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05437

Distr.
LIMITED

ID/WG.178/4
29 April 1974

ORIGINAL: ENGLISH

United Nations Industrial Development Organization

Regional Seminar on Know-how About
Licensing Arrangements
Manila, Philippines, 30 May-6 June 1974

PRACTICAL REMARKS CONCERNING THE SELECTION OF TECHNOLOGY INCLUDING MAIN CONSIDERATIONS OF THE PURCHASE OF INTERMEDIATE PRODUCTS, COMPONENTS, ETC. IN LICENSING AGREEMENTS 1/

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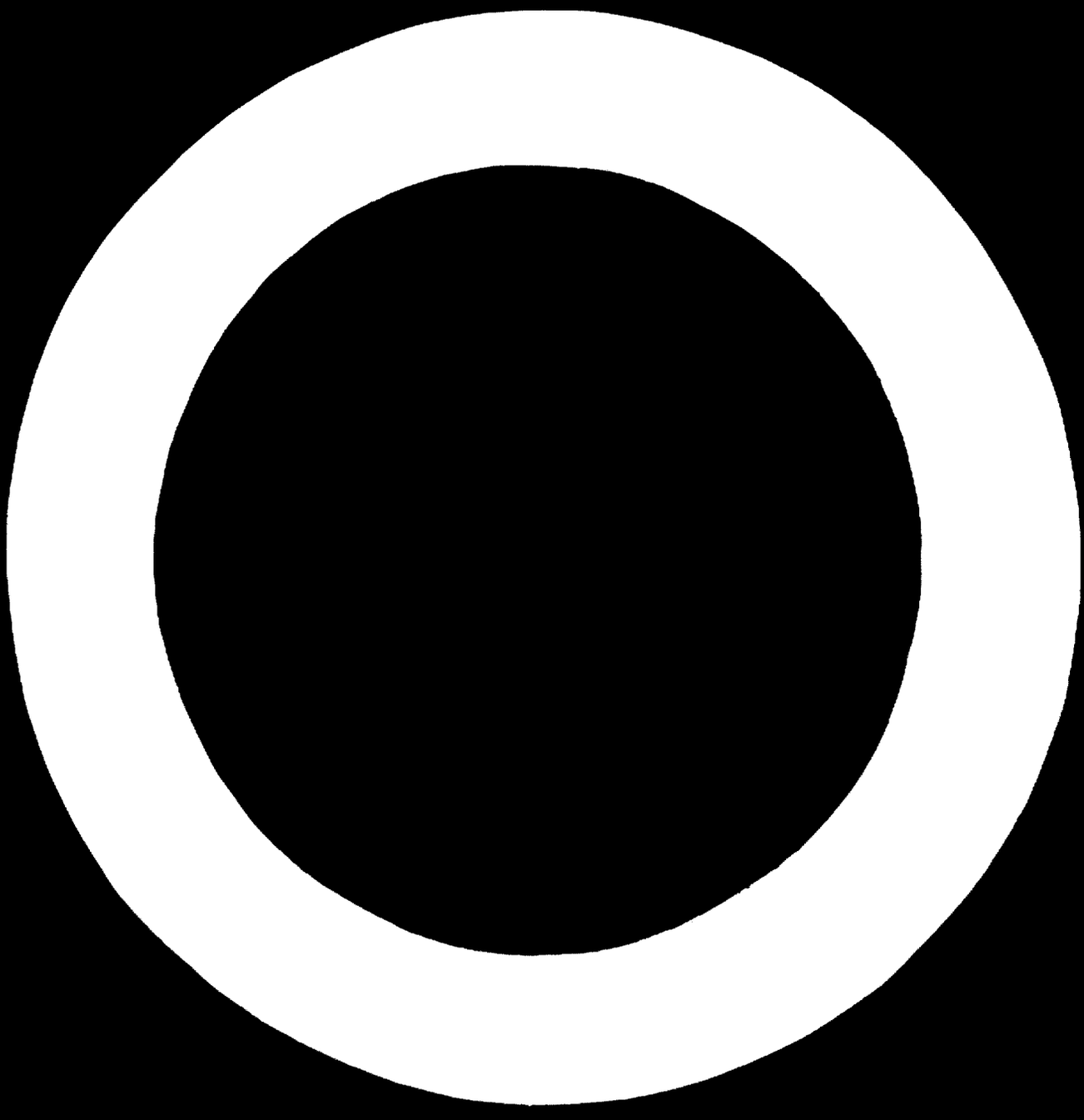

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Introduction

There are two primary factors to be considered in the selection of technology in licensing agreements. These are the standpoint of private business which places primary emphasis on the economic feasibility, and secondly, from a government level viewpoint which considers national economy and welfare.

