Patenting Strategies and Technology Control of Multinationals

——Focusing on the Case of Thailand and the Philippines——

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1. Abstract

The ASEAN region has attracted a huge volume of foreign direct investment from Japan and other countries particularly since 1988. The paper examines the patenting strategies and technology control by Multinationals, focusing on the case of Thailand snd the Philippines.

Firstly, technology control by the patenting strategy of mltinational companies is examined. Through the examination, the paper aims to clarify the negative side of intellectual property strategies by foreign multinationals. It analyses, in paticular, the case of Thailand where foreign patent application has increased dramatically as industrialisation proceeds.

Secondly, it analyses that trade-mark plays an important role for fereign multinationals as their intellectual preperty right strategies, especially in the developing countries.

Finally, after examining the relationship between recouping period of R&D expenditures and the technology life-cycle of the Japanese firms, the paper indicates that payment for imported technology in Thailand and the Philippines amounts to more than 100 percent of their R & D expenditures, while the ratio in Japan is about 7 percent. It concludes finally that an industrialisation process is also the ones that they have been globally integrated into the production, trade and investment processes of the multinationals.

2. Technology Control by Patenting Strategies

The constant development and introduction of new technologies into the production process ensure new products, greater productivity, and economic growth. In this sense,

Tablel 1 Country Ranking by the Number of Patents Registered

(Externnal Applications Only in 1990

Ranking	Country	No. of Patents	Share	Cumulative
1	US	71,136	24.2%	
2	W. Germany	57,123	19.4	
3	Japan	53,890	18.3	61.9%
4	France	25,197	8.6	
5	UK	17,862	6.1	76.6
6	Switzerland	12,932	4.4	
7	Italy	9,736	3.3	84.3
8	Netherland	9,348	3.2	
9	Sweden	6,599	2.3	89.8
10	Canada	3,947	1.3	
11	Austria	3,692	1.3	92.6
12	Other Countries	22,278	7.4	
	TOTAL	293,740	100.0%	100.0%

(1) Each number does not include domestic patents.
Source: Compiled from *Industrial Property Statistics 1990* (WIPO, 1992)

technological development through research and development (R & D) and technology transfer is indispensable in every country, especilly in the developing countries. However, almost all new technologies are developed in the developed countries, and these newly invented (and developed) technologies are under patent (or knowhow) control by a handful of countries.

The ownership of patent inventor gives a monopoly of use, manufacture, sale and import of a patented product. Thus, once registered as patent rights, the critical technologies come under the control of the inventor.

Therefore, inasmuch as the technological monopoly by patent right comprises one of the effective entry barriers to the industrial sectors, patenting is one of the most important business strategies of the manufacturing companies assuring monopoly rent. Consequently, the great number of firms which depend upon international markets and produce products globally apply for their newly developed technologies to several countries. What should be remembered here is that the main patented technologies of the new products and new industrial sectors are acknowledged as their exclusive legal rights by a handful of countries and a few multinational companies. Table 1 shows the country ranking by the number of international patents granted in 1990. It can be seen that newly invented technologies patented in 1990, for example, are held by a handful of developed countries. Furthermore, only three countries, -US, (West) Ger-

Ttable 2
Number and Ranking of the Patent Applications filed in Thailand

(in 1990)

Thailand	73	3.8%
US	813	41.9
Japan	360	18.6
UK	117	6.0
Germany	94	4.8
Switzerland	72	3.7
France	71	3.7
Netherland	71	3.7
Australia	47	2.4
Sweden	36	1.9
Italy	24	1.2
Bergium	21	1.1
Hungary	13	0.7
Canada	12	0.6
Other Countries	116	6.0
TOTAL	1.940	100.0%

Source; WIPO, op. cit.

many and Japan - take out more than sixty percent of the world total. This means that the technologies of the newly emerging sectors, which are likely to comprise the leading sectors for the future, are under their control.

3. Foreigh Patent Applications to Thailand

The next question to be answered is what percent of the total number of patents applied to Thailand are foreign-owned patents. As documented in Table 2, of 1940 newly apllied patents in 1990, Thai firms (and residents) account for only 3.8 percent, while the remaining 96.2 percent went to foreigners.

The sectoral distribution of foreign patents is examined next. Table 3-2 shows the breakdown of the patents applied in 1990 by industrial sector.

