investment decisions. Gaps in protection reduce conductivity for new technology.

Where there are gaps in protection, secondary protection is often sought in the form of ownership of a technology recipient by the technology supplier. Thus, ownership can become a contributor to conductivity, but the broadest enhancement of conductivity comes from a comprehensive system for protecting new technology, that is, from adequate and effective safeguards for inventions, creative expressions, and special technical knowledge.

The economic benefits that a country would derive from installing an effective system for protecting new technology are far greater than the benefits gained by not having such a system. It is sometimes observed that a poor country will do well to "steal" proprietary technology, this way at least some sort of economic activity is promoted. It may be, instead, that such a policy con-

signs that country to a perpetually low level of activity in the technology arena. There has been too little study of this question.

To frame the development question differently, it is sometimes suggested that a poor country should install an effective system for protecting new technology only when it has advanced to a higher level of capability. The issues then become whether this approach denies the very result sought and whether that country will mobilize its resources to participate in the rapidly expanding streams of emerging technology. With respect to any given technology, as well as technology in general, any country (or company) faces the choices of participation, leadership, or trying to catch up. Leadership can be costly because of the risks involved. Participation will be less costly, while perpetually catching up through copying can be very costly over time to a national economy because other opportunities are denied.

There are many areas of technology in which even a poor country can participate. Human intelligence is not the monopoly of a few nations. Indeed, bright minds are found everywhere. They are encouraged or discouraged in proportion to the national policy regarding protection for new technology. If an innovation, however modest, is not protectable, it is not likely to become a new factor in economic growth in that country. Where the incentive to invent and to market the invention is stunted, these human resources are diverted to other pursuits or they leave the country, and the country becomes further assigned to playing catch up.

The ability to participate in the rapidly expanding streams of new technology is conditioned by no factor more than by a country's system for protection of that new technology. Where protection is available, participation is enhanced. In turn, funding for the application of new technology will tend to emerge, even where it was thought no money existed.

The work of Nobel Laureate economist Robert Solow showed that the injection of new technology into an economy is the single most powerful factor for promoting growth.⁶ Professor Edwin Mansfield of the University of Pennsylvania has gone on to show that the introduction of new technology into an economy has a very high social rate of return.⁷ Their observations are only be-

6. See generally Robert Solow, *Technical Change and Aggregate Production Function*, 39 REV. ECON. & STATISTICS 312 (1957).

7. Edwin Mansfield et al., *Social and Private Rates of Return from Industrial In-*

ginning to be directed to the field of Third World economic development.

A convincing explanation is already emerging which suggests that the protection of new technology by developing countries could provide accelerated economic growth. It would encourage local people to participate in global information flows, enhance the generation of new, domestically derived technology, and, as protectable new technology is present, attract investment.⁸

A. The Electronics Industry as an Example

Many developing countries seek to promote investment in various industries. However, nonrobust intellectual property protection often undercuts their desire to do so. The connection between protection and investment can be difficult to visualize. What follows is a brief examination of this connection in the electronics industry.

The harnessing of electricity to industrial and commercial application occurred about 100 years ago. This happened with the culmination of experiments and discoveries in many countries over the prior 200 years. In this century, devices and systems that utilize electricity have proliferated, aided by a host of associated inventions and developments. Today, frontiers such as nanotechnology, superconductivity, bioelectricity, and photovoltaics hold promise of further advances.

Developments in neighboring fields such as electric cars, biologically-derived integrated circuits, and biomedical-medical advances will influence the electronics industry. Advancing techniques in fields such as micro-welding, fiber optics, thermal fixation, inks, static reduction, and digital image transmissions are intensified by global competition.

The precise direction that these factors will take in the future is unclear, however, overall change and obsolescence are quite predictable. This puts innovation, invention, and development at the center of investment decisionmaking. For a developing coun-

novations, 91 Q.J. ECON. 221 (1977).

8. ROBERT M. SHERWOOD, INTELLECTUAL PROPERTY AND ECONOMIC DEVELOPMENT (1990) (out of print); also available as PROPRIEDADE INTELECTUAL E DESENVOLVIMENTO ECONÓMICO, (São Paulo, Editora da Universidade de São Paulo (1992)); PROPIEDAD INTELECTUAL Y DESARROLLO ECONÓMICO, (Buenos Aires, Editorial Heliasta (1992)).

try, this appears to demonstrate the desirability of creating conditions for investments in the highest possible levels of technical activities, rather than simply aspiring to assembly or rudimentary production, activities that can abruptly be rendered obsolete with less scope for adjustment.

What follows is a description of what happens as ideas form into inventions and eventually result in marketable products. The description indicates the role of intellectual property at various stages along the way.

Before a new product is envisioned, many factors exert an influence. These may include market surveys, competitors' advances, increased or decreased costs of components or raw materials, suppliers' suggestions, and the like. The availability of new kinds of technology plays a role. For example, some firms will race to find ways to miniaturize their products. When miniaturization becomes possible, those firms or others will race to apply it.

At this early stage, companies often will strive to keep the direction of their plans from their competitors. Their fear is that employees will be hired away by competitors or become competitors, taking with them information which the former employer paid to develop. In this situation, the ability of a country to offer trade secret protection will play a role in promoting investment in planning for new products. This is true whether the firms are large or small, at the frontiers of their field, or out-sourcing minor components.