Therefore, this paper is divided into two principal parts. The first part deals with how and by what criteria private business decides on the most suitable technology. The second part concerns comments on how the Japanese government exercised its guidance policies concerning selection of technology for promoting the national well being.

I. SELECTION OF TECHNOLOGY AND ADAPTATION BY PRIVATE FIRMS

Generally speaking, a private firm selects the best and most advanced technology to best promote its market competitiveness.

However, the problem in selection lies not in the level of the technology, but in the economic feasibility of the process or project. Sometimes the most sophisticated technology, under certain conditions, has proven to be less economical or even unfeasible. At times a process which was very profitable for one company proved to be quite the opposite for another company.

Once certain company introduced equipment which was integrated with highly sophisticated automation devices for interlocking the production process of a certain plant. The equipment worked beautifully. However, the catch was that the cost for the equipment and the cost for training the technicians was so high that it seriously affected the plant's profitability.

In another case, a certain company introduced a modern mass production system. However, initially, it could not find sufficient customers for its products. Therefore it sustained considerable losses for a prolonged period until market demand increased to a point where it was taking up the plant's output.

In another case, a petroleum development company purchased expensive drilling equipment for oil exploration. However, as the company does not have a sufficient accumulation of geological data and inadequate number of geologists, so far it has not been able to put the equipment to use.

Thus, before a company introduces any new technology, it must carefully evaluate many factors. Among these are resources in terms of technical experience; man power; availability of raw materials, parts, components, machines and facilities; organizational structure; market acceptance; competition; product life; availability of funds; and, at times, even climatic conditions, etc.

In examining the various criteria for selection, it is best to break this down into two categories. One is the case where a company is interested in better technology to manufacture a known product. The other involves manufacture of an entirely new product or a product which is not known to the company.

In the first case, the selection is easier because the company has some experience in manufacturing and marketing the product. Thus, it would be easier for the company to integrate the new technology into its own systems. In these cases, selection criteria would consider the following points:

A. Whether the process has been commercially proven

Purchase of a process which is only in the early stages of development entails substantial risks. There are many recorded cases of companies which have failed because they purchased processes which were not fully developed.

New ideas are born in laboratories or the minds of men. However, before such ideas can be made commercially feasible, they must go thru various stages. Among these are bench scale testing, pilot plant testing and plant engineering.

Throughout all the stages, the paramount check factor is commercial feasibility.

It is generally considered that in the chain of development, the last 20% is the most difficult part of the research and development for new processes. In most cases in which the company is fairly advanced in the sophistication of its technical abilities, it is not too difficult to carry out the first 80% of the R&D. However, often they are not able to complete the last 20%.

Therefore, the selected technology must be commercially proven. Even when a licensing agreement incorporates a guarantee clause and payment of penalty, in most cases the amount of the penalty is less than the total license fee. In cases of unsatisfactory results, the licensee stands to be the biggest loser. He sustains losses for the equipment for the plant and also the loss of time which may be fatal to the success of the project.

B. Capability to adapt and develop

Another vital check is whether the company has the needed technical capability in the given field. For example, if the new technology were to involve a fermentation process, no matter how large a chemical firm, it would be hesitant in adopting a new technology if it had no previous experience in fermentation.

Another example would be the case of a producer of chemicals having an interest in producing pharmaceuticals. Before undertaking such a project, the company must ensure that adequate prior preparations are complete. Among these would be acquiring additional technical staff such as pharmacists and physicians, and additional marketing organization to handle the additional products.

Technical innovations are created rather rapidly. Although the speed of developing new technology has slowed somewhat in recent years, companies must stress both adaptation and digestion of new technology, and redeveloping or improving the licensed process to maintain and improve its competitive position.

In this era of relatively fast technological developments, to survive in today's markets, it is very important to carry out continuing research to improve the process to further lower production cost.

In this sense, it is most helpful to the licensee if the licensing agreement includes provisions whereby the licensor agrees to provide technology on any improvements. Licensors are generally agreeable to such provisions provided it also stipulates the licensee will help to defray development costs thru means such as payment of royalties.

In cases where the licensor desires to purchase the products produced, it is almost a must for the licensor to provide, on a continuing basis, information on new developments related to the technology.

On the other hand, there are circumstances in which the licensor would be reluctant to provide such continuing information. Examples of such circumstances are when the licensor has no other direct business relations with the licensee; or when the general political and economic situation in the licensee's country are uncertain.

