

Mechanisms That Work

A discussion for employing various mechanisms in transferring technology between developed and developing countries

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This paper examines various mechanisms for transferring technology from developed countries to developing countries.

The paper is meant to furnish a basis for an expansion of the dialogue established between representatives of developed and developing countries at the Joint UNIDO/LES meeting in Lisbon, Portugal on October 8-9, 1979. At the Lisbon meeting Mr. Alan Limburg ably presented a paper and led discussions on the subject "Regulation of Technology Transfer in Developed and Developing Countries."

Mr. Limburg correctly pointed out that a climate must be created conducive to:

— Voluntary transfer on reasonable terms of technology owned by private enterprise, while

— Achieving the legitimate aspirations of developing countries. Unquestionably, all people of goodwill subscribe to this premise, only to be realized by unstinting effort.

Herein financial criteria are presented for selecting transfer mechanisms for implementing voluntary technical commercialization projects by private enterprise. Advantages and disadvantages of each technology transfer mechanism are discussed.

In an effort to provide a fresh basis for discussion at the meeting in Helsinki, the author has stepped back from the bustling arena of business analysis, negotiation, registration and project implementation in an attempt to view in isolation factors which prevent one or more of the parties to a transfer mechanism from achieving its valid and fair objectives.

Factors which prevent achievement of such valid objectives have been termed "holdup factors." These may arise from the transferor, the transferee or the host developing country. They are discussed at some length.

The reduction or elimination of "hold up factors" will unblock the flow of technology and stimulate its voluntary transfer by private enterprise while achieving the legitimate aspirations of developing countries.

TECHNOLOGY

Although many exhaustive attempts have been made to define "technology," the simplest definition is the most accurate.

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"Technology" is, after all, the way people make things or give services."¹

"Technology" is reflected in documents which explain "how to do it," such as engineering drawings, material and operating specifications, written formulae and process steps, manuals of maintenance and purchasing, etc. "Know-how" and "trade secrets" also are elements of "technology." When "technology" is transferred the physical transfer usually is by the transfer of such documents. However, to effectively employ "technology" it usually is necessary for the transferor to explain the documents to the transferee and show him how to effectively use the information in them. This explanation and demonstration is called "technical assistance."

"Technology" can also be inherent in a product, a machine or a turnkey plant. There are two kinds of inherent technology in these — one technology inherent in manufacture — the other technology inherent in use.

Property Rights

Property rights often arise when "technology" and related products are developed by a technology owner. These property rights are called "proprietary rights." Proprietary rights include patents, trade secrets and rights in confidential information.

Some portions of "technology" may comprise nonproprietary know-how and nonconfidential information. However, usually when such nonproprietary know-how and nonconfidential information are combined into a "technology package," the "technology package" becomes proprietary and is sought after by prospective buyers because of its proprietary nature.

In developed countries the technology transfer mechanisms are thought to be business/legal mechanisms which include not only the transfer of information, but the transfer of rights to use the information, i.e. the right to use patents, know-how and/or trade secrets.

Transfer Rights

Bodies of case law and government regulations in many countries treat the technology transfer mechanism as including the transfer of rights. Consequently, when technology transfer mechanisms are discussed hereinafter, the term is meant to include not only the physical transfer of technology, but the transfer of all related proprietary rights, such as rights in patents and confidential information.

The classically accepted technology transfer mechanisms in developed countries which will be discussed in detail hereinafter are:

1. License

2. Investment
 - a. Joint Venture
 - b. 100% Basis
3. Direct Sale of Product, Machine or Turnkey Plant
4. Marketing Arrangements
5. Technical-Assistance Agreements
6. Combination of the above

The foregoing is basic information well understood by those working in the field of technology deployment. However, negative legal, political and commercial complexities arise in dealing with the selection of transfer mechanisms for transfer of technology from developed countries to developing countries. These complexities are termed "holdup factors" in this paper.

TECHNOLOGY COMMERCIALIZATION

Examination of the alternative technology transfer mechanisms for developing countries must be undertaken with a full understanding of the established elements of planning and implementation necessary in a technology commercialization project of which the selection of the appropriate technology transfer mechanism is only one element.

Every entity, business or governmental, which employs technology commercially first must make plans for its commercial use. In industrialized developed countries any company, large or small, engaging in a program of research and development to produce technology only undertakes such a program as the first step of a business plan for commercially employing the expected technology if the research and development program is successful.

Every entity, business or governmental, searching for technology to buy or to license usually intends to put the acquired technology to commercial use. Developing countries searching for technology sources do so for the most part for commercial purposes or to support commercial purposes through infrastructure development.

Developing countries early in their program usually plan for and focus effort on the acquisition of large "packages" of technology for the establishment of infrastructure or large industry. Consequently, they usually have interfaced early in the history of their technology transfer experience with very large technology owners to which has been applied the term "multinational" companies. Usually these multinational companies have been "giants" in terms of size and scope of international operations compared to the average size of companies in developed countries.

Mini-multinational

For example, in the United States there are literally thousands of what might be termed "mini-multinational" companies of from \$10 million to \$500 million in annual sales. These mini-multinational companies have branches, distributors, licensees, joint ventures or subsidiaries in countries outside of the United States — almost invariably in developed or industrialized countries.

These mini-multinational companies usually are not

known to — and usually know little about — developing countries.

Unfortunately, because developing countries have interfaced more often and early in time with "giant multinationals" rather than with mini-multinationals, developing countries have geared regulations and procedures to fit relationships with such giants. For various reasons, some historical and many valid, relationships between developing countries and such giants have become adversary. However, laws and regulations developed around relationships with giant multinationals to some extent do disservice to developing countries because such laws and regulations discourage the flow of technology to developing countries from mini-multinational companies.

Mini-multinational companies of sales volume from \$10 million to \$500 million must plan to expand the use of technology just as must giant multinationals — and, in fact, as must developing countries plan. Planning may be much less formalized in smaller companies. However, the basic elements of technology transfer planning are the same for all three entities: giant multinational companies, mini-multinational companies, and developing countries. These elements of technology planning are:

1. *Proposal* to undertake study of the project. In *private companies* this study proposal is made by a responsible executive to his management. In developing countries the study proposal is made in one instance (i) by a government entity to the national executive under a national development plan, or in another instance (ii) by an executive in a private company to his management. Whether technology is to be bought or sold, someone must take the responsibility for making the initial "proposal of investigation to management."

Unfortunately, rarely in mini-multinational companies are study proposals made by executives to management to transfer technology to developing countries. The main reason for this lack of flow of proposals in mini-multinational companies for technology transfer programs to developing countries is that the risks are greater than and the rewards less than risks and rewards incurred or received by proposing technology transfer projects to developed countries.

2. *Partner Identification* — companies selling technology identify potential partners in host countries — developing countries or companies in developing countries identify technology source companies.

3. *Examination and Selection of Transfer Mechanisms*. This is done by all companies considering buying or selling technology — and by developing countries undertaking to procure technology.

4. *Negotiation of the Transfer Contract*.

5. *Implementation of the Technology Transfer Mechanism*.

6. *Follow-on Relationships* between transferor and transferee.

Clearly, the steps of planning and implementation of a plan follows substantially the same course for technology buyers and technology sellers — for companies large and small and for government agencies in developing countries.

