

Trends in Technology Exports from Japan - 1995 Fiscal Year -

(NISTEP Report No. 53)

Hiroki Nii

3rd Policy-Oriented Research Group

## 1.Objectives

This survey is one of the series of questionnaire-based surveys conducted annually since FY 1992 targeting private companies, with the aim of producing reference material that can be characterized as an export version of the "Trend Analysis of Foreign Technology Introduction", prepared annually by NISTEP based on reports on the conclusion (amendment) of technology import agreements having taken place under the "Foreign Exchange and Foreign Trade Control Law" and other data, and analyzing the qualitative aspects of technology export, such as the nature of exported technologies, agreement formats and compensatory payment receiving methods.

## 2.Survey Method and Questionnaire Response Rate

### 1)Survey target companies:

Companies with a capital of 1000 million yen or more which conduct R&D activities or have relation with technology trade (1,597 companies)

### 2)Agreements to be covered:

Technology export agreements concluded in the year-long period from April 1, 1995 to March 31, 1996.

### 3)Method:

Questionnaire was mailed directly to intellectual property department managers or R&D department managers in the above companies.

### 4)Period:

Between January 9, 1997 (questionnaires sent) to February 10, 1997 (reply deadline)

### 5)Recovery result:

Responses received from 1,032 companies (response rate: 64.6 %)

(In this fiscal year, a similar survey targeting 503 companies capitalized at 100 million to 1 billion yen was also undertaken.)

## 3.Survey Items

To facilitate comparison with the "Analysis of Trends in Exports of Foreign Technology to Japan" survey, the survey items were set by taking into consideration covered in that survey.

### Survey items

1)Companies: Industry category and capitalization

2)Technologies exported: Contents of technology, technological category, technology type, number of patents involved and specified technological area

3)Agreement partner companies: Destination countries/areas and share holding relationship

4) Agreement formats: Agreement term, agreement form, compensatory payment receiving method, and presence of rights to exclusive use or sublicense

#### 4. Survey Results

(1) Trends in technology exports in FY 1995

1) Number of technology exports

- Of the 1,032 companies that responded to the survey (1,597 covered all together), 235 newly took part in technology export activities in FY 1995, involving 766 agreements.

2) Destination countries/areas for technology export

- By region, 64.5% of technology exports went to Asia, 18.7% to North America, 13.1% to Europe and 3.8% to other regions. Notably, Asia's share increased for three years in a row, accounting for nearly two-thirds of the total in this fiscal year.

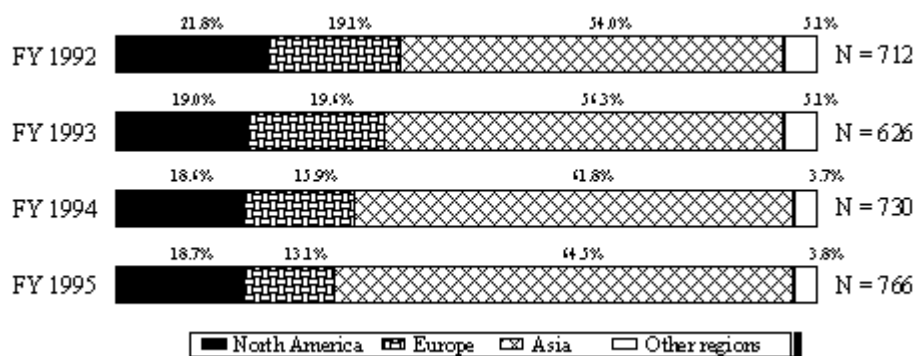


Fig. 1 Home Regions of Technology Export Agreement Partners

- By country/area, the top export destination was the U.S. with a 17% share, followed by R.O.K. (16.3%), China (15.8%), Taiwan (8.5%) and Thailand (8.1%), with Asia accounting for four of the top five destinations. Over the last few years, China's share has risen dramatically (from 7.9% in FY 1992 to 15.8% in FY 1995).