C. Profitability of the new technology

Generally the profitability of new technology is evaluated by routine accounting. A typical form for such evaluation is shown in Exhibit I. These rules, of course, vary from country to country. They depend on the nature of the technology, the legal systems of the country, and the general corporate accounting procedures. The examples shown in Exhibit I are typical.

The most important criteria in the economic evaluation is Return on Investment (ROI). ROI is dependent on the "life of the product" in view of the rapid development of new and improved technology. In industries where technical innovations are relatively fast, a product or process becomes obsolete because of the advent of a better product or process.

In Japan's chemical industry, in former times, the optimum ROI was 25 to 30%. However, in recent years, due to a slowdown in the development of new technology, an ROI as low as 10 to 15% is considered acceptable.

D. Intermediates and components

At times, difficulties are encountered in the procurement of raw materials, intermediates and components. For example, a catalyst indispensable for the operation of a process may not be continually available in the licensee's country. If the licensee has to depend on imports, he will run risks in terms of delivery and prices.

In another example, an electrical component needed for the manufacture of a certain type of machinery may not be locally available. Here again, the licensee must pay special attention to the stable supply of such components.

There are numerous recorded instances in which a major problem of newly constructed manufacturing plants has been the supply of parts.

On the other hand, if the licensor stipulates that the licensee must purchase intermediates and components from the licensor, there is the possibility that such procedures would be a violation of antitrust laws.

It seems that such "tie-in" clauses in licensing agreements have involved certain U.S. licensors in antitrust litigation.

This subject will be discussed in Chapter III, which is titled Restrictions Applying to Licensees.

E. Other factors

1. Pollution control

In recent times, pollution control regulations and laws are being made more and more stringent. Therefore, there have been many cases when stiffening of pollution control laws have had serious effects on certain production processes.

A recent major example in Japan involves caustic soda plants. Under new regulations, not one of the present caustic soda plants will be able to be operated after the deadline of August 1975 unless the manufacturing process is changed to the so-called diaphram process. This will require the shutdown of some plants which are only a few years old. To convert the plants to the new process will require an investment by the chemical industry of some $1 billion.

2. Patent infringements

Normally licensing agreements include provisions in which the licensor guarantees that the license agreement does not infringe on any patent rights. Licensees generally require that the licensor give assurance of non-infringement; and in case of infringement, the payment of a penalty or other arrangements for settlement.

3. Fund requirements

Companies acquiring outside technology must be financially prepared to be solvent until operations start to yield profits.

Therefore, it is very difficult for smaller companies to undertake large investments for new technology. For example, in Japan's chemical industry, it is considered rare that new production facilities show a profit in less than three years after starting operations.

4. Climatic conditions

Conditions of climate frequently affect the profitability of an enterprise because of higher operating costs due to adverse conditions such as heat or cold.

For example, the installation of a pipeline for crude oil in the arctic region costs more than when such lines are laid in temperate zones. Also the installation of such pipelines requires special knowledge and experience in the geology of the region.

When a technology to be introduced relates to the products which is unknown to the market or the to the licensee, the screening criteria should include another importance factor which is market potential of the product.

F. Market potentials

The determination of market potentials involves many unknown factors. Compared with evaluation of the technology in question, determining market potentials is much less accurate.

Among the sources of market information are the following: the company's own Business Department or Market Research Department, trading firms, potential customers, industrial associations, market research consultants, and the licensor.

There are many factors to be considered in determining market potentials. Among these are the anticipated rate of growth of the national economy, anticipated growth of the industry which is the potential consumer of the product, and the total market share expected to be secured by the licensee. In this respect it is often found advantageous to engage the services of an outside market research consultant and use their report for comparative purposes with the results of the in-company research. Also, in many cases, the potential licensee imports a small quantity of the products to conduct trial marketing as a means to evaluate the market prior to making a final commitment for contracting for the particular technology.

II. ALTERNATIVE SOURCES OF TECHNOLOGY

A. Self-development or obtaining a license

In recent years there has been a sharp increase in wages and salaries and a growing strictness in regulations and laws pertaining to new products. In the face of these developments, the costs of research and development are also soaring.

In light of the above, today, even the world's largest companies are constantly on the lookout for new and improved technologies developed by others. This is because in most cases it is less expensive and quicker to purchase technology developed and proven by others.

There are several motives for purchasing technology. Among these are: to diversify into new fields, supplement one's own research, save on time and funds for research and development, to obtain immunity under the patent block of others, to sub-license to others, etc.

According to Japanese experiences, these methods, in many cases, have served to provide a short-cut to speeding the growth of the nation's economy.

A typical example can be seen in Japan's petrochemical industry. The industry was started from a zero beginning in 1958. Today some 92% of the petrochemical products sold in Japan are produced with the use of imported technology. Yet, in spite of this, Japan's petrochemical industry has been expanded to the point where it now ranks second in the free world. Its output of ethylene is about 5 million tons per year.