Theory informs the conceptualization of new products. It is vital for those involved to have reliable access to sources of up-to-date technical information. Some theories come from academic or public sources, but some come only from proprietary sources. The latter are usually available only under conditions of adequate intellectual property protection. Copyright, patent, and trade secret protection may all be involved. Again, whether firms are large or small, the influence of intellectual property protection will be felt.

Published patent applications are among the valuable sources of proprietary information. They are accessible through computer-searchable proprietary databases, which are increasingly available through the Internet, where the rules for protecting proprietary information are far from settled. Primarily, they will involve copyright protection. In the next few years, countries with enhanced intellectual property systems may find that their human

resource pool is better prepared to function in this new environment.

The design of a new product involves an assortment of skills and technical knowledge, much of which can be acquired in university courses. Experience beyond formal education is often the best teacher. For a developing country, an important question will be whether product design will be done in the country or elsewhere. The willingness to invest in design capacity will be influenced by many factors, but among them will often be the ability to maintain design secrets during and after their creation. Hence, trade secret protection will play a role at the design stage.

Where the design is incremental, protection in the form of utility models or industrial designs may be helpful in encouraging private activity. These types of intellectual property are a kind of junior patent and are relatively inexpensive to acquire and administer. They are widely used in Germany, Japan, and some developing countries. Although available in the United States, they are not widely used.

The role of patent protection at the design stage can be critical in the electronics industry. The patent forces others to design around any invention embodied in a new product. This gives the new product the advantage of not being copied immediately, which is often enough advantage to stimulate the initial investment in new product design.

Product development entails testing and making adjustments to the initial designs. Sometimes a product failure will lead to a new product or new design, or a product intended for a particular use will be altered to serve another use. During this trial and error stage, important information is often developed that would be useful to competitors. Product developers often say that knowledge of their errors can be more valuable than their successes. Obviously, if such information is gained by their competitors, it will reduce their research time and costs in the race for better products. Again, this observation is applicable whether the company is large or small. Although at times highly valuable, the technical information obtained during the product development stage is seldom protectable by patents. It will be defended largely by trade secret protection.

Preparation for manufacturing may overlap with product design and product development. At this stage, proprietary infor-

mation that is independent of the product itself may be brought into play or developed. Shifting from the drawing board to pilot scale and then to full commercial production often exposes "glitches" and "bugs" in the product design. A company may make discoveries during the manufacturing process that will benefit both other products and the new product. Manufacturing techniques and processes can be the secrets to commercial success for many products and many companies.

In many cases, patents may be available for inventions which are produced during this stage. However, much of the incremental technical patrimony of the company engaged in this stage will remain secret proprietary information for which trade secret protection is important. Often, this is the stage during which small firms are most likely to lose information which gives them a competitive advantage.

Also, in preparation for manufacturing, firms may make decisions about out-sourcing some elements of the new manufacturing process. To initiate such arrangements, it is often important for the candidate second firm to be informed about some elements of the new product or process. Agreements facilitating these disclosures depend on intellectual property protection in various ways. A patent or a group of patents will often be used to define the scope of the technology being disclosed that is to be maintained in confidence by the recipient. Trade secret protection, once again, is an important element in such disclosure agreements. If such disclosures are not buttressed by the country's intellectual property system, firms will be less willing to make disclosures or will constrain their disclosures. In a developing country this could mean that local firms are invited to provide out-sourcing for only lower level inputs, even though they may have the technical capability to perform higher level work.

Manufacturing often entails constant efforts to improve techniques and methods, reduce costs, and improve quality. These internal adjustments can be done best if all relevant employees are brought together in meetings of various types to discuss improvements. Where manufacturing or process techniques are proprietary and subject to loss to competitors, firms will be reluctant to enlarge the circle of employees with enough knowledge of the technology to make them attractive targets for hiring by competitors. In Brazil and Ecuador, for example, which have very weak protection for trade secrets, firms will frequently subdivide pro-

duction lines, even into separate facilities miles apart, and refrain from practicing the techniques of employee involvement in process improvement in order to prevent loss of proprietary technology to competitors.

Contracting out for special services, ingredients, or parts is another common aspect of manufacturing. Again, the willingness of firms to share specifications and other technical information in order to make contracting arrangements will be influenced by the ability to protect that information. Such arrangements can be made in the absence of protection, but the content, scope, and nature of the arrangements may be constrained.

Software related manufacturing relies on copyright protection or, again, in the case of most customized manufacturing software, on trade secret protection. This applies both to those cases where software is used to guide a manufacturing process, and to those cases where a product itself, such as computer hardware, involves an interface between hardware and software.

Often, in the absence of adequate intellectual property protection, firms will resort to extra legal techniques to minimize losses. These techniques produce inefficiencies and waste to a degree that reduces competitiveness. There are examples of companies that have moved ahead with the development of system controls even in the absence of strong protection for trade secrets. In some countries, they have done so in partial reliance on copyright law, which explicitly protects computer software. Such firms are usually nervous about their continuing ability to protect their controls from loss to others.

Technical support and product information today are part of the electronics industry. In some of these activities, written materials are prepared at considerable expense. In some situations, the ability to protect written materials through copyright protection is a valuable asset for attracting investment.