Table 1 Top 10 Destination Countries/Areas of Technology Exports

	FY 1993			FY 1994			FY 1995		
	Country/Area	Number of agreements	Share	Country/Area	Number of agreements	Share	Country/Area	Number of agreements	Share
1	Korea	104	16.6%	U.S.	122	16.7%	U.S.	130	17.0%
2	U.S.	100	16.0%	Korea	101	13.8%	Korea	125	16.3%
3	China	80	12.8%	China	101	13.8%	China	121	15.8%
4	Taiwan	52	8.3%	Taiwan	73	10.0%	Taiwan	65	8.5%
5	Thailand	32	5.1%	Thailand	49	6.7%	Thailand	62	8.1%
6	U.K.	29	4.6%	Germany	28	3.8%	Germany	31	4.0%
7	Germany	26	4.2%	Malaysia	26	3.6%	Indonesia	29	3.8%
8	Indonesia	19	3.0%	Indonesia	24	3.3%	Malaysia	28	3.7%
9	India	18	2.9%	India	23	3.2%	India	23	3.0%
10	France	15	2.4%	U.K.	15	2.1%	U.K.	19	2.5%
10				Italy	15	2.1%			
	Others	151	24.1%	Others	153	21.0%	Others	133	17.4%
	Total	626	100.0%	Total	730	100.0%	Total	766	100.0%

3) Technological fields of exported technologies

- By technological field, "electrical" tops the list with a 27.0% share, followed by "machinery" (24.9%), "chemical" (20.6%), "metals" (14.6%) and "miscellaneous" (12.8%). Thus, it can be seen that technology exports are fairly evenly distributed among different technological fields.

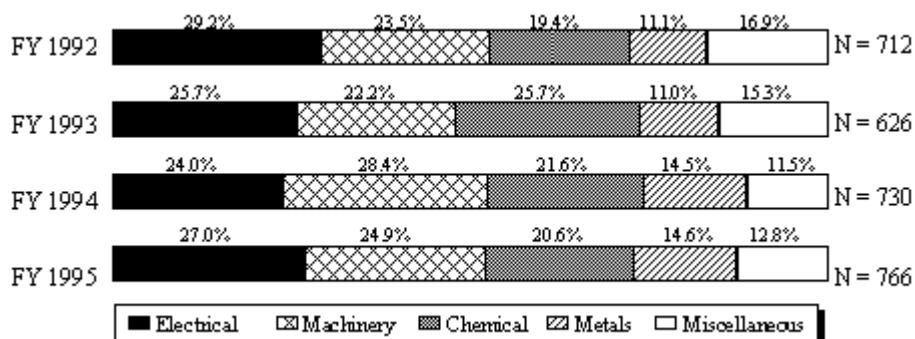


Fig. 2 Technological Field of Exported Technology

- By technological category, technology exports in "transportation equipment" has been No. 1 for the last four years, accounting for 15.0% of all agreements, a similar share to the previous fiscal year.

Table 2 Top 10 Technological Categories in Technology Export Agreement

	FY 1993			FY 1994			FY 1995		
	Technological category	No. of agreements	Share	Technological category	No. of agreements	Share	Technological category	No. of agreements	Share
1	Transportation equipment	65	10.4%	Transportation equipment	110	15.1%	Transportation equipment	115	15.0%
2	Drugs and medicines	50	8.0%	Computers	57	7.8%	Computers	51	6.7%
3	Oils and paints	41	6.5%	Iron and steel	45	6.2%	Electronics/communications parts	51	6.7%
4	Electronics/communications parts	39	6.2%	Organic chemicals	44	6.0%	Iron and steel	43	5.6%
5	Computers	38	6.1%	Electronics/communications parts	40	5.5%	Non-ferrous metals and products	42	5.5%
6	Fabricated metal products	34	5.4%	Fabricated metal products	33	4.5%	Drugs and medicines	39	5.1%
7	Home appliances	30	4.8%	Drugs and medicines	30	4.1%	Oils and paints	36	4.7%
8	Organic chemicals	29	4.6%	Other chemical products	28	3.8%	Home appliances	36	4.7%
9	Communications equipment	23	3.7%	Non-ferrous metals and products	28	3.8%	Organic chemicals	32	4.2%
10	Ceramics	22	3.5%	Oils and paints	27	3.7%	Plastic products	28	3.7%
	Others	255	40.7%	Others	288	39.5%	Others	293	38.3%
	Total	626	100.0%	Total	730	100.0%	Total	766	100.0%

(2) Overall trends in technology exports

1) Share holding relationship with agreement partners

- Technology exports to companies with which Japanese exporting companies have a

share holding relationship account for 42.6% of the total, and this represents the second straight yearly increase.

- In Asia, more than half of all exports (50.8%) go to companies with which the Japanese exporting companies have a share holding relationship.