In the process, the industry was very quick to adapt the imported technology. Furthermore, it has also been quick to develop improvements to imported technology and perfect new technology. Thus, in a relatively short time, the industry has been able to gradually alter its position from that of a licensee to a licensor.

A somewhat similar pattern is to be found in Japan's electronics industry. In the early postwar period of industrial rehabilitation, the industry purchased much of the technology used in its plants. However, today, it exports a major part of its output of transistor radios and TV sets.

There are several sources of information concerning new technology. The foremost source is the Patent Gazette. Among the other sources are engineering and industrial research organizations, private firms, government research institutions such as NASA, educational institutions and consultant firms. Also other sources include private publications which introduce published patent.

Another important source is technical and trade publications. For example, for the chemical industry, among the leading publications are Chemical Week, Chemical Engineering News, Chemical Marketing News, Journal of Commerce and Wall Street Journal. A list of publications subscribed to by one of Japan's largest chemical companies is attached as Exhibit II.

Another source of information is personal contacts. Company personnel travelling on business and representatives of companies posted to other countries often obtain important information concerning new technology.

If the company is seriously interested, it may send its technical personnel to visit the particular firm having the technology to seek additional information. In the advanced stages of acquiring new technology, this procedure is perhaps the most effective means.

By the same token, visitors of other company may also be an important source of information.

Japan's trading firms are another important source concerning new technology and products. These firms have worldwide business networks and in the course of their daily operations they frequently come across new information and data.

Engineering firms also have considerable knowledge concerning available technology. Generally they will undertake, on a fee basis, search for the most suitable technology according to the needs of the seeking company. Engineering firms which conduct international operations are often excellent sources of information.

In some cases, companies develop a new technology which they themselves find impractical to utilize. In such cases the company could bring this information to the attention of potential users thru various means.

One means is through the Licensing Executive Society. This is an international organization which includes among its members licensing managers, attorneys and other persons involved in licensing activity. The society is an excellent vehicle for technological exchange.

Another source are consultant firms which specialize in the exchange of information concerning new processes and products. A leading American firm in this field utilizes computers for mass exchange of information. In England there is a semi-public organization which is engaged in similar activity.

Last but not least are various international organizations such as UNIDO which is active in promoting dissemination of technical information. Among other sources are various other governmental and public institutions, diplomatic channels, government sponsored trade organizations and chambers of commerce.

III. RESTRICTIONS IMPOSED ON LICENSEES

In the execution of licensing agreements, there are several matters which are of a nature that restrict the licensee. Among these may be the following:

A. Scope of agreement

The licensor restricts the scope of the license and technical assistance. Thus, if the licensee desires to obtain information not covered in the license agreement, he is generally required to pay additional fees.

A typical example of this is the case where a license limits the technology to be made available to that which is in commercial application as of the date of the signing of the agreement. Thus, the licensee does not have access to future improvements unless he is willing to pay additional fees.

Also there are cases when the licensor may try to keep the provisions of the agreement within a narrow range when it is known that the licensee appears not to have a desire to re-develop or improve the technology.

On the other hand, if the licensee appears to have an excellent potential for re-developing or improving the technology, the licensor may attempt to broaden the scope of the agreement to a point where he (the licensor) would be able to utilize any developments made by the licensee.

Therefore, an agreement having such a wide scope is not always to the advantage of the licensee. This is because the licensee would not have the opportunity for exclusive ownership of any improvements to the technology.

B. Sub-license rights

The licensee does not have the right to sub-license the technology unless this is specifically mentioned in the licensing agreement. This form of restriction may prove to be a disadvantage in cases where the licensee would like to make the technology accessible to subsidiaries.

C. Territorial limitations

License agreements generally specify the territory in which the licensee is authorized to use the technology and the territory in which the licensee is authorized to market the product.

Additionally there are other measures of a restrictive nature. Among these are limiting the licensee's use of the technology to within specific sectors of the general field of application. Restriction on export territories may often conflict with limitations set down by the licensee's government. Furthermore, in the case of U.S. companies, restrictions as to the sector of application may trigger antitrust action by the Fair Trade Commission.

D. Restrictions concerning technical assistance

Due primarily for the sake of convenience and cost, licensors generally desire to restrict the scope of technical assistance to within certain bounds. Among the means to ensure this are specifying the number of technical personnel to be despatched, number of licensee trainees to be accepted, quantity of blue prints and logs books, etc.