However, what developing countries generally have overlooked is the distinction between the high-profile, clearly visible giant multinationals and the mini-multinationals below the horizon having vast amounts of available technology that could be of great use to developing countries.

"Mini" companies are relatively newcomers on the international scene of developing countries. Regrettably, these companies are discouraged early in the planning stage of their technology commercialization programs from considering technology transfer to developing countries.

REGULATIONS WITHOUT COUNTER-BALANCING INDUCEMENT SUBSTANTIALLY LIMIT TECHNOLOGY FLOW TO DEVELOPING COUNTRIES

Business executives and licensing experts in developed countries examining new laws and regulations enacted by developing countries see identity and analogy with the rationale of long established, well reasoned legislative and case law evolved over the years in their home countries.

Likewise, knowledgeable experts, technocrats and lawyers from developing countries recognize that most of the problems they face in managing technology and regulating technology transfer mechanisms are not confined solely to their countries. These problems have arisen earlier in developed countries — have been faced and solutions have been implemented. One problem each developing country faces is balancing necessary regulations with inducement to technology owners.

UNIDO Help

UNIDO can aid in helping developing countries design regulations and to create an environment to induce the offer of technology by mini-multinational companies. UNIDO's objectives in this respect are ably stated by Mr. Enrique Aguilar.²

"There is recognition of the fact that by establishing laws and regulations oriented only to regulate, control or limit participation of foreign partners, there may be a negative effect as to the actual interest (of the technology owner) of going into a particular country. We feel that UNIDO's efforts in this area would have to be promotional in nature, would have to be oriented, indeed, to establishing certain regulations, but at the same time would have to create a receptive atmosphere in the country, which will enable foreign licensors to decide on viable projects."

By adopting a program of inducement with reasonable regulations, developing countries will open up a reservoir of technology in mini-multinational companies to which they have not as yet been exposed.

TECHNOLOGY OWNER'S DECISION TO TRANSFER TECHNOLOGY IS A COMMERCIAL DECISION

As a practical matter, a great number of companies with technology being commercialized in developed countries do not even consider in the first instance licensing or otherwise introducing their technology into developing countries. In these companies there never is such a *proposal to management* in the plan-

ning stage as outlined heretofore. This also is true of many large companies, but it is particularly true of small and medium companies — companies with technology and management expertise that would be particularly valuable to developing countries.

While developed country governments can freely (without profit) give assistance to developing countries, individual companies of sheer necessity must look on technology transfer as a commercial venture. Economic realities are common to the private technology seller and the private technology buyer alike.³

As outlined heretofore, planning based on commercial criteria arises early in the evolution of a technical program within a company of any size. Developing countries should understand how decisions to export technology are arrived at by private commercial companies.

One of the first decisions is the decision in which country to file patent applications. As a new technology passes from research into development, a U.S. patent probably will be filed by the technology owning company. Within one year thereafter the decision must be made respecting filing of foreign patent applications. Good management practice does not permit even the largest companies the expense of filing patent applications in countries other than those in which commercial business opportunities may exist. Patent application filings must be made where the technology will be used, i.e. where present company operations exist or where a profitable business entry may be made in the foreseeable future.

In making a foreign patent filing decision — often the first decision in the planning stage for a U.S. company — a list may be drawn roughly as follows:

North American Market: Canada, United States, Mexico

Common Market: Country List

Scandinavia: Country List

Other European Countries: Country List

Pacific Basin: Japan, Australia, New Zealand, Other

South America: Country List

Middle East: Country List

Africa: Country List

Clearly, the decision in which countries to file patent applications must take into account where licenses can be granted, where investment reasonably can be made and where normal profitable business transactions can be carried on. At this stage it could be said that many countries are in competition for "a look" at a technology owner's technology.

Reasonable Balance

Regrettably, what many mini-multinationals have found, or have been told, is that there is no reasonable business opportunity, no inducement, and a great deal of difficulty and risk in making investments, granting licenses and transferring technology into most developing countries. Such companies bypass developing countries and direct their technology to countries offering some reasonable balance of risk and opportunity.

This is the result in part from many developing countries evolving a structure of regulations to correct historical imbalance involving giant multinational companies. In so doing these developing countries have denied themselves access to the enormous fund of technology found in mini-multinational companies.⁴

No experienced international business lawyer or businessman questions the need of developing countries to control importation and use of technology under a plan of national development. Certainly, to properly achieve national goals, restrictions on technology transfer mechanisms by such countries are necessary. However, inflexible restrictions are hold-up factors which turn away the flow of technology.⁵ On the other hand, flexible restrictions reasonably administered can be part of the inducement of the flow of technology to a developing country.

PARTIES TO THE TRANSFER MECHANISM

Technology transfer mechanisms must be designed in view of the laws and regulations of each country. These mechanisms also must be designed and implemented to achieve the objectives of all of the parties involved in the agreement implementing the mechanism.

These parties are:

The transferor

The transferee in the host country

The host country

The host country is included as a party for the reasons that (a) the subject technology usually is transferred under its national plan of development, (b) its contract registration regulations preset many of the terms and conditions of the agreement prior and during negotiations, (c) its employees and representatives actively participate in negotiations between transferor and transferee, and (d) it continues to monitor the performance of the transfer agreement over its term.

The country of the transferor is not included as a party because it usually is involved, if at all, only through an export license application procedure.

PARTY OBJECTIVES

To complete preparation for examination of individual technology transfer mechanisms one must examine the objectives of those involved in a technology commercialization program. The objectives of the transferor and transferee are practically identical, i.e. the successful and profitable commercialization of the technology. Each wants to expand his business and make a profit; the transferor by expanding internationally to and into the host country and the transferee by profitably expanding in his own (host) country.

The third party to the transfer mechanisms participating in the technology commercialization project is the host country. The host country has the objectives of expanding its technology base and of generating economic growth for the welfare of its people within the limits of the country's resources.

Each party has a healthy and honest objective in engaging in technology commercialization. However, each of the parties involved can propose and implement conditions drastically affecting the transfer mechanism and making it difficult or impossible for another party to achieve valid objectives. (These conditions are termed holdup factors and are discussed in detail hereinafter.)

ALTERNATIVE MECHANISMS FOR TECHNOLOGY TRANSFER

Each technology transfer mechanism not only is expressed in a contract document but also is a total business arrangement. As pointed out, the business arrangement is selected after careful planning and analysis by both the prospective transferor and the prospective transferee of the technology on which the business is based.

The analysis by the transferor of technology is key to the business arrangement and is directed primarily to financial, legal and market factors affecting business under the selected transfer mechanism to be used in the host country. Such an analysis results in the selection of one of the following technology transfer mechanisms as the basis for the business arrangement:

1. License
2. Investment — either 100% or by joint venture
3. Direct sale of products, machines or turnkey plants which inherently include technology
4. Technical assistance agreement
5. A marketing arrangement
6. A combination of the foregoing

The License

A much-used technology transfer mechanism in and between business entities in developed countries, as well as between business entities in developed countries and developing countries, is the license. A license is a technology transfer mechanism whereby the owner (transferor) of the technology rents or leases the technology to the licensee (transferee) so that the latter can commercialize the technology in his country.⁶

A right is granted by a transferor (licensor) to a transferee (licensee) to use the transferor's patented and/or unpatented proprietary rights to practice processes to manufacture, use and sell products.

