Chapter 4. DEMAND AND SUPPLY OF TIMBER IN JAPAN.

Preface

This ITTO-funded study on the demand and supply of timber in Japan has been undertaken by the Japan Wood-products Information and Research Center (JAWIC)[98] and prepared by Dr. Satoshi Tachibana (fellow of JAWIC) from the University of Tuskuba (Japan). It builds on a 2008 study of the Japanese wood market and use of tropical wood[99] between 1945 to 2008.

Situation of the forest and forest products industries in Japan for the period 2008-2017

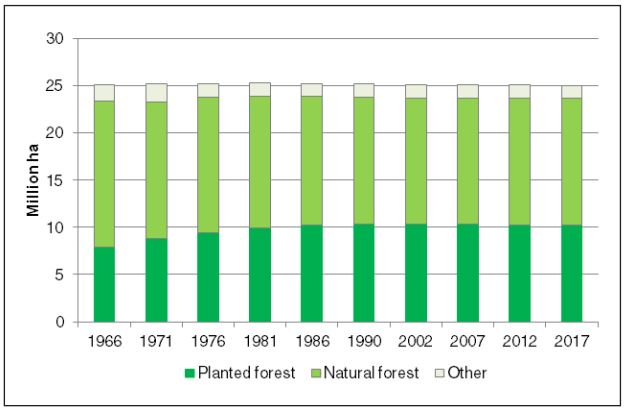
Forest resources

The total area of forested land in Japan is about 25 million ha and has been stable since the 1960s. However, the composition ratio of natural forest and planted forest has changed as shown in Figure 4.1. Large-scale forest exploitation had occurred during the wartime and postwar revival period due to the large quantity of wood that was required to secure necessary supplies. Reforestation was then promoted to rehabilitate degraded land after exploitation. From the mid-1950s to the mid-1970s, more than 300,000 ha of land were reforested annually resulting in an increase in planted forests from the 1960s to the 1980s, while the area of natural forests declined. The main species of planted forest during the period were *Cryptomeria japonica* (Japanese cedar), *Chamaecyparis* (Japanese cypress) and *Larix kaempferi* (Japanese larch), with the former two species having the desirable features of fast growth, straightness and ease of processing.

From mainly the mid-1950s to the mid-1960s, the major fuel usage switched from firewood and charcoal to oil and gas as economic growth increased (the fuel revolution). Firewood and charcoal demand decreased dramatically during the fuel revolution, and the demand for building materials and paper products increased rapidly from the mid-1950s to the early 1970s, the period of high economic growth. In response to such demand, "expansive afforestation" was promoted to enable a transition from natural forests such as those used for firewood, to planted forests.

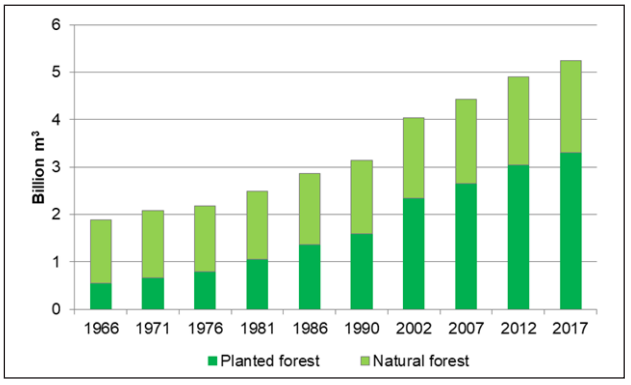
From the viewpoint of land conservation, degraded land should be reforested as soon as possible. Therefore, needle-leaved tree species such as Cryptomeria japonica (Japanese cedar), *Chamaecyparis* (Japanese cypress), *Larix kaempferi* (Japanese larch) (*Picea jezoensis* (Ezo spruce), *Abies sachalinensis* (Sakhalin-fir), *Pinus densiflora* (Japanese red pine), and *Pinus thunbergii* (Japanese black pine) were chosen for their high growth rates as well as high economic value.

Figure 4.1: Forest area change in Japan



Source: Forestry Agency (2010) "Annual Report on Forest and Forestry in Japan 2010" and Forestry Agency "Forest inventory survey (Shinrin Shigen Genkyo in Japanese)" (http://www.rinya.maff.go.jp/j/keikaku/genkyou/index1.html)

Figure 4.2: Forest stock change in Japan



Source: Forestry Agency (2018) "Annual Report on Forest and Forestry in Japan 2018" and Forestry Agency "Forest inventory survey (Shinrin Shigen Genkyo in Japanese)" (http://www.rinya.maff.go.jp/j/keikaku/genkyou/index1.html)

Forest stock in Japan has been growing continuously since the 1960s as shown in Figure 4.2. The forest stock has almost tripled from 18.8 billion m^3 in 1966 to 52.4 billion m^3 in 2017. Though forest stock from natural forests has been stable, forest stock from planted forests has been increasing significantly since the 1970s. This is the result of the conversion from natural forests to planted forests since the 1950s.

The change in age structure of planted forests between 1987 and 2017 is shown in Figure 4.3. Disproportionate age class distribution can be observed both in 1987 and 2017. A high proportion of planted forests fall into the age class X-XII (51-65 years from planting), such as 1.1 million ha in the age class IX, 1.5 million ha in the age class X, 1.6 million ha in in the age class XI and 1.4 million ha in the age class XII in 2017. Planted forests of Japanese cedar can be generally harvested at 50 years when most plantations have reached a harvestable age. However, over the last two or three decades, clearfelling has been stagnant, resulting in insignificant reforestation and a small area of young age-class forest.

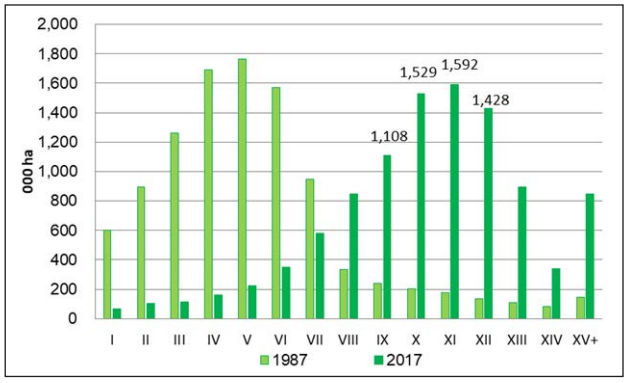
Since the 2000s, after the conclusion of the Kyoto Protocol, the Japanese government has actively promoted thinning in planted

[98] JAWIC originates from the Wood-Products Stockpile Corporation, which was established in 1974, and changed its name to Japan Wood-Products Information and Research Center in 1991. JAWIC promotes activities to support the secure supply of timber, such as collecting, analyzing, and providing information on timber supply and demand, price, production, distribution, and consumption. Dr. Satoshi Tachibana is a leading expert on timber trade research and has been conducting quantitative and qualitative research on global forest products trade and Japanese forest products trade since the mid-1990s.

[99] FAO/JAWIC 2008. The Japanese wood market and use of tropical wood. Available at: http://www.fao.org/forestry/18282-0c6347955461596080c8333bc5c3c4c4a.pdf

forest to prevent global warming. Furthermore, the Forestry Agency of Japan has been adopting measures to promote clear-cutting and reforestation in order to rejuvenate matured planted forest. In the future it is expected that the area of young planted forests will increase gradually.