However, in view of the fact that the licensor generally assumes the responsibility for successful start-up and initial commercial operation, these considerations do not constitute a major problem area when both parties discuss the matter on a reciprocally sincere basis.

E. Grant back

There are cases in which the licensor requires that the licensee grant back any developments to the technology realized by the licensee.

In some cases, the two parties may agree to exclude major improvements or patentable improvements from the scope of any grant-back.

When the agreement includes mutual exchange of any improvements between licensor and licensee, such exchange should be on a two-way and equal basis. However, it is more common that the licensor requires that improvements made by the licensee be granted back with sub-licensing rights. This is generally true even in cases when the licensee has not such rights.

Concerning the above, the licensee may agree to such unequal terms on condition that the licensor shall not sub-license to manufacturers who are in competition with the licensee, or to parties who do not agree to grant-back of improvements to licensors together with sub-licensing rights.

F. Prohibiting licensing from others in the same field

Licensors may require that licensee will not obtain any licenses from other licensors in the same field of activity. The primary reason for this is to prevent divulgence of information to the third party.

If a licensee obtains a license from a third party, it may provide access to the licensee's facilities by the third party. Thus, there exits the possibility of divulgence of technology originally provided to the licensee by the licensor.

G. Validity of patents held by licensor

The licensee has the obligation of not contesting the validity of patents licensed by the licensor.

However, in the United States, this has been ruled a violation of the antitrust laws following a decision handed down by the United States Supreme Court in the well-known Lear Versus Adkins case.

H. Minimum royalties

Generally, in the case of exclusive licensing, the licensee is obligated to pay the licensor a minimum stipulated royalty even though the licensee's sales do not attain a certain level. In this way the licensor attempts to avoid the risk of non-diligence. However, in such cases, the Japanese government usually did not grant approval of the licencing.

I. Restrictions concerning retail pricing

Licensors may try to incorporate in the agreement provisions which in effect give the licensor control over the retail prices of the products produced under the licensing agreement.

However, in many countries this form of control has been ruled a violation of fair trade regulations. This is because the licensor, thru such action, can virtually subdivide the market and hinder the free flow of the products.

J. Trademarks

Licensors may prohibit the use of his trademark by the licensee. Generally, if use of the trademark is granted, the licensor charges a fee and also requires the licensee to maintain specified standards of product quality.

K. Manufacture and sale of competitive products

Licensors usually require that licensees will not manufacture or sell products competitive to those of the licensor. This is based on the licensor's desire that licensee exerts his best efforts in promoting the sales of the products produced under the licensed technology.

L. Obligation of secrecy

Generally, licensors require that the licensee shall safeguard the technical know-how and shall not divulge the information to others for a certain period, usually five years, after the termination of the licensing agreement.

In view of the above, in the case of licensees who have a good potential for re-development of the technology, this could constitute a marked disadvantage because the licensee can not divulge the results of his re-development until the five years or other specified time has passed after the termination of the agreement.

The obligation for secrecy also goes with the so-called "Option Agreement". Parties entering into an option agreement should always insist on inclusion in the agreement of provisions stipulating that he will not be bound by the non-disclosure obligation in regard to 1) the information which has been known to licensee prior to receiving information from the licensor, 2) that which is or will become public knowledge, and 3) that which he may obtain from a third party who has the right to disclose such information.

M. Right to use the technology

Agreements should clearly indicate that the licensee has full rights to use the licensed technology when the licensee fulfills his obligations and the agreement expires.

Otherwise, the licensor may claim additional payment thru a renewal of the agreement or may place a claim for prohibiting the licensee to continue use of the technology.

N. Tie-in

When licensor obligates the licensee to buy intermediates or components unrelated to the coverage of licensed patents "against the will" of the licensee, he will be prosecuted for violation of fair trade rules. This is an established rule in the U.S. and fairly common practise in other countries also.

IV. JAPANESE EXPERIENCE OF SELECTION AND ADAPTATION OF TECHNOLOGY TRANSFER BY LICENSING

In the past five years the licensing fees paid by Japanese industry amounts to about 10 times the amount received in licensing fees.

One of the major driving forces accounting for the rapid growth of Japan's economy has been the vigorous introduction of foreign technology. The cycle of economic growth has had a definite pattern which was expanded manifold to keep abreast of the country's economic expansion. The major components of this cycle include the following: 1) introduction of new technology and new investment, 2) increase in demand, 3) expansion of production facilities, 4) lowered manufacturing cost and resulting higher international competitive power, 5) increase in exports, 6) increase in foreign exchange earning, and 7) introduction of more new technology and more investments.

The Japanese government has encouraged the introduction of new technology and processes from abroad. As an example, the Foreign Investment Law was originally enacted to encourage the introduction of both foreign technology and capital, although in later days it appeared as if it is a restrictive law. Both the government and the industry were positive in introducing foreign technology.