Surrounding the license and involved as a part of the license as a transfer mechanism may be other arrangements. Such arrangements may include an agreement to furnish components, materials or technical assistance by the transferor (licensor) to enable the transferee (licensee) to have the proper support to use more effectively the licensed rights.

As we have seen, technology is reflected by engineering drawings, data books, operation manuals and other related information, all of which has little value to a transferee (licensee) unless it is explained to him by the transferor (licensor) and his employees are shown how to use the information effectively. Consequently, technology licenses usually include technical assistance provisions whereby the licensor (transferor) will show the licensee (transferee) how to best use the technology.

In return for the right to use the licensor's information and property rights, the licensee pays the licensor rent or royalty. Quite often the rent or royalty is divided into a lump sum paid upon execution of the license contract with provision for the payment of certain additional amounts over the life of the agreement. Such later payments are proportional to the advantage of using the technology. Usually these

follow-on payments are calculated on a rate based on the volume of sales or number units of production resulting from use of the technology.

Investment by Joint Venture

A joint venture is a transfer mechanism pursuant to which a technology owner enters into partnership with a technology user in a host country.

The legal entity employed may be either a partnership or a corporation. Almost invariably in technology commercialization projects employing joint ventures as a transfer mechanism the legal vehicle employed is a corporation. The transferor and the transferee invest in a corporation in the host country. Each takes shares in the corporation. Equity shares of the transferor and transferee will be determined either through negotiations between the parties or under host government regulations. Quite often the transferor will want a majority interest in the corporation which will employ his technology. His view is that to make most effective use of his technology, he should have management control of the corporation which contracts for the design, construction and operation of the plant, as well as undertakes marketing the product. The technology owner wants to be certain that his technology is employed in the same manner as he has successfully employed it in his home country.

However, because of the policy of most host developing countries in maintaining nationals in positions of majority ownership, the transferee (host country national) may own a greater proportion of the venture than the transferor. (These regulations limiting ownership of transferors in joint ventures raise the possibility of holdup factors in that they discourage consideration of technology commercialization projects *ab initio* by some technology owners.)

Cash Investment

The transferor may obtain his shares in the joint venture through the investment of cash. When the initial investment by the transferor is made in cash, his technology usually initially is not transferred to the joint venture. Consequently, the joint venture must either buy or license the needed technology from the transferor. The transferor, after having purchased shares in the company for cash or other consideration, then either sells the technology or grants a license under the technology to the joint venture. The joint venture is then free to use the technology upon terms and conditions negotiated.

In another approach, termed "capitalizing technology," the technology owner exchanges his technology for shares in the joint-venture corporation. When a technology owner "capitalizes" his technology he has made all or part of his investment by technology investment rather than cash investment. The joint-venture corporation then owns the technology and may use it freely. Thereafter the joint-venture corporation does not need to purchase or license the technology from the owner. Sometimes a technology owner will make his investment in part by capitalizing his technology and part by payment of money for shares.

100% Investment

Often a technology owner in a developed country

wants to employ his technology in a developing country by starting up his own 100%-owned subsidiary. To do this he buys property, builds a plant and installs equipment. The finished plant is 100% owned by the technology owner. As an alternative to purchasing land and constructing a plant, a technology owner may buy an existing operating company in the host country and transfer his technology to that company by license. This also is transfer of technology by investment. Host countries consider the transfer and use of technology from a foreign parent to a host country subsidiary as a license arrangement.

From the point of view of the technology owner, investment in a wholly-owned subsidiary company greatly simplifies the transfer and use of his technology into a new host country. However, 100% investment involves the greatest risk to the technology owner of any of the transfer mechanisms. In recent years, however, it has become increasingly difficult for technology owners to transfer technology into a developing country using the transfer mechanism of direct investment. Consequently, many companies do not consider developing countries as a good business locations for commercializing technology.

Direct Sale of Products and Machines

Often, a technology owner uses his technology to manufacture a product or a machine in his country and sell such directly to a buyer in a host developing country. The buyer acquires not only the physical product or machine, but he also acquires information as to two types of technology inherent in the product or machine. The first type is the technology that has been used in *manufacture* of the product or machine. The second type is the technology of *use* of the product or machine.

The buyer, in effect, is receiving the results of all the *manufacturing* technology that the seller has developed and employed to manufacture the product or machine. Therefore, the sale is a transfer mechanism for transferring to the developing country the technology which the technology owner has employed in the *manufacture* of the machine or product.

In some instances the transferee may "reverse engineer" the product or machine in order to extract the manufacturing technology to be able to commence manufacture in the host country. The transferee can freely do this subject to patent rights of the transferor in the host country.

Use Technology

The second type of technology transferred by a sale is the technology of *use* inherent in the machine or product. For example, the sale of a machine which is *used* to perform a function which could not be performed or could not be performed as well by any other machine and thereby gives an operation in the host country higher production rates or increased efficiency is the transfer of *use* technology inherent in the machine. Many developing countries have expanded their technological bases by buying products and machines from developed countries. Usually a product or machine purchased is furnished with maintenance manuals and use instructions. Such manuals also

serve to transfer technology into developing countries.

Another form of sale which is a technology transfer mechanism is the construction and start up of a turnkey plant in a developing country. In effect, the engineering contractor (transferor) contracts to sell a product (turnkey plant) with technology inherent in its construction. Included in the turnkey plant is the technology of use once operations commence. The consideration for such a turnkey plant sale may be a lump sum or may be payments over a period of years based on productivity.

Technical Assistance Agreement

Technology is the knowledge of how to make things. Usually, technology must be explained by the transferor to the transferee under licenses, joint venture or marketing transfer mechanisms. When such is the case, provision for technical assistance is provided for in the agreement supporting the transfer mechanism.

However, often a company in a developing country will want to keep abreast of technology growth in a certain industry in another country by making an arrangement with a major company in that industry. The mechanisms for this is a technical assistance agreement. No rights or technology are transferred when the agreement is executed. However, periodically, usually at least annually, the major company will provide seminars, visitations or introductions which will help upgrade the technology in the company in the developing country. These arrangements can last for many years and can result in licenses, joint ventures or marketing agreements respecting technology emerging during the agreement.

Yet another form of technical assistance can come by the company in the developing country hiring an independent consultant with a great deal of background and know-how to work on a specific assignment. During work on such assignment the consultant is providing technical assistance and transferring know-how and technology to the company.

Marketing (Distributor/Agent) Agreement

A marketing agreement really is a sale with a first transferee (distributor) between the owner (transferor) and the ultimate buyer (second transferee). It is a transfer of technology from a technology owner to two consecutive transferees. The distributor, first transferee, buys and stocks the product or machine for resale to the ultimate buyer (second transferee). The first sale under the marketing agreement transfers to the distributor the benefits of the manufacturing technology employed to make the product or machine. The distributor does not employ the use technology inherent in the product or machine, but seeks a user-purchaser to whom to sell. The user-purchaser (second transferee) employs the use technology once the sale is consummated.

The distributor (first transferee) in the host country has performed no research and development and has invested in no manufacturing facilities to make the product or machine. However, by buying the product or machine for resale he has received the benefit of and is the transferee of part of another's manufacturing technology.

The second technology inherent in the produce

or the machine, i.e. the use technology, is employed by the ultimate buyer, the second transferee. He employs the use technology in his operations without having to risk his resources on the time and expense of development of the product or machine to fill his needs.