The industrial sector classification is made in accordance with the tecnical units of international patent classification which is shown in Table 3'. The sectors which have the largest number of patents applied are C07: A01N with 264, C08 with 199 and C 09-C11 with 179. These sectors consist of Organic Chemistry such as Fertilizer or Bio-sides, Organic macromolecular, Dyes, Paints, Petroleum, Animal & Vegetable Oil and

Table 3-1 Foreign Patent Applications in Thailand (in 1980)

	AT	AU	BE	CA	CH	DE	DK	ES	FI	FR	GB	HU	IT	JP	NL	NO	SE	US	XX	TOTAL
A01					1						3			8	10			10		32
A21—A24					1									2				2	1	6
A41—A47					1													4		5
A61—A63			1									2		2				3	1	9
A61K														2				1		3
B01—B20											1			1				3		5
B21—B23																			2	2
B24—B32											1			1				2	3	7
B41—B44																			2	2
B60—B64													1	1				1		3
B65—B68											1			3				1		5
C01—C05						1								1			1	4		7
C07, A01N		1	1		9	2					2	2	1	7	1			16		42
C08																		2		2
C09—C11															1			1	1	3
C12—C14											1			1				1		3
C21—23, C25, C30						2	2							1				2		7
D01—D07																				0
D21—R31							2		1		1									0
E01—E06																			2	6
E21																				0
F01—F04, F15																		1	1	2
F16, F17														1				1		2
F21—F28		2					1							1					3	7
F41, F42, C06																		4	2	6
G01—G03																				0
G04—G08																				0
G09—G12																				0
G21																				0
H01, H02, H05		2																1		3
H03, H04																				0

Source, Comiled from *Industrial Property Statistics 1980* (WIPO, Geneva, 1982)

so on which account for 34.4 percenth of the total. When including A01 which consists of Agriculture, Forestry and Fishery, these sectors 35.5 percent of the total. However, comparing with 1980, shown in Table 3-1, a share of these sectors dicreased from 42.9 percent. The important point here is that the number of H01-H05 and G04-G08 increased dramatically from 3 in 1980 to 328 in 1990. These sectors mainly consist of electric (and electronic) parts and devices, and Controlling, Computing, Checking and Signalling tecnologies. The number of patents applied by Thai-residents of these expanding sextorsis only 5 accounting for 1.5 percent, remaining 98.5 percen-

Table 3-2 Foreign Patent Applications in Thailand (in 1990)

	TH	AT	AU	BE	CA	CH	DE	DK	ES	FI	FR	GB	HU	IT	JP	NL	NO	SE	US	XX	TOTAL
A01	6	1	2			1									2	1			2	5	20
A21—A24	4					10	1	1	1	1	3		1	4	2				28	2	58
A41—A47	10		1	1	2	3	1				3	6		3	32	2			13	13	90
A61—A63	5	2									2	4			19	1		1	43	1	78
A61K						3	2	1			2	1	1	2	16	21		11	39		99
B01—B20	1		3			3	4				5	2			4	6			17	7	52
B21—B23	1		1							1	2				13	1			11	2	32
B24—B32	3		3	1	2	2	2	1			3	7			12	1			18	2	57
B41—B44	1		1				2				1	1				1			4	1	12
B60—B64	5										3				1		1		9	2	21
B65—B68	5		3			5	5	1	1		3	6			11	2	2	1	26	2	73
C01—C05	3		1	3			3				6	6			10	1	1		21	2	57
C07, A01N	3	1	1	8		32	29		1		14	35	12	3	38	5		12	68	2	264
C08			1	5		3	4				12	12		1	31	2	1		127		199
C09—C11	1		2	1	2		9	1	1		4	7			55	18			76	2	179
C12—C14	2									1	3	2			6			1	3	2	20
C21—23,C25,30		2		1	1										2	1			6	1	14
D01—D07				1		2	4					1			4	3			11	2	28
D21—R31			1			1	1												5		8
E01—E06	7	1	7				2				6	3			15	3	1		21	5	71
E21	1																				1
F01—F04, F15	5					1						1			1		1		10	1	20
F16, F17	2		3		1		5	1			2	2			7				11	11	44
F21—F28	2		1		1	1	1				1				10				11	6	39
F41, F42, C06			2									3					1		3		6
G01—G03		1		1								3			9				20		34
G04—G08	2		1		1	5	2					1			15		2		44	1	81
G09—G12							1								13				15	2	32
G21											1				2				1		4
H01, H02, H05	3	1					4	1				3			16	2			86	18	138
H03, H04			4			1	11				1	3			5			16	63	3	109

