

TRENDS IN WOOD INDUSTRY OF JAPAN DURING 30 YEARS (PART II)

Chiaki TANAKA*, Tetsuya NAKAO*, Akira TAKAHASHI*
Yoshihiko NISHINO** and Chunrui ZHAO*,***

この30年間における日本の木材工業の趨勢 (Ⅰ)

田中 千秋・中尾 哲也・高橋 徹
西野 吉彦・趙 春瑞

This article will begin with an examination of the various branches of the forest products industry, that is, sawmill, wood furniture, chipmills, plywood, pulp and paper, laminated wood, and flooring. This will be followed by a look at specialized industrial parks for the wood industry, and in conclusion there will be a section on the importance of building construction to the wood industry and the domestic economy.

1. INTRODUCTION

This is the second and concluding part of an article dealing with the Japanese wood industry. As discussed in the first part, Japan depends on imports to fill beyond 70 percents of its demand for wood. The main suppliers are Southeast Asia, North America, Siberia, and New Zealand. Since wood consumption is high because of extensive use of wood in building construction and paper, this becomes a major factor on world markets for wood.

This report will begin with an examination of the various branches of the forest products industry. This will be followed by a look at specialized industrial parks for the wood industry, and in conclusion there will be a section on the importance of building construction to the wood industry and the domestic economy.

2. MAKEUP OF WOOD PRODUCTS INDUSTRIES

2.1 SAWMILLS

The first sawmill in Japan opened in 1875, and the industry grew to 23,000 mills by 1940. The number of sawmills declined steadily during World War II, however, and was reduced to 7,500 mills by the end of the War II. The number of sawmills

* Lab. of Material Science and Technology of Natural Products, Shimane Univ.

** University Forests Shimane University

***Northeast Forestry University, P. R. China

Table 1. Types and Number of Industries and Production Value of Wood and Wood Products in Japan in 1985

Industry	Number of Plants	Production Value (Million U. S. dollars)
Sawmills	18933	11670
Wood furniture	13945	10000
Chipmills	3646	1400
Plywood	554	6050
Pulp (large mills)	15	690
Pulp, paper, and paperboard	412	49260
Laminated wood	212	500
Preservative treating plant	88	190
Flooring	64	700
Particleboard	18	270
Fiberboard	16	270

Data from Research and Statistics Department of Japan Based on 1 dollar = 150 yen

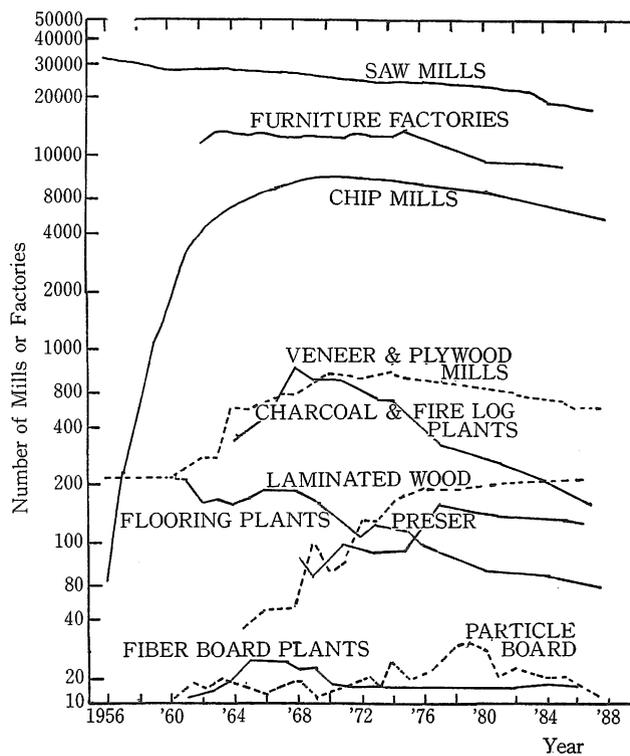


Figure 1. Trends in Number of Wood Products Mills and Factories in Japan
Data from Forest Agency (3)

increased again to 35,000 by 1950, and most of these used circular saws. As shown in Figure 1 the number of sawmills has been steadily declining again from 1956 onward, and the number of sawmills was to 17,886 in 1987 (Table 1 and Figure 1).