The marketing agreement as a technology transfer mechanism is extremely important because, quite often, a distributor/agent in a developing country ultimately will become a manufacturing licensee and/or joint-venture partner of the seller (transferor) as the market for the product grows.

ADVANTAGES AND DISADVANTAGES OF VARIOUS TRANSFER MECHANISMS

A comparison of the advantages and disadvantages of different transfer mechanisms is useful in order to observe how the objectives of the transferor, the transferee and the host country are affected by each mechanism when used in technology commercialization programs.

License (Advantages and Disadvantages)

The advantages to each of the three parties to the license are as follows:

The Licensor (Transferor). By granting a license instead of making a direct investment the licensor has the advantage of minimizing his cash investment in a developing country and yet receiving a return on the investment he has made in the original development of his technology. The licensor is exposed to less financial risk if he licenses another to invest in a plant to manufacture and sell his product.

Another advantage to the licensor is that a license can be entered into and implemented more rapidly than can a 100% investment or a joint venture. (Note that the average market agreement or sale probably can be implemented more rapidly than a license.)

A disadvantage to the transferor in using the license as a transfer mechanism is that he will obtain less return on his original investment made in the development of his technology. The license royalty usually is less than the normal profit that the technology owner would achieve in entering into a joint venture or by making a 100% investment in a developing country. Most technology owners in developed countries invest in development in order to originate technology for their own commercial use — not for licensing. In developed countries licensing usually is selected as a last resort by the technology owner to be used if the technology cannot be commercialized at reasonable risk by another business mode. The harsh term and royalty restrictions imposed by some developing countries make licensing impossible for the technology owner.

Another disadvantage to the licensor in using the license as a transfer mechanism is that he loses a certain degree of control over the employment of his technology. The licensed technology may not be as effectively used in the hands of the licensee and, therefore, not contribute as effectively to the objectives of the transferor, transferee and the host country as would be the case if the technology were under close management of the technology owner in joint venture

of 100% investment.

The licensor suffers another disadvantage in that in a license he must turn over his valuable confidential information to a transferee over whom he has little or no control. Unauthorized disclosure of such confidential information in a developing country can result in even broader unauthorized international disclosure. Such a broad disclosure can seriously damage technologies which have a large content of confidential engineering trade secret and know-how information.

These disadvantages serve to deter technology owners from considering licensing into developing countries. In particular, small and medium companies in developed countries are deterred from entering into business in developing countries.

The Licensee (Transferee). The licensee finds a great advantage in the license as a transfer mechanism because, as a technology transferee, he can expand his business rapidly using R&D with respect to which he has taken no development risk and made no development investment. (The licensor has taken the risk and invested his resources.) In developed countries it is accepted that risk in technical development is such that perhaps one or two out of a hundred expensive programs will succeed. Obviously, if a development program is successful and the resulting technology is licensed by the technology owner, the licensee has the advantage of not having to take the risk or spend the money on development.

Another advantage to the licensee is saving in time. If the licensee were to undertake the technology development himself, he would spend time in going through the development program to completion. Such programs take years. By taking the license, the licensee (transferee) can immediately employ the technology developed by the licensor. The development time has been spent by the licensor.

Relationship

Another advantage to the licensee, of course, is the ongoing relationship that he established with his licensor. That relationship can lead to other business arrangements involving other transfer mechanisms to his benefit.

A disadvantage to a licensee under a license is the lack of close association with the technology owner such as would result from a joint venture. In the absence of a closer relationship with the technology owner, the licensee is less likely to receive close support and technical and marketing assistance. A license does not require such a high level of commitment from the technology owner as does a joint venture or even a marketing agreement. This disadvantage is not a serious handicap and the licensee should profit if he uses the licensed technology well.

The Host Country. The license benefits the host country because it introduces new technology into the country to broaden the technology base and to raise the standard of the people in the country. A license is more beneficial to a host country than is a marketing agreement because a licensing agreement introduces manufacturing which in turn provides jobs and self sufficiency.

The host country, however, suffers a disadvantage by going the licensing route rather than encouraging

direct investment or joint venture by the technology owner. In a license arrangement, the licensor seldom invests in the host country, but contributes his technology under a contract of rental or royalty. On the other hand, under a joint-venture arrangement the host country would benefit by the investment by the technology owner in the joint-venture corporation. (The host country would benefit even more by direct investment by the transferor in a 100% subsidiary.) However, of course, in the joint venture and the direct investment the host country would lose a degree of control over the profits generated.

Joint Venture (Advantages and Disadvantages)

A joint venture as a transfer mechanism has attraction to a technology owner (transferor) because it gives him the advantage of entering a developing country with a partner who is a national of the host country and who can establish easy communications and relationships with government, marketing, technical and financial people in that country. A local joint-venture partner also can help to guide and expedite action on the various documents of organization of the transfer mechanisms as well as the many permit and operating licenses that have to be obtained.

A disadvantage of a joint venture to the transferor is that he must take less profit for the use of his technology than if he had employed it in the host country through direct investment. Normally, by making a direct investment he would have full control of his technology and be able to take all of the profits from its use.

Experience

The transferee joint-venture partner has the advantage of the use of the technology on a profitable basis. He also has the experienced management and technical support of the technology owner (transferor) partner.

A disadvantage to each joint-venture partner, of course, is that each must give up both a share of the profits and a degree of control of the venture. Each must cooperate with the other partner to make the venture successful. The degree of management control sacrificed by each and the necessity to cooperate with each other in order to make the venture successful often slows venture operations.

The host country benefits from joint ventures because such builds the country's technology base while involving foreign technology owners in a commitment in the country over an extended period of time — a period of time much longer than the period of a license. Of course, the cash investment often required of a foreign-venture partner is an advantage to the host country.

100% Investment (Advantages and Disadvantages)

A conventional transfer mechanism for business expansion in developed countries is direct investment. An expanding company will commit its resources to buying land, building a factory, installing its technology and manufacturing and selling products. Direct investment also is often used by companies expanding from one developed country into another developed country.

From the technology owner's point of view, if he has the resources, direct investment is an ideal technology transfer mechanism to employ his technology in a developing country. He has the advantage of full control of his technology. Also his proprietary information is protected from breach of confidentiality. His subsidiary in the developing country has quick and ready access to the home office. Inter-company procedures and communications are well established and can be implemented without reference to a partner.

To the host country, direct investment as a transfer mechanism has the disadvantage that its country nationals are not involved as owners in the business. Unquestionably, over the years some technology owners (transferors) have tended to exclude country nationals from operation of the business. This has been done to maintain efficiency and quality control of operations. As a result nationals of a host country have not been trained in the critical aspects of operating the business. This is a holdup factor which in recent years, to a great extent, has been alleviated.

Advantages to the host country lie in the increase in total investment when a technology owner uses direct investment as a transfer mechanism. Also, by permitting 100% investment the host country will attract a wide range of useful technology from owners in developed countries who would not consider entering the developing country by license or joint venture. By permitting reasonably controlled direct (100%) investment a host country will attract the transfer of more technologies and be able to achieve its objectives.