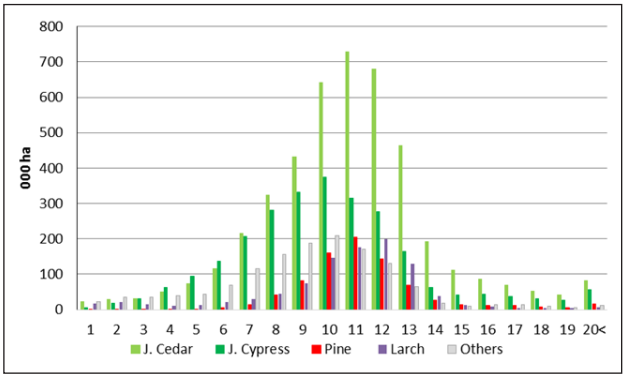
Figure 4.3: Age structures of planted forests in 1987 and 2017



Source: Forestry Agency (1987, 2017) "Forest inventory survey (Shinrin Shigen Genkyo in Japanese)"

Focusing on age structure by major planted coniferous tree species, four major species, Japanese cedar, Japanese cypress, pine, and Japanese larch, have an uneven distribution of age class as shown in Figure 4.4. This is the result of an expansive period of afforestation as stated above. Currently, most Japanese cedar and larch trees have reached the harvesting stage at around 40-50 years old, and forestry activities of thinning and final harvesting are carried out progressively in these planted forests.

Figure 4.4: Age structure by planted conifers in 2017



Source: Forestry Agency (2017) "Forest inventory survey (Shinrin Shigen Genkyo in Japanese)"

Administration scheme

(1) Basic framework of forest management in Japan

The "Forest and Forestry Basic Law" was established in 2001 as an alternative to the "Forest Basic Law" established in 1964. The "Forest Basic Law" had been established to develop forestry in response to a significant increase in timber demand during high economic growth periods. However, between the latter half of the 1970s to the 1990s, the demand for timber was varied and stagnant, and Japan also faced a decline in its timber self-sufficiency rate. In response to such changes, the "Forest and Forestry Basic Law" was enacted to integrate multiple functions of forests, such as watershed protection, land conservation, prevention of global warming, etc. It can be noted that the addition of the "wood processing industry" to the text of the basic law has also been important.

The "Forest and Forestry Basic Plan" is the fundamental national policy on forests and forestry in Japan, while the "National Forest Plan" provides national guidelines for forest management. In the "Forest and Forestry Basic Plan," forests are categorized into three functional types according to their primary function: "land and water conservation forests," "forest-human co-existence forests," and "sustainable resource use forests."

(2) Policy Revision for Revitalization of Forests and Forestry

In 2011, as the "first year of the revitalization of forest and forestry", the MAFF reviewed forest policies and revised the "Forest Law," introduced the "Forest Management and Environmental Conservation Direct Support System," and developed the new "Forest and Forestry Basic Plan" and "National Forest Plan."

In April 2011, the "Forest Law" was revised to introduce 1) the assurance system of proper forest management of forests whose owners are unknown, 2) the administrative order system to halt logging without permission and oblige such loggers to replant, and 3) the "Forest Management Plan" system to promote coordination and consolidation of forestry practices among groups of small-forest owners.

The "Forest Management and Environmental Conservation Direct Support System" is a subsidy program which supports the costs of forest management, including thinning and construction of forestry roads, in combination with forest management activities[100].

Forest utilization by forest products industries

As mentioned in the Forestry Agency's "Annual Report on Forest and Forestry in Japan: Fiscal Year 2017", forests provide a variety of goods and services indispensable for people's lives and national economy, through fulfillment of multiple functions such as land conservation, watershed conservation, and prevention of global warming. We can observe changes in the public's expectations for the roles of forests referring to the results of government polls. In the public's expectations for forests, "production of wood to serve as building materials for homes and raw materials for furniture, paper, etc." was the ninth lowest rank in 1999, but in the year 2015 it was ranked fourth. Top three in the results of government polls conducted in 2015 are "Disaster prevention", "Contribution to prevent of global warming by absorbing CO_2", and "Storage of water resources".

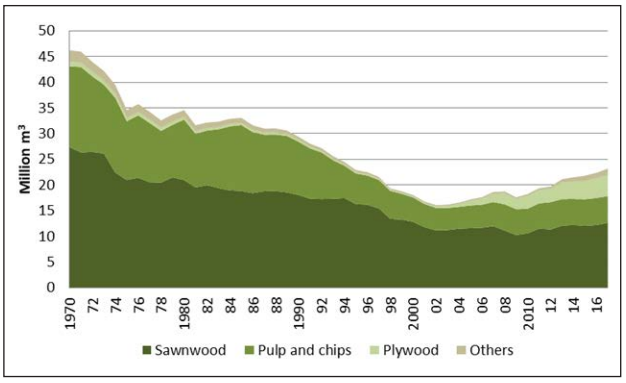
Total domestic production[101] of roundwood increased from 18.730 million m^3 in 2008 to 23.181 million m^3 in 2017 as shown

[100] Annual report on forest and forestry in Japan fiscal year 2012. Available at: http://www.rinya.maff.go.jp/j/kikaku/hakusyo/24hakusyo/190411.html

[101] Production and trade data reported in this chapter may not correspond with ITTO data derived from the official data submitted through the Joint Forest Sector Questionnaire 2017 by the Japanese focal point and presented in Appendices 1 and 2. Consultations were underway with the government of Japan regarding the data presented in this study at the time of finalizing the Biennial Review. Any revisions or comments on Japan's production and trade on timber will be posted in due course on https://www.itto.int/biennal_review/

in Figure 4.6. Of the total production, 12.632 million m^3 were used for lumber, 5.193 million m^3 for pulp and chip, 3.993 million m^3 for plywood, 1.363 million m^3 for other uses, 0.311 million m^3 to grow shiitake mushrooms, and 7.793 million m^3 for firewood as shown in Figure 4.5. Over the last decade the increase in roundwood production of plywood and fuelwood has been remarkable. As will be described later, imports of roundwood for plywood have decreased dramatically due to the decline in natural forest resources and the rise of restrictions on exports of natural resources in timber-producing countries, resulting in demand for domestic roundwood to replace imported roundwood. Since the Great East Japan Earthquake occurred in 2011, expectations and demand for biomass fuels has been increasing in Japan, and wood production for fuelwood has also been increasing.

Figure 4.5: Domestic roundwood production by purpose



Source: Forestry Agency "Mokuzai jyukyuhyo" (issued each year)

Supply and demand of wood in Japan for the period 2008-2017

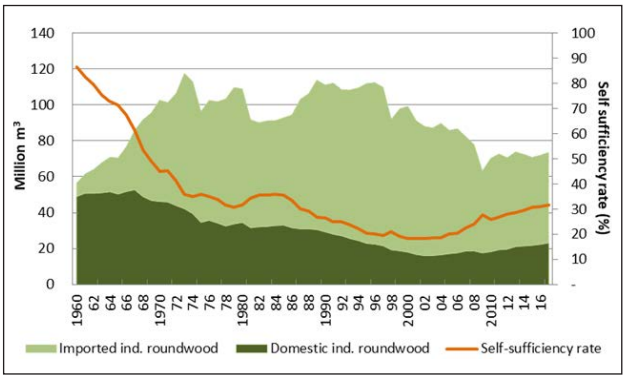
Supply of wood

(1) Changes in wood supply

As mentioned in the previous section, a significant proportion of planted forests in Japan are of harvestable age and the focus is now shifting from planting and tending to harvesting. Considering regional characteristics, the rotation of Japanese cedar is about 40 to 60 years, and that of Japanese cypress about 60 to 70 years. With the maturation of planted forests, as shown in Figure 4.6, the supply of domestic roundwood in Japan remained in a downward trend to 2002 from a peak of 52.7 million m^3 in 1967, dropping to 46.2 million m^3 in 1970, 34.6 million m^3 in 1980, 29.4 million m^3 in 1990, to 18.0 million m^3 in 2000. However, it has been increasing since 2002 when the supply had reached 16.1 million m^3, increasing to 18.6 million m^3 in 2007, 19.7 million m^3 in 2012, to 23.2 million m^3 in 2017. A significant proportion of domestic roundwood supply in the 2000s has been from thinnings, with thinnings being promoted following the conclusion of the Kyoto Protocol in 1997 and entry into force of the Kyoto Protocol in 2006.

