Basic Business in Changing World

Because of special nature of technology transfer, there is need for mutuality of understanding in world today

BY JOHN R. PEGAN*

INTRODUCTION

Urgent demands are being voiced, on both national and international levels, for improvements in education, employment and general living standard of large segments of an increasingly compressed population which, in global aggregate, rapidly is consuming the common heritage of limited natural resources. In the United States—where the rate of productivity increase over the last 10 years or so has been well behind that of other major industrial countries—we are aware, as are others, of the increasing difficulties of maintaining and improving general business level and health in the face of contracting supplies and increasing costs, tighter restrictions on expansion into certain foreign markets, and wider and more intense foreign competition in both the domestic and foreign markets for goods, services and technology. Any realistic expectation of amelioration of these diverse and often apparently conflicting supply-demand problems within a reasonable time frame must be formulated in a context of concentrated application of the full range of social, economic and political mechanisms and powers available to rational persons and enterprises, acting directly and through their respective governments in a spirit of cooperation and recognition of mutual need.

Our society has a technological foundation and framework. New technology is the maker of change in that structure. The scope, size and rate of change is directly related to the kind and rate of new technology development and application, anywhere, and the scope and rate of its dissemination. Thus, technology innovation and transfer constitute a pervasive and potentially powerful means of achieving optimum handling of remaining natural resources and maximum utilization of untapped and under-used human resources in a safe and satisfying environment. In a changing world, technology transfer indeed is a basic business. As such and because of its special nature in dealing with the technological means of production underlying the economic power of its possessors, the transfer of technology provides a prime case for the need of mutuality of understanding which promotes successful trade and commerce generally.

Many technologies, or elements of them, suitable for improvement of fundamental economic conditions in satisfaction of basic human needs, such as agriculture, housing and health care, are available from public sources. However, most industrial, state-of-the-art technologies are proprietary in nature and, in the market-economy countries, are in the hands of private business enterprises. Therefore, the supply of such technologies within and among such economies (and by their enterprises into states wherein the economy is fully or partially centrally-planned) is subject, not only to the general business and technology transfer-specific "climate" of the host market, but also to the economic conditions affecting industry generally in the supplier's domestic market and to the legal/political framework of doing business there. But in some respects, technology transfer is a very special business, unlike any other. The most fundamental, distinguishing attribute of this basic business is that it is utterly dependent on the availability of proprietary technology for transfer to others in need of it. Without the protective property rights in the technical product of intellectual effort, as afforded by patent and trade-secret laws, there is no proprietary technology and no business of technology transfer. This fundamental and unique nature of technology transfer as a business is no respecter of ideology. It is applicable whenever and wherever technology is transferred from or to any enterprise functioning under any substantial element(s) of a free-market system. Lack of understanding of, or unwillingness to recognize, this principle is considered a major factor in the debate arising from the industrialization need of developing countries of the "South" with the assistance of the technologically more advanced countries of the industralized "North".

In the United States, the evident relationship of poor productivity performance and a technological innovation rate also lagging behind past levels and foreign competition, has attracted considerable national attention. Examples of recent Congressional activity include the Small Business Innovation Research Act of 1981 (S.881) ("SBIR"); the September 1981 House hearings on human and productivity factors in innovation; revision of the Patent Statute (Public Law 96-517); and an extensive, yet unreported study by the Office of Technology Assessment on innovation incentives of the patent system. However, even in this country there remains considerable lack of understanding and differences of opinion as to the nature, function and value of intellectual property, the means to protect it, and its transfer to others, especially to foreigners. For example, analysts still disagree on such basic issues as:

*Senior General Attorney-Patents, United States Steel Corporation, Pittsburgh, PA; *paper presented at the American Patent Law Association, Inc., Mid-Winter Meeting Institute, January 1982.*

—The extent to which the patent system is needed, useful or effective to promote innovation and technology transfer;[1]
—The relationship, if any, of innovation and technology transfer to corporate size and industry concentration;[2]
—The net advantage or disadvantage of the foreign transfer of U.S. technology and other accompanying investment to the U.S. supplier, to the relevant domestic industry and labor constituencies, and, in aggregate, to the nation's general economic position;[3] and
—The actual and proper roles of intellectual property rights in marketing of the products of innovation, including the technology itself, both domestically and overseas, especially to developing countries.[4,5]

Patent attorneys and licensing managers involved daily with protection of the products of technical innovation and their transfer to others, and business executives having responsibility for protecting the investments and expanding the assets of their companies are well aware, from actual experience, of the essential role which patents and trade secrets play in successful business operations. Undoubtedly, it is a complex and difficult task to identify the many technical, economic and legal factors involved in technology innovation and transfer, and reliably to analyze and predict the respective and interacting effects of those factors in promoting or inhibiting these processes. Attempts at such analysis, especially by those inexperienced in the actual conduct of such business, can lead to misleading conclusions or to those of little relation or application to practical, day-to-day affairs. However, provision of the economic/legal/political environments, both here and abroad, within which the potential results of effective technology development, application and transfer can be obtained, absolutely demand a wider and more thorough understanding of the basic function of intellectual property rights by the affected public, by those in academia striving to inform others, and by those in government most directly responsible for creation and preservation of the legal/political conditions for promoting or inhibiting the innovation and transfer of technology.

Real-Life Factors

Perhaps the following observations concerning some basic business considerations in technology licensing risk a further confusion in the ranks of unresolved issues in this field. Hopefully, they at least will provide some flavor of the real-life factors which are involved.

To that end, these observations are drawn in part from the results of a survey of nearly 150 U.S. corporate technology suppliers (mostly having multinational interests and experience, and nearly 60% of which are among the 1,000 largest U.S. corporations) carried out, with support of the Licensing Executives Society, Inc. (U.S.A. and Canada), in an effort to improve understanding of the basic factors influencing the initiation, implementation and results of technology transfer from the United States. The many helpful contributions to that work by Dr. Norman P. Hummon, of the University of Pittsburgh, are gratefully acknowledged.

INNOVATORS—INVENTORS AND INVESTORS

The Creators of New Technology

Invention is the most critical stage of technical innovation since without such a foundation there is nothing on which to build further. Invention also is the most unpredictable component of innovation, for all new ideas come from individual human minds. Theoretically, the sources of new technical ideas are limited only by the size and quality of the technically-trained manpower pool. Creativity is the essence of invention, although type, scope and quality of education and experience most often are essential contributors to the inventive process. Environments posing technical needs are conducive to solutions ("necessity is the mother of invention"). Such environments are found principally in:

—Industrial enterprises,
—Academia, and
—Government R&D facilities.

Today, in the United States, most industrially useful technical ideas originate with inventors employed in the R&D activities of industrial enterprises, despite the fact that about one half of all U.S. R&D is underwritten by the Federal Government.[6] The bulk (about two-thirds of Federal R&D expenditures goes to defense- and space-related subjects (in contract to nondefense-oriented, government-funded R&D in other major industrial countries of the West). Industrial application of such government R&D suffers due to technical problems, delays and costs of adaptation of technology developed for other purposes, as well as to lack of needed long-range management control, for example, because of changing funding policies and practices or unattractive economics caused by patent and related property rights conditions.

There is at least some evidence that, although a greater total volume of new technology is generated by large corporations, small companies are a more fertile source of major innovations[7] produced more efficiently in terms of R&D dollars,[8] and that, in aggregate, new technology-based companies provide more new jobs than do large, mature companies.[9] In any event, the quantity and quality of new technology coming from industrial firms is highly dependent on the condition of the domestic economy and related general and industry-specific business cycles which largely determine the emphasis placed on the type and volume of R&D performed.

Academic

Although there is increasing awareness of the capabilities of the academic community as a source of new technical information, and many universities are expanding and more fully applying their R&D resources toward an income-development objective, such organizations commonly have labored under a significant degree of divorcement from the detailed problems and needs of industry, with consequent inadequate utilization of their probable potential contribution of new technical ideas of practical, industrial value.