The "Sale" and "Marketing Agreement" (Advantages and Disadvantages)

The owner (transferor) of technology under a marketing agreement or sale either sells a product or a machine through a distributor (transferee) to an end user or directly to the end user in the host country. The use of a marketing agreement or sale as a transfer mechanism reduces risk to the seller (transferor) of error in his analysis of the market for his product or machine in the developing country. Sale and marketing agreements as transfer mechanisms do not expose the technology owner (seller) to as great a risk of loss if he has misjudged the market as he would experience if he were to enter into a direct investment or a joint venture in the developing country. However, the seller (transferor) is under a disadvantage in that when the product or machine is sold to the distributor or sold by the distributor to the end user, the inherent technology in the product or machine is immediately free from the seller's (transferor's) control. He has committed his technology free from his control either to the buyer, or often to the public, by the sale or series of sales, i.e. the marketing agreement.

Ready Source

In the marketing agreement the first transferee (distributor) gains by having a ready source of proven product or machine for stock without the risk of investment in a research and development program or in a manufacturing plant to produce the product or machine. The end-user buyer from the distributor, the ultimate transferee of the use technology, also has a quick and ready source of proven products or ma-

chines without risky and costly investment.

A further advantage to a buyer under a sale or marketing arrangement is that he may be able to "reverse engineer" the product or machine to piece together the manufacturing technology, i.e. the way the machine or product is made. The buyer also can make improvements on the product or machine without licensing them back to the seller (technology owner). Of course, such advantages to the buyer are disadvantages to the seller.

The host country benefits under the sale or marketing agreement transfer mechanism because it builds its technology base and increases benefits for its people. A disadvantage to the host country is the outflow of foreign exchange necessary to buy products or machines under sale or marketing agreements. To a developing country with limited foreign exchange, the marketing agreements or sales are transfer mechanisms that must be carefully monitored because of currency problems.

An advantage of the marketing agreement or sale to all parties — the transferor, the transferee and the host country — is that this transfer mechanism may be used as a preliminary gauge of the market size for the product or machine, i.e. to determine whether the market is large enough to justify a heavier investment and greater risk by the parties in a license, joint venture or direct investment.

ECONOMIC FACTORS USUALLY DETERMINE THE SELECTION OF TRANSFER MECHANISMS

In industrial countries technology owners generally base the decision to commercialize technology on financial parameters — on the economics of the proposed commercial program.

In examining the economic desirability of deploying technology into commercial use in a project there are at least four factors which must be considered:

- Opportunity
- Investment
- Profit (Payback)
- Risk

Of these, *opportunity and risk* are exceedingly difficult to reduce to absolute values. This is true not only because there are a large number of variables attached to each of these factors, but because many of such variables do not lend themselves to absolute expression.

People's desires, local customs and degree of need for the technology are but a few of the many intangible variables bearing on whether an opportunity exists for employment of a certain body of technology in a developing country.

Risk also is affected by many variables which may not be reduced to absolute values. The possibility of unexpected technology obsolescence; change of nationalization of an industry business; lack of ability of a licensee, distributor, or joint-venture partner are but several of a wide array of uncertain future events that affect the degree of risk involved in embarking on a technological commercialization project.

Opportunity and risk are assessed by gathering as much information as possible about a project and applying various formulae and variable sensitivity substitutions. However, it is the business executive

examining all factors but drawing on experience and intuition (not to mention courage) who must finally make the "go-no-go" decision on implementing a technology commercialization project.

Investment and profit, however, are factors which lend themselves to absolute expression. Also, these are factors about which much is usually known by those examining the feasibility of a technical project for developing countries — known because the technology usually already has been employed commercially in an industrialized country.

In examining potentials of investment and profit it is useful to keep in mind a simple operating statement based on annual "sales" of \$100 of product. In order to arrive at net profit one deducts cost of sales, i.e. cost of making the product and general, administrative and sales expense.⁷

Formula A (1)

		As Percent of Sales
Sale of Product	\$100	100%
Cost of Product	60	60%
Gross Profit	\$ 40	40%
General, Administrative and Sales Expense	\$ 20	20%
Net Profit (Pretaxed)	\$ 20	20%
After Tax Profit (U.S.A.) (2)	\$ 10	10%

- (1) All values are arbitrarily selected for this example.
 (2) Corporate income tax in U.S.A. is about 50%.

Ways of using a well worked out proforma operating statement in the selection of transfer mechanism by the technology owner are important to understand. Information from this statement, which represents profitability, helps many technology owners decide whether to go into a project in another country.

In all the following examples we will assume that Company A has market research information which indicates \$1,000,000 sales annually in Developing Country B. Investment to produce that amount of sales is \$1,000,000. Further, Company A has a policy of investing only in foreign projects which:

- (a) Return no less than \$100,000 of after-tax income annually.
 (b) Return no less than 10% on investment after tax.

Example I—Use of the Proforma Operating Statement in considering *Direct Investment* as a transfer mechanism.

<i>Sale of Product</i>	\$1,000,000	100% of Sales
<i>Cost of Product</i>	600,000	60% of Sales
<i>Gross Profit</i>	400,000	40% of Sales
<i>General, Administrative and Sales Expense</i>	200,000	20% of Sales
<i>Pretax Net Profit</i>	200,000	20% of Sales
<i>Less Tax</i>	100,000	10% of Sales
<i>After Tax Net Profit</i>	\$ 100,000	10% of Sales

Clearly, \$100,000 after-tax income meets Company A's requirements of income volume and return on investment. However, \$100,000 is at the lower margin of meeting those requirements. Risk and possibilities of factors occurring which change the "proforma" must be carefully weighed before selecting direct investment as a transfer mechanism.

Statement in considering a 50% *Joint Venture* as a transfer mechanism.

<i>Sale of Product</i>	\$1,000,000
<i>Cost of Product</i>	600,000
<i>Gross Profit</i>	400,000
<i>General, Administrative</i>	200,000
<i>Pretax Net Profit</i>	200,000
<i>Less Tax</i>	100,000
<i>Total Venture After Tax Profit</i>	100,000
<i>Less Partner's Portion</i>	50,000 *
<i>Company A's After Tax Profit</i>	\$ 50,000

* (to Joint Venture Partner)

Company A has invested only \$500,000 in this joint venture (50% of the venture). Consequently, Company A's requirement of 10% return on investment is met by using this transfer mechanism.

However, \$50,000 after-tax net profit is below the \$100,000 net after tax goal of Company A. Consequently, joint venture as a transfer mechanism is discarded by Company A unless the size of projected sales can be doubled from \$1,000,000 to \$2,000,000.

Note: A great deal of management time and the efforts of technical manufacturing and marketing people go into setting up a manufacturing and marketing project such as this. It is better for Company A to use its staff on projects in other countries where the same effort directed to 100% direct investment would be more profitable.)

Example III—Use of the same Proforma Operating Statement in considering *Licensing* as a transfer mechanism. Here Company A must determine at what level of royalty it can afford to license in Country B.

Licensee Operations

	5% Royalty	10% Royalty	20% Royalty
<i>Sale of Product</i>	\$1,000,000		
<i>Cost of Product</i>	600,000		
<i>Gross Profit</i>	400,000		
<i>License Royalty</i>	50,000	\$100,000	\$200,000
<i>General, Administrative & Sales Expense</i>	200,000	200,000	200,000
<i>Pretax Net Profit</i>	150,000	100,000	-
<i>Tax</i>	75,000	50,000	-
<i>After Tax Profit</i>	75,000	50,000	-
<i>Licensor's Royalty Income After Tax</i>	\$ 25,000	\$ 50,000	\$100,000

Clearly, neither Company A nor licensee can afford to use a license as a transfer mechanism.