For example, Costa Rica is now a base for technical support service conducted via telephone to the United States. This suggests that such support could be offered for products originating in Costa Rica. Again, protection, or lack thereof, may have an influence in regard to the preparation of instruction manuals and training for telephone service personnel.

This examination of a single industry shows multiple activities with respect to which private investment will routinely seek risk reduction. The public is seldom aware of these risks, yet they have a quiet influence on investment decisions. Emphasis must be given to investment decisions by local investors. Foreign investors have more available alternatives than local investors.

B. Assessing National Intellectual Property Systems

This analysis now shifts to assess national intellectual property systems in selected countries of the Western Hemisphere. This assessment seeks to determine their ability to stimulate private investment in creating and developing new technology.⁹

After visits by the author to a number of countries for the Investment Sector Reform Program of the InterAmerican Development Bank, Foreign Investment Advisory Service of the World Bank Group, U.S. AID, and groups of private companies, a methodology was developed to assess and compare national intellectual property regimes. This methodology evolved rather naturally when people in these countries asked how their intellectual property systems compared with the systems in the other countries.

The methodology, created in response to their inquiries, involves a numerical system based on a score of 100 from which points are subtracted to reflect those aspects of a country's system which are likely to create concern for private investors. Eight components of each country's intellectual property regime were examined, and each component was assigned a weight, as follows:

Enforcement	25
Administration	10
Copyright	12
Patents	17
Trademarks	9
Trade Secrets	15
Life Forms	6
Treaties	6

9. See Robert M. Sherwood, *Intellectual Property Systems and Investment Stimulation: The Rating of Systems in Eighteen Developing Countries*, 37 IDEA 261 (1997) (also forthcoming in Spanish translation from *Editorial Heliasta*, Buenos Aires, Argentina). See also Belay Seyoum, *The Impact of Intellectual Property Rights on Foreign Direct Investment*, 31 COLUM. J. WORLD BUS. 50 (1996).

These weightings then served as the maximum number of points which could be subtracted for each component.

Within each component, subcategories were assigned a range of points. For example, up to twelve points could be subtracted under "Enforcement" if the country's judicial system exhibited a lack of judicial independence, and up to seven points if judges lacked basic knowledge of intellectual property concepts. Up to three points could be subtracted under "Life Forms" if there was no statutory basis for the protection of new plant varieties. Up to twelve points could be subtracted if no statutory basis existed to protect "Trade Secrets" and up to two points under "Treaties" if the country has not adhered to the Patent Cooperation Treaty.

The results of the negative point allocation are subtracted from 100. A bonus of up to three points is awarded and added to the difference if a country exhibited public commitment to robust protection. The result determines the country's ranking. For purposes of further comparison, this rating system was also applied, with some reservation, to the TRIPS Agreement and Chapter 17 of the North American Free Trade Agreement (NAFTA).¹⁰

The study goes further to present a tentative correlation between the author's findings and the results of important research conducted by Edwin Mansfield for the World Bank.¹¹ Mansfield's study sought to determine the degree to which intellectual property influences direct investment, joint venture, and licensing decisions in sixteen countries. He surveyed a random selection of American, German, and Japanese companies from six industries. They were asked to consider only their best and latest technology and to examine the importance of intellectual property at the following five levels of activity:

research and development
manufacture of complete products
manufacture of components
rudimentary production and assembly
sales and distribution outlets

10. See *infra* Parts VI-VII for the results.

11. See Edwin Mansfield, *Intellectual Property Protection, Foreign Direct Investment, and Technology Transfer*, Discussion Paper No. 19, International Finance Corporation, World Bank (1994); Edwin Mansfield, *Intellectual Property Protection, Direct Investment, and Technology Transfer: Germany, Japan and the United States*, Discussion Paper No. 27, International Finance Corporation, World Bank (1995) [hereinafter Discussion Paper No. 27].

Mansfield found that the higher the level of technological activity, the greater the importance of reliable intellectual property protection for investor decisions. For example, about twenty percent of the American companies were troubled by weak protection at the level of sales and distribution (with the food industry companies showing greatest concern) while some eighty percent expressed concern at the level of research and development. From his findings, Mansfield concluded that:

[I]n relatively high-technology industries like chemicals, pharmaceuticals, machinery, and electrical equipment, a country's system of intellectual property protection often has a significant effect on the amount and kinds of technology transfer and direct investment Also, when a variety of relevant factors are held constant in an econometric model, the effects of such protection on U.S. direct foreign investment are substantial and statistically significant.¹²

A tentative correlation between the Mansfield study and the author's numerical rating system is shown at Figure One at the end of this Paper. The correlation is not particularly robust, in part because of regime improvements in some countries during the time lapse between the two studies, and in part because of the limited number of countries common to both. Still, this attempt at a correlation may be useful for suggesting the level of protection required to fully stimulate private investment toward the creation and development of new technology.

It appears that at levels of protection below that of the TRIPS Agreement, countries are able to encourage sales and distribution, assembly, and component manufacture. However, protection that stimulates private investment in higher technological activities appears to be viable only at a level somewhat above the protection offered by the TRIPS Agreement.

On reflection, that observation makes sense. The TRIPS Agreement was forged in the context of a trade negotiation. The negotiators were seeking to ameliorate trade friction, not to stimulate investment.