Examination of the data in more detail shows that the small-size mills located on or near forest tract and in the country, which cut only domestic woods, decreased by almost half in the last decade and continue to be close down as a result of decreasing supplies of domestic wood. The number of sawmills of less than 22.5 kw

Table 2. Number of Sawmills Classified According to Power Use from 1960 to 1987^a

Year	From 7.5 to 22.5 (kw)	From 22.5 to 37.5(kw)	From 37.5 to 75 (kw)	From 75 to 150 (kw)	From 150 to 300 (kw)	Over 300 (kw)
1960	14807	5594	3046	782	—	—
1970	8125	6704	6349	2387	981	—
1975	6201	5579	7035	3099	1716	—
1980	4359	5055	7273	3444	2110	—
1985	2737	4227	6508	2996	1325	467
1987	2601	4118	6420	2958	1302	479

^a Forestry Agency (3). Data from Forestry Cooperative (4) and

Table 3. Size and Production of Sawmills using Imported Wood at Coastal Locations in 1988^a

Location (city)	No. of mills	Avg. kw of mills	No. of mills of over 150 kw power		Total shipping (10000 m ³)	Shipping by mills over 150 kw power	
			No.	% of total		Shipping (10000 m ³)	Amount of all shipping (%)
Hiroshima and Hatsukaichi	81	170	31	38	58		
Iwaki ^b	96	181	32	33	70	55	79
Shimizu	50	186	13	26	28	19	66
Wakayama	88	114	19	22	46	24	53
Tokushima	40	149	12	30	32	20	63
Takaoka and Shinminato	67	196	20	30	55	31	57
Niigata	39	149	16	41	18	12	66
Tanabe	32	211	9	28	23	18	78
Kitakyushu	17	274	5	29	18	15	86
Toyama	63	94	10	16	18	10	55
Countrywide ^b	17854	73	1781	10	2984	1323	44

^a Data from Forestry Agency (3) and Forestry Cooperative (4).

^b Data for 1988.

power decreased remarkably (Table 2).

On the other hand, because of increased log imports, new and larger mills have been established at or near the ports of entry. This development was furthered reasons as follows:

- 1) the sawmill industry was especially designated for application of the "Law for Accelerated Modernization of Small and Medium Size Enterprises" in 1965,
- 2) there was developed a government policy of "Rationalization" of Mills by the formation of large units and collective (Okamura 1976).

Sawmills formerly scattered in the country were scrapped, and new, automatic efficient, and large sawmills were constructed in new industrial parks. The number of sawmills with a power of over 75 kw to 300 kw increased remarkably. For example, the number of sawmills with a power of over 75 kw more than doubled from 1960 to 1975 (Table 2), but the number of those mills decreased after 1980 onward.

The sawmills located in industrial parks at the seaside are characterized by large-scale equipment and efficient production (Table 3). The average power of sawmills countrywide was 65 kw by 1977, and 73 kw by 1988, and the number of sawmills countrywide decreased 23,647 by 1978 to 17,854 by 1988. The average for sawmills sawing only imported wood was considerably more and for those located in the industrial parks of Kitakyushu and Tanabe, it was over 200 kw.

Table 4. Imported Woodchips to Japan in 1987

Exported Country	Woodchips Amount (1000 tons)	Woodchips Value (1000 U. S. dollars)
Total	7,140	795,833
Taiwan & China	8.6	764
U. S. S. R.	259	23,727
Canada	535	61,029
U. S. A.	2,447	282,079
Australia	2,770	310,464
New Zealand	382	41,008
Indonesia	203	19,394
South Africa	409	42,983
Chile	50	5,310

The ratio of sawmills of over 150 kw power to all sawmills was 10 percent countrywide. This ratio ranged from 16 to 41 percent in the coastal industrial parks (Table 3). Accordingly, shipments from sawmills of 150 kw power were over 44 percent of total shipments in all, but both of the locations of over the 200 kw power were 78 percent. The large sawmills in industrial parks at the seaside obviously had high productivity.

The number of sawmills in the ten big locations sawing imported wood was only 3 percent of those countrywide, but the shipment values were about 12 percent. The concentration of production in the bigger sawmills located at the seaside is a trend that has been progressing steadily. The total production of sawmills all over the country has reached a value of 11,670 million U. S. dollars (Table 1).

2. 2. WOOD FURNITURE

In terms of the number of establishments, the furniture industry is ranked second after sawmills. Almost all are small factories and workshops. Their number has fluctuated up and down during the last 25 years. Production value reached 3.4 billion U. S. dollars in 1975 to 1977, and 10.0 billion in 1985 to 1986. A gradual reorganization of the furniture industry has been proceeding by relocating factories to designated production centers with the aim of creating centers for specialized products corresponding to the supply of raw materials (log or lumber).