Figure 4.6 shows that the wood self-sufficiency rate dropped to its lowest level at 18% in 2002 but has continued to rise to the present. The self-sufficiency of industrial roundwood was 32% in 2017 and that of roundwood including fuelwood was 36%. The increase in self-sufficiency has been in response to both supply and demand side factors. On the supply side, there has been a significant increase in roundwood production under the Kyoto Protocol, and on the demand side, an expansion in demand including in the plywood sector, has been contributing to the increase.

Figure 4.6: Changes in wood supply and self-sufficiency rate[102]

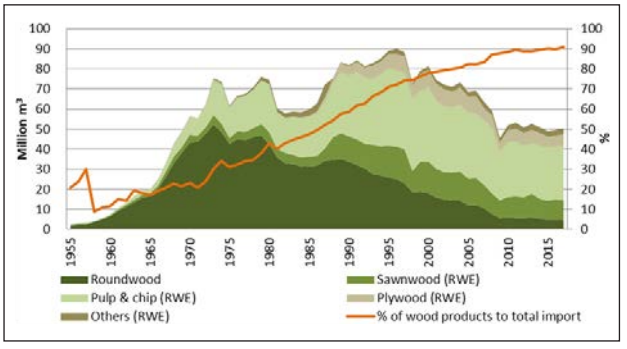


Source: Forestry Agency "Mokuzai jyukyuhyo" (issued each year), Ministry of Finance "Trade statistics of Japan" (issued each year)

(2) Imported roundwood and wood products by product type

The total volume of roundwood and wood products imports increased between 1955 and 1973, corresponding with an increase in the number of housing starts as shown in Figure 4.7. The volume of imports declined sharply in the first half of the 1980s after the second oil shock in 1978-79, but until the 1990s it was at a level exceeding roughly 70 million m^3 under the bubble economy in Japan. Since the latter half of 1990s the volume of imports has been declining as shown. This has been the result of (1) decreased demand for wood products from the latter half of the 1990s after the Great Hanshin-Awaji Earthquake, (2) forest resource constraints in wood-exporting countries such as Southeast Asian countries and the U.S., and (3) increasing demand for roundwood and wood products in China since the end of the 1990s. Roundwood and wood products imports in 2009 dropped significantly due to the global financial crisis. The imposition of restrictive export tariffs on softwood roundwood by the Russian government in the latter half of the 2000s also influenced trade and decreased sharply the amount of roundwood imports into Japan.

Figure 4.7: Changes in the amount of imported roundwood and wood products by product type



Source: Forestry Agency "Mokuzai jyukyohyo" (issued each year)

[102] The self-sufficiency ratio (SSR) is defined as follows:
SSR = production × 100 / (production + imports - exports).

From 2008 to 2017 Japan's imports of roundwood and wood products decreased significantly, by 14.9%, as shown in table 4.1. Roundwood imports have declined by the largest amount, by 38.8% over the last ten years. A total of 59.2 million m^3 of roundwood and wood products was imported in 2008, of which 7.6 million m^3 (13%) was roundwood, 10.3 million m^3 (17%) was sawnwood, 6.5 million m^3 (11%) was wood pulp, 26.1 million m^3 (44%) was wood chip, 6.3 million m^3 (11%) was plywood, and 2.2 million m^3 (4%) was "others". In 2017, a total of 50.4 million m^3 of roundwood and wood products was imported, of which 4.7 million m^3 (9%) was roundwood, 10.0 million m^3 (20%) was sawnwood, 5.9 million m^3 (12%) was wood pulp, 21.2 million m^3 (42%) was woodchips, 5.6 million m^3 (11%) was plywood, and 3.0 million m^3 (4%) was "others". In recent years, the proportion of processed wood products imports has increased, and they were 90% of total imports of roundwood and wood products in 2017. (Figure 4.7 and Table 4.1).

Table 4.1 Roundwood and wood products imports to Japan.

Units: 1000 m^3, %

	2008	Share	2017	Share	Change
Grand total	**59,234**	**100**	**50,431**	**100**	**-14.9**
Roundwood	7,622	13	4,666	9	-38.8
Wood products	51,611	87	45,764	91	-11.3
Sawnwood	10,319	17	9,978	20	-3.3
Wood pulp	6,526	11	5,887	12	-9.8
Wood chips	26,196	44	22,216	42	-19.0
Plywood	6,283	11	5,663	11	-9.9
Other	2,287	4	3,020	6	32.1

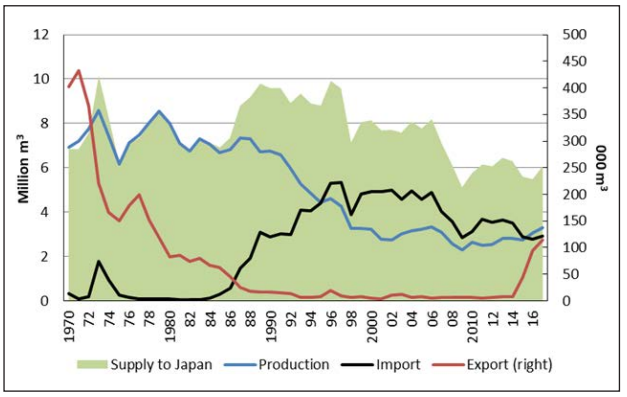
Source: Forestry Agency "Mokuzai jyukyohyo" (issued each year)

The plywood supply to the Japanese plywood market since 1970 is shown in Figure 4.8. The total amount was in the range from roughly 7 million m^3 to 10 million m^3 from the 1970s to 2007, but it declined to around 6 million m^3 after the global economic crisis in 2008. Domestic plywood production had declined from 8 million m^3 in 1980 to 3 million m^3 in 2000 due to the influence of log export restrictions and bans in Indonesia and Malaysia after the 1980s. After that it stabilized at roughly around 3 million m^3 in the 2000s and has started to gradually increase since 2010. Roundwood imports for veneer, including Southsea roundwood, have declined significantly over this period, while the use of domestic roundwood for veneer has increased. Imported roundwood for veneers was only 880 thousand m^3 and domestic roundwood was 3.99 million m^3 in 2017, with domestic roundwood accounting for 82% of roundwood consumption. Based on official statistics "Mokuzai jyukyuhyo" (2017), Japanese cedars accounted for 62% of roundwood consumption, larch 19%, and Japanese cypress 6%. Roundwood production is changing from thinnings to clear cuttings, and there is an increasing tendency to mainly use Japanese cedar for plywood.

Until 2008, the production of thin plywood was dominant, and the divisions of plywood thickness were from less than 3 mm thick to more than 12 mm thick. About 80% of plywood production was of 12 mm thickness or more in 2008, as shown in Figure 4.9. A dramatic change has occurred in plywood produced domestically in the past decade. In recent years, production of 12 to 24 mm plywood has been more than 50% of the total, and 24 mm or more plywood has exceeded 35%. (Figure 4.10).

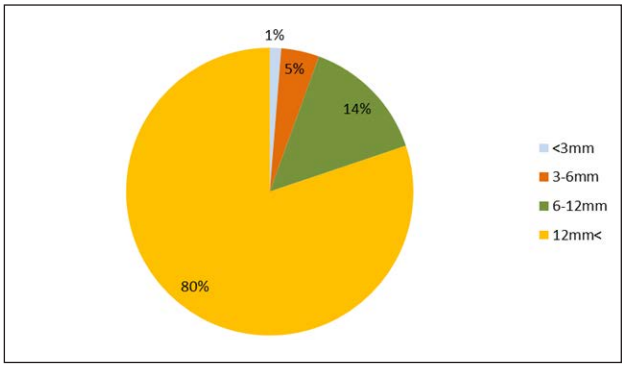
This change reflects the replacement of tropical hardwoods by domestic softwoods in plywood production.