Moreover, it is noteworthy that the investment commonly required of the three lower levels of activity, that is, of sales and dis-

12. Discussion Paper No. 27, *supra* note 11.

tribution, assembly, and component manufacture, is in major part the financing of inventory. The investment can be withdrawn fairly easily. There may also be somewhat less incentive to upgrade human resources at these levels of activity.

At the upper levels of technological activity, the investment required is normally of a more durable nature. The facilities that result are substantial and have low salvage value. At the same time, there are stronger incentives to train employees to high skills levels.

Whether local investors are even more sensitive than foreign investors to the consequences of intellectual property protection is a subject deserving greater attention. One might wish that the Mansfield survey could be extended to companies in some of the developing countries included in his study. Yet, the results might not be instructive. Several studies of Brazilian firms have found managers largely ignorant of what intellectual property is and what it might do for them. Thus, they are unable to comment on how it affects their decisions. This is not surprising. If the system does not work, why would managers take the trouble to learn about it?

This is not to say that a weak intellectual property system has no effect on investment decisions. The business manager is only aware of the lack of protection and proceeds accordingly. As noted in the discussion of the electronics industry, the manager may proceed to do things in an inefficient or second-best manner. For example, firm size may be influenced. Employee training may suffer. Out-sourcing may be limited. Each of these phenomena, and others, deserve more thought and research.

III. THE TRIPS AGREEMENT, COMPARATIVE EFFECTS

The comparative effects of diverse levels of intellectual property protection deserve more thought and research than they have received to date. The World Intellectual Property Organization (WIPO), in response to a decision of its General Assembly in October 1995, commissioned four studies on the financial and other implications of the implementation of the TRIPS Agreement for developing countries. These studies were completed in September 1996.¹³ As they become more widely available they will contribute

13. See Robert M. Sherwood, *The TRIPS Agreement: Implications for Developing*

to our understanding of the comparative effects of diverse levels of protection.

For analytical purposes it may be useful to identify various economic activities which implicate intellectual property issues and then characterize the possible influence of various levels of protection on each. The matrix shown on the following page is one attempt to do this.¹⁴ The matrix distinguishes between three levels of protection: nonrobust systems, trade-enhancing systems, and investment-stimulating systems, and relates them to nine selected economic activities which involve technology. The influence will be conditioned in each case, of course, by such factors as country size, industrial maturity, and the openness of the economy.

Although over-simplified and tending to focus on the influence of patent and trade secret protection, the matrix helps to suggest some of the dynamics occasioned by shifts toward higher levels of protection.

An extended analysis of these comparative effects is found in the author's numerical rating system study noted below in footnote thirteen.

Brief comments on three of the activities follow the matrix: human skills development, the agricultural base, and university technology.

Countries, 37 IDEA J.L. & TECH. 3, 1997. The other three studies are available from the World Intellectual Property Organization, Geneva, Switzerland.

14. This matrix is taken from Sherwood, *supra* note 13, at 6.

MATRIX OF COMPARATIVE EFFECTS
FOR DIVERSE INTELLECTUAL PROPERTY SYSTEMS

NONROBUST SYSTEMS	TRADE-ENHANCING SYSTEMS = TRIPS	INVESTMENT- STIMULATING SYSTEMS
innovation is random and sporadic	innovation achieved in some areas	innovation is planned and constant
low prices of some pirated products	higher prices of those products	prices lower than trade model
little proprietary technology acquired	some proprietary technology acquired	more proprietary technology acquired
limited human skills development	some human skills development	higher skills developed
little private investment in technology	private investment in low technology	private investment in high technology
agricultural base- old science	agricultural base- some new science	agricultural base- best new science
industrial base- sales & distribu- tion and assembly	industrial base- some "pirates" displaced by imports	industrial base- new high tech industries spring up
little risk capital	some risk capital	optimum risk capital
university technology theoretical, unused	some university technology transfer	more university technology transfer

A. Human Skills Development

Human skills development will tend to be nominal in nonrobust system environments. Those who try to advance technology usually work in isolation. Owners fear that employees who learn too much about the firm's technology will be hired by competitors or will leave and become competitors. This undermines efforts to train employees. In Brazil, for example, many companies are reluctant to adopt the Japanese techniques for process improvement and quality control because that would acquaint most of the work force with all aspects of the company's technology. While this would serve to advance internal attention to improvements, it would also increase the number of candidates for "predatory" hiring and consequent loss of proprietary technology. In a nonrobust system, the means for stopping such losses are quite limited.

Under a trade-facilitating intellectual property system, there may be some means to deter loss of technical knowledge through employee transfer. Much depends on whether the nation's judicial system takes trade secret protection seriously. The breadth of compulsory licensing provisions is also highly relevant.

After a nation's intellectual property system has crossed the threshold into robust protection, the willingness of companies to invest in employee development at higher skills levels becomes almost imperative.

B. The Agricultural Base

The agricultural base of many developing countries remains a significant portion of the economy, and yet the application of new science to agriculture is usually stunted by weak protection for intellectual property. In countries with nonrobust protection for seeds and transgenic life forms, the agricultural sector commonly relies on the ministry of agriculture for new science. Private initiative also has remained quite limited.