Table 5. Plywood Imported to Japan (1000 m²: 4 mm thickness basis)

Year	Total	Indonesia	Taiwan	Korea	Canada	U. S. A.	Production in Japan
1980	15,060	2,600	100	7,367	2,309	665	1,343,936
1981	5,077	1,595	106	543	1,706	504	1,188,108
1982	5,058	866	103	953	2,026	691	1,138,788
1983	5,881	2,559	61	7	2,219	588	1,221,346
1984	17,956	14,652	92	0	2,014	610	1,165,026
1985	44,950	41,697	146	18	1,988	637	1,093,505
1986	89,595	84,521	656	450	1,706	595	1,073,466
1987	240,537	227,568	4,222	2,558	3,002	1,110	1,146,496
1988	265,240	256,623	1,855	356	3,211	1,368	1,129,539
1989	464,576	455,222	1,430	256	4,071	1,264	1,032,521

Data from Customs and Tariff Bureau of Japanese Ministry of Finance 1990 (2)

Table 6. Productivity Related to Plywood Plant Size—Labor Required to Produce 1000 m² of Plywood (4 mm thickness basis)

Plant size, by production in 1000 m ²	1973		
	1967	hrs.	1977
Under 3000	130.5	151.6	105.9
From 3000 to 6000	106.8	69.5	63.7
From 6000 to 10000	80.1	55.6	49.3
Over 10000	79.3	42.5	35.4
Avg.	94.4	50.8	43.7

^a Data from Ministry of Labor (10).

Table 7. Variations of the Number of Plywood Mills (3)

Years	1987				
	Total	Veneer only	Plywood Regular Size	Regular and Special Plywood	Special Plywood only
1972	716	52	198	56	410
1974	769	58	199	66	446
1976	711	56	197	47	411
1978	666	55	180	37	384
1980	644	53	166	33	392
1982	604	45	141	31	387
1984	581	50	135	30	366
1985	554	46	128	27	353
1986	550	45	118	30	357
1987	545	49	115	32	349

2. 3. CHIPMILLS

Chip production appeared first in 1953 as a specialized business enterprise using woodwaste. Chipmills are mostly satellite mills for utilizing woodwaste. Enterprises specializing in chip-making represent only 11 percent of total in 1975, and this percentage decreases year by year. Among chipmills as specialized enterprises there are many that are managed by forest owners' associations with financial support from the government. However, chipmills are usually a sideline of sawmills and plywood factories.

Chipmills flourished because they made possible a high degree of utilization of woodwaste. They increased in number continually from about 1960 on, but attained a peak in 1970. Chip production is worthwhile in utilizing woodwaste, but there is little value added in producing such a simple commodity. Consequently the value of production at 1,400 million U. S. dollars (Table 1), compared to the large number of mills, is remarkably low.

Looking at the employment picture in chipmills at the end of 1987, the overwhelming majority (4,278 mills or 87 percent) had fewer than four employees. There were 468 mills (9.5 percent) with five to nine employees, 141 mills (2.9 percent) with 10 to 19, and 20 mills (0.4%) with more than 20 employees.

Table 8. Trends in Number of Wood Products Mills and Factories in Japan

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Saw Mills	22794	22541	22241	21535	20937	20256	19512	18834	18260	17886
Furniture Factories	8645	8547	8491	8705	8666	8430	8121	7999		
Chip Mills	6764	6618	6590	6305	5996	5829	5518	5315	5123	4907
Veneer & Plywood mills	666	654	644	621	604	605	581	554	550	545
Charcoal & Fire Log Plants		297		275		220	216	191		164
Flooring Plants	81	73	69	67	68	68	67	64	60	56
Laminated Wood Plants	189	193	204	211	208	213	216	212	214	218
Preservative Treating Plants	173	158		154		161	157	157		140
Pulp & Paper Mills		606						412		
Particle Board Plants	34	35	27	20	24	22	21	24		15
Fiber Board Plants		14		14		13	16	16		16

Data from Forestry Agency (3)