Improved collaboration among these technological environments is being sought on many fronts, and en-

tails more and better communication and meshing of industry needs, government resources and academic capabilities in applied as well as basic research, in development of on-going programs of general and specific technical objectives, and in treatment of proprietary rights and income generated as a result of such work. Further advancement of such cooperation and consequent enlargement of the effective "mind-power" resources available to address the problems of the future are essential factors in promoting innovation and technology transfer.

Development and Commercialization of Technology

An invention rarely is immediately practically applicable to the satisfaction of human needs. Inventions nearly always must be further developed for feasible industrial use. In the technical-development phase of the innovation process, a wide variety of costly technical skills and facilities requirements are brought to bear in the refinement, modification and expansion of the inventive concept and in its tangible embodiment and testing. Thereafter, some degree of market testing usually is required which, depending on product and market characteristics, also may be extensive, time-consuming and expensive.

The development and commercialization of new technical ideas originating within existing industrial enterprises usually is carried out by the originating enterprise and financed from its general business income and borrowings. Axiomatically, healthy general and company-specific business is a precondition to maintenance of a high level of the costly activities associated with a fruitful innovation program.

New technology-based business ventures generally utilize technology created "outside" that venture, though it often is created or developed by one or more of the individuals or enterprises participating in the venture. Sourcing of funds for support of the innovation process by such ventures is more varied and often more difficult than for technology developed "in-house" by established enterprises. Such sources prominently include private savings of the venture partners and various types of specialized venture capital companies, groups or individuals.

Since the level of technical uncertainty—and corresponding risk—is greater at earliest stages of R&D, even though costs generally are lowest at that stage of the innovation process, attraction of venture capital often is most difficult for such companies just when it is most needed. New mechanisms are needed effectively to fill this gap by providing "seed money" to substantiate or strengthen the perception of technical merit and potential commercial value of new technical ideas to the point where capital necessary for implementing the full innovation process can be attracted. Perhaps approaches such as the SBIR can help fill such need, especially in case of technologies having the potential of satisfying broad or acutely-felt public needs.

In the context of either large, mature companies or small, new ones, effective and timely technical and market development may necessitate participation of several enterprises as contractors, suppliers or consultants, entailing disclosures to such "outsiders" or to the public. The need for protection of technology often is felt earlier and more urgently by individual entrepreneur/inventors and small business enterprises having more reasons impelling early disclosures of their technologies to others in order to obtain the technical and economic support needed for development and commercialization. In the long run, however, larger corporations are subject to the same fundamental need as the smaller ones for the protection providing a potential for economic advantage in a competitive market.

The usual end object of new technology development is the supply of products and services at a competitive advantage achieved by the technology's provision of:

1. Superior performance of those products or services such as:
   - Improved quality;
   - Longer life;
   - Greater availability, reliability, convenience or flexibility of use;
   - Easier or cheaper maintenance, replacement or repair;
   - More pleasing appearance, taste or texture; or
   - Reduced environmental or other safety or nuisance hazards.
2. Lower cost of product or service;
3. More efficient and/or less costly design, construction or operation of the means of production, or
4. Better procedures or techniques for the purchasing, storage, supply, maintenance, quality control, or servicing of goods and services connected with a company's business.

Thus, in addition to providing new products, equipment, facilities and technical processes, technical innovation includes development and use of new management and related practices which lend competitive advantage to the business.

Regardless of the origin of new technical concepts, the subsequent stages of careful elucidation of technical merit and potential commercial value are quite similar in nature, differing from case-to-case substantially only as respects the peculiarities of the specific technologies and markets concerned. Although the sharpened technical definition obtained by successive R&D steps correspondingly reduces investment risk, the necessity of defining the potential market for the emerging technology and the production and market supply requirements compels yet greater capital inputs with a commensurately increased need for assurance of protection of and return on that investment.

Risk Reduction

The common shift of risk reduction emphasis from the technical to the commercial aspects of innovation with progress of that process applies essentially regardless of company size or concentration in a competitive market. However, the pressure of increasing financial protection need is more keenly felt as regards technologies representing most drastic departures from the prior art and designed for new and hence least predictable markets.

The general technical field of an industry and the specific product mix of a company in that industry typically are functions of the type and rate of change of related market demand and therefore normally will be

of significant influence on the specific nature, scope and rate of innovation and on its cost as a market penetration and supply factor.

As in the case of initial stages of R&D, new ventures, without proven "track records", can be expected to feel the pressures of these innovation factors more keenly than others, whether engaged in the development and commercialization of high technologies or those of less advanced character.

LICENSING AND THE COMPETITIVE POSITION

Licensing Objectives

Why should the user of proprietary technology jeopardize the economic advantage of its possession and application by licensing the technology to others? In fact, many will not. About one-quarter of the companies responding to the mentioned survey do not transfer their technology and another 30% will transfer technology only to wholly-owned or controlled affiliates. Obviously, technology, and the commercial advantage which it makes possible in a market economy, is jealously guarded by its proprietors or most of them.

For those enterprises willing to license, technology transfer most often is conducted *ad hoc,* without a regular practice of inventory of technology available for licensing; without special organizational structure for licensing, and commonly initiated by inquiry from potential licensees. Nevertheless, when undertaken, the transfer of technology is carried out primarily to provide additional income from new markets. In over 70% of the foreign licenses reported in the survey, an important or dominating objective of the supplier was development of new business in the host country market.

On the domestic front, licenses commonly are granted to satisfy customers' multiple supply source requirements; to avoid loss of market share to existing alternative technology or to that potentially arising from innovation by unlicensed competitors; to supply a market demand unsatisfiable by the licensor's own production; in settlement of legal disputes, or other reasons. In most circumstances, licensing clearly is a mechanism supplementing the basic business objective of market participation, either indirectly through an independent licensee, or directly in conjunction with other direct investment in the concerned market.

Any sharing of an exclusive or preferred position, as derived from possession and use of technology not available to others, results in some diminution of competitive advantage, the degree of which depends on: (1) the potential for direct market participation by the technology owner; (2) the extent to which that direct participation potential is reduced by the licensed participation; and (3) the relative cost/income balance of direct vs. indirect market participation.

Presumably, those companies which refuse to license their technologies to anyone either have great market accessibility and an economic balance favorable to direct participation, or they choose to forego indirect exploitation of directly inaccessible markets for technology- and economic-protection reasons or otherwise, or they find an unfavorable economic balance for those markets in which they could license their technologies should they choose to do so. Similar considerations, with apparently different results, apparently motivate those companies which agree to license their technologies to independent third parties, and those which license only to affiliates presumably find in such approaches a satisfactory extent of participation in markets accessible by such direct investments.

In any event, the incentive for any such sharing by the technology owner/user normally is a consideration which includes compensation for the potential loss attributable to his relinquishment of any feasibly available direct market participation, as well as a "reasonable" profit. Pricing of transferred technology presents difficulties in negotiation more often than any other factor (nearly one-half of the transfers studied in the survey).

Understandably, such difficulties are more often encountered with transfers to markets in which the supplier's direct participation is hampered by legislation, regulation or other legal or political factors. Host government factors presented most negotiation difficulty in a good majority of survey transfers to developing countries, but in less than one-fifth of those to other industrialized countries.

Needs/Problems

Many specific business needs and problems supplement or reinforce the general objective of licensing to develop profitable new business. For example, export sales may be inhibited by:

- —High cost of transportation of goods from the U.S. (52% of survey transfers);
- —High U.S. labor costs (45% of survey transfers);
- —Physical impracticalities of exports, such as product perishability or fragibility (24% of survey transfers);
- —High U.S. construction costs (13% of survey transfers), or
- —Relative U.S./host country tax treatment of manufactures (14% of survey transfers).

In such cases particularly, the license route may be chosen or dictated because of the relatively lesser opportunity cost, compared to direct investment in the host market, especially by smaller companies of limited financial resources. Licensing also may be impelled by various types of host government requirements (14% of the survey transfers), or by the need to acquire finished or semi-finished goods (21% of survey transfers) or raw materials (5% of survey transfers).