Much of the new science relating to agriculture involves the tools of biotechnology. The TRIPS Agreement does a poor job of ensuring protection in this area. Thus, a trade-facilitating system will offer some benefit from a modest increase in protection, but it will tend to be tentative and limited.

A robust system of intellectual property protection will offer reliable protection for both the traditional farm research methods and the biotechnology tools of genetic engineering for both plant and animal life forms above the level of the microorganism. The protection is extended to aquaculture which, thus, gains stimulation for private investment.

C. University Technology

University technology is a latent resource for developing countries. Whether deliberately or serendipitously derived, the small quantity of technology generated in the universities of developing countries often fits local conditions particularly well. Normally, universities are not prepared to develop raw technological advances into practical applications for commercial use, and, thus, private companies generally do this. However, in the absence of reliable protection, private companies will not usually seek access to university research results and apply their skills and resources in order to serve the public through the marketplace.

The interest of private parties in gaining access in order to serve the marketplace will be in proportion to their ability to safeguard the technology from appropriation by others. In nonrobust systems, university research often heavily emphasizes theory, and any practical results are seldom used. In a trade-facilitating system, enough protection becomes available that those close to the university setting, often the professors themselves, may attempt to commercialize new inventions. When the intellectual property system becomes robust, more transfers to a wider range of private parties take place, thus, contributing to the wealth of the country. By one estimate, university-originated technology contributed about \$5 billion to the gross national product of the United States in 1992.

IV. WITHIN THE FTAA

The possibility of creating a free trade area for the Western Hemisphere has raised the possibility of creating arrangements for common treatment of intellectual property protection for the hemisphere. The design of the FTAA has begun, with 2005 set as the target date for its completion.

The process of designing intellectual property arrangements within the FTAA offers a variety of rich opportunities.¹⁵ Already, the heads of the registries from many of the Hemisphere countries have met on numerous occasions. They have exchanged information and learned from each other. Useful cooperation in small matters has begun. Expanded cooperation among these administrators might prove to be one of the most beneficial consequences of the FTAA negotiation, even if no agreement is ever reached. It is interesting to consider how much can be done to improve intellectual property protection throughout the Hemisphere without recourse to a treaty.

Officials functioning at a policy level in the Hemisphere countries who are charged with developing the negotiations for a treaty have also met and become familiar with each other. Perhaps a hundred people constitute this group. Some countries have deep staffing for this role, while others have less. Preliminary views have been expressed, but they are a mix of early positioning and varying degrees of knowledge.

If these negotiations aspire to anything more than simple affirmation of the TRIPS Agreement, they will break new ground. Few officials, if any, are as yet prepared for them. Very few of the officials who negotiated the NAFTA intellectual property accord remain in their same government posts. Most of those involved in the TRIPS Agreement negotiations during the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) have moved on as well.

A. *The Search for a Context*

Thus far, the FTAA negotiations lack a clearly articulated context. Will the FTAA seek only lowest common-denominator tariffs and accompanying trade facilitation standards, or will it seek deeper integration of some kind? Will it give attention to encouraging investment? Will technology as such receive specific treatment?

The answers to these questions will strongly condition the intellectual property negotiations. However, definitive answers may

15. For an extended discussion, see Robert M. Sherwood & Carlos A. Primo Braga, *Intellectual Property, Trade, and Economic Development: A Road Map for the FTAA Negotiations*, NORTH-SOUTH AGENDA PAPERS 21 (North-South Center, Univ. of Miami 1996).

not be forthcoming until much later in the overall FTAA process. In the meantime, the intellectual property negotiators could nonetheless establish their own working context. There are several options to consider:

1. The Hemisphere is a group of countries among which trade is to be encouraged. Intellectual property protection would then be designed to merely facilitate trade, as in the TRIPS Agreement.

2. The Hemisphere is competing in a global setting where advancing technology drives economic growth. Intellectual property would then seek to stimulate private national investment, as well as foreign investment, in the creation and development of new technology.

3. The Hemisphere is primarily a collection of individual countries with trade and technology objectives set by each. Intellectual property would involve only unilateral decisions as to levels of protection, keeping TRIPS Agreement commitments in mind in the background.

It is useful to consider which of these understandings of the Hemisphere will best advance the interests of the Hemisphere in coming decades. Factors to evaluate in determining the appropriate context and the congruent intellectual property arrangements would include the following, among others:

1. What is the current level of scientific and technical cooperation and training within the Hemisphere? Is money well spent training Brazilian science researchers in the United States if on return to Brazil there is little private capital to support research? Do Asian students trained in the United States anticipate better career options than Latin American students?

2. How does the level of intra-Hemisphere trade today compare with trade levels in other comparable regions? Is trade enhancement alone the aim of the FTAA? What would broader aims imply for the nature and level of FTAA intellectual property protection arrangements?

3. What do business and research circles consider to be the important differences between intellectual property protection that facilitates trade and protection that stimulates investment? What does the economic literature have to tell us, if anything?

4. The business community in many countries of the Hemisphere has had only very limited experience of reliable intellectual property protection, except perhaps for trademarks. For example, there is little knowledge of protecting industrial and commercial secrets. Patent protection has tended to be weak. Copyright protection for new forms of expression is only beginning to be experienced.

5. Establishing reliable and useful arrangements for intellectual property protection within the Hemisphere may involve greater tensions between different interests within countries than between one country and others.