## 2) Agreement term

- "Five-to-ten year" terms are most common, with 35.8% of all agreements falling into this category, followed by "1-5 year" terms (21.7%).
- Compared to North America and Europe, the proportion of agreements "valid until the expiration of industrial property rights" is low with Asia, while that of "5-10 year" terms is high.

## 3) Compensatory payment receiving method.

- "Running royalties only" is most common, with a 41.1% share, followed by "initial payment plus running royalties" (36.7%) and "initial payment only" (17.2%).
- Technology exports to companies with which Japanese exporting companies do not have a share holding relationship tend to favor the "initial payment only" method, while technology exports to companies with which Japanese exporting companies have a share holding relationship are most likely to fall into the "running royalties only" category.
- In the majority of cases (57.3%), running royalty rates are set at 2-5%.

## 4) Exclusive rights and sublicense rights

- Agreements with "exclusive rights" clauses account for 27.7% of the total, while those granting "sublicense rights" make up 7.4%
- With Asia, "exclusive rights" clauses are common, and the proportion of "sublicense rights" clauses is fairly low.

## 5) Form of technology

- "Patents" are included in 39.7% of all agreements, while the figures for "know-how" and "trademarks" are 83.7% and 18.1%, respectively.
- Compared to North America and Europe, the proportion of "patents" is low with Asia, while that of "know-how" is high.

## (3) Comparison of technology exports and imports

According to Bank of Japan and Management and Coordination Agency statistics, the value of Japan's technology exports is growing at a faster rate than that of technology imports, and the country's overall technology trade performance is experiencing a turn around in monetary terms from deficit towards balance. However, a comparison of technology exports and imports based on findings of this survey and the corresponding "Analysis Trends in Imports of Foreign Technology to Japan" report reveal a rather different picture as shown below.

### 1) Type of technology

- Technology exports centering on hardware and technology imports centering on software

-

- Hardware technology accounts for 92.8% of all technology exports.
- In technology imports, software accounts for 49.2%, outstripping hardware technology.

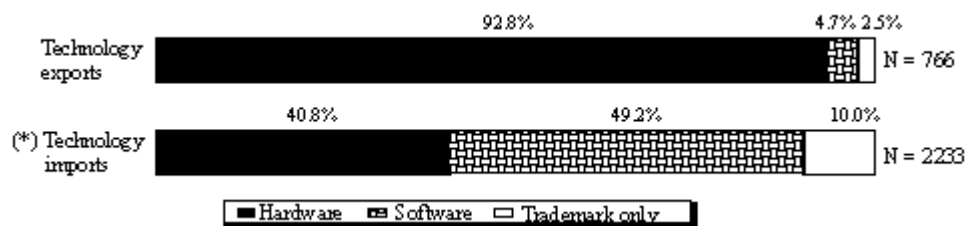


Fig. 3 Technology Types in Technology Exports and Imports

2) Home regions of agreement partners

- Technology imports originating in North America and Europe and technology exports destined for Asia -

- With technology exports, Asia is the most prominent destination region, accounting for 65.4% of the hardware technology total and 42.4% of the software total. With technology imports, North America is the most prominent region of origin, accounting for 66.2% of the hardware technology total and 82.6% of the software total.

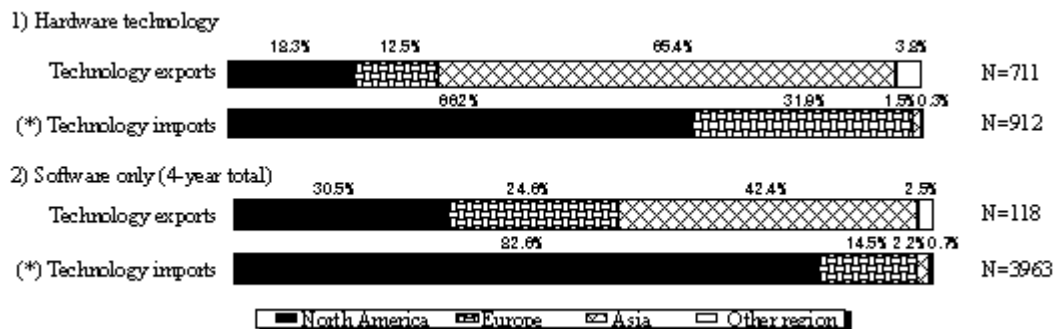


Fig. 4 Home Regions of Technology Export/Import Agreement Partners

3) Relationship between technology export/import and direct investment

- Technology exports tend to follow direct investment but technology imports do not -

- As destinations of Japan's technology exports, companies in which Japanese exporters hold shares (both 50% or more and less than 50% share holding) feature prominently, accounting for 42.8% of the hardware technology total and 45.8% of the software total.
- Nevertheless, the proportion of Japan's technology imports attributable to foreign affiliated companies (companies controlled by foreign companies through 50% or more share holding) is extremely low, only 1.2% for both hardware technology and software.

