New Theory Of Conductivity In Licensing

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Safeguarding new technology enhances conductivity of technology, resulting in benefits to developing country

Twenty years ago foreign investment was the leading actor on the international business stage. Technology played only a supporting role and intellectual property, if it even got into the program notes, was probably on the back page. The image, moreover, was static.

Today, new technology flashes across the screen. Now the image is dynamic and always changing. Technology streams ahead, proliferating, subdividing into new streams and sub-streams, sometimes sharply shifting vector to coalesce with other streams and leaping ever forward. Investment, it seems, tries hard to catch up and intellectual property races along with the new technology, guiding its speed and direction.

TECHNOLOGY NETWORKS

Some of the world's leading products are now made by networks of companies. Technology alliance, not ownership, is the key to these networks.

The auto industry is an example. The great automobile companies of Japan, Europe and the United States all practice different approaches to out-sourcing, but all look to places like Mexico and Brazil for important components. Those sources are chosen partly because of competitive costs, but the ability to meet technical specifications for those components is the key, particularly for future sourcing choices.

Ownership of these sources is less vital than technical compatibility. The ability of source companies to anticipate and meet the future needs of user companies is increasingly at stake for countries like Mexico and Brazil. It is interesting that two major Brazilian auto parts suppliers recently established research centers in the United States and West Germany so their researchers can follow more closely the rapidly advancing technology requirements of user companies.

Other modern products are produced by small, new companies. They spring up quickly. Some go on to be major companies. Computing and bio-tech are examples. Microsoft and Genentech are frequently mentioned, but there are many others. These fields are driven by emerging technologies, not by investment decisions.

The electronics industry is another case where trans-border sourcing is common. The ties that bind suppliers and users are founded in technology alliances, rather than equity relations. The users typically furnish the suppliers with specifications and technical assistance, including quality control techniques. The electron guns used in French television tubes are produced in Minas Gerais, Brazil, to specifications provided by a division of RCA. Computer hard-disk drives made in Korea find their way into PCs made in California.

In these and countless other such linkages, the point I want to make is that technology finds locations of opportunity and then money flows to support good, new technology.

TECHNOLOGY FLOWS

Technology is embodied knowledge. Knowledge, in one sense, knows no boundaries. Much of it flows unobstructed from one country to another. To make a point, let me suggest there are three types of technology flows.

First, there is what might be called "media technology." It is knowledge gained from headlines and newsstands, from conferences and grapevines. Table-top fusion was announced from Utah recently. Every physicist in the world immediately found his thinking shifted. That is vital knowledge, freely available. Recall the initial announcement of fiber optics. Or suppose an announcement from Perth, Australia, were made next week that sand has been successfully used to produce air conditioning. Today we laugh, next week we start thinking about it. Specialized journals do much the same for many fields of technology. The ability of media technology to influence the direction of thought and research is powerful.

Second, there is the transfer of proprietary technology. In this type of flow we can identify knowledge to which access may be gained only by direct communication with the source which generated it. It flows through licenses and sales or simply through confidentiality agreements. Typically, patents or copyrights are involved as the vehicles for the transfer and there is often a high degree of reliance on safeguards for trade secrets. To visualize the typical transfer we may think of blueprints, specifications and plant visits.

Part of this second type of technology flow may be practical know-how, knowledge anyone might gain by working on something or thinking about it. Often it is the

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result of trial and error. The best way to acquire such knowledge, nonetheless, may be to learn from someone who has already spent time thinking or working on that technology. Members of the Licensing Executives Society are of course, dedicated to transfers of this general type of proprietary technology.

Third, knowledge diffusion is implicit in or embodied in products themselves or in the instructions (including advertising) for the product. The introduction of such products into a country is a type of technology transfer. For example, it was not evident when personal computers first came out that they could do many things quickly and well. The first PC makers had to educate the public. Take another example. As soon as Toyota introduces a new model, General Motors conducts elaborate reverse engineering and learns how automotive technology has advanced. General Motors does not then copy Toyota through exact imitation, particularly where patents are present, but tries to move beyond from the new base of knowledge.