6. Throughout the Hemisphere, an underestimated amount of individuals aspire to be creative and inventive and are routinely frustrated by the lack of protection for their work. They represent a pent-up demand for protection. Although they represent the future, their voices have not yet been heard.

7. Private risk capital will invest in the creation and development of new technology in virtually all corners of the Hemisphere once reliable protection for intellectual property becomes available. This is true of both formal and informal risk capital.

8. Given reliable intellectual property protection, virtually any country can participate in the world's rapid technological advances. Small increments of technical advancement will boost economic growth. Large companies will grow from micro-companies. The agricultural base of countries will benefit from the application of new science.

These factors deserve reflection, discussion and, in some cases, research. The role of intellectual property in economic de-

velopment has been debated at a fairly superficial level; but there is little empirical research on the subject and, therefore, a great deal we do not know.¹⁶ The experience of some of the countries of the Hemisphere which have undertaken intellectual property system reforms offers excellent material for study. For example, the effect of the Mexican reforms in 1991 and 1994 on Mexican interests should be examined. The adjustments in Chile in 1991 and in El Salvador in 1993 deserve attention. Most of the other changes in the Hemisphere in the last decade have not been of sufficient magnitude to warrant "before and after" assessments.

Anecdotal information suggests that those countries in the Hemisphere which provided reliable copyright protection for software were rewarded. In Argentina before 1992, Brazil in 1987, Mexico in 1991, and Colombia in the early 1990s, the provision of protection, whether through court decisions, by executive decree, or full scale legislative reform, encouraged local programmers to write software and make it commercially available. As a consequence, local companies had a local resource at their disposal that produced applications and customized programs of considerable value. In Brazil, cases arose where, in the absence of effective protection for trade secrets or patents, manufacturers sought to protect themselves against loss of process technology by having it embodied in software for which copyright protection was available. In contrast, Costa Rica delayed copyright protection for software until 1995. Prior to that change, a promising local software company was nearly forced to move to Miami because of the lack of protection for its products.

B. Suggestions for the Process

Some steps the intellectual property working group has already taken have begun creating FTAA arrangements for intellectual property. For example, it has assembled a collection of the relevant laws and treaty memberships of the Hemisphere countries. This is undoubtedly useful as a rudimentary baseline of information.

16. Carlos Primo Braga & Carsten Fink, *The Economic Justification for the Grant of Intellectual Property Rights: Patterns of Convergence and Conflict*, in PUBLIC POLICY AND TECHNOLOGICAL INTEGRATION (Frederick M. Abbott & David J. Gerber eds., forthcoming 1997).

Several suggestions are offered for furthering the process. They proceed along two tracks and are intended to help shape the intellectual property arrangements without prescribing their content. One track *seeks to expand* the base of information within which negotiations will proceed. This track would probably engender little controversy. The other track *would identify and evaluate* specific issues which may present difficulties. This track *would* approach controversial matters in a noncontroversial manner.

1. Track One: Information Gathering

It is salient to observe that for any intellectual property system to function well, it is critical that the judicial power provide reliable support for intellectual property rights. Specific information could be gathered and evaluated regarding the interface between each national intellectual property system and the relevant components of each national judicial power. It would be useful, for example, to identify those countries that have created specialized courts for intellectual property matters and learn from their experience. Chile, Panama, and Peru are gaining valuable experience in this area. Mexico and Brazil are currently contemplating such courts. A study of the experience of the specialized courts in Germany and the United Kingdom would enhance our understanding of the utility of these courts.

Information regarding the training of judges in matters of intellectual property, the process for judicial appeals, the role of administrative appeals, the availability of provisional measures to promptly halt infringements, the powers available to prosecutors and police, the types of actions and penalties that private parties may pursue, and the level of criminal penalties are further examples of the types of information which would be useful.

For any industrial property system to function well, it is important that public administration provide for the effective creation and maintenance of industrial property rights. An inventory of the capability of each nation's patent and trademark offices could point to areas for cooperation and greater congruence.

For example, it would be useful to collect the experience of the countries that utilize semi-autonomous institutes for their public registries, among them Argentina, Brazil, Costa Rica, Mexico, and Peru. What are the characteristics of these registries? How are

they governed? How do their budgets work in practice? What are their employment practices? How are capital expenditures financed? What has worked well and what has not? The design of a relevant questionnaire format would itself be a useful exercise.

In addition, it would be useful to gather the experience of the country registries with regard to the examination of patent applications and the use of the Patent Cooperation Treaty. Does it make sense for small countries to attempt, as some do, the technical examination of applications? Would they be better off to recognize the high administrative costs of conducting examinations and rely instead on examinations conducted in the internationally recognized examination centers designated by the Patent Cooperation Treaty? Indeed, might it make sense for them to grant patents in reliance on patents granted by any of these international centers?

The TRIPS Agreement requires protection for integrated circuit lay-out designs by the year 2000.¹⁷ If a copyright-style of statute provides this protection, no public administration is involved. If, instead, a patent-like approach to protection is taken, then a new burden will be placed on public administration.

The business community has already gained experience of multicountry intellectual property systems within subregional trade agreements in the Hemisphere (and elsewhere) which could be useful to designing arrangements at the hemispheric level. Some of those agreements exceed the TRIPS Agreement requirements.¹⁸ An inventory of this experience could be obtained and evaluated.