Figure 4.8: Plywood supply to Japan



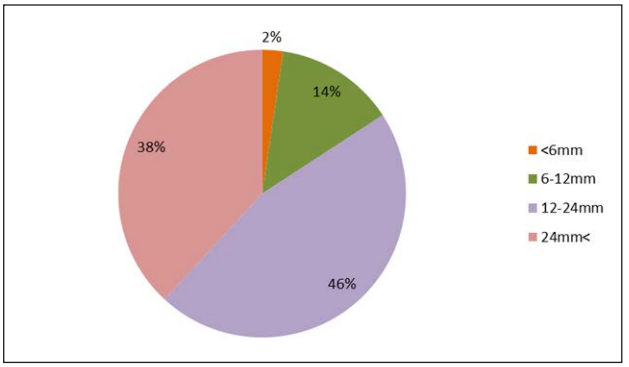
Source: Ministry of Agriculture, Forestry and Fisheries "Mokuzai jyukyu hokokusho" (issued each year), Ministry of Finance "Trade statistics of Japan" (issued each year)

Figure 4.9: Plywood production by thickness in 2008



Source: Ministry of Agriculture, Forestry and Fisheries (2009) "Mokuzai jyukyu hokokusho"

Figure 4.10: Plywood production by thickness in 2017

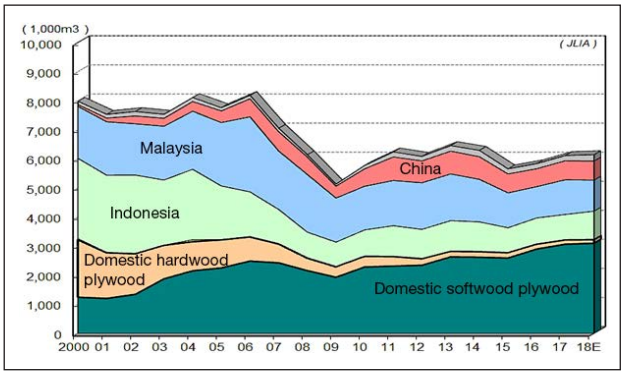


Source: Ministry of Agriculture, Forestry and Fisheries (2018) "Mokuzai jyukyu hokokusho"

Plywood exports have been increasing since 2015, and mainly destined for the Philippines. Total plywood exports amounted to 110 thousand m^3 in 2017. It is understood that plywood is exported to the Philippines together with sawnwood and re-imported to Japan after being pre-cut in the Philippines by a major Japanese housing company. On the other hand, plywood

imports increased sharply from the 1980s to the 1990s following the introduction of measures to promote the plywood industries in Indonesia and Malaysia (especially Sabah and Sarawak states). Imports reached 5 million m^3 in the mid-1990s, but there has been a downward trend since the middle of 2000 as shown in Figure 4.8.

Figure 4.11: Suppliers to Japanese plywood market



Source: Japan Lumber Importers' Association

Changes in suppliers of plywood since 2000 are shown in Figure 4.11. The volume of domestic supply has been stable in the range of approximately 2.7 million m^3 to 3.3 million m^3. During this period, the domestic supply has totalled more than 3 million in the years of 2000, from 2003 to 2007, 2016 and 2017, but falling below 2.7 million in 2008 to 2012. Although the volume of hardwood plywood has been declining, the volume of softwood plywood has been increasing for the period. With respect to imported plywood, Indonesian plywood had declined dramatically in the 2000s and Malaysian plywood had also declined in the 2010s, with both volumes now less than 1 million m^3 per year. On the other hand, imports of Chinese plywood have increased gradually in the 2000s, and now total a few hundred thousand m^3 per year.

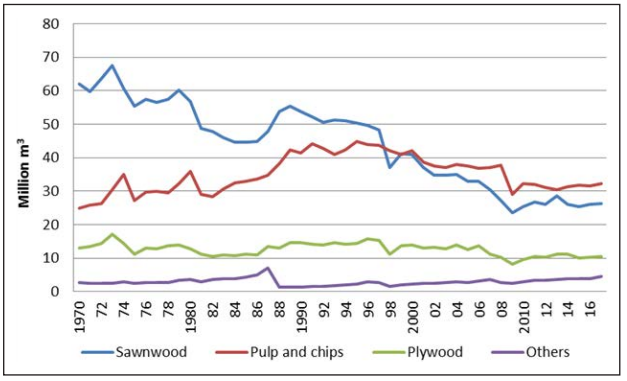
Demand for wood

(1) Demand for wood by usage

The demand for wood products in Japan increased rapidly along with economic development during the postwar revival period and the period of high economic growth between the middle of the 1950s and the beginning of 1970s with a remarkable increase in new housing starts. In 1973, demand reached its peak at 117.6 million m^3. However, the first oil crisis in 1973 and the second oil crisis in 1979 had negative influences on the wood products market, and demand fluctuated repeatedly. After 1987, demand for wood products remained generally stable at around 100 million m^3 per annum. However, the collapse of the bubble economy in 1991 and the later economic recession caused a decrease in wood products demand. Particularly, the rapid economic deterioration in 2008 caused a sharp decline in wood products demand.

Demand for wood by usage from the 1970s is shown in Figure 4.12. During this period, the reduction in wood demand for sawnwood was significant, declining from about 70 million m^3 a year in the early 1970s to more than 25 million m^3 in recent years. Wood demand for pulp and woodchips increased from the 1970s to the 1980s but declined when the global financial crisis triggered. Wood demand for plywood materials was stable at around 10 million m^3 during this period.

Figure 4.12: Demand for wood by usage in roundwood equivalents

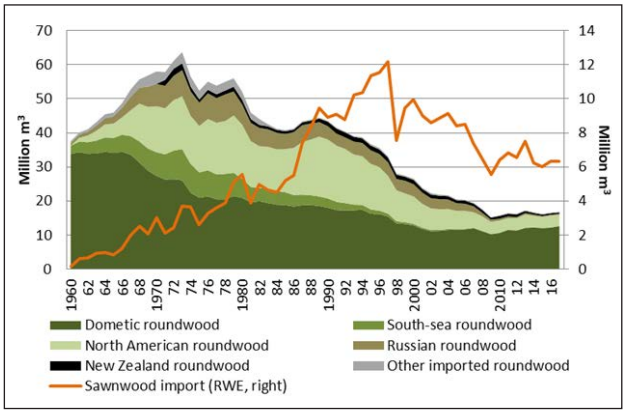


Source: Forestry Agency "Mokuzai jyukyuhyo" (issued each year)

(2) Demand by the sawnwood industry

Changes in the supply of roundwood for the sawnwood industry are shown in Figure 4.13. The supply of roundwood for the sawnwood industry increased and reached a peak of 63.7 million m^3 in 1973. After 1973, the supply volume declined until 1975 when it began to rebound. However, since 1979 it has continued to decline. This decrease in demand for roundwood for the sawnwood industry is a result of the decline in number of new housing starts in Japan. About 80% of sawnwood products are used for construction, and roundwood demand for the sawnwood industry has a strong relationship with the number of new wooden housing starts.