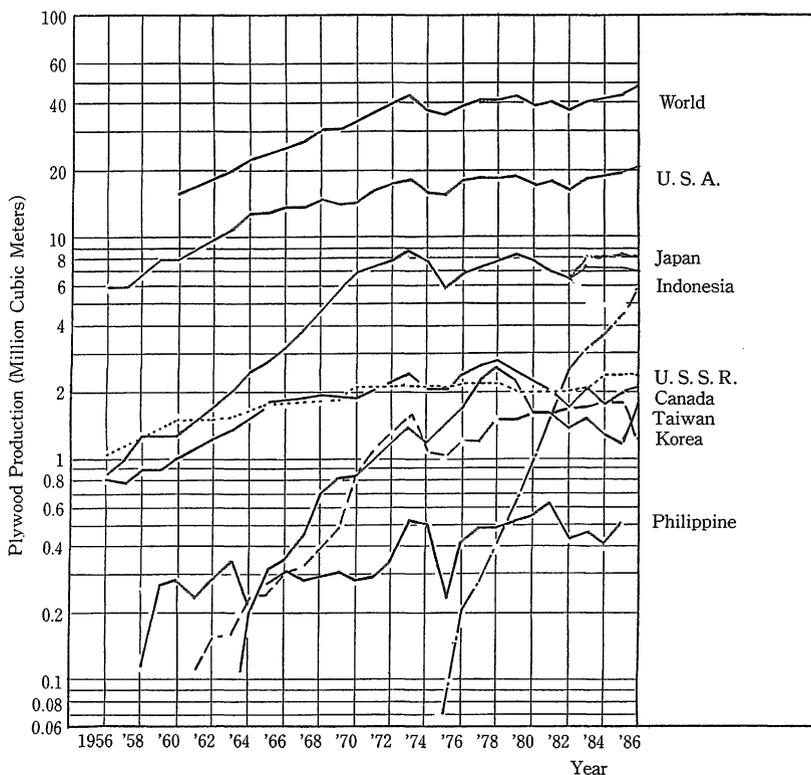


Figure 2. Plywood Production of Selected Countries from 1956 to 1986. Data from Bureau of Statistics of Japan, Japanese Plywood Inspection Agency, and United Nations

Most chipmills of 4,301 mills are side line of sawmills, but of those 606 mills are independent enterprises in 1987.

A large quantity of woodchips were imported as shown in Table 4.

2. 4. PLYWOOD

The plywood industry experienced its main development and prosperity in the 1960s., but has maintained a stable size of about 700 factories in 1970s. In 1987, there were 545 plywood factories, which can be classified as follows: 115 standard plywood mills, 32 mills making both regular and special plywood, 349 mills producing only special plywood and 49 mills making only veneer. During the current two decades the number of mills making standard plywood decreased from a maximum of 248 in 1970, to 224 mills in 1977, and to a minimum of 115 in 1987. The decrease of plywood mills was due to import cheap plywood from Indonesia. The import of plywood to Japan were remarkably increased, and the plywood production in Japan decreased year by year, as shown in Table 5. and Fig. 2 On the other hand, Japanese capitals and productional technology of plywood have been exporting to Indonesia, and plywood mills were built in Indonesia. As shown in Table 6, labor

Table 9. Recent Production Statistics for Glulam in Japan

Year	Millwork (1000 m ³)	Structural timber (1000 m ³)
1965	17	3
1970	113	8
1984	192	98
1985	198	99
1986	208	108
1987	234	115

^a Data from Research and Statistics Department

productivity in the plywood industry is better in larger mills. In 1977 the productivity in the largest and smallest mills differed by a factor of three. The big enterprises may be thought to be surpassing the medium-size and smaller makers on the strength of their accumulation of capital and profits. The value of plywood production amounted to 6,050 U. S. dollars in 1985.

2. 5. PULP AND PAPER

There were 660 establishments in the pulp, paper, and paperboard industry in 1975. Medium and small factories with fewer than 300 workers accounted for 91% of the total number. However, the largest 15 pulpmills had production amounting to 129 billion yen (420 million U. S. dollars). The pulp and paper establishments were decreased to 412 as shown in Table 8. In pulp and papermaking, the big companies with large capital have the greatest market power.

Because of the major capital outlay required for pulp plants, the need for a balance in demand and supply of pulp and paper, and the problems of pollution of air and water in manufacturing, new construction or enlargement of pulp and paper factories has become rare. The use of imported pulp is an increasing trend, and the pulp industry is making major investments for replacement of old manufacturing equipment and the installation of new equipment for pollution control.

The amount of imported pulp showed the increase of 16 percent for dissolving pulp, and 40 percent for the paper making pulp in this ten years.