The subregional agreements themselves exhibit diversity. The Andean Common Market Decisions, which go back to 1975, have in recent years shifted from weak to more reliable protection. In general, NAFTA provides the highest level of protection, although there are points which fall below the TRIPS requirements. The Group of Three has adopted some, but not all, of the NAFTA provisions. The South American Common Market (MERCOSUR) pact does not yet embody a full set of intellectual property arrangements. The trademark protocol, which has not yet taken effect, was fashioned in response to business concerns. Protocols re-

17. See TRIPS, *supra* note 3, arts. 35-38.

18. For a partial inventory of these agreements, see Sherwood & Braga, *supra* note 15.

garding the other forms of intellectual property protection are under informal preliminary discussion.

A survey of business experience under this diversity of accords could shed useful light on the scope and content of arrangements for the Hemisphere. Designing such a survey would be a challenge matched only by the challenge of administering it.

2. Track Two: Specific Issues

We can anticipate that certain issues will prove particularly difficult for the negotiators. Among them will be the approach to compulsory licensing, dependent patents, information network systems, industrial secrets, transgenic life forms, and geographic exhaustion of rights.

For each of these issues, specific information gathering and cross-country analysis would illuminate the probable economic impact of various options. The experience of countries outside of the Hemisphere could be useful. This information gathering and analysis could be identified and initiated as a service to the negotiations.¹⁹ It would help to take the deliberations beyond simple comparison of existing statutes.

Approaches to compulsory licensing, for example, might look at the origins of the concept at the time the Paris Convention was created in 1883 and its antecedents. The continuing lack of understanding as to what constitutes an "abuse" and what would constitute a justification for action or inaction could be addressed.²⁰ The policy contradiction implicit in a compulsory license deserves careful thought.²¹ It would also be useful to appreciate the uncertainty produced by the time gap between the moment when investors make investment decisions and the time, usually years later, when officials decide whether to grant a compulsory license.

19. For a preliminary identification and analysis of specific issues, see Sherwood & Braga, *supra* note 15.

20. Article 31 of the TRIPS Agreement does not address these underlying issues. See TRIPS, *supra* note 3, art. 31.

21. See Sherwood & Braga, *supra* note 15, at 9.

V. CONCLUSION: PENT-UP DEMAND

How many Buick transmission improvements that people invented in the Hemisphere have never seen the light of day? How many people today are capable of contributing to their country's national technological base and national wealth but are frustrated by a lack of encouragement which reliable intellectual property protection provides? A few examples will help to illustrate the problem.

Case Two: In Brazil, the BioRio Foundation was organized in 1990. Its purpose was threefold: to build a bridge between the university and business communities; to provide incubation for micro-enterprises in the biotechnological sciences, and; to upgrade human skills in this field. BioRio was established on the campus of the Federal University of Rio de Janeiro with the promise of financial support from four government agencies. World Bank loans provided much of the original financing for these sources of funds.

The organizers of BioRio stated at the outset that to become viable, it would be vital to attract private risk capital within five years. They traveled to Europe and the United States to invite such investment. They also approached many Brazilian firms with a potential interest. However, they attracted no private capital. This confirmed their suspicions that private risk capital would not have much interest in investing in the BioRio research programs if the expected results were vulnerable to copying by others.

In 1993, the Brazilian government faced a financial crisis and sharply limited the funds promised to BioRio. By then, five microcompanies had been formed within the incubator, but none had a commercial product ready for market. Thus, without adequate income, BioRio faced the prospect that it would be forced to abandon its objectives.

One of the micro-companies was about two years away from producing its expected new product. However, in the moment of crisis, it felt it could quickly produce an interim product, a simple biological diagnostic product for hospital use. This interim product was an immediate success, and within six months

amounted to nearly \$1.5 million in sales. This provided critical financial relief for BioRio.

However, two multinational hospital product companies spotted the new product and realized it had no patent protection. They quickly introduced their copies of the diagnostic product and took over the market. At the time, Brazil's patent office was refusing to process patent applications in this area of technology. Today, patent protection for some aspects of biotechnology is becoming available under Brazil's new patent legislation, and private investors are now taking interest in BioRio.

Case Three: In 1992, a small group of Brazilian legislators visited the United States to learn more about how intellectual property can contribute to technical innovation and economic growth. They visited a private venture capital firm on Wall Street. The president of the firm told the legislators that when her firm receives requests for risk capital investment, the first thing she examines is whether the applicant company has a patent or an equivalent means of protecting its core technology from imitation or theft. If such protection is not available, she rejects the application immediately.

Case Four: In 1996, a Nicaraguan man noticed that many melons rot in the fields before harvest. He invented a small stand like an enlarged golf tee with extra legs which he can insert under the melon as it grows. The "melon saver" is made of low cost molded plastic. Although the patent law of Nicaragua is antiquated and defective in many ways, the man obtained a patent there for his invention. He also obtained a patent in the United States. The availability of a patent for this simple device was enough to encourage him to bring his idea into reality. The melon yield in Nicaragua stands to improve as a result.

Case Five: In its formative years, Brazil's leading risk capital company, BrasilPar, aspired to imitate successful venture capital firms in Europe and the United States. However, an insufficient number of applicants stymied its effort. Experience in developed countries suggested that about 100 applicants were needed in order to find as many as five promising candidate companies.