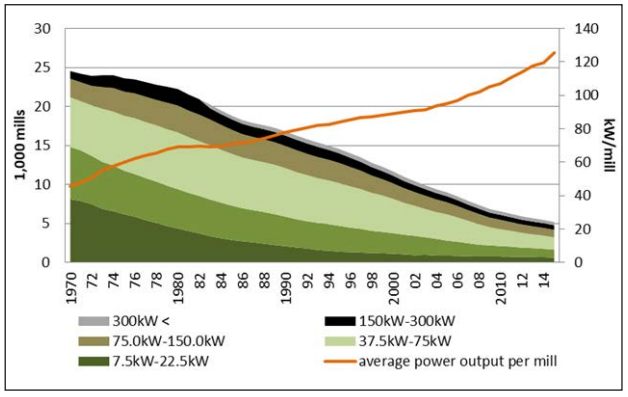
Figure 4.13: Demand for roundwood for the sawnwood industry by supply source



Source: Ministry of Agriculture, Forestry and Fisheries "Mokuzai jyukyu hokokusho" (issued each year), Ministry of Finance "Trade statistics of Japan" (issued each year)

The total supply of roundwood for the sawnwood industry was approximately 16.8 million m^3 in 2017 as shown in Figure 4.13. Of this, domestic roundwood accounted for 12.6 million m^3 (75.2%), Southsea roundwood 0.08 million m^3 (0.5%), North American roundwood 3.3 million m^3 (19.5%), Russian roundwood 0.24 million m^3 (1.4%), New Zealand roundwood 0.4 million m^3 (2.5%), and other sources 0.15 million m^3 (0.9%). The ratio of domestic timber to total supply increased from 41.4% in 1990 to 75.2% in 2017. Japan's sawnwood imports increased from the 1950's to the mid-1990s, as shown in Figure 4.13, but declined in the latter half of 1990's mainly because of declining housing starts.

Figure 4.14: Number of sawmills by output and average power output per sawmill



Source: Ministry of Agriculture, Forestry and Fisheries "Mokuzai jyukyu hokokusho" (issued each year)

The number of sawmills in Japan was 5,927. Of these, 82.4% were small- to middle-scale outputs of less than 150 kW. The number of sawmills overall has declined continuously since the 1970s, with the number of small- and middle-scale sawmills decreasing significantly.

(3) Demand by the plywood industry

At the end of the 1980s, most of the roundwood for plywood was hardwood imported from Southeast Asian countries. This situation changed when roundwood exports were banned in 1985 from Indonesia which was the largest hardwood supplier to Japan at the end of 1970s. Domestic plywood manufacturers changed their materials gradually from hardwood produced in Southeast Asian countries to softwood mainly produced in Russia and New Zealand in the 1990s (Table 4.2). Russian roundwood for plywood increased from 181 thousand m^3 in 1990 to 928 thousand m^3 in 1995, 1,893 thousand m^3 in 2000, and 2,506 thousand m^3 in 2005. New Zealand roundwood for plywood also increased from 103 thousand m^3 in 1990 to 603 thousand m^3 in 2000.

Stable procurement of roundwood has become an important issue for the plywood industry because of the severity of the economic international environment such as the sudden changes in the exchange rate and the rise in freight costs on shipping. In the latter half of the 1990s plywood manufacturing technology developed, enabling domestic softwood roundwood to become a key raw material for plywood. The volume of domestic roundwood used for plywood production has been increasing since then, from 138 thousand m^3 in 2000, to 863 thousand m^3 in 2005, 2.490 million m^3 in 2010, 3.356 million m^3 in 2015 and 3.993 million m^3 in 2017. The share of domestic roundwood increased rapidly from 3% in 2000 to 19% in 2005, 65% in 2010, and reached 80% in 2015.

Total plywood demand (roundwood equivalent) in Japan exceeded 7.5 million m^3 from 2000 to 2006 as shown in Table 4.2 and Table 4.3. However, it decreased to 5.13 million m^3 in 2009 immediately after the global financial crisis, picking up slightly from 2011 to 2014 when it exceeded 6 million m^3. However, since then demand has been in the range of 5.49 million m^3 to 6.8 million m^3 a year and is currently about 70% of the demand level in 2000. During the period 2000 to 2006 the number of newly built houses exceeded 1.1 million units but declined to 790 thousand units in 2008. Thereafter, housing starts have

Table 4.2 Roundwood supply to Japanese plywood industry

units: 1,000m^3, %

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Imports	9,485	7,093	5,263	3,773	4,039	3,595	1,849	1,128	1,321	1,334	1,235	1,165	1,214	864	957	882
Southsea roundwood	9,129	5,502	2,597	1,108	1,018	846	535	399	424	347	251	204	216	193	184	134
North American roundwood	63	102	29	13	26	48	135	194	412	877	855	871	869	544	588	594
Russian roundwood	181	928	1,893	2,506	2,897	2,655	1,123	443	431	92	x	x	88	100	151	106
New Zealand roundwood	103	388	603	124	83	35	33	64	44	x	x	x	35	20	28	44
Others	9	173	141	22	15	11	23	28	10	18	129	3	6	5	5	4
Domestic	354	369	546	863	1,144	1,632	2,137	1,979	2,490	2,524	2,602	3,016	3,191	3,356	3,682	3,993
Pine			60	74	98	130	135	61	107	83	137	142	152	237	176	184
Japanese ceader	0	1	266	542	803	1,061	1,297	1,176	1,538	1,550	1,593	1,922	2,111	2,087	2,280	2,481
Japanese cypress			0	0	0	6	25	81	55	75	87	104	126	188	240	221
Larch	3	40	171	210	217	386	592	607	649	727	690	733	681	687	798	757
Other softwood	14	144	17	7	8	36	54	47	127	79	86	105	107	141	173	329
Hardwood	337	184	32	30	18	13	34	7	14	10	9	10	14	16	15	21
Ground total	9,839	7,462	5,809	4,636	5,183	5,227	3,986	3,107	3,811	3,858	3,837	4,181	4,405	4,218	4,638	4,875
Share of domestic roundwood	*4*	*5*	*9*	*19*	*22*	*31*	*54*	*64*	*65*	*65*	*68*	*72*	*72*	*80*	*79*	82

Source: Mokuzai Jyukyu Hokokusho, Mokuzaitoukei

Source: Ministry of Agriculture, Forestry and Fisheries "Mokuzai jyukyu hokokusho" (issued each year) and "Mokuzai toukei" (issued each year)

Table 4.3 Plywood mill numbers and plywood supply to the domestic market								
	Housing starts (000 units)	Plywood mill		Production (m^3)	Export (m^3)	Import (m^3)	Supply (m^3)	Self-sufficiency rate (%)
		No.	Labor					
2008	1,093.5	45	4,975	2,586,000	5,687	3,559,931	6,140,244	42
2009	788.4	38	5,587	2,287,000	6,346	2,844,088	5,124,742	45
2010	813.1	37	4,975	2,645,000	6,113	3,130,135	5,769,022	46
2011	834.1	38	4,459	2,486,000	4,250	3,666,173	6,147,923	40
2012	882.8	36	4,108	2,549,000	6,537	3,525,664	6,068,127	42
2013	980.0	33	3,818	2,811,000	7,375	3,644,640	6,448,265	44
2014	892.3	32	3,759	2,813,000	8,335	3,491,168	6,295,833	45
2015	909.3	34	3,603	2,756,000	43,116	2,885,794	5,598,678	49
2016	967.2	32	3,565	3,063,000	93,594	2,770,633	5,490,039	56
2017	964.6	34	3,687	3,287,000	113,856	2,904,104	6,077,248	54

Note: "supply" = "production" + "import" - "export"; This supply does not include inventory quantity.

Source: Ministry of Agriculture, Forestry and Fisheries "Mokuzai jyukyu hokokusyo" (issued each year), Ministry of Finance "Trade statistics of Japan" (issued each year)

been in the range of 810 thousand units to 980 thousand units per year, with the demand for plywood corresponding with the number of new housing starts. Plywood is used for walls, under flooring, concrete formwork etc. in housing construction.

The number of plywood manufacturing plants has decreased from 45 in 2008 to 34 in 2017, and the number of workers in plywood manufacturing plants has also declined from 4975 to 3687. While plywood production in Japan has been on an upward trend in recent years, the number of plywood manufacturing plants and the number of workers have decreased, so that plant size has expanded and manufacturing productivity has increased. With domestic production of plywood increasing, the plywood self-sufficiency rate increased significantly from 42% in 2008 to 54% in 2017.

Regarding final utilization, furniture manufacturers such as Nitori and Ikea are expanding the use of roundwood from plantation forests as raw materials.