Source, Comiled from *Industrial Property Statistics 1990* (WIPO, Geneva, 1992)

Country Code

Country Code

TH:Thailand	CH:Switzerland	FR:France	NL:Netherland
AU:Australia	DE:West Germany	GB:United Kingdom	NO:Norway
AT:Austria	DK:Denmark	HU:Hungary	SE:Sweden
BE:Belgium	ES:Spain	IT:Italy	US:United States
CA:Canada	FI:Finland	JP:Japan	XX:Other Countries

Table 3′ International Patent Classification

Section A- HUMAN NECESSSITIES

SUB-SECTION: AGRICULTURE

Class:

A01—Agriculture; forestry; animal husbandry; hunting; fishing

Except sub-class: A01N—Preservation of bodies of humans or animals or plants or parts thereof; biocides, e.g. as disi nfectants, as pesticides, as herbicides; pest repellants or attractants; plant growth regulators (see unit 13).

SUB-SECTION: FOODSTUFFS AND TOBACCO

Classes:

A21—Baking; edible doughs

A22—Butchering; meat treatment; processing poultry or fish

A23—Foods or foodstuffs; their treatment not included in other classes

A24—Tobacco; cigars; cigarettes; smokers' requisites

SUB-SECTION: PERSONAL AND DOMESTIC ARTICLES

Classes:

A41—Wearing apparel

A42—Headwear

A43—Footwear

A44—Haberdashery; jewellery

A45—Hand and travelling articles

A46—Brushware

A47—Furniture; domestic articles or appliances; coffee mills; spice mills; suction cleaners in general

SUB-SECTION: HEALTH AND AMUSEMENT

Classes:

A61—Medical and veterinary science; hygiene

Except sub-class: A61K—Preparations for medical, dental or toilet purposes (see unit 5).

A62—Life-saving; fire-fighting

A63—Sports; games; amusements

Sub-class:

A61K—Preparations for medical, dental, or toilet purposes

Section B- PERFORMING OPERATIONS: TRANSPORTING

SUB-SECTION: SEPARATING AND MIXING

Classes:

B01—Physical or chemical processes or apparatus in general

B02—Crushing, pulverising or disintegrating; preparatory treatment of grain for milling

B03—Separation of solid materials using liquids or using pneumatic tables or jigs; magnetic or electrostatic separation

B04—Centrifugal apparatus or machines for carrying-out physical or chemical processes

B05—Spraying or atomising in general, applying liquids or other fluent materials to surfaces, in general

B06—Generating or transmitting mechanical vibrations in general

B07—Separating solids from solids; sorting

B08—Cleaning

B09—Disposal of solid waste

SUB-SECTION: SHAPING

Except class: B31—Making paper articles; working paper (see unit 19).

Classes:

B21—Mechanical metal-working without essentially removing material; punching metal

B22—Casting; powder metallurgy

B23—Machine tools; metal-working not otherwise provided for

Classes:

B24—Grinding; polishing

B25—Hand tools; portable power-driven tools; workbench devices; manipulators

B26—Hand cutting tools; cutting; severing

B27—Working or preserving wood or similar material; nailing or stapling machines in general
B28—Working cement, clay, and stone
B29—Working of plastics; working of substances in a plastic state, in general; workig of substances not othewise provided for
B30—Presses
B32—Layered products

SUB-SECTION: PRINTING

Classes:
B41—Printing; lining machines; typewriters; stamps
B42—Bookbinding; albums; files; special printed matter
B43—Writing and drawing appliances; bureau accessories
B44—Decorative arts

SUB-SECTION: TRANSPORTIG

Classes:
B60—Vehicles in general
B61—Railways
B62—Land vehicles for travelling otherwise than on rails
B63—Ships or other waterbone vessels; related equipment
B64—Aircraft; aviation; cosmonautics

Classes:
B65—Conveying; packing; storing; handling thin or filamentary material
B66—Hoisting, lifting; hauling
B67—Liquid handling
B68—Saddlery; upholstery