Licensor's investment criteria are met only at a royalty rate of 20% on sales (above). This royalty rate generates the \$100,000 annual minimum income necessary for licensor to enter into a foreign project. On the other hand, of course, 20% royalty is much too high for licensee.

Licensee can only achieve 10% return on the \$1,000,000 investment if the technology is licensed royalty free.

There is no way that Company A can achieve its objectives except by direct investment.

Also, suppose that Company A learns that Country

B has just passed a law requiring that license royalty rates be not more than 3%, the term of the license agreement be not greater than five years, and that the licensee has the right to use the technology freely when the license expires. In effect, Company A would sell its technology with payments over a five-year term totalling \$75,000 after tax. These terms are so burdensome that Company A "closes the file" on Country B and continues to evaluate projects in countries where reasonable possibilities of success lie.

Much has been written about royalty rates in license agreements. Royalties may be taken by the licensor in cash, in products or in equity shares of the licensed company. When a licensor takes shares instead of cash, he builds an equity interest in the licensee company so that he can participate in management and can share in income from licensee company operations.

Misguided View

There is a misguided view that royalty is an income sharing device between the licensor and the licensee and in no way differs from income sharing that occurs from equity holdings in a joint-venture enterprise. The word income in this context is synonymous with profit.

The accounting fallacy of this position from the licensee's point of view is that royalty is not treated as an "above-the-line" expense and is treated as a "below-the-line" disbursement of income, i.e. as a dividend. The licensee is paying "rent" out of income after taxes.

From the licensor's side, the fallacy is more serious. The licensor has presented the licensee with a business opportunity — the business opportunity in itself has a certain real value which is an increment of the total royalty value. Further, the licensor has transferred technology and "rented" rights to the licensee to enable the licensee to manage the business opportunity and hopefully make a profit. While the licensee has the rights he is expected to pay the "rent." The licensor is not expected to wait until the licensee makes a profit before he is paid his "rent." (In such event the licensor would be a joint-venture partner having an equity position.) However, as licensor, he has no board representation, no voice in management and would be at the absolute mercy of the licensee's allocation of cost and expense of operations in the determination of profit.

The handy proforma operating statement of the licensee points up the fallacy of this approach.

Assume that the licensor believes that the value of his technology is equal to one-third of pretax profits of the licensee under normally profitable operations. He and the licensee then negotiate a royalty which is 5% of sales.

Under Example A (following) royalty is treated as it is universally treated — as an expense. In Example B it is treated as sharing of income but the licensee is grossly inefficient, and, although having sales of \$1,000,000, his inefficiency has increased cost of sales to 75% of sales.

Note: Under A, royalty is expensed in the usual manner — Licensee receives \$150,000 — Licensor receives \$50,000 (one-third of licensee's income).

Licensee Operations

	A	B	C
Sales	\$1,000,000	\$1,000,000	\$1,000,000
Cost of Sales	<u>600,000</u>	<u>600,000</u>	<u>750,000</u>
Gross Profit	400,000	400,000	250,000
Royalty 5% Sales	50,000	-	-
General, Administrative and Sales Expense	<u>200,000</u>	<u>200,000</u>	<u>200,000</u>
Pretax Income	150,000	200,000	50,000
Licensor's 33 1/3% of Income	-	<u>66,000</u>	<u>16,000</u>
Licensee's Profit	\$ 250,000	\$ 134,000	\$ 23,334

Under B, royalty is not expensed so that income is up — licensor gets his 33% participation and licensee suffers a drop in profit over A. Licensee suffers.

Under C, Licensee's inefficiency or improper allocation of expense has reduced income to a low level so that licensor gets an unfair "rent" return. He has no ownership position to know the cause of the problem or the remedy.

Example IV — Use of Proforma Operating Statement in selection of the *Marketing Agreement* as a transfer mechanism.

The financial layout of the operating statement is as set out in Formula A.

Sales (To Distributor)	100%
Cost of Product	<u>60%</u>
Gross Profit	40%
General, Administrative and Sales Expense	<u>20%</u>
Net Profit Pretax	20%
Net Profit After Tax	10%

The problem to Company A is that it does not know much about doing business in Country B. The potential size of the market is unknown. The manner of doing business is new. Much must be learned about the country and business before direct investment, joint venture, or licensing can be selected as transfer mechanisms.

Consequently, to gether experience and to enter Country B on a business basis but with least risk, Company A appoints a distributor and exports products to Country B.

After several years' experience Company A expects to have quantified the market, gained more experience and be able to select a transfer mechanism from direct investment, joint venture or licensing.

In summary, selection of the transfer mechanism is primarily a business decision. The proforma operating statement can be a useful tool in selecting technology transfer mechanisms.

HOLDUP FACTORS CREATE PROBLEMS IN TECHNOLOGY TRANSFER MECHANISMS

Holdup factors are defined herein as conditions sought to be imposed by the transferor, transferee or the host government on technology transfer mechanisms which discourage transfer or make transfer mechanisms unworkable or unfair to one or more parties to the transfer mechanism, i.e. transferor, trans-

feree or host country.

The analysis here is an attempt to step back from the selection, negotiation and implementation of transfer mechanisms to determine objectively what holds up the successful introduction of technology from developed countries to developing countries. Countless books and articles have been written about restricted business practices. Certainly these exist and with other factors must be considered among the holdup factors to technology transfer mechanisms which hinder one or more of the parties to the transfer mechanisms from achieving fair objectives.

Holdup factors are found either in (a) contract provisions sought to be imposed on the transferee by the transferor, or in (b) government laws and regulations which impose conditions, usually on the transferor and which discourage the transferor from initiating or going ahead with a technology commercialization project in a developing country.

In developed countries experience in earlier years was that certain holdup factors were in provisions imposed by transferors on transferees in technology transfer mechanisms. As a result of these holdup factors developed countries have evolved laws and regulations to ameliorate the effect of such holdup factors and establish fairness to both parties involved in technology commercialization through the use of technology transfer mechanism.

Examples

Examples of laws of developed countries which control holdup factors in technology transfer mechanisms are the antitrust and Federal Trade Commission laws of the United States, Article 85 of the Rome Treaty in the Common Market, and regulations of MITI and the Fair Trade Commissions Laws of Japan. These laws and regulations now are well established and operate in a legal and social environment well understood by technology owners. These laws have been tested, revised and retested over the years. They contain many conditions subject to flexible determination. While eliminating many holdup factors on the one hand, they have provided on the other hand a legal-regulatory system which parties to transfer mechanisms now easily understand and with respect to which they are relatively certain of their standing. This environment encourages the flow of technology between parties within a developed country or between parties across borders between developed countries. Such laws and regulations deal with holdup factors in transfer mechanisms involving patents as well as technology. As pointed out earlier, it is generally recognized in developed countries that transfer mechanisms involving solely technology are treated in substantially the same way as transfer mechanisms involving solely patent rights. The laws of the United States, the Common Market and Japan appear to follow this rationale.

However, laws and regulations of developed countries regarding restrictive business practices do not pose the severe business entry barriers that similar laws often pose in developing countries.

The reason developed country laws do not pose barriers to business entries is that they operate as

corrective factors to business operation after the business is underway. A technology owner is not turned away from a country by the deadening and overriding burden of qualifying legal regulations before making his business entry by technology transfer.