(4) Demand by the woodchip industry

The share of domestic timber in the raw material input for domestic woodchip mills was 99.7% in 2012. Changes in the supply of timber for the chip industry are shown in Figure 4.15. The supply of timber for the woodchip industry increased rapidly until 1971 and reached a peak of 11.2 million m^3 in 1985. It decreased considerably between 1985 and 1994 and has been declining at a slow rate since then.

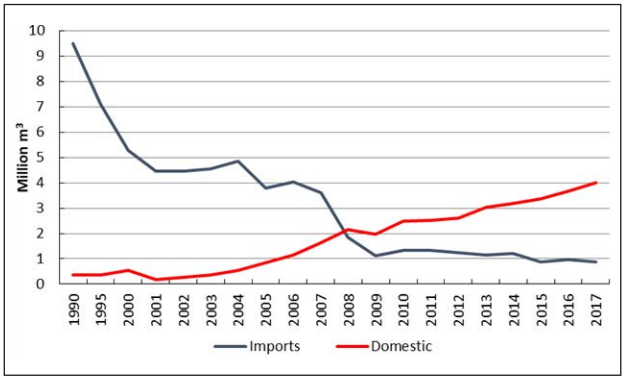
The total supply of timber for the woodchip industry was around 4.57 million m^3 in 2012. Of this, domestic timber amounted to 4.56 million m^3 (99.7%), Southsea timber 0.006 million m^3 (0.1%), and North American timber 0.009 million m^3 (0.2%). The domestic share of the overall timber supply has remained stable.

The use of tropical wood (including legal/supply issues) for the period 2008-2017

Imports of tropical roundwood (Southsea roundwood)

In the supply of roundwood to Japan's plywood industry, which is the largest destination of Japan's tropical wood imports, roundwood imports have declined since the 2000s, and domestically harvested roundwood has been increasing as mentioned above. Figure 4.15 shows the time series changes. Imports declined from 1.849 million m^3 in 2008 to 882 thousand m^3 in 2017, with domestic supply increasing from 2.137 million m^3 to 3.993 million m^3 over the same period. In the past 10 years the rankings of both have changed and in 2017 the supply of domestic roundwood for plywood was 4.5 times the volume of roundwood imports.

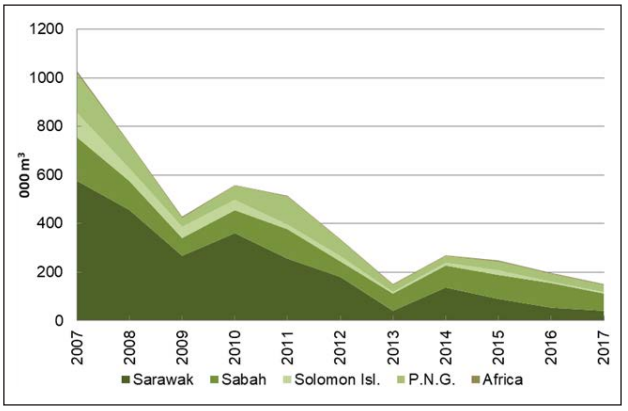
Figure 4.15: Roundwood supply to the Japanese plywood industry



Source: Forestry Agency "Mokuzai jyukyuhyo" (issued each year), Ministry of Finance "Trade statistics of Japan" (issued each year)

Figure 4.16 shows the quantity of Southsea roundwood imported to Japan from Southeast Asia and Africa by country of origin. This figure was made with reference to data obtained from the Japan Lumber Importers' Association. The amount of Southsea roundwood imported in 2007 exceeded 1 million m^3, with most of the volume provided by Sarawak state followed by Papua New Guinea and Sabah state. By 2017 roundwood imports from Sarawak state had drastically declined, to only 41 thousand m^3, with imports from Sabah State amounting to 71 thousand m^3. Roundwood production in Sarawak state has continued to decline since the 1990s, and its decline has accelerated in recent years. In addition, since Sabah state launched a new log export ban in May 2018 along with the change of administration, there

Figure 4.16: Imports of Southsea and African roundwood to Japan



Source: Japan Lumber Importers' Association

is a possibility that the volume of Southsea roundwood imported in Japan will decline further.

Table 4.4 shows the changes in quantities of Southsea roundwood imported from 2008 to 2017, by exporting country. Changes during this period include Southsea roundwood import reductions by Sarawak state by 91%, Solomon Islands by 88.3%, Papua New Guinea by 71.3% and Sabah state by 40%. Based on interviews with three general trading companies, especially in Sarawak and Sabah states, roundwood export volumes have been significantly reduced against the backdrop of natural forest resources. It can also be pointed out that measures to counter illegal logging and illegal trade (as described later) have had an impact on the trade in Southsea roundwood.

Table 4.4 Imports of Southsea roundwood to Japan

Units: m^3, %

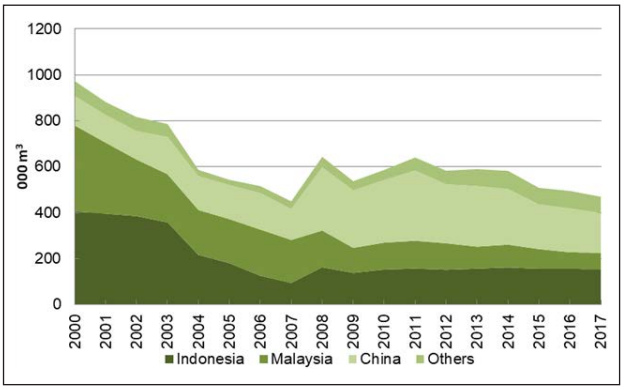
	2008	2017	changes in %
Philippines	-	-	-
Malaysia Total	575,147	111,891	-80.5
Sabah	119,198	71,202	-40.0
Sarawak	455,949	40,689	-91.0
W. Malaysia (Peninsular Malaysia)	-	-	-
Solomon	51,895	6,029	-88.3
P.N.G	100,803	28,886	-71.3
Indonesia	-	-	-
Others	-	-	-
TOTAL	727,845	146,806	-79.8

Source: Japan Lumber Importers' Association, Ministry of Finance "Trade statistics of Japan"

Imports of tropical wood products (Southsea wood products)

Imports of Southsea sawnwood had reached nearly 1 million m^3 in 2000, but have continued to decline since then, decreasing by half between 2000 and 2007 as shown in Figure 4.17. Imports have totalled around 600 thousand m^3 annually from 2008 to 2014, declining again from 2015. In the beginning of the 2000s, Indonesia was the largest exporter of Southsea sawnwood to Japan, exporting nearly 400 thousand m^3 per year (Figure 4.17). Since 2008 Indonesia's exports have declined to between 140 thousand m^3 to 160 thousand m^3. China has been exporting the largest volume of Southsea sawnwood to Japan since 2008, which amounted to over 250 thousand m^3 per annum from 2008 to 2013. There has been a declining trend since then, and it remains at 170 thousand m^3 in 2017. China processes Southsea roundwood imported from Southeast Asia and Africa into sawnwood which is then exported to Japan. The decline in recent years may be due to the decline in the natural forest resources in Southeast Asia. For the same reason, imports from Malaysia have been on a downward trend for the period and have decreased from 160 thousand m^3 in 2008 to 70 thousand m^3 in 2017.

Figure 4.17: Imports of Southsea sawnwood into Japan



Note: Imports do not include free board (a type of wood product) imports from 2004 to 2008.
Source: Japan Lumber Importers' Association

Table 4.5 shows the changes in the import volumes of Southsea sawnwood to Japan by exporting country in 2008 and 2017. During this period, the volume of Japan's sawnwood imports decreased by 27%, with imports from China declining by 37.3% and from Malaysia by 55.8%. On the other hand, imports of sawnwood from Vietnam have more than tripled from 2008 to 2017. Based on interviews conducted with general trading companies, it can be concluded that (1) plantation forests have expanded in Vietnam, (2) the production of woodchips using plantation forests have increased, and (3) the wood processing industry has been developing. Therefore, the volume of sawnwood imports from Vietnam to Japan is expected to further increase.