Section C- CHEMISTRY AND METALLURGY

SUB-SECTION: CHEMISTRY

Except class: C06—Explosives; matches (see unit 25) and including sub-class A01N

Classes:
C01—Inorganic chemistry
C02—Treatment of water, waste water, sewage, or sludge
C03—Glass, mineral, and slag wool
C04—Cements; ceramics, etc.; sound or thermal insulating materials
C05—Fertilizers, manufacture thereof

Classes:
C07—Organic chemistry
and sub-class:
A01N—Preservation of bodies of humans or animals or plants or arts thereof; biocides, e. g. as disinfectants, as pesticides, as herbicides; pest repellants or attractants; plant growth regulators

Class:
C08—Organic macromolecular compounds; their preparation or chemical working-up; compositions based thereon

Classes:
C09—Dyes; paints; polishes, natural resins; adhesives; miscellaneous compositions; miscellaneous applications of materials
C10—Petroleum, gas and coke industries; technical gases containing carbon monoxide; fuels; lubricants; peat
C11—Animal and vegetable oils, fats, fatty substances and waxes; fatty acids therefrom; detergents; candles
C12—Biochemistry; beer; spirits; Wine; vinegar; microbiology; enzymology; mutation or genetic engineering
C13—Sugar or starch industry
C14—Skins; hides; peits leather

SUB-SECTION: METALLURGY

Classes:
C21—Metallurgy of iron
C22—Metallurgy; ferrous or non-ferrous alloys; treatment of alloys or non-ferrous metals
C23—Working or treatment of metals, other than by mechanical means; covering materials with metals; Inhibiting corrosion or incrustation in general
C25—Electrolytic or electrophoretic processes; apparatus thereof
C30—Crystal growth

Section D- TEXTILES AND PAPER

SUB-SECTION: TEXTILES AND FLEXIBLE MATERIALS NOT OTHERWISE PROVIDED FOR

Classes:

D01—Natural or artificial threads or fibres; spinning

D02—Yarns; mechanical finishing of yarns or ropes; warping or beaming

D30—Weaving

D40—Braiding; lace-making; knitting; trimmings; non-woven fabrics

D05—Sewing; embroidering tufting

D06—Treatment of textilles, etc; laundering; flexible materials not otherwise provided for

D07—Ropes; cables other than electric

SUB-SECTION: PAPER (including class B 31)

Class:

D21—Paper-making; production of cellulose and class:

D31—Making paper articles; working paper

Section E- FIXED CONSTRUCTIONS

SUB-SECTION: BUILDING

Classes:

E01—Construction of roads, railways, or bridges

E02—Hydraulic engineering, foundations; soil shifting

E03—Water supply, sewerage

E04—Building

E05—Locks; keys; window or door fittings; safes

E06—Doors. windows, shutters, or roller blinds, in general; ladders

SUB-SECTION: EARTH DRILLING; MINING

Class:

E21—Earth drilling

Section F- MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING

SUB-SECTION: ENGINES AND PUMPS

Classes:

F01—Machines or engines in general; engine plants in general, steam engines

F02—Combustion engines; hot-gas or combustion-product engine plants

F03—Machines or engines for liquids; wind, spring, weight, or miscellaneous motors; producing mechanical power or a reactive propulsive thrust, not otherwise provided for

F04—Positive-displacement machines for liquids; pumps for liquids or elastic fluids

and

SUB-SECTION: ENGINEERING IN GENERAL

Class:

F15—Fluid-pressure actuators; hydraulics or pneumatics in general

Classes:

F16—Engineering elements or units; general measures for producing and maintaining effective functioning of machines or installations; thermal insulation in general

F17—Storing or distributing gasses or liquids

SUB-SECTION: LIGHTING HEATING

Classes:

F21—Lighting

F22—Steam generation

F23—Combustion apparatus; combusition processes

F24—Heating; ranges; ventillating

F25—Refrigeration or cooling; manufacture or storage of ice;
liquefaction or solidification of gasses

F26—Drying

F27—Furnaces; kilns; ovens; retorts

F28—Heat exchange in general

SUB-SECTION: WEAPONS; BLASTING (including class C 06)

Classes:
F 14—Weapons
F 42—Ammunition; blasting and class:
C 06—Explosives; matches