Regardless of the reasons motivating a transfer of technology, the major steps involved in that process, in order of usual occurrence in technology transfer management, are:

1. Commercial demonstration of a practical, economical technology which is unique or provides performance or cost advantages superior to competitive technology;
2. Identification and, as necessary, development of markets and estimation of market potentials for the product of the technology;
3. Selection of those markets or sectors which are better served by licensing rather than or in sup-

plement to self-use of the technology or which are accessible only by licensing—and profitably;

4. Selection of reputable licensee(s) qualified to apply the technology and to supply estimated market demand; and
5. Negotiation of the license agreement on terms and conditions reasonably assuring optimum effective implementation, including fair and "reasonable" return to the licensee and participation of the licensor.

Progress along this road toward a successful license depends, in largest measure, on:

—The licensor's willingness and competence effectively to transfer his available technology of competitive "quality" in terms of:
- Performance,
- Cost, and
- Inherent protectability;

—The economic potential of the market, in terms of:
- Volume and ease of penetration (functions of the competitive and infrastructural conditions in the market),
- Accessibility, and
- Protection of technology and its licensing;

—The competence and integrity of the licensee, in terms of:
- Technical capabilities,
- Marketing capability and general competitive power,
- Financial condition and stability, and
- General business reputation for trustworthiness, including protection of confidential information.

The key role of protection of transferred technology is apparent from its appearance as a major factor at every stage of the development of a potential licensing opportunity.

Sources and Types of Licensed Technology

The licensing business of almost all suppliers of technology relies for that technology in largest measure upon the supplier's own operations. More specifically, new company business is the most common source of licensed technology (nearly 70% of surveyed companies identified such innovation as a source of technology for licensing). Much less often, transfers comprise technology acquired from others. (Outside acquisition provided at least an occasional source of transferrable technology for about one-fifth of the surveyed companies.) Rarely is technical innovation carried out specifically for support of a licensing business. (Only about 7% of the surveyed companies reported such activity.) Clearly, as technical innovation is engendered by response to the prospect of profit in a healthy economy, so is technology transfer the child of innovation.

The market of concern here is essentially one for technology which has been technically-proven and commercially-established. Although some attention recently has been devoted, e.g. in Japan, to the possible advantages of transferring technology in earlier stages of development, most technology is at a mature commercial use stage in the supplier's operations when transferred to others (60% of the transfers reported in the survey were in commercial use for five years or more and another 30% had been used commercially for less than five years). There is relatively little market demand in these days of rapid and effective communication, fast-paced, aggressive, competitive marketing and increasingly knowledgeable markets, for older technology in a declining state of use. (Less than 2% of survey transfers were of this type.)

All types of industrially-useful information and goods are licensable, but evidence indicates that process technologies are perhaps more common than those relating to products, equipment, compositions and services. (Nearly 70% of the survey transfers involved processes as at least a part of the concerned technology.) This finding is consistent with a recent trend of general foreign investment patterns toward process-based, cost reduction-related investments.[10]

The technology transfer business most often is one in which potential transferors are competing for supply of esstentially the same technology available from at least a few other sources (23% of the survey transfers) or in a market where other suppliers are offering similar technology (44% of the survey transfers) or inferior technology (11% of the survey transfers). Nevertheless, it is not unusual (22% of the survey transfers) to find technologies uniquely available from a single source as the subject of transfer to others.

Whatever the type or competitive advantage, technology is transferred largely by means of personal services rendered by the licensor, usually supplemented by written materials and, less often, by supply of hardware, as "turn-key" facilities, equipment or component parts. Importance of the personal services aspect of licensing is illustrated by the almost universal provision of some form of technical assistance to the licensee. (About 95% of the survey transfers involved provision of some technical assistance and about 40% were primarily T.A. agreements.)

Similarly, the transfer of technology commonly entails the licensor's supply of engineering services in some form, either in preparation of documentation for the licensee or in consultation with the licensee and/or his other contractors or suppliers. Provision of design engineering is the most common type of engineering supplied in connection with technology licensing (about 20% of the survey transfers). Marketing assistance and other management services are common subjects of transfer (at least ¼ to ⅓ of the survey transfers involved such technology).

The provision of engineering and other technical assistance to support orderly and effective transfer of technology in a form substantially as used by the supplier can itself be costly in money and supplier manpower requirements. Basic design modifications and adaptations to suit different conditions or needs of the licensee can add significantly to the supplier's task and costs. Usually, technology transfers to licensees of comparable technical competence operating in markets of comparable technological structure to that of the United States do not entail such basic changes (about 70% of survey transfers to other industrial countries). However, under less favorable conditions, such changes are more often required (about 50% of all survey transfers to developing countries involved some technology adaptation), for example to utilize local process or construction materials (39% of such transfers); to provide lower production rate (35% of such transfers) or greater labor intensity (20% of such transfers), or the manufacture of different products (15% of such transfers).

Although "bare" patent licenses are not a common

form of "technology transfer" (they represented only about 10% of the survey transactions), at least some part of transferred technology usually is patented by the supplier in his own (U.S.) market and in other industrialized countries to which technology is transferred (nearly 70% of the survey transfers). For many possible reasons, host-country patent coverage of technology transferred to developing countries apparently is less common (less than 50% of the survey transfers).

These characteristics of transferred technology and associated licensing mechanisms have an important bearing on incentives and decisions of potential licensors. The effective marketing and transfer of substantial bodies of technical information and experience can be and usually are activities requiring a considerable input of licensor personnel time, effort and expense. As such it is understandable that, regardless of relative innovative efficiencies, technology transfer is a more usual business with large corporations than with smaller ones having smaller personnel complements, less-developed marketing organizations and skills and lesser financial resources than multinational corporations experienced in many aspects of international trade and commerce.

Changing worldwide patterns of industrial capabilities responsive to unequally divided and also changing natural and human resources, are producing and will continue to cause more reallocations of production among nations. Nevertheless, it is reasonably clear that technology transfer is a business mechanism which, when used by U.S. companies, regardless of supplier size, for the most part utilizes domestically developed and applied patented and unpatented innovations as the means for entry into new markets generating added corporate income, and is not merely a device for transposing the existing domestic business to foreign operational bases.

It follows that the usefulness of this business approach to participation in foreign markets, many of which are effectively closed to export of U.S. manufactures, depends upon, first, continued and improved domestic economic conditions fostering the technical innovation which provides the substance of technology transfer, and, second, upon the existence of effective patent and legal systems in all markets within and among which technology is developed, used or transferred.

TECHNOLOGY MARKETS AND MARKETING

Market Areas and Technology Flows

Available evidence indicates that the domestic market and the aggregate foreign market for supply of technology by U.S. companies currently are roughly equivalent, in terms of numbers of transfers. During the four-year survey period, 1974-1977, the average annual aggregate number of technology transfers by all companies was 368 in the U.S. and 461 foreign (excluding Comecon countries) or 519 including the latter countries. However, the foreign marketing pattern is not a homogeneous one with respect to territory. Aggregate annual number of transfers by all companies, to all types of recipients (affiliated and independent) was 321 to other industrialized countries and only 140 to the developing countries. Some 70% of the developing-country transfers were to Latin America.

This technology market pattern is similar to that for aggregate U.S. direct foreign investment,[11] as illustrated in Table I.