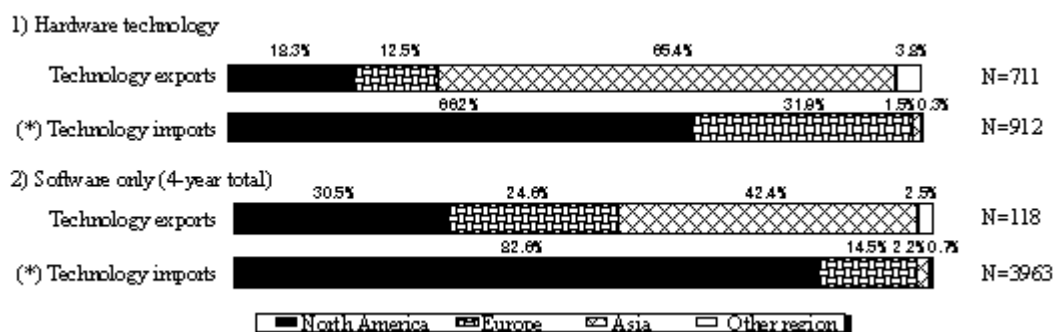


Fig. 4 Home Regions of Technology Export/Import Agreement Partners

4) Contents of exported technologies and imported technologies

- "Transportation equipment" technologies dominate in technology exports and "electrical" technologies do so in technology imports -

- With technology exports, "transportation equipment" technologies are ranked No. 1 for the fourth consecutive year.
- With technology imports, "electronics and communications parts", "computers", "communications equipment" and other "electrical" field technologies are ranked high.

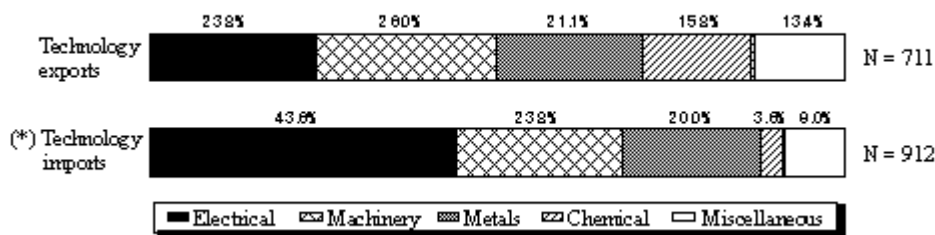


Fig. 6 Breakdown of Hardware Technology Exports and Imports by Technological Field

5) Technology trade agreement conditions

- Distinct differences in agreement conditions between technology exports and technology imports -

(1) Agreement term

- With technology exports, the proportion of agreements with an agreement term of "less than 10 years" is high for both hardware technology and software.
- With technology imports, the proportion of agreements "valid until the expiration of industrial property rights" is high for hardware technology, while "others" (no specific duration etc.) is more common for software.