Beyond this, the companies that did apply for investment funds invariably refused to disclose their technology. Thus, BrasilPar was unable to make well-informed investment decisions since it could not learn enough about the nature of the technology on which the applicant company was basing its future. This led BrasilPar to suspect that many of these tiny companies had no valuable technology, but instead were committing a fraud to obtain money from BrasilPar.

After reflection, BrasilPar realized the companies were afraid to disclose their technology for fear BrasilPar would itself steal the technology. BrasilPar then sought legal advice. Could they offer the applicant companies a written promise not to steal their technology in order to encourage them to disclose their secret information? Their lawyer replied that they could offer a written promise, but that if one of BrasilPar's own employees then stole the technology and passed it to others, there would be no effective means under the law of Brazil to adequately protect the secret technology from some other company using it. That remains largely true today under Brazil's new law. As a result, BrasilPar has shifted away from risk capital investments to other lines of financial activity.

Case Six: In Peru, a rustic man invented a new kind of harp. The instrument won a prize in Peru and then a second prize in an international competition sponsored by the World Intellectual Property Organization. Fortunately, the man obtained a patent in Peru with support from the patent office of the National Institute for the Defense of Competition and Protection of Intellectual Property. He has received more orders than he can fill himself, and apparently a tiny new business has been born.

There are many more cases which illustrate the benefits of reliable intellectual property protection. They also point to an underappreciated phenomenon. There are numerous people who represent a latent demand for reliable intellectual property protection in virtually every country of the Hemisphere. They are not organized and their voices are not yet heard, but they represent an important potential for the future of the Hemisphere. The FTAA's ultimate approach to intellectual property protection can support or discourage this potential.

VI. TABLE ONE

NEGATIVE POINTS SUBTRACTED

Overview Matrix

(in alphabetical order)

	Enfc	Adm	Cpyr	Pat	Tmk	TdSc	LiffS	Trts	Total
(of possible)	(25)	(10)	(12)	(17)	(9)	(15)	(6)	(6)	(100)
Argentina	21	3	4	13	0	13	4	3	61
Bahamas	0	1	4	3	3	0	5	4	20
Barbados	0	9	7	10	1	0	6	0	33
Brazil	13	8	4	10	1	11	5	0	52
Chile	9	5	2	5	1	10	5	2	39
Costa Rica	9	0	0	16	3	12	4	2	46
Ecuador	20	7	5	9	3	7	3	4	58
El Salvador	21	8	5	1	7	10	3	2	57
Guatemala	25	8	10	14	7	12	6	5	87
India	12	3	5	11	4	8	6	5	54
Mexico	19	2	7	1	0	3	1	0	33
Nicaragua	22	5	10	15	7	14	6	4	83
Pakistan	9	6	8	14	5	1	2	6	51
Panama	17	5	3	7	8	12	6	6	64
Paraguay	21	5	10	15	7	12	6	2	78
Peru	14	1	3*	9*	1*	7	3*	2	40
S. Korea	7	2*	3*	6*	1	5*	2	2	28
Uruguay	7	2	8	14	5	10	4	2	52
TRIPS	18	3	4	10	0	3	4	4	46
NAFTA	12	5	2	5	0	5	3	1	33

* tentative

VII. TABLE TWO

COUNTRY RATINGS

reciprocal of points subtracted (Table One),
plus "bonus" points for General Public Commitment
(in numerical rank order)

Bahamas	$60 + 1 = 61$
South Korea	$54 + 1 = 55$
Barbados	$54 + 0 = 54$
Mexico	$48 + 1 = 49$
NAFTA	$80 + 3 = 83$
Chile	$72 + 2 = 74$
Peru	$67 + 2 = 69$
TRIPS	$67 + 2 = 69$
Costa Rica	$67 + 1 = 68$
Brazil	$61 + 1 = 62$
Pakistan	$49 + 0 = 49$
Uruguay	$48 + 0 = 48$
India	$46 + 0 = 46$
El Salvador	$43 + 0 = 43$
Ecuador	$42 + 0 = 42$
Argentina	$39 + 0 = 39$
Panama	$22 + 0 = 22$
Paraguay	$17 + 0 = 17$
Nicaragua	$36 + 0 = 36$
Guatemala	$22 + 0 = 22$

VIII. FIGURE ONE

TENTATIVE CORRELATION OF RATING SYSTEM
WITH MANSFIELD 1994-95

<u>Rating System</u>	<u>Mansfield Findings</u>
100	
(75-90+ = US, EU, Japan)	
83 Bahamas	
74 South Korea	
	? <— research and development
69 Barbados	
69 Mexico	
68 ^^NAFTA^^	
62 Chile	
61 Peru	
	? <— complete manufacture
55 ^^TRIPS^^	
54 Costa Rica	
49 Brazil	
49 Pakistan	
	? <— components manufacture
48 Uruguay	
46 India	
43 El Salvador	
42 Ecuador	
	? <— assembly
39 Argentina	
36 Panama	
	? <— sales and distribution
22 Paraguay	
17 Nicaragua	
13 Guatemala	
0	

Note: The scale increments are not evenly distributed and the position of the Mansfield categories relative to the scale calibration is done by inference and is approximate.