As of the 1977 date of the Benchmark Survey of U.S. companies from which the Table I data resulted, the

		INDUSTRIALIZED COUNTRIES					DEVELOPING COUNTRIES					
	Total All Countries	Canada	West. Europe[3]	Japan	Australia N.Zealand S.Africa	Total	Latin America	Other Africa	Mid-East	Other Asia & Pacific	Total	International
DFI[4]	143,433	34,888	60,509	4,448	7,709	107,553	26,114	2,006	-3,404	5,094	29,810	4,070
% of Total DFI	100	24.3	42.2	3.1	5.4	75	18.2	1.4	-2.4	3.6	20.8	2.8
% of IND or DEV DFI	-	32.4	56.3	4.1	7.2	100	87.6	6.7	-11.4	17.1	100	-
DFI Income[5]	17,833	3,241	6,714	539	794	11,289	2,784	530	2,024	1,107	6,444	100
% of Total Income	100	18.2	37.6	3.0	4.5	63.3	15.6	3.0	11.3	6.2	36.1	0.6
% of IND or DEV Income	-	29	59.5	4.8	7.0	100	43.2	8.2	31.4	17.2	100	-
Income/DFI (%)	12.4	9.3	11.1	12.1	10.3	10.5	10.7	26.4	-	21.7	21.6	2.5
Fees & Royalties[6]	3,697	789	2,144	238	216	3,388	255	60	132	135	583	-274
% of Total F&R	100	21.3	58.0	6.4	5.8	91.6	6.9	1.6	3.6	3.7	15.8	-7.4
% of Total IND or DEV F&R	-	23.3	63.3	7.0	6.4	100	43.7	10.3	22.6	23.2	100	-
F&R as % of DFI Income	20.7	24.3	31.9	44.2	27.2	30.0	9.2	11.3	6.5	12.2	9.0	

(1) "U.S. Direct Investment Abroad, 1977", U.S. Dept. of Commerce, Bureau of Economic Analyses, International Investment Division, Wash., D.C., April, '81.
(2) Non-bank affiliates of non-bank parents.
(3) Includes Turkey; excludes Eastern European (Socialist) countries.
(4) BEA, op.cit., Table II.W.4, page 196.
(5) Ibid, Table II.Y.1, page 209.
(6) Ibid, Table II.Z.1, page 217. "Fees & Royalties" are aggregate U.S. receipts of corresponding direct investment-related fee and royalty income from patents, trademarks, copyrights and know-how, together with service charges for management, professional and technical services as well as tangible property rentals and leases.

1977 U.S. DIRECT FOREIGN INVESTMENT AND RECEIPTS ($Millions), BY AREA[1] [2]

TABLE I

markets of other industrialized countries accounted for 75% of aggregate U.S. direct investment abroad, and for over 60% of the associated total foreign income and over 90% of affiliate-sourced fees and royalties including income from technology transfers to those affiliates. Total fees and royalties from such foreign market sources were about 30% of aggregate income from foreign direct investments.

The developing-country markets represented only about 20% of aggregate direct foreign investment, about 36% of aggregate income, and 16% of total fees and royalties (taking into account a 7% negative flow related to fees and royalties payable by U.S. parents to affiliates engaged in international activities such as shipping, petroleum extraction, etc.). Nearly 90% of total developing-country investment was in the Latin American countries which, however, provided only about 43-44% of total investment-related income and of fees and royalties from developing areas. This seeming imbalance apparently reflects, at least in part, unusually high income rates from other developing areas, especially the Mid-Eastern countries—apparently reinforced by high returns on investments in the petroleum-rich OPEC countries of that region.

Pattern

Such market patterns might well be considered generally descriptive of a pattern of foreign technology licensing by the high percentage of large multinational companies which, as above-indicated, only will license their technologies to affiliates. But, regardless of recipient affiliation, the market distribution of foreign technology transfer does seem to follow the general outline described by foreign direct investment. A notable exception is Japan, which, due principally to peculiarities of internal marketing (and to formerly strict foreign investment limitations) affords an abundant market for U.S. technology but still is a relatively much less significant one for direct investment.

Thus, the principal markets for U.S. technology clearly are the United States itself and other industrialized countries, mainly Western Europe, Canada and Japan. Except for Japan, a large proportion of such transfers likely are made in connection with the supplier's investments for direct participation in these markets. In aggregate, the developing countries currently comprise a much smaller foreign market for U.S. technology, either in conjunction with other direct investments or by licensing only, but there is a very substantial flow of U.S. technology to Latin America.

Marketing Channels and Approaches

Personal contacts between corporate managements are the most usual means of finding opportunities for the licensing of proprietary technologies (about ¾ of the surveyed companies). Inquiries or requests from the potential licensee may be prompted or facilitated by information concerning new technologies made available in scientific conventions, trade shows and scientific, technical and trade publications (each such route was used at least to some extent by about ¼ of the surveyed companies) or by direct marketing efforts, such as advertising. The commercial advertising medium, however, generally plays a relatively lesser role (about one-third of the surveyed companies) in technology licensing than in the marketing of manufactured goods and commodities. The do-it-yourself approach also is illustrated by the still minor part played in the aggregate technology transfer process by intermediaries such as license brokers and U.S. Government aids (under 5% each for the surveyed companies), although foreign transfer opportunities sometimes are uncovered with the assistance of the host government or international organizations (about 9% and 15%, respectively, of the surveyed companies). Distributors and agents of the technology proprietor not infrequently are involved in finding licensing opportunities (about one-fifth of the surveyed companies use this route to some extent).

Such approaches to the marketing of technology characterize this business as one involving, in most cases under present circumstances, the transfer of substantial and complex bodies of technical information and experience, and in which implementation of the transfer is facilitated, from earliest stages to completion, by people knowledgeable in the technology itself and the related business. There are many clues to possible future changes in the marketing of technology. One of apparent significance is the increasing number of new, small companies which are based on new, unique or highly-advanced technologies or which are part of the expanding services sector of the economy, and having relatively small capital investment requirements. Such technologies should find ready and profitable markets in many countries.

More Help

Those countries, as potential suppliers, and potential licensees, should find substantial marketing help increasingly available from the growing list of small companies and experienced sole proprietors offering their services in finding and facilitating license opportunities and sources, and from various governmental and international organizations dedicated to collection and dissemination of source/need information and related assistance. Potentially, the technology transfer activity can become one in which small business plays an increasingly greater and more important role.

A survey showing of a noticeable trend among larger corporations toward a practice of regular inventory of technology and specialized organization for its transfer suggests that greater attention by more companies to the licensing potential of their commercially-used technical information and experience is a factor of possible influence on future trends of this business. We have seen a signpost trend toward cost-reducing process technologies. Further development of practical, inexpensive approaches and aids to marketing of know-how and "show-how" "packages" of limited technical scope or height but of appreciable operating- or cost-advantage could substantially expand the practical licensing of less-advanced technologies and provide at least the potential of greater supplier involvement in these and related markets.

The future of technology marketing will be shaped, surely but to a yet unknown degree, by the changing nature of the aggregate market itself in terms of alter-

natives open to participation in each market area and the applicable actual or perceived rewards and risks.

PROTECTION AND PERFORMANCE—THE COMMON DENOMINATORS OF PROFIT

Pricing of Licensed Technology

The pricing of technology on its transfer by its developer to others reflects the basic principle that technical knowledge confers potential economic power on those possessing and using it. Relative advantage arises only from "ownership" of practically useful technology, i.e. the legal rights of exclusion of others from the benefits of its possession and use as granted, confirmed or recognized and enforced by the sovereign power within whose jurisdiction technology is developed, is used, or under which those rights or some part of them are transferred or "licensed" to others. Among license pricing factors, other than intrinsic technical and cost performance, know-how was ranked of foremost pricing significance most often in the survey transfers (52%), followed by patents (25%)—although not all the transfers included patents.

Given, first, the potential afforded by necessary, underlying legal protection, the economic advantage of technology application and the pricing of its transfer to others, derives from superior technical performance, lower capital investment requirements or operating cost savings compared to competitive technologies. Technical performance of a technology—as initially established in the licensor's own commercial operations (and as may be further defined by operations of prior licensees)—usually is the most important of these factors in technology transfer pricing (over 70% of the survey transfers). Although such prior uses of technology provide an indication of the technology's value for licensing others, each licensing situation is different in terms of the licensee's technical base and marketing capabilities, market demand, and competitive effect on the licensor's own business of the proposed license versus other, alternative routes to the licensor's participation in the contemplated market. Therefore, value of each, specific license, to licensor and to licensee, is unique to that particular situation, commercially as well as technically.