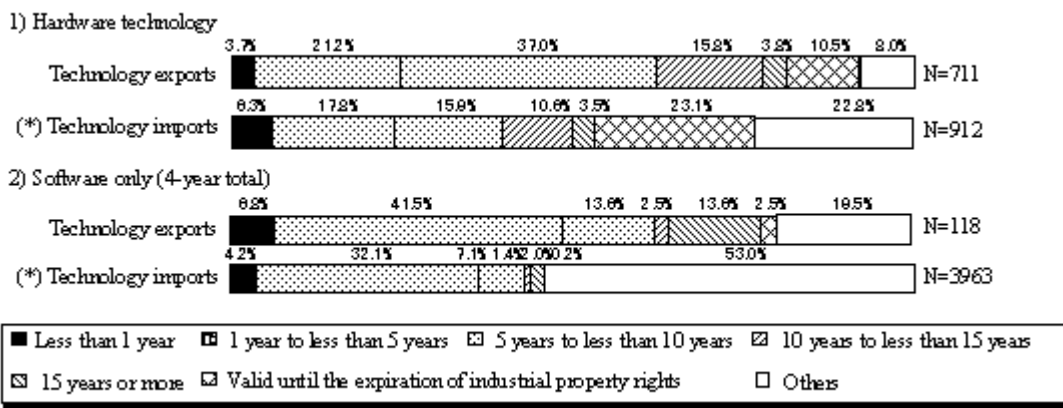


Fig. 7 Agreement Terms of Technology Export/Import Agreements

(2) Compensatory payment receiving method

- With hardware technology, the proportion of "running royalties only" is high in technology exports, while that of "initial payment only" is high in technology imports.

- With software, the proportion of “initial payment only” is high in both technology exports and technology imports.
- Low running royalty rates are more common with technology exports than technology imports.

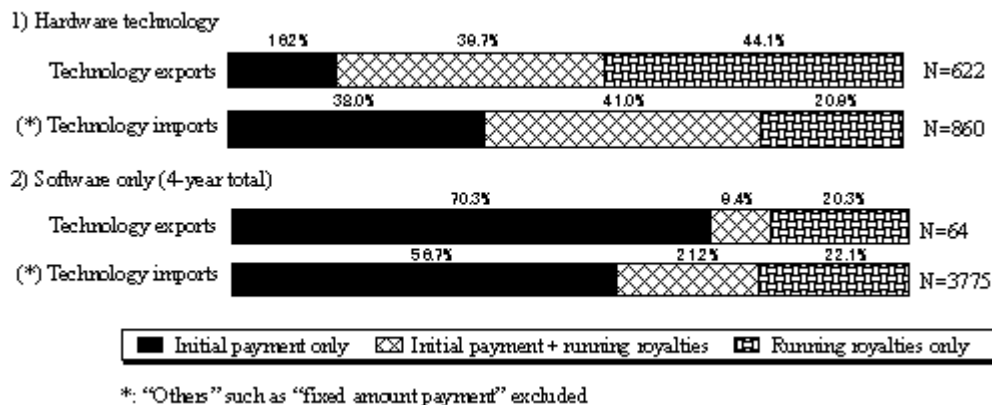


Fig. 8 Compensatory Payment Receiving Methods in Technology Export/Import Agreements

#### (4) Summary

The above analyses show that, although Japan's technology trade performance is improving from deficit towards balance in quantitative monetary terms, there still exists a major imbalance between technology imports and exports in qualitative terms.

##### 1) Dependence on North America and Europe

Japan's basic technology trade structure is characterized by imports from North America and Europe and exports to Asia. Although the value of Japan's technology exports have been increasing dramatically in recent years, it does not mean that Japan is engaging in technology trade with North America and Europe as equal partners. Rather, this is largely attributable to an increase in technology exports to Asia that has occurred as a direct result of the recent expansion in Japan's direct investment in that region. There is no denying that a large disparity in technological expertise still exists between North America/Europe and Japan.

##### 2) Large deficit in software trade

Japan's hardware technology exports are not just Asia-bound, with a substantial portion also going to North America and Europe. The problem area is software. In recent years, software imports have soared, while software exports have remained very low. An improvement in software development capabilities is therefore an urgent task for Japan.

##### 3) Sluggish technology import via foreign capital

In recent years, Japan's manufacturing industry has been expanding its direct investment in foreign countries, centering around East Asia, in response to the widening gap in manufacturing costs between Japanese and overseas sites, and this has given rise to a dramatic increase in the volume of technology exports to the recipients of Japanese capital. In contrast, foreign direct investment in Japan remains very low, resulting in perennially low technology imports via foreign affiliated companies. It is therefore also necessary to step up efforts to increase technology transfer to Japan via foreign affiliated companies by establishing an attractive investment environment for foreign companies.

##### 4) Disparity in agreement conditions between imports and exports

Japan's technology trade centers on Asia in terms of exports and North America and

Europe in terms of imports. Technological awareness in some Asian countries/areas is low compared to North America and Europe, and priority tends to be given to technology importing countries' financial interests rather than technology exporters' rights. As a result, Japan's technology exports are disadvantaged compared to imports in terms of agreement term and running royalty rate. It is therefore important to better protect technology exporters' rights by pointing to the fact that technologies exported today lay the foundations for future technological development in the countries for which these technologies are bound.