Another example, for which I thank Meyer Burstein[1] of York University in Toronto, is found in medicine. Before its discovery it was not obvious, for example, that the oxamniquine molecule had beneficial effects in treating schistosomiasis. So too for the treatment of many other diseases. To market these medicines, the originator places the molecule in public hands and teaches the doctor population the mechanism of its positive effect on human health. The knowledge of doctors is frequently advanced beyond what they learned in medical school.

THE ROLE OF "CONDUCTIVITY"

I make an obvious point in noting that *proprietary* technology tends to flow only to countries where it is protected. That is to say, those who create proprietary technology tend to refrain from placing valuable technology in environments which do not have adequate safeguards for it in terms of patents, copyrights, trade secrets and enforcement systems. This might be called "the first rule of technology conductivity."

The "second rule of technology conductivity" is far less obvious and yet potentially just as important. It is this. Media technology flows and diffusion technology flows, as I call them, have only a limited impact in countries that do not have adequate safeguards for intellectual property. These flows may lead to curiosity, but they do not stimulate technicians and scientists to undertake serious work to nearly the degree as in countries with adequate intellectual property protection. This is not because such technology does not reach developing countries. It is because, in contrast with countries with strong protective systems, less can be done with such technology once it arrives, even though it is free of cost and conditions. A series of examples will illustrate the "second rule."

I visit Brazil with some frequency on behalf of the Brazil Ad Hoc Group.[2] This group of major U.S. and European companies is seeking to understand the thinking behind Brazil's intellectual property system and to learn the impact of that system on Brazilian activity. In talks with some 30 Brazilian businessmen, I have learned that nearly every one of them has suffered losses when key technical employees have been hired away by competitors, taking proprietary technology with them. Under Brazilian law (and the laws of most Latin American countries) little can be done to stop this.

The result is fourfold. First, local businesses are very reluctant to spend much on internal research and development, knowing that if they do, their results will be easily lost to their competition. Instead, they wait to see if they can hire technical people themselves. This leads to the second result. Technical employees position themselves to be hired away to higher salaries rather than do serious research in-house. This leads to the third impact. Career paths are distorted in Brazil (and elsewhere). The best scientific and technical minds do not see business careers as a viable option. They either leave the country or work in government research institutions which have their own limitations. The fourth effect is that a very low percentage of GDP is spent on research. In Brazil the figure is only about .6% for a recent year,[3] quite low compared with the United States and other developed countries.

Also during my visits to Brazil, I spoke with a company owner in Belo Horizonte. He wanted to acquire very specific technology for metal etching with electronics application. Then he realized that if he reached an agreement to learn from a foreign source, he stood the risk of losing that technology through employee departure to a competitor while still being obligated to pay for the acquired technology. He dropped his plans.

The point of these examples is that as media technology or diffusion technology reaches Brazil (or Mexico or elsewhere), even though free of cost and conditions, the recipients of such information are unlikely to be willing to do much with the knowledge they receive. They know that if they undertake serious work which further advances that technology, they would risk its loss. In consequence they do little with the new knowledge, even though freely available to them. Studies by Jorge Katz of Argentina and others seem to confirm this.[4]

The reason Mexican technicians or Brazilian technicians are less likely to spring into action when they hear air conditioning is done with sand is not that they are intellectually inferior or that their laboratory facilities are insuffient. It is that any attempt they make to convert media technology or knowledge diffusion technology into proprietary technology is likely to be defeated by lack of adequate legal safeguards for their new resulting technology. In other words, conductivity is impaired by weak protection for intellectual property.

INTELLECTUAL PROPERTY

Intellectual property is two things. First, it is ideas, innovations, inventions, creative expressions — the result of essentially private activity. Second, it is public willingness to

bestow the status of property on those inventions and expressions — through copyright, trade secrets, patents, mask works, trademarks and industrial design protection.