Section G- PHYSICS

SUB-SECTION: INSTRUMENTS

Classes:
G 01—Measuring; testing
G 02—Optics
G 03—Photography; cinematography; electrography; photography

classes:
G 04—Horology
G 05—Controlling; regulating
G 06—Computing; calculating; counting
G 07—Checking devices
G 08—Signalling

Classes:
G 09—Educating; cryptography; display; advertising; deals
G 10—Musical instruments; acoustics
G 11—Information storage
G 12—Instruments details

SUB-SECTION: NUCLEONICS

Class:
G 21—Nuclear physics; nuclear engineering

Section H- ELECTRICITY

Classes:
H 01—Basic electric elements
H 02—Generation, conversion, or distribution of electric power
H 05—Electric techniques not otherwise provided for

Classes:
H 03—Basic electronic circuitry
H 04—Electric communication technique

tis by foreigners. Only three countries, ie., US, Japan and Germany (West) account for 75 pecent of the total, in which US alone accounts for 58.8 percent. Putting these facts together, patents in the technolgical sectors, which are definitely expected to be comprised of more important industries and markets for the future, are mostly held by the major developed countries, particularly, US, Japan, Germany, UK, and Switzerland.

4. Basic Differences Between Patent Application by MNCs to Home Countries and to Developing Countries and ASEAN (Thailand)

In this section, the extent by which patented technologies have been actually used or exployted is examined. In Japan, the averge exploitation rate of patented technologies in 1982 was 27.2 percent at home (Patent Office, 1984). In the US, J. M. Katz (1973) estimates this ratio as 54-56 percent. On the other hand, in the case of Latin America, the rate of patents exploited by foreign subsidiaries was only under 5 percent. In columbia, for examhple, it was 0.28 percnt (UN, 1975). In the case of

Thailand, it is also expected to be under 5 percet. This is because even if local firms exploited about 50 percent of their patented techologies, domestic patents themselves account for only under 5 percent of the total.

Then, for what reasons do foreign companies sapply for patents to developing countries (or ASEAN countries) or to Thailand? The main purposes of their international patenting strategy here is to obtain the exclusive distribution right of their patented products which will predominantly be produced at home, and to make it easier to make technology transfer agreements for transmitting royalties. The next section deals whith the extent by which new technologies are transferd from the parent companies in their home countries to the subsidiaries in the developing countries (or ASEAN countres).

5. Recouping the R&D Expenditures

A study on 65 international technology contracts by 31 American multinational companies between 1960 and 1978 (Mansfield and Anthony 1980), shows that the time-lag of international intra-firm technology transfer from parent companies to subsidiariaries in developing countries was 9.8, or nearly ten years. On the other hand, according to a case study by 94 international technology contracts by 63 Japanese companies in 1987 (Komoda and Fujiwara, 1989), 46.8 percent of international intra-firm technology transfer from parent companies to subsidiaries in developing countries was performed within 3 years, 62.8 percent within 5 years and 37.2 percent more then 5 years.

The reason why the time-lag of the Japanese companies is shorter than Americans seems to be owing to the fact that fierce competitions among Japanese companies are deployed not only at home and in developed countries, but also in developing countries (especially in ASEAN countries). What should further be kept in mind is that the time lapses between patent application of newly developed technologes and their exploitation in the production was 2.4 years on average in the case of Japanse companies.

Therefore, it could well be estimated that the transfer time-lag between the period when newly developed technologies for which patents were applied for and when they were transfered to susidiaries was more than 12 years on average in the case of American firms, and more than 5-7 years of the Japanese firms. In other words,

Table 4 Recouping Periood of R & D Exprnditures and the Technology Life-cycle

Table 4—1		Tabel 4—2	
Recouping Period of R & D Expenditures by Recouping Period		Technology Life-cycle	
less than 2 years	25.1%	less than 2 years	0.2%
2—less than 4	28.5	2—less than 4	2.1
4—less than 6	24.1	4—less than 6	3.0
6—less than 8	9.9	6—less than 8	3.4
8—less than 10	6.5	8—less than 10	7.7
10—less than15	5.3	10—less than 15	14.7
more than 15 years	0.5	more than 15 years	68.9
Total	100.0%	Total	100.0%
(sample : 323)		(smple : 470)	

Note: Technology life-cycle is from launching of new product into the market till discontinuation of production.