Table 10. Industrial Parks of Wood Industry in Japan (4)

	1969			1972			1975			1977		
	Coast	Inland	Total									
Being planned	26	4	30	8	1	9	16	11	27	10	10	20
Under construction	25	2	27	32	7	39	13	3	16	17	9	26
In use	11	10	21	22	17	39	35	23	58	42	27	69
	1981			1983			1985			1988		
	Coast	Inland	Total									
Being planned	6	3	9	7	2	9	6	3	9	3	—	3
Under construction	15	5	20	12	5	17	10	6	16	8	2	10
In use	50	33	88	54	34	88	35	33	88	51	40	91

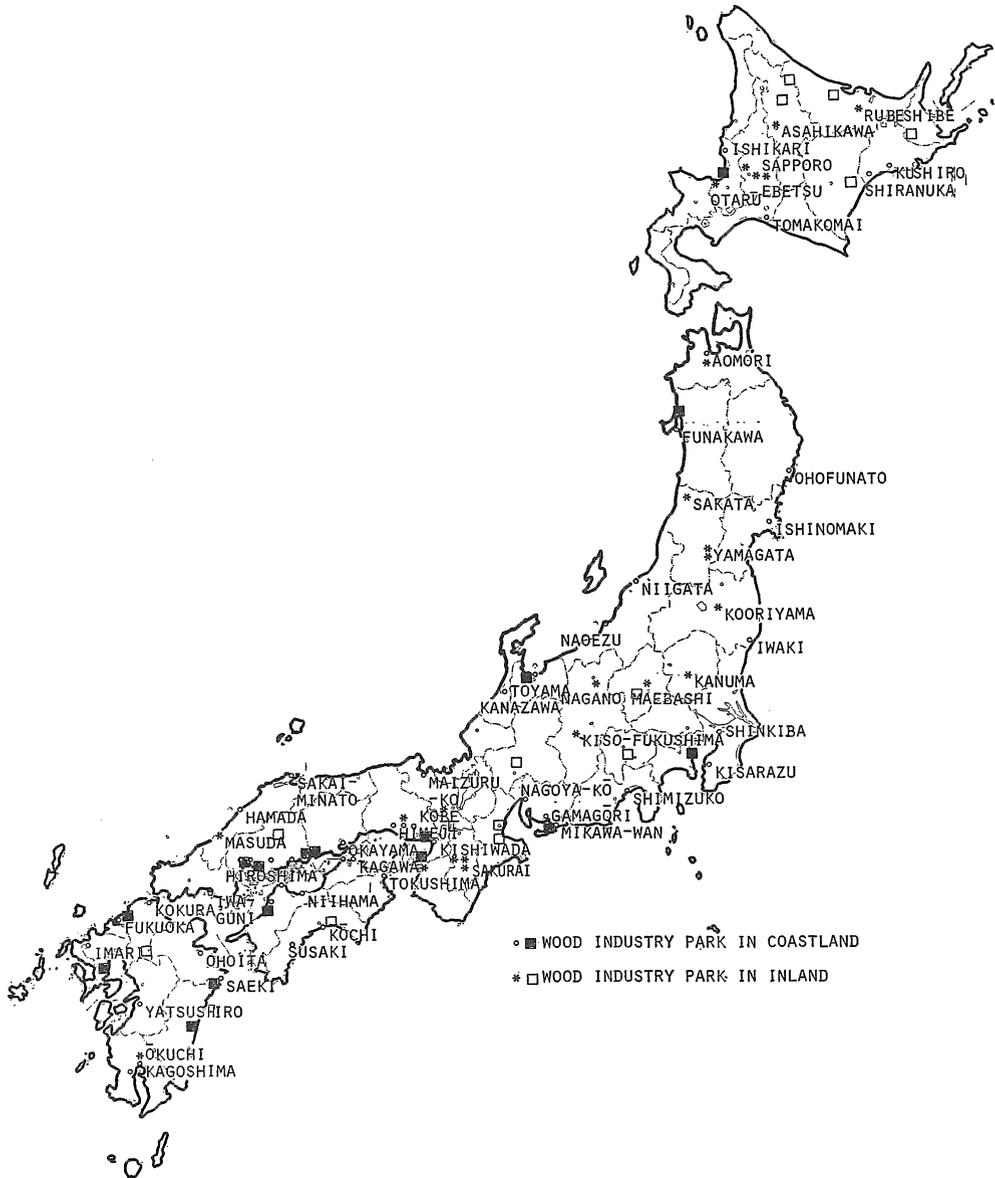


Figure 3. Location of Wood Industrial Parks in 1988

2. 6. LAMINATED WOOD

The glulam industry in Japan includes production of structural timber as well as laminated wood for interior trim, millwork, and fixtures.