This public willingness to confer the status of property goes back even to ancient times. A slave in early Rome, for example, could not take his master's secrets to another owner without a severe penalty. The remarkable industrial growth of Europe since 1750 certainly sprang, in part, from the institution of copyright and patent protection.[5] The United States Founding Fathers wisely institutionalized human creativity with a constitutional mandate to protect creative expression and inventions.[6]

When Japan opened to the West, teams were sent to find the secret of the strength of the United States and the European countries. They returned with this interesting report: "We have looked about us to see what nations are the greatest, so that we can be like them. We said, 'What is it that makes the United States such a great nation?' and we investigated and we found that it was patents, and we will have patents." The report led to establishment of virtually full-blown patent protection in Japan about 1890.[7]

There is a remarkable degree of similarity among the legal systems of these countries. Details differ, but fundamental principles of protection are evident in each system and they have guided creation and administration of their systems which confer property status on inventions and creative expressions. I'll return to these *fundamental principles.*

BENEFITS TO DEVELOPING COUNTRIES

The benefits of protection for creative expression and inventions are so well established that they are largely taken for granted in the developed countries. Yet, curiously, many people assume that protection is not beneficial for developing countries. This assumption seems to have been made without careful thought about the potential of sound protection for development and business growth in these countries. Very little has been written about the intersection of intellectual property and economic development theory.

Lack of protection is said to help domestic infant industries get started. They may get started but they may also get stuck at the starting point. As I mentioned, the research I have been doing in Brazil for the Ad Hoc Group has uncovered the widespread loss of valuable technology when key technical employees are hired away by the competition. I suspect the pattern is similar in Mexico and other developing countries.

It is often noted that multinationals do little research in Brazil (and Mexico). But the same appears to be true of domestic companies and for the same reason, namely that money spent on R&D becomes a gift to the competitor, and so gifts are not made. I have come to believe that if strong protection for the results of research could be relied upon, research would flourish with dramatic results for the economic growth of Brazil, Mexico and other developing countries. New technology would be introduced into their economies giving a strong boost to real economic growth and providing a high social rate of return.[8]

It has become clear to me that the economists have a fertile field for new insights waiting for them as they begin to seriously examine the positive role which intellectual property can play in enhancing business growth and economic development in countries like Brazil and Mexico. They are just beginning to examine this subject area. My research tells me they will find that adequate protection for new technology can have a profoundly positive effect.

THE UNITED STATES VIEW

Let me offer you at least a few words expressly about "The United States point of view." I will speak of two things: partnership and intellectual property in the GATT.

First, it is clear that as the trading and technology alliances of the world sort themselves into new patterns — through events like "Europe 1992," the Free Trade Agreement with Canada, and the emergence of the Four Asian Tigers — the relationship of Mexico and the United States is being seen more clearly as one of partnership. Mexico, in joining the GATT and in managing macro-economic policy with an even hand over the last few years — to name but two accomplishments — has clearly grown in stature. More and more people in the United States have come to see Mexico as important. Perception is catching up with reality. Trade and technology alliances spanning the Rio Grande are already substantial and will grow.

There is at the same time within the United States the appreciation that this growth potential can be even greater as Mexico moves further to install laws and practices that fully safeguard all forms of newly created intellectual property and enhance technology flows.

My second observation relates to activities in the GATT. (Let me predict, incidentally, that in the next GATT Round explicit attention will be paid to technology transfer. It is unfortunate that in the current Round it is lost in an obscure corner of the negotiations on investment rules.) The mid-term review of progress in the current Uruguay Round was completed in Geneva last week with agreement being reached on the four issues not settled at Montreal in November. In addition to agricultural subsidies, textiles and measures to deal with sudden damaging surges in imports, the delegates hammered out language which sets the direction for negotiations for the remainder of the Round on trade-related intellectual property rights, the so-called TRIPs.