However, there has been a rather marked difference between private firms and the government in the standards for evaluating foreign technology.

The primary objective of private firms is the pursuit of profits. Therefore their evaluation of foreign technology has been based on the factor of economic feasibility.

On the other hand, the government conducts their evaluation based on the overall advantage to the national economy. For example, when a Japanese company applies to the Ministry of International Trade and Industry (MITI) for approval of a licensing agreement, MITI first checks to see if such technology would be advantageous to the overall national economic development and welfare. MITI bases its review on criteria such as whether introduction would generate more competition in the given field and thus result in lower prices for the consuming public.

Basically government's criteria is based on whether such action would conform to the national goal. National goal changes from one era to another.

In the early days following the reopening of Japan just a little over a hundred years ago, the government goal was increasing the nation's wealth and building up its military forces.

Prior to the outbreak of the Pacific War the goal was naturally to increase her military forces.

In the postwar period the goals have been rehabilitation, increasing production of food, stepping up industrial output and promoting exports to earn the needed foreign exchange.

However, in recent times, government emphasis has been shifted from one of economic growth to the promotion of the welfare of the people and a reorganization of Japan's internal industrial structure.

In line with the above, the government is discouraging industrial processes which require large amounts of energy. On the other hand, it is encouraging industries which consume relatively lower amounts of energy and which produce value-added or more sophisticated goods. Also being discouraged are activities which are the cause of pollutants unless adequate measures are installed for pollution control and abatement.

It is worthy of special mention here that there are no published government guidelines for the screening and deliberation of licensing applications. The basic guideline is: would it be beneficial to the national economy and the welfare of the people?

The government has envoked special tax measures to encourage new industries and promote the introduction of new technology needed by Japan.

At the same time, the government has instituted tariffs and other so-called barriers to foster the growth of infant industries in Japan.

However, concerning the terms of individual licensing agreements, there have been no published rules or established guidelines. All judgements are made on a "case-by-case" basis by the competent authorities in each respective field.

The review of applications for licensing of foreign technology by MITI therefore encompasses a wide range of technical fields. To enable it to carry out such functions, about half of MITI's staff of over 12,000 have a technical background in their education and experience.

Another characteristic of the procedure for screening of applications by Japanese Government was that copies of applications are filed with many government ministries. These are the ministries of Finance, Welfare, Agriculture and Forestry and others as may be required.

MITI circulates copies of the applications to the ministries concerned for their examination. The Ministry of Fiance studies the applications from the standpoint of Japan's balance of payments and the position of the exchange reserves. The Ministry of Welfare studies them from the view of overall national health. The Ministry of Agriculture and Forestry evaluate any impact the technology may have on farmers, etc.

After the applications have been reviewed by the various ministries concerned, they are forwarded to the Foreign Investment Deliberation Council for final action as to approval or disapproval.

One of the important points checked by the government in evaluating applications for licensing new technology in recent years is the matter of emission of pollutants. In this area both the central and local governments have enacted relatively strict laws and regulations. It is considered in Japan that the country now has the strictest pollution control laws in the world. Among the paramount factors behind the enactment of such legislation is the exceptionally high density ratio of Japan's population and industrial sites.

The so-called Plant Location Law which became effective in April of this year is a good example. This law stipulates that of the total area of an industrial site, only a specified percentage can be given over to production facilities. Thus, as examples, in the refinery industry the figure is only 10 per cent; in the petrochemical industry it is 15 per cent. The most generous figure is the 40 per cent for the light machinery and precision machinery industries.

This law will have a serious impact on the selection of technology to be licensed. For example, under the new law, plants to be constructed will of necessity come to be much more expensive in view of Japan's exceptionally high cost of land.

Another important consideration concerning licensing is the recent change in the attitude of Japan's Fair Trade Commission. In recent times the commission is stepping up its intervention into private industrial activities. A most recent example is the FTC's interrogation of oil companies, chemical companies and trading firms. In the past, license agreements have been filed with the FTC and it was only rare that the commission questioned or requested modification of the terms of a licensing agreement. However, it is felt that the commission will be more strict in their evaluation of licensing terms hereafter. This stricter attitude is expected to also affect the evaluation of technology to be licensed.

In conclusion, the following observation is made: "The initiative and vitality of private business motivated by incentive for profit and appropriate guidance by the government from the viewpoint of the national welfare has been the established policy through the history of the development of modern Japan."