Table 4.5 Imports of Southsea sawnwood to Japan

Units: m^3, %

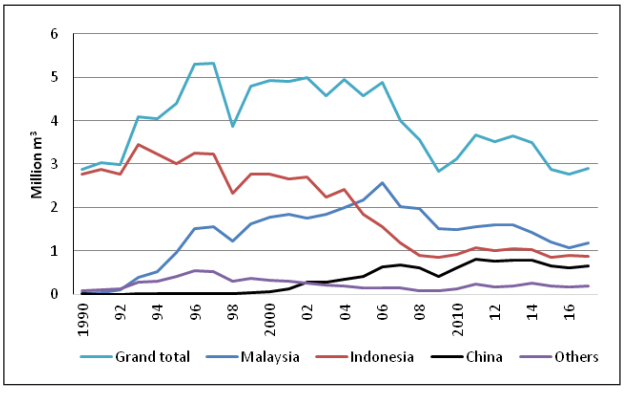
	2008	2017	changes in %
China	275,221	172,536	-37.3
Taiwan	2,920	1,314	-55.0
Viet Nam	12,644	41,080	224.9
Thailand	15,624	8,585	-45.1
Malaysia	159,815	70,580	-55.8
Philippines	8,447	17,292	104.7
Indonesia	162,714	155,709	-4.3
Laos	2,821	324	-88.5
Myanmar	465	2,194	371.8
P. N. G.	2,477	0	-100.0
Others	327	444	35.8
TOTAL	643,475	470,058	-27.0

Source: Japan Lumber Importers' Association, Ministry of Finance "Trade statistics of Japan"

Imports of plywood amounted to nearly 5 million m^3 per year between the latter half of the 1990s and the first half of the 2000s. However, imports have gradually declined since then, falling to below 3 million m^3 in recent years as shown in Figure 4.18. Since 2006 Malaysia has been the most important plywood exporting country to Japan, with exports totaling about 1.19 million m^3 in 2017, followed by Indonesia with about 880 thousand m^3 and China about 650 thousand m^3. These three countries accounted for 94% of imports in 2017, as shown in Table 4.6. However, the import volume from Malaysia in 2017 was 60% of the volume in 2007, and imports from Indonesia had also reduced by three-quarters over the same period. Given the decline in supply of natural forest resources in Southeast Asian countries and the measures taken towards legal logging and trading in Japan, plywood imports from these countries may be further reduced. Since around 80% of domestic plywood is made from domestic softwoods, it is considered that domestic roundwood accounts for more than 40% (roundwood equivalent) of total plywood demand. The amount of domestic roundwood used in the plywood manufacturing industry is expected to increase further.

While imports of roundwood from Sabah and Sarawak states have become increasingly difficult, *Anisoptera spp.* (Mersawa) from PNG has been identified as suitable for plywood manufacturing, although the PNG government is also considering banning roundwood exports in 2020. In addition, Japan has also been importing some Southsea wood veneers. However, Southsea natural forest resources are becoming depleted and under stricter regulation.

Figure 4.18: Plywood imports to Japan



Source: Ministry of Finance "Trade statistics of Japan"

As mentioned above, Japan's imports of tropical roundwood have declined sharply because Japanese companies have moved offshore to process raw materials and ship home finished products. Figure 4.19 shows Japan's imports of wooden flooring products (HS441875: assembled flooring panels, not of bamboo or with at least the top layer (wear layer) of bamboo, multilayer) from the top 5 shippers in 2018. HS codes of heading 4418 are defined as builder's joinery and carpentry of wood, including cellular wood panels, assembled flooring panels, shingles and shakes. Imports of HS 441875 were rare in 2008, but in recent years imports have increased as shown in Figure 4.19. Import from China are the largest, accounting for 58% by quantity (5.2 million kg in total) and 52% by value (23 billion yen in total) in 2018. Based on interviews with general trading companies, oak and birch produced in China and Russia are used mainly as surface materials and lauan plywood is used for the base material. Indonesia, Malaysia, Vietnam, and Thailand were the next most important suppliers. Recently, due to rising prices of lauan plywood accompanying the decrease in lauan roundwood supply, Japan's softwood plywood is being used as base material, so it is possible that imports will decrease gradually in the future. In solid wood flooring, the demand for rubberwood in Thailand, *Acacia mangium* in Indonesia and Malaysia, etc. is increasing, against a backdrop of price rises in Chinese wooden flooring products. Given this trend, there is a possibility that the quantity of solid wood flooring using roundwood from plantation forests in Southeast Asian countries will increase in the future.

As shown in Figures 4.20 and 4.21, wooden kitchen furniture imports also increased by 20% on a quantity basis from 2008 to 2018 and by 60% on a value basis. Japan's imports of wooden kitchen furniture in 2018 were 41.7 million kg and 16.2 billion yen. Vietnam was the largest supplier in 2018, accounting for 34% of the total import quantity and 27% of the total import value,

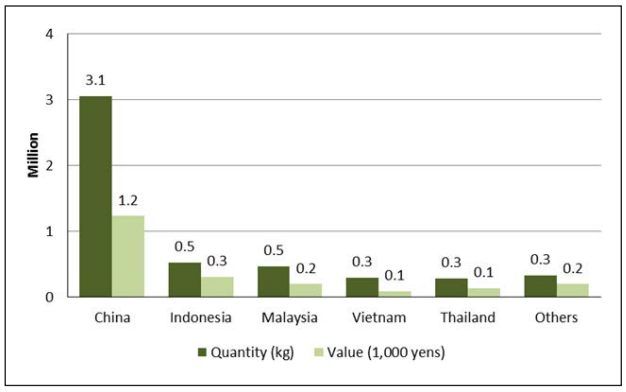
Table 4.6 Plywood imports to Japan

Unit: 1000 m^3

	Total	Malaysia	Indonesia	China	Taiwan	Canada	Philippines	New Zealand	Others
2004	4,941	1,995	2,424	334	38	49	18	54	29
2005	4,570	2,177	1,848	403	18	32	22	47	23
2006	4,881	2,579	1,544	622	26	22	26	34	28
2007	4,008	2,009	1,180	668	17	35	29	45	25
2008	3,560	1,982	890	601	12	7	19	33	16
2009	2,844	1,515	847	409	6	5	12	30	20
2010	3,130	1,500	908	600	18	5	22	42	34
2011	3,666	1,554	1,061	810	20	60	31	62	68
2012	3,526	1,601	1,010	752	18	8	26	53	58
2013	3,645	1,604	1,056	786	25	6	11	54	102
2014	3,491	1,427	1,026	778	18	5	9	44	147
2015	2,886	1,200	859	649	11	2	8	24	133
2016	2,771	1,076	903	617	5	1	10	23	136
2017	2,904	1,190	878	655	0	1	5	17	158

Source: Ministry of Finance "Trade statistics of Japan"

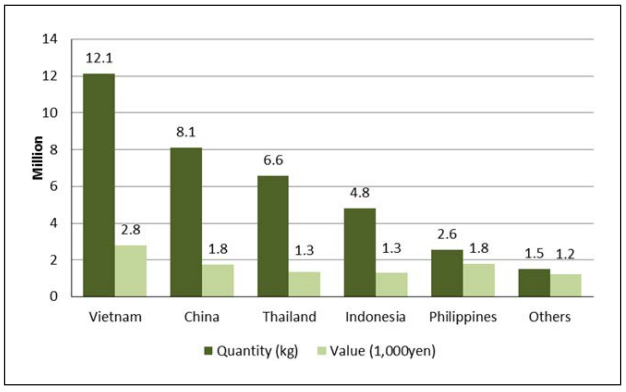
Figure 4.19: Japan's Wooden Flooring (HS441875) Imports from the top 5 Shippers in 2018