True, his business arrangement some years later may be legally tested and found to contravene the laws of restrictive business practices. Meantime, he and his technology transferee, as well as hundreds of others, have been able, often by a great deal of struggle and effort, to build businesses to their benefit and the benefit of the developed country. They do this guided as they go by the restrictive business practice laws.

Conversely, many developing countries observing the evolving laws of the developed countries on restrictive business practices, have "thrown it all up front," i.e. they have legislated investment and contract registration laws and regulations that must be applied and conformed to before a technology owner can ever start business with his transferee. They marshal all of their early bad experience with giant foreign companies with the observed (but not clearly understood) experience seen in restrictive business practice laws and regulations of developed countries and write barrier regulations to technology transfer mechanisms.

Such barrier regulations are holdup factors to the valid aspirations of a technology owner, a potential transferee, and the potential host country itself.

Turned Away

Although they would like to do business for profit, social and humanitarian reasons, literally hundreds and hundreds of small and medium technology owner companies are turned away from even first consideration of countries such as Andean Pact countries because of barrier regulation holdup factors.

It is important to note that evolution of laws and regulations to ameliorate unfair business practices have not evolved serious holdup factors to technology transfer between developed countries. On the other hand, inducements are inherent in the total business/legal structure which encourages the use of technology transfer mechanisms.

Holdup factors also arise respecting technology transfer mechanisms between developed countries and developing countries when the transferor, on the one hand, attempts to impose burdensome conditions on the transferee and, on the other hand, when the host country imposes burdensome regulations on the transferor or transferee. (The transferee however, rarely if ever, created holdup factor problems.)

Holdup factors usually proposed by the transferor include:

1. Price Restrictions

Here, the transferor unfairly would restrict pricing by the transferee. Restricted pricing would help the transferor maintain an unfairly high price. This, in effect, is a conspiracy with the transferee to fix and maintain prices. The laws of developed countries under most circumstances have stopped this practice. In

some instances, however, legal price fixing is possible.

Conclusion: All concerned in developed and developing countries would agree that such price restrictions unfairly imposed on transfer mechanisms are holdup factors which should not be used. However, host country regulations should be flexible enough to consider and approve those instances when price fixing may contribute to the effectiveness of the transfer mechanism and further the objectives of all of the parties.

2. Resale Limitations

A condition by the transferor imposed in the sales or marketing agreements which requires the transferee (buyer) to limit or control the resale of the product or machine. Generally, these have been held to be a holdup factor by court decision in developed countries.

Conclusion: It follows that such provisions imposed by transferors in transfer mechanisms respecting developing countries also would be holdup factors and unfair. Conversely, reasonable flexible host country regulations controlling such resale conditions would not be holdup factors.

3. "Tie-in" Conditions

"Tie-in" conditions are conditions imposed by the transferor on the transferee forcing the transferee, in order to participate in the transfer mechanism, to purchase materials or take products which he otherwise would not take.

Conclusion: The general rule in developed countries is that such a "tie-in" demanded of the transferee by the transferor is a holdup factor unfairly burdensome to the transferee.

However, almost all developed countries have recognized an important exception to the general rule against "tie-ins" in that the transferor should be able to require use by the transferee of a critical material or component necessary to the successful or efficient employment of his technology. Under this exception a technology owner, by establishing that the use of a particular composition or component is critical to the effective use of his technology, may require the transferee to acquire and use such. This, in effect, is a valid and constructive "tie-in."

Developed countries go further to permit the transferor and transferee to agree without coercion by the transferor that such critical materials or components must be purchased from the transferor.

These "tie-in" exceptions are vital to the success of programs involving transfer mechanism in many instances. In the United States it is well known that many companies avoid transferring technology to developing countries simply because rules and regulations will not permit them to require the transferee to use critical materials or components, often imported, which are absolutely essential to successful operation of technology. Such requirements are holdup factors. If the transferee were to use other than the critical materials or components the technology would not perform properly. None of the three parties would achieve its valid objectives through use of the transfer mechanism.

Such host country's rules and regulations against the required use of critical materials or components

are holdup factors which usually discourage *ab initio* planning of technology introduction into the host country by technology owners.

Logically, developing countries, in order to facilitate inflow of technology, should provide flexible requirements to permit the transferor, after a showing of criticality, to require use of specified materials or components by the transferee.

4. Quantity Limitations

Often in transfer mechanisms transferors will propose product quantity limitations on the output of the technology by the transferee. The transferor's reason for this limitation often is to limit the quantities of product available in the market in order to maintain price. This generally is recognized in developed countries as an unfair business practice, i.e. a holdup factor imposed by the transferor. Regulations and laws have been instituted against it.

However, developing countries should maintain flexibility in any regulation against quantity restriction for the reason that to develop a particular market it might be best to permit quantity restrictions for a limited time.

In general, quantity limitations are bad when applied to technology transfer mechanisms because they unfairly limit the use of the technology in the hands of the transferee and limit the benefit of the technology in the host country.

5. Export Restrictions

Under this provision a transferor to a first host country conditions the transfer of the technology to the transferee on agreement by the transferee to limit export of the product of the technology.

By limiting exports the transferor is attempting to protect his transfer mechanisms in other host countries from import competition. Often his transferees in such other host countries have spent a good deal of time and money in building a market for the product of the same technology. If such parties are suddenly faced with new competition from the new transferee in the first host country, the possibility exists that the entire market for the product would be disrupted with the result that none of the transferees of the technology producing the product would be able to stay in business. If none of the parties can efficiently employ the technology, all will suffer — all host countries, the transferor and all transferees.

Notwithstanding the foregoing, a number of jurisdictions in developed countries have held that restrictions on export are holdup factors in transfer mechanisms and have held them illegal. Other jurisdictions, based on certain fact situations, have not so held.

Export restrictions to certain countries where a technology owner has patents will occur as a matter of law. Also, even in the absence of patent protection, cost of shipping and import duties in the other host country may effectively restrict export from the first host country to the other host countries.

Conclusion: Limitation on export generally may be considered a holdup factor. However, there are valid instances where, even in the absence of patents, such limitations are beneficial to all of the parties to the transfer mechanism. Regulations in host countries

against such restrictions should be flexible enough to consider all factors and not unfairly burden the technology transfer mechanism by arbitrary requirements.

6. Field-of-Use Restrictions

A "field of use" is a limited segment of the total use to which a certain technology can be applied. For example, technology (and patents) broadly useful in the manufacture of wheeled self-propelled vehicles may be used to manufacture either passenger cars or airplanes. Suppose the owner/transferor of such technology is forced to give an exclusive license under his technology (and patents) to an automobile company. The automobile company will only make automobiles and not use the technology to make airplanes. Since the owner (transferor) has given an exclusive license under all of his technology (and patents) to the automobile company, no airplanes ever will be made using the valuable technology (and patents) — the automobile company won't make airplanes — the technology owner cannot authorize the airplane company to use the rights — the automobile company has them (but probably does not want them) — the airplane technology is completely wasted.

In developed countries a mechanism of licensing has been developed to prevent such wasting of technology. That mechanism is field-of-use licensing. In our example, the airplane technology can be saved if the owner (transferor) gives the automobile company only an exclusive license to use his technology (and patents) in the "field" of automobile manufacture. He then is free to exclusively license his technology to an airplane company in the "field" of airplane manufacture. His airplane technology is not wasted.

Field-of-use licensing by itself is a recognized valid way of being certain that full use is made of technology and patent rights.