Source: Japan Society for Promotion of Machine Industry. 1981. *Innovation and Patent System.* Tokyo: Hatsumeikyoukai. Pp. 74—79, 100—103.

most of these technologies have not been exploited for more then 12 years by American subsidiaries, and 5-7 years by Japanese subsidiaries in developing countries, although patents were applied for t here. If this is the case, there is a need to examine next the extent by which R&D expenditures spent on the projects at home were recouped.

As is demonstrated in Table 4-1, while large R&D intensive Japanese sample firms have invested huge amount of money in R & D, about 78 percent of them succesfully recouped R & D expenditures spent on the project within 4-6 years.

Furthermore, as is shown in Table 4-2, about 84 percent of the sample firms still get an incom from the already recouped technologies for quite a long period of time, i. e., for more than 10-15 years.

6. Application of Trademarks (and Sevicemarks) in Thailand

Considering the importance of intellectual property rights as business strategies for MNCs in Thailand, however, trademarks (and servicemarks) seems to play a more critical role than patenting for developed industrial technologies. From 1989 through 1991, main forign companies whose patents, trademarks (and servicemarks) and industrial designs were granted in Thailand, are Lego Group (Denmark), Colgate-Palmolive (US), Dart Industries (US), Loventa Enex (Switzerland), Seico (Japan), Takara

Tabie 5—1 The Number of Trademark-Servicemark Applications Filed in Thailand in 1990

(The number in the brackets are those in 1985)

United States	1,601 (735)
Japan	854 (404)
France	537 (199)
United Kigdon	485 (478)
Germany	447 (264)
Italy	427 (8)
Switzerland	264 (172)
Netherland	133 (88)
Australia	119 (56)
Other	935 (415)
Total Foreign Applications	5,802 (2,819)
Total Thai Applications	7,061 (5,235)
TOTAL	12,863 (8,054)

Source: WIPO, *Industrial Property Statistics* (*Part II*), 1985, 1990.

(Japan), YKK (Japan), and Mita Industries (Japan) and so forth (Dept. of Commercial registration, Thailand). When breaking down the industrial property rights of these foreign companies mentioned above into product fields, they belong to toys, toiletary products, watches, fastener, photocopy machines, and so forth. These product fields do not seem to be High-tech sectors. In the case of photocopy machines, not critical but rather peripheral technologies of parts and components, and also trademarks are applied for patents. In other words, it means that technologies in these product fields are the ones which are quite possible to be imitated, if certain level of infrastrucures are established. The foreign companies, therefore, firstly apply for their trademarks (and servicemarks) to Thailand to prevent from copied products with their original brandnames or Logomarks, and to protect structural features of the products from imitation, through applying them for patents.

Table 5-1 shows the number of application of trademarks (and servicemarks) by foreigners to Thailand. As it shows, the number of trademark applications increased from 8,054 in 1985 to 12,863 in 1990, of which the number of foreign applications increased from 2,819 to 5,802 in the same period, i. e., 210 percent, while that of the Thai-domestic increased from 5,235 to 7,061, i. e., 35 percent.

Furthermore, while the number of patent applications filed in Thailand was 1,940 in 1990, that of trademark applications was 12,863 in the same year.

Table 5—2 Comparison of the Number of Patent Applications and the Number of Trademark Applications filed in Each Country (in 1990)

(The number in the brackets shows the one by foreign residents)

	Patent Applications	Trademark Applications
Thailand	1,940 (1,907)	12,863 (5.802)
Japan	376,692 (43,419)	171,726 (20,653)
United States	176,100 (86,690)	127,346 (20,653)
Germany	110,349 (66,459)	42,878 (N・A)

Note: In the case of France, the number of Trademark applications is bigger than that of patent applications.
Source: WIPO, op, cit.

The latter number, thererfore, is equivalent to 6.6 times as much as the former. On the other hand, as is shown in Table 5-2, the number of patent applications filed in Japan in 1990 was 2.2 times as many as that of trademark applications. In the case of the US and Germany, one can see the same pattern. In Generall, the number of patent applications is bigger than that of trademark applications in the developed industrialised countries, while the adeverse pattern can be seen in the developing countries.