Value to the licensee takes into account his out-of-pocket costs of the transfer; the estimated potential loss of income due to license competition in the supplier's existing market(s); and a profit providing a return which is reasonable compared to such alternatives as may be available for the supplier's exploitation of the technology in the relevant market(s), and/or to other uses for the investment required for the proposed transfer. The sum of these value factors can be considered as the supplier's participation or fractional share, S (of value from 0 to 1), in the licensee's estimated net economic return, R, from the market (s) served by the licensed technology, so that the transfer potential, P, for the proposed transfer, as seen, respectively, by the supplier (P_S) and the recipient (P_R) can be expressed as:

$$P_S = R \times S \quad \text{(Equation 1)}$$

and

$$P_R = R(1\text{-}S) \quad \text{(Equation 2)}$$

Though such expression of the old maxim that "the price must be right" highly collapses and simplifies the complexities of technology marketing and transfer, this rule, in whatever form used, nevertheless is a fundamental, first-brush guide in evaluating and negotiating prospective licensing opportunities. Obviously, as S approaches O, the supplier's incentive to transfer disappears, regardless of the size of the potential return to the prospective licensee, whose appetite is whetted in proportion to the magnitude of that potential return and the extent to which S is reduced.

The opposite is true as S approaches a value of 1. Mutual recognition of the applicability of these basic "transfer equations" should serve to drive S into an intermediate range where the parties can assess whether their respective needs and objectives are satisfied by the resulting transfer potentials in light of the magnitude and reliability of the R value expected by the parties. While there may be some basis in natural human acquisitiveness for suspicions that pricing not uncommonly is set a a level that the market will bear, it may be equally reasonably expected that the economic forces inherent in these "transfer equations" will prevail in most cases.

Consistent with its characterization as a business aimed at profitable new-market participation, licensing income generally is not "earmarked" for support of R&D (nearly 90% of the surveyed companies), but is returned to the originating company unit (47% of surveyed companies) or to the general corporate account (28%) or to the licensing organization (13%). It appears, therefore, that the price for licensed technology generally is not established primarily for the purpose of off-setting development costs of the technology, although such costs may be considered, in the pricing formulation and negotiation, as a factor affecting the supplier's overall competitive posture as a result of the transfer.

Risks and Their Management

As in other human endeavors, technology transfer seldom or never is carried out under ideal, risk-free circumstances, not can the potential of a proposed transfer reasonably be evaluated without consideration of risk effects. Indeed, the management of technology transfer largely is concerned with identification and analysis of risks, since the licensing of proprietary technology always entails some risk to the owner's competitive position. Therefore, it is necessary to consider these risks and their effects upon the parties' objectives in each proposed technology transfer and, therefore, on its likely viability or potential.

Risks may be characterized broadly as of two types:

I—Unavoidable risks.

II—Avoidable risks.

Type I risks are those outside the powers of either party to control or negotiate—for example, Acts of God. Legal/political risks created by exercise of governmental powers, e.g. in respect to protection of intellectual property rights, import or investment restrictions and other legislation and regulations affecting technology rights and flows create technology transfer climates which often can be addressed only by avoidance. Examples are provided by some developing countries. In some of these countries infrastructures inadequate for effective technology utilization add new

or further dimensions to such risks. Current patterns of technology transfer from the U.S. apparently reflect supplier's response to such unavoidable risks.

Type II risks are those to which one or both parties can address efforts reasonably expectable to result in reduction or avoidance of the risk. Such efforts may involve either negotiation or the taking of overt action to change the probability of risk occurrences. The previously-listed factors influencing achievement of licensing objectives provide a roadmap of potential risks of both avoidable and unavoidable types and suggest possible courses of action in the management of risks. A prime example of avoidable risk is that associated with the technical performance of a technology which is fundamental to its successful commercial application and licensing. The almost universal selection of commercially proven technologies as subject matter for licensing illustrates a first and most important action usually taken by suppliers—and by licensees—in avoidance or reduction of this basic, avoidable risk.

Competitive quality of a technology, and even the licensability of a unique technology, also may be enhanced or provided by its modification to improve or alter its technical performance and/or cost effectiveness as established in the licensor's operations, thereby reducing risk of failure of the transfer. Risk of failure in the marketplace is reduced by careful and timely analysis of potential market volume, accessibility and probable needed penetration time and effort, and responsively proper planning of marketing effort. This will include determination of the scope and quality of probable patent and confidentiality protection afforded to the technology under the host market laws and regulations governing intellectual property rights and their enforcement, as well as related legislation, regulations and practices controlling direct investment, repatriation of income, taxes, and import and export controls on technology and goods.

Risks of loss of technology and income, due to improper application of the technology or to its unfair or unauthorized use or disclosure by an incompetent, irresponsible or financially unstable licensee, are reduced by careful licensee selection and negotiation of appropriate performance rights and obligations of licensor and licensee. For example, provision of optimum kinds and amounts of technical assistance reduces risk of improper technology assimilation and application by the licensee, with corresponding reduction of risk to both parties' financial expectations. Typically, "front end" fee payments are provided to reduce risks of premature loss of technology and/or nonrecovery of large opportunity costs incurred by the supplier.

In transferring technology from a licensor/supplier to a licensee/recipient, risks may affect either the cost or the income of either party. Effective risk management entails identification of each major risk of potential substantial effect on one or more of these cost and income streams, and best-estimate evaluations of the nature and magnitude of such effects and their consequences on the proposed technology transfer. Consider a proposed license wherein the supplier has negotiated a price providing to him a potential participation S, in the host market as a fraction of the benefit, R, potentially realizable by the licensee's supply of that market demand by application of the licensed technology, in accordance with the Transfer Equations 1 and 2. The licensee's aggregate expected economic benefit, R_E, can be considered as the summation of a number of components, R_1, R_2, R_3. . ., each of which is subject to some element(s) of risk.

Suppose that this hypothetical transfer involves three licensee benefit components, for example R_1, related to effectiveness of absorption of the technology, e.g. as compared to its practice by the licensor in his own operations; R_2, related to market volume; and R_3, related to, say, product obsolescence, each of which is valued in terms of an applicable risk factor, x, y and z, so that:

$$R_E = x(R_1) + y(R_2) + z(R_3). \quad \text{(Equation 3)}$$

A business risk is simply the probability that some event will occur to reduce the estimated, risk-free (ideal) value of the business activity. Therefore, to arrive at the estimated benefit, R_E, it is necessary to establish the values of the risk factors, x, y and z, for each benefit component, i.e. the probabilities of occurrence of the associated risk events within the range of 100% likelihood of risk event occurrence to no risk at all. That is, some values between 0 and 1 must be determined for each of the risk factors x, y and z. If, in the hypothetical case, market volume were assured and obsolescence could be discounted as a risk during the time period of concern, but, for example, due to inadequate training of the licensee's technical personnel, effective application appeared as a serious problem, the licensees expected benefit could be expressed as:

$$R_E = x(R_1) + R_2 + R_3 \quad \text{(Equation 4)}$$

leaving only the risk factor x as a matter of concern.

In this case, the supplier's provision of technical assistance could reduce the risk of misapplication or underutilization of the technology and consequent reduction of benefit component R_1. Assuming that investigation shows that, without supply of technical assistance, a benefit equal to 75% of R_1 (i.e. recipient utilization is 75% as dollar effective as that of the licensor himself) can be expected with a risk factor, x, of 0.5; that $0.5R_1$ can be expected to result, with probability of 0.25; and that there is a 25% probability that there will be a complete failure, on the part of the recipient, of technical implementation and related economic benefit (x = o), so that $R_1 = 0$ (and, importantly, rendering R_2 and R_3 meaningless). Since the sum of the probabilities equal 1.0, all possibilities are covered, though in a simplified fashion. Accordingly, probable benefit, R_{1P}, from component R_1 is:

$$R_{1P} = 0.5(.75R_1) + 0.25(.5R_1) + .25(.OR) \quad \text{(Equation 4)}$$
$$= 0.5R_1$$

if no technical assistance is provided. That is, the probable benefit from component R_1 will be only half that expected were the technology implemented in accordance with the supplier's own standards.