Problems arise, however, when an owner (transferor) and a transferee conspire to divide fields of use in order to monopolize markets and maintain prices. Unfortunately, some cases of bad field-of-use agreements have led developed countries to regulation of field-of-use licensing. Nevertheless, valid field-of-use licensing is a healthy concept on which to base transfer mechanisms. The concept is widely used.

Conclusion: Field-of-use licensing is a valid adjunct to a technology transfer mechanism and should be supported by transferor, transferee and host countries to make full use of technology.

Proposal by transferors of field-of-use limitations in transfer mechanisms are not holdup factors. On the other hand, a host country regulation which bans field-of-use provisions from transfer mechanisms is a holdup factor in that the valid objectives of all the parties to the mechanism are lost. Such regulations discourage transferors *ab initio* from considering transferring technology into such host country.

7. Package Licensing

Package licensing is a requirement by a transferor that a transferee take a license to unneeded or unwanted patents or technology in order to receive rights under the technology or patents he wants to employ. The concept of package licensing is analogous to the concept of tie-in. Under each concept the transferee

is forced to take something he does not want from the transferor in order to participate in the benefits of the proposed transfer mechanism.

Conclusion: The rule in developed countries is that when a transferor forces a transferee to take unwanted patents or technology in order for the transferee to get wanted patents or technology, it is an unfair practice. However, if the additional patents or technology are taken freely by the transferee, it is not an unfair practice.

Developing country regulations should be flexible enough to permit a transfer mechanism to include large blocks of patents or technology at the transferee's election.

8. Improvements

All knowledgeable technically-trained people know that a body of technology in use today will be the basis for subsequent continuing improvements by those using the technology. A technology owner, having invested substantial resources in development of basic technology, plans to use and improve on the technology as he uses it commercially. If the technology owner (transferor) lets someone else also use his technology, the transferor knows full well that the transferee also will make improvements. Of course, the transferor wants the use of the transferee's improvements with his basic technology. He also usually wants his other transferees in other countries to use improvements whether by him or by his licensees. All of this seems fair — no transferee would be in this business if it were not for the transferor — and usually the transferor provides the transferee with ongoing improvements.

Consequently, in developed countries the transferor in the transfer mechanism invariably requires as partial consideration for use of his technology (i) that the transferee pay him money (royalty) and (ii) that the transferee grant the free right to use improvements to him — and usually to his other licensees.

In early years the problem in improvement "feedback" was that the transferor required that the transferee give back to the transferor all title to the improvements. In taking back title to improvements the transferor was in a position to perpetuate his dominate position. By owning improvement patents and technology he could manipulate rights with multiple transferees to form illegal pools. Consequently, developed countries began to treat an exclusive grant-back or an assignment-back from the transferee to the transferor as an unfair practice, in effect a holdup factor in that the transferee and the host country could not achieve valid objectives when the transferor was assigned all improvements.

Almost uniformly, developed countries have "outlawed" the assignment grant-back of improvements from transferee to transferor in technology transfer mechanisms. However, developed countries permit the grant-back of a nonexclusive license from the transferee to the transferor; the transferee to keep title to the improvements but the transferor is licensed non-exclusively to use such and there is no requirement that the transferor pay for the improvements. Often the nonexclusive license from transferee to transferor permits the transferor to sublicense its transferees in

other countries. In this manner technology improvements can achieve more widespread use than if no improvement license back were permitted.

Conclusion: Developing countries regulations which bar assignment-back of improvements to the transferor are reasonable and not holdup factors. However, regulations which bar nonexclusive license-back to the transferor with the right to sublicense other transferees are holdup factors. Also, regulations which require transferors to transfer improvements without additional royalty but to pay royalty on improvements made by the transferee are unfair and are holdup factors. They are holdup factors because they unfavorably affect ability of the transferor, the transferee and the host country to achieve valid objectives. Technology owners faced with such regulations usually will choose not even to consider entry into transfer mechanisms in such countries.

9. Government Regulations

The thrust of government regulations must be such as to encourage the flow of technology. Harsh regulations are holdup factors. Regulations with flexibility of decision reserved for the technocrats administering the regulations are less likely to be holdup factors.

SUMMARY

Mechanisms for transferring technology from developed countries to developing countries have been explained and examined. These mechanisms are: (a) licensing, (b) investment by joint venture and (c) 100% investment; direct sale, marketing agreements and combinations of the foregoing.

Each transfer mechanism is a business arrangement and starts with the planning of a technology commercialization project. Such projects always require planning to a greater or lesser degree depending on the size and resources of the technology owners.

However, planning of technology commercialization projects for developing countries by a technology owner can come to a sudden halt once he recognizes barrier regulations which are holdup factors to achieving his valid objectives. Often such barrier regulations in a developing country are a result of past experience with giant multinational companies. Being unfortunately geared to cope with giant multinationals the regulations discourage small and medium companies.

Inducement must be nurtured as an element of developing country policy respecting technology transfer mechanisms. In this area UNIDO can be of great help.

Technology transfer to a certain country, as well as

the selection of the transfer mechanism is the result of a series of commercial (business) decisions. The first decision often arises during consideration of in what countries patent applications should be filed. Dozens and dozens of countries could be considered to be competing for the "foreign patent filing dollar" of the individual company. However, to justify a patent program in a country a reasonable chance of a profitable business opportunity must present itself to the technology owners.

Economic factors usually determine the selection of the transfer mechanism in a technology commercialization project. In this connection the proforma operating statement can be useful in evaluating business (transfer mechanism) alternatives.

Holdup factors are defined as provisions which impede introduction of technology into a developing country by denying one or all of the parties, the transferor, the transferee and the host country its valid objectives. Such holdup factors include both unfair business practices proposed by the transferor and unfair regulations imposed by the host country.

The elimination of holdup factors originating from transferors, transferees and host developing countries will unblock the flow of technology from free enterprise companies into developing countries and go a long way toward helping those countries achieve their fair aspirations.

To attain this goal each party must honestly attempt not to overreach in its requirements respecting technology transfer mechanisms. Free enterprise companies must set realistic financial goals and use fair methods of operation. Developing countries must set regulations both liberal enough to encourage the initial approach of technology and flexible enough to adapt to the multifaceted arrangements necessary to convert such approach into a successful productive technology transfer mechanism.

NOTES

1. "Forms and Terms of Transfers of Technology Between Countries of Different Economic and Social Circumstances," by Professor F. R. Bradbury, LES Conference, Paris, June 14-15, 1976.
2. "Licensing to Developing Countries, Panel Discussion, International Forum for Innovation, Oslo, Norway - 1977," Enrique Aquilar. *Law and Business of Licensing*, page 520.4.
3. See comments Cyril A. Wickham, p. 520.12, *Law and Business of Licensing #2/2/77* - Panel Discussion, "The International Forum of Innovation," Oslo, Norway.
4. See "Business View of Mexico Laws," Robert P. Whipple, p. 155, *Les Nouvelles*, September 1978.
5. *Ibid.*
6. "Licensee Evaluation of Payment," H. A. Janiszewski, *Les Nouvelles*, p. 248, December 1978.
7. "Sales Expense" includes promotion, advertising and distribution - cost of selling product to customers. "Administrative Expense" includes office salaries, communications, etc. "General Expense" is all other expenses over Cost of Product, Sales and Administrative Expense.