Source: Ministry of Finance "Trade statistics of Japan"

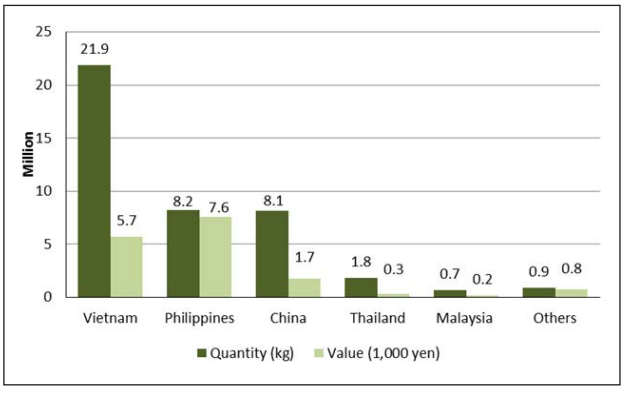
followed by the Philippines, China, Thailand and Malaysia. Regarding imports from the Philippines, the average import unit price was the highest of all suppliers. In reference to the results of interviews with general trading companies, one large home building company has imported joinery manufactured in the Philippines to Japan. Some Southeast Asian countries produce flooring and furniture using hardwoods (oak, walnut, cherry etc.) imported from North America. In recent years, Vietnam has been the largest producer of wooden furniture in the region, followed by Thailand and Indonesia.

Figure 4.20: Japan's Wooden Kitchen Furniture (HS940340) Imports from top 5 shippers in 2018



Source: Ministry of Finance "Trade statistics of Japan"

Figure 4.21: Japan's Wooden Kitchen Furniture (HS940340) Imports from top 5 shippers in 2018



Source: Ministry of Finance "Trade statistics of Japan"

Legal/supply issues

The Green Purchasing Law was revised in April 2006 and the Guideline for verification on legality and sustainability of roundwood and wood products (Goho Wood) was introduced. The guideline, prepared by the Forestry Agency, clearly promotes the procurement of roundwood and wood products that are confirmed as legal and sustainability. All roundwood and wood products are targeted for paper, stationery and materials. For thinned roundwood and related wood products, certification is unnecessary from the viewpoint of effective utilization of unused resources. It covers forest owners, roundwood auction market, wood manufacturing mills, trading companies, and governmental officials. The Goho Wood has three schemes as follows; (1) in order to promote sustainable forest management, third-party forest certified roundwood and wood products, (2) from the viewpoint of conservation of forests, thinned roundwood and wood products, (3) from the viewpoint of contributing to the conservation of forests through effective utilization of wood, effective utilization of unused resources and reuse of wood, environmentally-friendly raw materials such as recycled materials.

The Act on Promotion of Use and Distribution of Legally-Harvested Wood and Wood Products (commonly called the Clean Wood Act) was promulgated on May 20th, 2016 based on legislation. It was enforced on May 20th, 2017 for "Promotion Law", not for "Control legislation". This voluntary scheme has both "Registration" and "Due-Diligence" clauses. The purpose of the Clean Wood Act is to promote the usage and distribution of legally harvested wood and wood products complying with laws of both our country and country of origin (exporting country).

To increase distribution of legally-harvested woods in the market, (1) business operators need to promote the use of legally-harvested wood and wood products, to review and confirm legally-harvested wood usage aligned with the standards defined by Government, and to use "Registered Wood-related Entity" as a name for commercial and marketing. (2) Government must do the following: (a) collect and provide information related to risk of illegal logging, (b) publicize contents of the Act, (c) instruct, advise, collect reports & on-site inspection in case, (d) publicize best-practices, and (e) collaborate and aligned with foreign countries and related organizations.

Three leading Ministries (Ministry of Agriculture, Forestry and Fisheries; Ministry of Economy, Trade and Industry; Ministry of Land, Infrastructure, Transport and Tourism) are in charge of the creation and operation of this Act, covering a wide range of timber products. It also applies to both Government related and private distributions under the two types of registered wood-related entities as follows; Type-1: upstream industries from harvesting to auction market and manufacturing, Type-2: Others not to be categorized Type-1 (downstream industries).

Forecast of the Japanese demand for tropical timber up to 2030.

Country circumstances of origin

According to interviews with Japan Lumber Importers' Association and three general trading companies, Sabah state in Malaysia banned roundwood exports again in June 2018, and Sarawak state also has the possibility of prohibiting roundwood exports as natural forest resources decrease. In Sarawak state, roundwood destined for export comprises up to 30% of the

harvest volume. Regarding export restrictions, the Sarawak state government is considering further strengthening the roundwood export restriction because of chronic shortages of roundwood supply to the Sarawak plywood industry. In Sarawak state, roundwood production has decreased from 8.715 million m^3 in 2014 to 5.490 million m^3 in 2017. In the first half of 2018, production totalled 2.173 million m^3. Roundwood production from plantations increased from 0.911 million m^3 in 2015, to 1.304 million m^3 in 2016 and 1.635 m^3 in 2017. *Acacia mangium*, for example, can be harvested in 10 years after planting and is suitable for woodchips and particle board, although not suitable for plywood.

In Malaysia, roundwood from natural forests is mainly used for plywood while Indonesia uses roundwood from planted forests for plywood. Malaysia's main market is Japan, whereas Indonesia exports to China, the US, and Japan, and also supplies the domestic market. In plywood supply from Indonesia, Japan is only one of a number of markets.

The number of plywood factories in tropical wood producing countries has halved since the peak period. In the past, illegally harvested roundwood was circulated and used for plywood, but in recent years measures against illegal harvested roundwood in developed countries of Europe and the US has expanded, and roundwood for the plywood industry is becoming scarce in Southeast Asian countries. Natural forest resources that can be harvested are becoming restricted in Southeast Asian countries, and the response to illegal logging is becoming more severe. The number of sawmills and the sawmilling industries are also changing, accompanying trends in the plywood industry. The number of laminated timber factories handling roundwood from plantation forests is increasing in these countries. The production volume of rubberwood in Southeast Asian countries is also rising, and wood processing factories that demand this species have been increasing for two decades. Because it is a laminated wood, roundwood of large diameter is not necessary in processing. Japan tire manufacturers are investing and increasing rubber plantations. After collection of sap from rubber forest, rubberwood cut down in 25 to 30 years after planting is supplied to the wood processing industry.

Relationship between Japan's demand and tropical wood

Plywood for concrete formwork is a demand amounting to 700 thousand m^3 per year, which requires plywood made of Southsea raw material. Indonesian and Malaysian plywood are used for concrete formwork and floorboards. It is distinct from the Japanese coniferous wood plywood in terms of use. Malaysian plywood is suitable for concrete panels, Indonesian plywood for floor bases and many versatile uses (foundation material at construction sites, home center sales). Some plywood imports are from China, and those are used for floorboards. China and Vietnam are still considered to have poor product quality. In China, poplar veneer is used for the core and Southsea veneer for the surfaces. Plywood imports from Vietnam are also beginning to increase.

According to interviews with Japan Lumber Importers' Association and three general trading companies, there is only one plywood manufacturing factory that mainly uses Southsea roundwood for plywood manufacture in Japan, and there are also a few plywood manufacturing companies using small quantities of Southsea roundwood. Based on an interview with a general trading company, plywood made by Southsea material has a specific demand due to high qualities such as strength, surface property, processing ease, shock absorbing property, sound insulation property, etc., and in reality, there is no suitable substitute. Therefore, there is a possibility that demand will continue for Southsea plywood of special quality. On the other hand, another general trading company considered that Japanese companies are averse to importing Southsea wood because of illegal logging measures. Unlike before, many companies are engaged in dialogue with environmental NGOs. Considering these circumstances, it is unlikely that domestic demand for Southsea wood will increase and it is expected that the volume of imports will gradually decline.