Assume further, that the risk analysis indicates that technical assistance of a certain type, quality and amount would alter the effectiveness of technology implementation so that the probabilities are:

—Same as the reference case (licensor's operations), with .50 probability (x),

—10% worse than the reference case, with .25 prob-

ability, and
—25% worse than the reference, with .25 probability.
Accordingly, the revised benefit projection is:

$$R_{1P} = .50(1.OR_1) + .25(.90R_1) + .25(.75\%_1) = .9R_1.$$

Thus, provision of the contemplated technical assistance could be expected to improve the benefit component R_1 from 50% to 90% of the standard (target) value. Having determined this effect of technical assistance, the value of the probable reduction in risk can be balanced against the ascertainable cost of supply of the technical assistance.

Determine Costs

Application of known or accurately determinable costs to reduce identifiable risks and associated potential losses is an important element of technology management. In such manner, the values of R and, therefore, S in the transfer equations can be refined and the potential of the proposed license hammered out by negotiation based more on probabilities than "seat-of-the-pants" guess work and bargaining power or skill.

Nevertheless, it is likely that many, or perhaps most, licensing managers do not literally work through such quantitative analyses of their proposed technology transfers, for many possible reasons, including, for example, the time and difficulty of obtaining reasonably accurate probability figures for the several applicable risk factors—or even of identifying those risks. It is equally likely, however, that successful managers apply their knowledge and experience in at least a qualitative approximation of such analysis of the risks posed by their potential license opportunities.

Product Lines and Market Powers

The nature of a company's industrial field, specific product line, its share of the market for those products, its profitability, and the number and power of existing or potential competitors play crucial roles in the processes of technology innovation and transfer.

Industries differ substantially in the inherent or historical rate and scope of market demands for their goods and services. Therefore, companies in different industrial fields respond to widely varying pressures, needs and urgencies to engage in research and development leading to new products and to new technologies which could be licensed. The heavy concentration of survey responses from chemical companies (17%) probably reflects such basic relationships and, in turn, the high-process technology content of the survey transfers. Size, technical reputation, financial condition and other factors defining market position and power of individual companies highly influence the scope and rate of technical innovation, the actual or perceived advantages and risks of sharing the products of innovation with others, and hence corporate licensing policies and practices. Of the 22 surveyed companies reporting more than 25 technology transfers during the survey period, 18 were among the 250 largest U.S. corporations. Of the pricing factors other than performance and cost advantage, the supplier's technical reputation was given as of prime significance in 23% of the survey transfers, and his financial capability was so designated in nearly 10% of those transfers.

Theoretically at least, and within the bounds prescribed by the antitrust laws, significant and perhaps controlling competitive advantage can be realized in the marketing of goods and services, even by nonregulated enterprises, which, by virtue of their special technical expertise, manufacturing and/or marketing capabilities, product mix, or sheer size and magnitude of capital investment and related economies of scale, have relatively little reason to fear inroads into their market(s) by others.

Although survival, and even an outstandingly successful competitive position perhaps may be maintained in theory—or for a while in real life—with an unreplenished technology cupboard, such an approach cannot provide long-term viability, especially considering the increasing volume of worldwide export competition and of foreign direct investments into any attractive and accessible market. Aside from the substantial benefits of innovation in nontechnical business activities, potential economic advantage realized by participation of any industrial enterprise in a market economy ultimately arises from and rests upon the possession and use of technologies at least competitive with those of others. The better the technologies and the more pervasive their use in the business, the closer the enterprise will be to leadership and superior economic performance. This relationship of economic advantage and the quality of technology applies to all industrial concerns, as regardless of the applicable innovation rate or pattern as it is essentially independent of company size or other component of market power.

Appropriation

Protection of technology against its unauthorized appropriation and use by others is equally important as performance and even more basic to realizing the economic potential of application of new technology in a market economy. For the postulated "ideal" enterprise holding, for some reason, a specially advantageous market position, technology innovation and licensing might be considered as posing fewer problems of protection of technology and corresponding competitive advantage than for others, less favorably situated companies.

Although available evidence does not appear to support such a conclusion, at least as to the need for continuing innovation,[12] if such a case is posed as an analytical starting point, it would be logical to assume that the further a particular case departs from such an "ideal" situation, the greater the need would be for protection of new technology from unfair appropriation by others. Well-removed from the theoretical "ideal" case would be companies engaged in fast-moving, high technologies which are the subject of intensive R&D and quickly become obsolete. At the far end of such a spectrum one would expect to find clustered small new ventures, developing new technologies for new markets of apparent great size and value. Though the protective needs of such companies likely are greater in degree than those of larger,

established enterprises, the same basic motivation of profit derived from application of protected technology applies to all.

The relationships of product line, market power, and patent protection of the investment in and technical product of innovation were well-summarized by an unidentified president of a large company quoted in a recent study for the Small Business Administration:

> Patent values and influence are highly variable from project to project. For entirely new products where we may be entering a field new to us where others have entrenched engineering, manufacturing, and market strengths, a patent position may be of critical significance to the decision to make the investment and enter that field. In this category, we likely view patents similar to small businesses or new ventures. The patent is viewed as a shield to protect the business during its start-up phase when it is most vulnerable. In areas where we feel that we are industry pace setters because of heavy R&D investments, patents are viewed as supportive of this investment and to keep the copyists from our heels, but patents are not likely to alter whether the innovation proceeds. Finally, there may be areas where products are developed to fill out a line where we have high marketing confidence that even a me-too product would be successful because of exposure, service support strengths, etc. In such an instance, patents may have no role except for defensive considerations of patents of others.[13]

It is suggested that no one, including companies such as that represented by this corporate officer, would view with anything but alarm approaching panic a future scenario wherein the only new products on the market are the "me-toos" either so insignificant in technical advance or economic value to be unworthy of competition or so heavily "protected" by overwhelming market power of the producer that no one else would dare to try to compete. The function of patents and reasonable trade secret laws in avoiding such a market in future, as in the past, should be self-evident.

Intellectual Property Rights—Keystones of Technology Innovation and Licensing

The CEO of a well-respected electronics company, but one not particularly well-known for the licensing of its full complement of technology, has succinctly described the fundamental role of patents and trade secrets in the development, use and transfer of technology:

> In general, companies do not develop technology to sell, but to use to make products to sell in the world marketplace. The only adequate form of payment for a transfer of technology is a share of the market served by the product made with the technology being transferred . . . Without an opportunity to share in the market served or without adequate protection of one's proprietary technological position through patents or contractural agreements, there would be little or no incentive to risk the investment needed to develop an innovative technology . . . and certainly there would be no incentive to transfer it to someone else.[14]

When the great cathedrals of Europe were rising, secret craft guilds served to protect the craftman's skills, but secrecy alone was not effective to protect the products marketed. When the Industrial Revolution made available easily-copied mass-produced goods, it was evident that other means had to be found to protect those goods against unfair copying so as to support the means of production and to induce and preserve the capital investment which could bring to the consuming public the potential benefits of industrialization. To do this, the patent system was developed in England and, as industrialization spread to the rest of Europe, the then-developing United States, and throughout the world, so did the need for patents, resulting in the Paris Convention of 1883.

The world today obviously is a different one than that of pre-18th-Century Europe, and has more needs and problems of different kinds than those which our forebearers faced. But, as shown by Mark Shepherd's comments, and as demonstrated by the experience typified by the companies participating in the survey on which this discussion is based, the needs of both business and the public for protection of new technology, both in its inception and commercial application and in its transfer, remain essentially the same in today's competitive market as those which sired the patent system. Nevertheless, perceptions of the function of the patent system and the values of effective, available patent protection, have undergone considerable distortion, not only in other countries which face tremendous demands for and simultaneous constraints on the industrialization which technology application makes possible, but, to some extent and for many reasons, in our own country as well.

Limited Resources

Our planet and our society are limited both in natural and in economic resources. Theoretically, we can do only the possible and, human nature and society being what they are, as a practical matter much less than that. As elements of that society, constrained by human limitations, technology innovation and transfer are subject to restraints which define a practical potential far short of a theoretical ideal. Understandably, nearly everyone wants, for self, family, friends, country, and for all mankind, a maximum of health, happiness and comforts which a technologically-based society can provide or supplement. Those benefits are made possible in a market-based society because someone invested his or her creative energies and talents, time, hard work or money in the origination, development and commercialization of technology.