# # #

EXHIBIT I

1. Standard Cost Calculation of Polyethylene (Low Density)

Production Scale (t/y)				10,000	20,000	40,000	80,000	120,000
Installation (cost mil.¥)	Main equip.			2,000	3,300	5,400	8,800	11,600
	Aux. equip.			600	990	1,620	2,640	3,480
	Total			2,600	4,290	7,020	11,440	15,080
	Factor	Unit Price	Mat. Bal	(¥/t)	(¥/t)	(¥/t)	(¥/t)	(¥/t)
Raw mat.	Ethylene & others	33 yen/kg	1.05 ton	34,650	34,650	34,650	34,650	34,650
				6,800	6,800	6,800	6,800	6,800
	Sub Total			41,450	41,450	41,450	41,450	41,450
Utility	Electr.	4 yen/KWH	2,000 KWH	8,000	8,000	8,000	8,000	8,000
	Steam	800 yen/ton	1.5 ton	1,200	1,200	1,200	1,200	1,200
	Water	5 yen/m^3	260 m^3	1,300	1,300	1,300	1,300	1,300
	Sub Total			10,500	10,500	10,500	10,500	10,500
Labor 120,000 yen/month			(number)	(100)	(120)	(150)	(200)	(250)
				14,400	8,640	5,400	3,600	3,000

- to be continued -

- continued -

Production Scale (t/y)			10,000	20,000	40,000	80,000	120,000
Maintenance cost main 3% aux. 1%			6,600	5,445	14,455	3,630	3,190
Depreciation main (8 yrs.) 11.25% aux. (18 yrs.) 50%			25,500	21,038	17,213	14,025	12,325
Interest on construction cost 5%			13,000	10,725	8,775	7,150	6,283
Other expenditure & overhead 5%			13,000	10,725	8,775	7,150	6,283
Royalty			5,000	4,000	3,000	2,000	2,000
Mfg. cost			129,500	112,521	109,568	89,505	83,231
Variation of material cost	Ethylene	20 yen/kg	112,200	96,713	94,568	74,955	70,631
		25 "	117,450	101,963	99,818	80,205	75,881
		30 "	122,700	107,213	105,068	85,455	71,131
		35 "	127,950	112,463	100,318	90,705	86,381
		40 "	133,200	117,713	115,568	95,955	91,631
		45 "	138,450	122,963	120,818	101,205	96,881

2. Standard Cost Calculation of ABS Resin

Production Scale (t/y)			3,000	6,000	12,000	24,000
Installation (cost mil.¥)			500	800	1,400	2,400
	Factor	Unit Price	Mat. Bal	(¥/t)	(¥/t)	(¥/t)	(¥/t)
Raw mat.	Acrylo-nitrile	110 yen/kg	0.27 ton	29,700	29,700	29,700	29,700
	Butadiene	50 yen/kg	0.32 ton	16,000	16,000	16,000	16,000
	Styrene	60 yen/kg	0.48 ton	28,800	28,800	28,800	28,800
	Others			3,000	3,000	3,000	3,000
	(Sub Total)			(77,500)	(77,500)	(77,500)	(77,500)
Utility	Electr.	4 yen/kg	400 KW	1,600	1,600	1,600	1,600
	Steam	800 yen/ton	4 ton	3,200	3,200	3,200	3,200
	Water	5 yen/m^3	100 m^3	500	500	500	500
	(Sub Total)			(5,300)	(5,300)	(5,300)	(5,300)
Labor ¥120,000/month		(number)		(80) 38,400	(100) 24,000	(160) 19,200	(240) 14,400
Maintenance cost		3%		5,000	4,000	3,500	3,000
Depreciation (8 yrs.)		11.25%		18,750	15,000	13,125	11,250
Interest on construction cost		5%		8,333	6,667	5,833	5,000
Other expenditure & overhead		5%		8,333	6,667	5,833	5,000
Mfg. cost				161,616	139,134	130,291	121,450

Exhibit II

Agricultural Chemicals

American Dyestuff Reporter

Angewandte Chemie

Automotive Engineering (The SAE Journal)

Chemical Age International (London)

Chemical Engineering

Chemical & Engineering News

Chemical Engineering Progress

Chemical Industry Notes

Chemische Industrie (Düsseldorf)

Chemistry and Industry (London)

Chemie-Ingenieur-Technik

Chemtech

Chemical Marketing Reporter (O.P.D.)