In spite of the recession the number of plants increased from 182 mills in 1976 to 218 mills in 1987. Many of these are medium and small enterprises, 66 percent of which employ fewer than 50 workers. There are only 5 plants with more than 300 workers. Many glulam plants are subsidiaries of sawmills and produce mainly laminated wood with decorative overlays for fittings and fixtures. Recently, timbers

for structures have come to represent about 50 percent of the total glulam production as shown in Table 9.

2. 7. FLOORING

Almost all solid wood flooring is produced by small makers. Solid wood flooring is made from logs and from lumber in 56 plants, and those plants are located mostly on Hokkaido and in the Touhoku area in Japan. On the other hand, composite wood flooring is produced by relatively large makers of 5 plants, and the medium and small size makers of 18 plants.

The number of flooring plants has been decreasing steadily over the last two decades. The output of kiln-dried, solid wood flooring decreased from a peak of 19.23 million m² in 1968 to 5.47 million m² in 1987— a 72 percent decrease. Production of composite wood flooring made of plywood overlaid with decorative veneer, decreased from 63 million m² in 1973 to 30 million m² in 1982— a decrease of 53 percent in about 10 years, but now an increase to 54.4 million m² in 1987.

The consumption of flooring in general depends chiefly on construction starts and thus the decrease in consumption is remarkable. However, the explanation lies in the nature of recent construction. Public buildings such as schools, halls, and apartments formerly consumed large quantities of wood flooring when the buildings were also of wood. Thereafter, they were mainly of reinforced concrete construction. In an attempt to make those buildings fireproof, the construction used concrete floors overlaid with vinyltile. In wood houses as well, the use of wood flooring had been decreasing due to change lifestyles and increasing availability of carpeting, plastic tile, or sheet vinyl on plywood or concrete slab floors. The non-wood materials were often preferred as accents in the total interior design. Recently wood floors are used again in schools and apartments built by concrete and all houses in a point of view from the liveability and health.

3. WOOD INDUSTRY INDUSTRIAL PARKS

In 1960 the Japanese government instituted a policy of concentrating small and medium mills or factories in specialized locations. With the necessary support of the government, industrial parks were constructed for particular industries. (Other industries included are metal, iron and steel, machinery, textile, food, and mercantile.) In the wood industry, land reclamation for the first industrial park was completed about 1963. Since then, industrial parks for timber and wood products have been established one after another. Their growth and location are shown in Fig. 3 and Table. 10. By 1989, 51 coastal parks and 41 inland parks, and now, total 92 industrial parks of wood industry are completed, in use, and under construction.

Inland industrial parks were constructed principally to use domestic wood as raw material, while those on the coast were to use only imported wood. However, the

use of imported wood in inland parks has been increasing year after year. Depending on location, parks are characterized as furniture industrial parks or sawmill industrial parks, or other combinational industrial parks including other type of industry.

The purpose of building industrial parks for the wood industry is to remove undesirable environmental influences present at the original plant locations, and to concentrate groups of related plants for increased efficiency, as for example the proximity of maintenance services. Moreover, in addition the government provided port facilities for entry of foreign wood. Industrial parks for sawmills were constructed at coastal locations to meet the countrys' demand for imported wood in huge quantities. There were a total of 1,524 operating mills in industrial parks by 1975, but 1,502 mills and other establishments of 1,735.

REFERENCES

1. BUREAU of STATISTICS, OFFICE of the PRIME MINISTER (JAPAN) 1978~1989, JAPAN Statistical Yearbook, The Mainichi Newspapers, Tokyo, Japan
2. CUSTOMS AND TARIFF BUREAU, MINISTRY of FINANCE. 1977~1989, Statistical Table. Tokyo, Japan
3. FOREST AGENCY (JAPAN) 1977~1990 FORESTRY STATISTICAL CONCISE BOOK, Rinya Kosaikai, Tokyo, Japan
4. FORESTRY COOPERATIVE (Rinya Kosaikai) 1990. Japan Forestry Yearbook, Forestry Cooperative, Tokyo, Japan. 243-327
5. MINISTRY of LABOR, JAPAN, 1978, Research Report of Labor Productivity Index Tokyo. Japan
6. TAKAHASHI, A. et al, 1980 Recent Trends in the Wood Industry of Japan, Forest Products Journal, No. 5 and No. 6, USA