Although conservation of limited resources dictates a reasonable maximum distribution of such technical accomplishments over the widest practical spectrum of need, the transfer of benefits—either in the form of sale of goods or services, or by transfer of technology for another's use to produce saleable goods or services—must produce sufficient return to keep the innovation cycle going. The only way yet devised to do that, outside a fully communistic society (and that's problemmatical also), is by affording to the technical and financial innovators the legal protection of patents and trade secrets and related rights in intellectual property.

Contrary to some belief, the patent system does not establish or promote monopolies inherently anticompetitive and irreconcilable with the antitrust laws.[14] Patents do provide to the owners the right to exclude others from the limited area of new technology which has been brought forth by the innovators of the claimed invention. Moreover, grant of a patent in a real

sense is a form of transfer of potential economic benefits deriving from that technology since, upon publication, the public acquires a "future interest" or "springing right" of free use of the disclosed technology when the owner's exclusionary right is lost upon expiration, lapse or invalidation of the patent. Perhaps even more importantly, publication presents an immediate and inviting target for new innovation circumventing or improving upon the patented technology. Either way, provided that use of the patent is not overextended so as unfairly to enhance the proprietor's market power, the public gains, and, provided that the patent is timely granted, is of good quality (valid and of proper scope), and the term is reasonably related to the period during which the technology practically can be commercially exploited, the innovators also gain their needed return.

Patent Role

It would be fatuous either to consider that the patent system alone is insufficient to support or encourage innovation or to suppose that that system alone can do the entire job of promoting the reindustrialization of America. However, considering the critical dependence of our industrial society upon technology for the means of production and its fruits, the reliance upon that productive capability as the base of our economy, the need for quick and effective dissemination of new technology, and the vital role of patents in inducing innovation by protecting both the use and transfer of technology, it is reasonable to conclude that the aggregate U.S. communities of technology users and suppliers are most interested and concerned about the availability, "durability" and reliability of patents and the availability and cost of patent protection and enforcement both at home and abroad. Fortunately, despite past apathy, criticism, and expressions of doubt concerning such value of the patent system, we now are moving ahead with improvements in both the legislative and administrative fields with laws and regulations which, if they receive continued support, can be expected to have appreciable, favorable effects in fostering technology innovation and transfer.

The foreign scene is less encouraging, especially in some countries where, variously, patent protection is not provided for important classes of technology, patent acquisition (where allowed) is difficult, time-consuming and costly, maximum term of exclusivity is short—and where it may be foreshortened by compulsory licensing or cancellation—and enforcement remedies often are not reliable. Unfortunately, as one rotten apple can spoil the barrel, such shortcomings in the protection of technology, in any country with a significant existing or potential local market and/or export potential, present serious problems extending far beyond the borders of that country. Not only may the local market for technology and its fruits be effectively denied to the foreign technology owner, but he may face, in his domestic and other markets, competition from that country in the form of technology and/or goods benefitting from the free copying of his invention. In aggregate, grave risks, of significant and increasing detrimental influence upon both donor and host countries, are raised in the resulting constriction of volume and/or quality of technology flow into such countries from abroad.

These unavoidable risks are peculiar in that they are within the power of government to control. Where needs for industrialization are most acute, technology transfer potentials should be greatest. Minimization of such Type-I risks affords a practical means of increasing these potentials. Unfortunately, this possibility is going unused by many governments or, worse, such risks are being heightened by further constrictions in the scope of intellectual property rights.

As the survey showed, confidential information and experience (trade secrets or know-how) remains a key component of proprietary technology in its application and transfer, despite the inherent limitations of secrecy protection. The value of that component rests upon the quality and enforcement of available trade secret laws.

> "Trade secrets have always been considered in the nature of a property right"[16]

under our legal system and those sharing our heritage of individual freedom and private property. As for such freedom generally, preservation of such property rights has required continual vigilance, for example in fending off theories of trade secrets preemption by the patent laws[17] or by the copyright laws.[18] Over the years, the principal problems in the U.S. concerning the licensing of know-how, and the most serious such difficulties in some other countries, have related to territorial and time restraints imposed on the licensee by the supplier in protection of his own competitive position. Evaluation of a competitive restraint as ancillary to a proper transfer of confidential information generally is made in terms of scope, duration and basic reasonableness somewhat similar to the corresponding factors applicable at the patent-antitrust interface, and were fairly described in the following test:

1. Is the licensed subject matter substantial, secret information?
2. Is the restraint limited to the period during which that information retains its secrecy?
3. Is the restraint limited to the subject matter produced by use of the secret information?[19]

However, as in the patent field, the domestic trade secrets landscape still is not without some clouds and shadows. Although views that a know-how license term should not exceed the time for independent technical development of the length of the licensee's "learning curve" have not been generally adopted by the courts, cautious licensors nevertheless rarely impose an unlimited period for the secrecy obligation, and special care is indicated to assure that the license is not an artificial device intended as a naked or too scantily-clothed division of markets rather than a *bona fide* transfer of information and experience otherwise unavailable to a licensee in actual need of it.

Maximum Terms

Somewhat similar approaches to the protection of know-how and its owner in its licensing to others are taken by most industrialized countries. Some others, mainly the same developing countries which have contracted the value of patents, have rejected or watered down the fundamental property right nature of trade secrets and know-how. Very short allowable maximum

agreement terms, e.g. five years, are usual, theoretically renewable for an additional equal term if doing so is considered by the concerned authorities to be in the national interest. It is equally common to find prohibition of substantially all export restrictions not based on patents (and then only if prior exclusive licenses have been granted). In some, if not most, cases of such strict foreign regulation of technology importation, such measures have been adopted in efforts to restrict in-flow of foreign technology only to that deemed essential by the national planning authorities, and on the belief that such technology as is imported will be obtained on terms more favorable to the host enterprises and more quickly freed of obligation to the foreign owner, thereby enhancing the value of the technology to the host country in both its domestic and export commerce. Pressures to license also are increased in many cases by effectively closing the host market to import of U.S.-made goods and to long-term direct local operation by the U.S. technology owner.

Our Federal Government's essentially "hands-off" policy regarding regulation of technology transfer (with reasonable exceptions for national security) is basic to our system of private enterprise which, in conduct of this business, has provided tremendous benefits in the domestic sharing of technology to the benefit of the national competitive position in the world marketplace, and with others abroad to the substantial advantage of the U.S. international trade balance. Supported by imperfect but reasonably effective patent and legal systems, it's a workable system which should be preserved and strengthened. However, other countries, with other economic/political systems and different national problems and goals, cannot reasonably be expected to conform those systems totally to our practices in the transfer of technology.

Suggestion

Nor can they expect us to give up our way of life and of doing business. There's no progress that way! Some more solid ground for mutual accommodation and benefit must be reached.

I suggest that one, perhaps narrow and certainly difficult, path toward that objective lies in the direction of harmonization of national patent systems and trade-secret laws and regulations which—for no personal-, company- or patriotically-related reason, but only from an objective viewpoint of experience and logic—I envision as having substantial resemblance to those existing in the U.S. and in many other industrial market economy countries. Neither literal duplication of such laws and regulations, nor substitution of existing or future national regulation of the importation of technology, goods or services is implied in this suggestion. Such regulations and their effects on technology transfer and trade and commerce generally are another, though related, topic.

Many countries need to further develop indigenous industries and innovation scope and rate, and favorably to alter their trade balances. These are problems peculiar to each country and properly within its discretion and control. Relevant decisions presumably will reflect national perceptions of self-interest in light of both domestic conditions and the total international nexus of trade and commerce.