Foreign multinationals, in this way, deploy their global business strategies by controlling intellectual property rights, through which even if Thai local firms and local industrial sectors succeed in industrialisation, technological leadership of the relating industrial sectors or newly emerging sectors is alway in the hands of foreign Multinationals. In other words, it means that technology transfer from the developed countries to Thailand (and to developing countries) is, structurally, performed within the system of the world ecnomy where major technologies are under control of the developed countries (and of Multinationals).

7. Payment for Imported Technology and R&D Expenditures in ASEAN

In this section, the extent by which the Philippines and Thailand paid for imported technologies will be examined. When some companies remit royalties and fees overseas from the countries, they generally need a technology transfer arrangement, which is "a contract or agreemnet involving the transfer of systematic knowledge for the manufacture of a product, for the application of a process or for the rendering of a

Table 6 Classification of Agreements by Type of Assets Transfered

(against country of origin as of 30 June 1988)

Type of Assets	Number of Assets (by Acountry)							
	US	JP	CH	UK	DE	AU	Others	TOTAL
Patents Trademarks Knowhow	111	50	18	12	15	5	24	235
Patents Trademarks	4	3	—	1	1	—	—	9
Patents Knowhow	22	16	4	—	2	3	9	56
Trademarks Knowhow	134	31	11	30	10	3	22	241
Patents	4	3	—	—	—	—	2	9
Trademarks	40	6	4	3	4	—	11	68
Knowhow	37	22	9	6	4	6	35	119
Consultancy	31	10	9	6	5	3	20	84
TOTAL	383	141	55	58	41	20	123	821

Source: Department of Trade and Industry (Philippines), bureau of Patents, Trademarks and Technology Transfer.

service, including the transfer, assignment or licensing of all forms of industrial property right" (Department of Trade and Industry, Philippines, 1988). Table 6 shows a classification of agreements by type of assets transfered and by the country of origin as of 1988.

It is important to keep in mind that technology transfer agreements, including trademark, account for the considerable part of them. It means that a considereable part of the agreement included those without any direct relation to the actual production technology.

What is more important is that as Table 7-2 shows, royalties and fees remitted abroad in 1987 was equivalent to 100.3 percent of R & D expenditures spent in the same year. In the case of Thailand, the ratio ammounted to 181 percent in 1989. The fact that the ratio is more than 100 percent seems to mean that these countries lack autonomous R&D infrastructures and heavily dependent on foreigh technologies.

The ratio in Japan is about 7 percent in the same year, although Japan is the biggest technology importer in the world.

Table 7 Royalties & Fees Remitted Abroad as a Percentage of R & D Expenditures (in 1989)

	A(=R&D Expenditures)	B(=Royalties & Fees)	B/A
Philippines ('87)	634	636	100.3%
Thailand	2,940	5,320	181.0%
Korea	4,029	930	23.1%
Japan	109,093	7,347	6.7%
Germany	47,565	2,968	6.2%
United States	193,871	2,978	1.5%

Note: Philippines; million Pesos, Thailand; hundred million Baht, Korea; million Dollar, Japan·Germany·US; hundred million Yen.

Source: Central Bank of the Philippines, Bank of Thailand, TDRI, Science & Tecnology Annual (Ministry of S&T, Korea), Science & Technology Annual (Ministry of S&T, Japan).

Table 8 The Number and Share of Patent Applications Fild in Thailand by Country of Origin

	1980	1985	1990
Thailand	18 (8.9%)	55 (7.8%)	73 (96.2%)
Foreign	184 (91.1%)	652 (92.2%)	1,867 (96.2%)
TOTAL	202 (100.0%)	707 (100.0%)	1,940 (100.0%)

Source: Compiled From *Industrial Property Statistics 1990* (WIPO, 1992).

8. Conclusion

The main conclusions and implications of this paper are as follows:

As Table 8 shows, the more Thailand (and ASEAN countries) gets industrialized, the more the number of patents applied for by foreign companies to this country has increased dramatically. It means that Thailand has been incorporated in the patent control of major developped countries and it has been globally integrated into the production, trade and investment process by them. What is to be kept in mind, furthermore, is that not only major industrial techonologies, but also brandnames and designs are covered as a package through intellectual property rights by foreign multinationals.

In other words, it has been a process by which ASEAN or Thailand has been integrated into MNC's global production and distribution network, and into international division of labor favoring major developed countries on the basis of their world wide intellecrual property right network.

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(* is written in Japanese).