The language of the agreed text is to a large degree consistent with the United States point of view. Strong language on standards and enforcement appears in the final text. This means that those fundamental principles, of which I spoke, will be articulated as part of the results of the Round. There is a misconception that the United States is insisting all other countries adopt the intellectual property laws of the United States. This is not the

concept. It is simply to urge that all nations adopt systems that produce effective protection for new technology. The test would be in the result, not in whether U.S. law has been followed. For most countries, in fact, this will probably not mean adoption of the U.S. approach. The fundamental principles might be loosely thought of as the common denominator of the protective systems of the developed countries. Those fundamental principals have served those countries well. They would serve the developing countries equally well.

THE TRADE SECRET

Let me close by returning to my theme of conductivity and talk briefly about the importance of the trade secret.

When I began, I downgraded investment and upgraded technology as the driving force on the international business scene today. At the same time I pointed to intellectual property protection — the safeguarding of new technology — as the factor that selects the locations where technology is generated and that guides the path of technology as it moves internationally.

Investment has played a role in conductivity. The parent is often more willing to pass its technology to its affiliate than to a third party in a developing country where the intellectual property protective system is weak. Yet, the affiliate is no better able to protect that technology than the local national capital company. Both suffer equally. Both react the same way. Company R&D, as I pointed out, is stifled. Training of employees is limited, career paths are skewed, interest in university research is stunted. Thus, the technology the parent is willing to pass to the affiliate is normally not its latest or most competitive.

Many of us in LES have found that the biggest gap in protection for emerging new technology in all of the countries of Latin America (and in many developing countries elsewhere in the world) centers on the trade secret. The trade secret is little known to the general public and to government officials and to most economists. By its nature it does not require a bureaucracy. No cadre of specialists is created, as is the case for the patent and the trademark. Yet there is evidence that of technology that is transferred from one point to another, as much as two-thirds is carried by the trade secret. It is the trade secret that protects a new invention while a patent application is being prepared. The trade secret protects a good deal of know-how that is gained through costly trial and error. Effective trade secret protection keeps departing employees from taking proprietary technical information to competitors.

Conclusion

In conclusion, I have tried to suggest that safeguarding new technology enhances the conductivity of technology, which in turn brings substantial benefits for economic development in developing countries. The frequently-stated, but seldom examined, idea that sound protection of intellectual property is somehow bad for developing countries deserves to be challenged. Research by economists is beginning to mount this challenge. Interest in the GATT Round will be stimulating more research. I think this is good news for all of us in LES and for the developing countries.

REFERENCES

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2. The Brazil Ad Hoc Group, which began its research and educational activities in 1987, includes AT&T, Caterpillar, Digital Equipment, Dow Chemical, Dupont, Eli Lilly, FMC, General Electric, Goodyear, Monsanto, 3M, Pfizer, Procter & Gamble, Rhone-Poulenc (provisionally), Rohm & Haas and The Wellcome Foundation. The Mexico Ad Hoc Group, a counterpart effort, began its work in 1978.

3. Mansfield, Edwin, (1989) "Protection of Intellectual Property Rights in Developing Countries," unpublished paper prepared for The World Bank, pg. 21, citing Kim, Hyunku, (1986).

4. See Jorge Katz, "Technological Innovation, Industrial Organization, and Comparative Advantages of Latin American Metal Work Industries," in Fransman and King (eds.), *Technology Capability in the Third World*, Macmilian, 1984.

5. Landes, David S., *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present*, Cambridge University Press, 1969.

6. Michael Novak, "Built Wiser than they Knew," lecture delivered at University of Santa Clara, January 30, 1987, unpublished version.

7. See Rahn, "The Role of Industrial Property in Economic Development: The Japanese Experience," 14 *International Review of Industrial Property and Copyright Law*, 1983, pp. 449.

8. I refer to valuable recent work by Prof. Edwin Mansfield of the University of Pennsylvania, and by Prof. Robert Solow, the Nobel Prize winner from M.I.T. in his 1957 study.