Chemical Week

Control Engineering

Erdöl und Kohle

European Chemical News

Euro plastics (Brit. Plastics)

Farm Chemicals

Hydrocarbon Processing

Industrial Engineering Chemistry

o Product Research & Development

o Process Design and Development

o Fundamental

Industrial Minerals

International Dyers

Journal of Agricultural and Food Chemistry

Journal of Applied Polymer Science

Journal of Cellular Plastics

Journal of Polymer Science

Journal of Society of Dyers Colourists

Kunststoffe German Plastics

Kunststoffe und Kautschuk Fasern

Light Metal Age

Modern Packaging

Modern Plastics International

Nitrogen

Oil Gas Journal

Petro Chemical Engineering

Polymer Age (Plastics Rubber Textile)

Polymer News

Process Technology International

Research Management

Rubber Age (N.Y.)

Rubber Chemistry and Technology

Rubber Journal

Rubber World

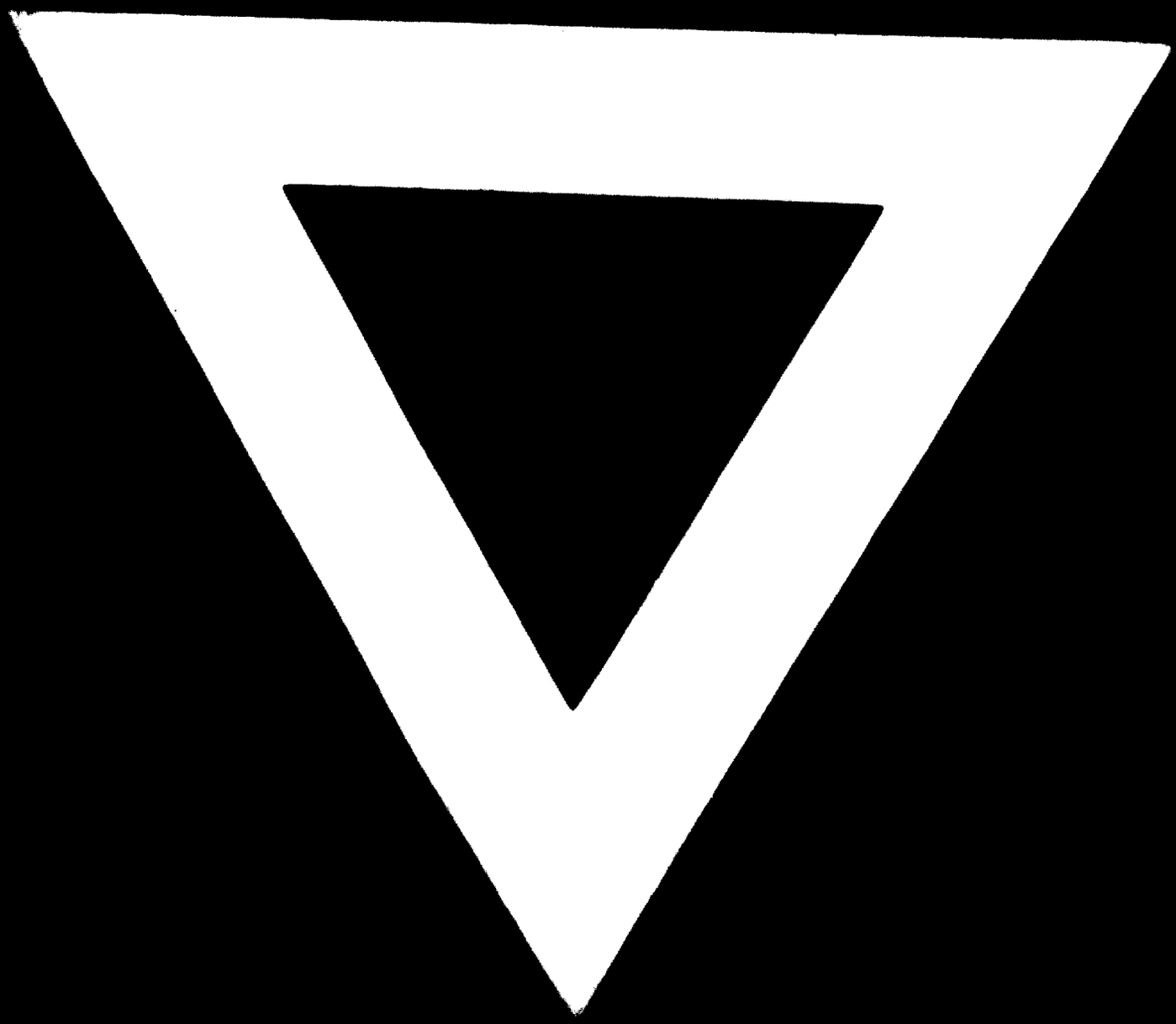
Soap Cosmetics Chemical Specialties

Plastics Engineering (SPE Journal)

Journal of Patent Office Society

List of Italian Chemical Patent

Official Gazette



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