The patent and legal protection afforded to technology is something else. If a country constricts the potential market for my domestic manufactures by refusing entry to them, I must assume that my goods are not needed there and I must forego a potential market opportunity. I give up nothing that was mine and no one else gets anything of mine. But if that country uses but consistently refuses to grant me patents on my inventions which I've "published" elsewhere via other, valid patents; or if I'm offered a patent of unconscionably narrow protective scope or a "certificate" which anyone can use at a price perhaps set by the government; or if I can only get a patent after five years' trying and have only five years life left after I get it; or if, for no fault of mine I can't find either the technical infrastructural support to "work" a patent or anyone interested or willing to take a license under it within three or four years, the exclusive patent right is taken from me, or, worse, all rights are taken—then I *have* lost something which was mine, and someone else has found a "free ride" on my work and investment.

Situation

Similarly, if I've developed new information and experience which I've demonstrated is technically superior and commands great commercial value, and I've kept it secret and can continue to do so and nobody else has it or is likely to get it except from me or by dint of a long, hard, expensive development and perhaps an element of luck, and if that same country now tells me, "If you want to transfer that technology here, you can't license it, you have to sell it to us for 1 to 5% of our sales price for five years, and after that five years we can do anything we want to with it—freely use it, disclose it, compete with you and your other licensees, anywhere"—then, unless I'm really desperate or unless that know-how really isn't worth more, my likely impulse would be to tell such a bargain shopper to go jump in the lake!

These are not merely individual reactions from a few case-specific situations. The survey showed that length of patent term, patent scope, and quality of enforcement of patent rights, as well as patent- and know-how-related license provisions affected by host-market laws and regulations, such as length of agreement term and pricing and payment restrictions, all are highly significantly correlated with both the licensor's decision to enter into the license and to its implementation. Long patent and agreement terms, broad patent scope and good enforcement quality, as well as lenient conditions for negotiated establishment of financial terms, favorably affect both initiation and outcome of this business.

An unconsummated potential transfer is no good for either side if the failure leaves unfilled a market need which otherwise could have been supplied to mutual economic advantage. And there's the rub. We're back to price, essentially. The diversities of technologies and their possible application are so great as to preclude any practical, universal "rules" for

determining pricing of particular technology transfers. Pricing which is fair and reasonable to both sides can only be done in the context of specific, case-by-case negotiation, using the fundamental rules of potential value and compensation embodied in the simple "transfer equations" supported by hard and careful work in assessing risks, together with some good sense and mutual understanding of respective needs.

At the base of each negotiation for each potential transfer of technology lies the value and potential reward of application of that technology as defined by its technical and cost performance characteristics and as supported by its protected nature as patented or confidential information and experience.

In common with all agreements projecting future actions expected to be taken or not taken in reliance on promises given, those transferring technology for profit under any legal system are only as effective as the dependability of the covenants undertaken. The survey showed that reliability of contract is the single most significant factor influencing success of this business.

Technology cannot be legislated into existence nor can its performance. But firm foundations of successful development and transfer of technology can be laid directly and simply by provision of readily available, effective and reliable legal and patent systems which reduce risk and increase the likelihood of occurrence and success of both endeavors. Such actions are within the powers of government—and only of government. Provision and reliable enforcement of effective legal rights in intellectual/industrial property should not be viewed as some abstract discipline divorced from the realities of life, trade and commerce, and therefore to be relegated to a low attention priority or lightly conceded in negotiations with other governments for something of seemingly more pressing urgency or general popular appeal.

Rather, the powerful, direct and positive influence of laws and regulations providing such property rights upon trade and commerce generally, and upon the resulting quality of life, should be promoted in all appropriate branches and levels of government by supporting and advancing improvements in such laws and regulations and by their careful application domestically, and whenever in whatever other fora such action is possible, by each concerned government—not least by our own. The resistance which has been posed to the retrogressive aspects of current activities in revision of the Paris Convention is an example of such positive action. The powers and persuasions of government logically could be brought to bear to such end in other ways, for instance when faced with inadequate intellectual property laws and regulations of another government seeking further concessions in international or bilateral trade, including demands for continued or enhanced freedom of access for that nation's exports to or preferential treatment in the historically free U.S. market. Recognizing that provision of the many advantages of new technology rests on the incentives of its potential economic value which is *defined by the intrinsic technical utility of the intellectual product and supported by the property rights endued by law,* we should be vigorously about the work of shaping the keystone of intellectual property *rights* if we want to maintain and strengthen technology innovation and transfer as vital structural elements of our economy.

NOTES

1. Obermayer, J.H., "The Role of Patents in the Commercialization of New Technology for Small Innovative Companies", Research & Planning, Inc., Cambridge, Mass., August, 1981, page 61 (report conducted pursuant to Grant No. SB-1A-00030-01 from the Small Business Administration, with additional funding provided by the Office of Technology Assessment under Contract No. 133.3720.0).
2. Birdzell, Jr., L.E., "Competing: The Enterprise of Business", National Chamber Foundation, Washington, D.C., 1981.
3. Tyler, G., "Technology Transfer: A Labor View", in *Transfer of Technology: The Future of Regulation,* Monograph Two of Conference sponsored by the Council of the Americas, et al, May, 1977, Library of Congress Catalog Card No. 77-79054.
4. Germides, D., *Transfer of Technology By Multinational Corporations,* vol. 1., Development Centre, OECD, Paris, 1977, page 36.
5. Obermayer, op.cit.
6. Senate Committee on Small Business, Report No. 97-194 on the Small Business Innovation Research Act of 1981, 97th Congress, September 25, 1981, page 4.
7. "Small Firms and Federal Research and Development", Report of the Office of Federal Procurement Policy, OMB, March 10, 1977.
8. *Science Indicators,* 1976, National Science Foundation.
9. Birch, D.L., "The Job Generation Process", U.S. Dept. of Commerce, February 1979; Flender, J.O. et al, "The Role of New Technical Enterprises in the U.S. Economy", MIT Development Foundation, 1975.
10. "Foreign Investment Data Highlight Changing Patterns and Need for New Strategies", *Business International,* Nov. 20, 1981, page 370.
11. U.S. Direct Investment Abroad, 1977, U.S. Dept. of Commerce, Bureau of Economic Analysis, International Investment Division, Washington, D.C., April, 1981.
12. Birdzell, Jr., op. cit., page 104.
13. Obermayer, op.cit., page 29.
14. Mark Shepherd, Jr., "The Critical Issues of Technology Transfer:, in Transfer of Technology: The Future of Regulation, Monograph 5, from a Conference sponsored by the Council of the Americas et al, May, 1977, page 5.
15. Andewelt, R.B. (Chief, Intellectual Property Section, Antitrust Division, U.S. Department of Justice) "Basic Principles to Apply at the Patent-Antitrust Interface", remarks before the Houston, Patent Law Association, Houston, Texas, Dec. 3, 1981; *Patent, Trademark & Copyright Journal,* No. 559, Dec. 17, 1981, page D-1 and ff, The Bureau of National Affairs, Inc., Wash., D.C.
16. *U.S. v. E.I. DuPont de Nemours & Co.,* 188 F. Supp. 41, 44USPQ462, aff'd. US Sup.Ct. 351US377(1955).
17. *Painton & Company, Ltd. v. Bourns, Inc.* 309 F.Supp.271 164USPQ595 (S.D.N.Y.1970); reversed 442 F.2d 216, 169USPQ529 (2nd Cir. 1971). *Kewanee Oil Co. v. Bicrow Corp.* 416 US 470, 181USPQ673 (1973).
18. *Avco Corp. v. Precision Air Parts, Inc.,* on appeal to US Ct. App., 5th Cir. (Atlanta Div.),. Appeal No. 80-77-72.
19. *Shin Nippon Koki Co., Ltd., v. Irvin Industries Inc.,* N.Y. Sup.Ct., Spec. Term, Part 1, N.Y. County, 173 N.Y. Law Jour. 100, page 14, May 23, 1975; CCH Trade Cases No. 66438, 60347, quoted by Michaelson, Peter L., "A Brief Look at the Legality of Competitive Restrictions Imposed on Trade Secret Licensees By Trade Secret Licensors", JPOS, Vol. 63, No. 6, June, 1981, page 334.