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Wood Manufacturing Industry In Japan

By: Dr. Ivan Eastin, Professor and Director, CINTRAFOR, UW
and Dr. Daisuke Sasatani, Post-Doctoral Researcher, Auburn University, AL.

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Japanese Softwood Lumber Industry

The lumber industry in Japan has traditionally been characterized by small-scale "mom and pop" sawmills operating within very localized, rural markets. These mills typically process domestic logs into lumber for use by local home builders. Most of their lumber is sold to local wholesalers who perform many of the marketing functions for the sawmill. As a result, most small sawmills have a poor understanding of the markets and demand for their products. The strong yen and increased competition from imported lumber has contributed to the problems confronting local sawmills, as has the closure of a large number of small rural sawmills over the past twenty years due to the combination of outdated sawmill technology and the high cost of domestic logs. These small rural sawmills are often family run and the continued movement of population from the rural areas to the big cities has caused many of these small sawmills to close when the owner retires.

Large sawmills located in the industrial zones of port cities have to a large extent replaced small rural sawmills, at least in terms of production volumes if not number of sawmills. These larger sawmills often process a combination of imported logs and domestic logs, although some of the largest sawmills process imported logs almost exclusively. These mills are larger, more efficient, with more modern equipment and better access to capital than the small local mills. However, these large mills are also confronted with the rising costs of production that have plagued the small rural mills and they are also finding themselves at a competitive disadvantage to foreign lumber producers. The recent adoption of the Revitalization Plan has resulted in government subsidies for sawmills that participate in the program to revitalize and expand the sawmill capacity for domestic wood.

Demographics of the Japanese Softwood Lumber Industry

Number of sawmills, by region

The number of sawmills in Japan has been declining steadily since 1963 while lumber production has been falling since 1973, although there has been a modest increase in the volume of lumber production since 2009 (Figure 1). The number of sawmills in Japan, which totaled 25,295 in 1963, had fallen to approximately 6,000 by 2012. As a consequence, lumber production has declined from a high of 45.3 million m^3 in 1973 to 9.4 million m^3 in 2012. It is interesting to note that while the number of sawmills has declined by 75% since 1973, the decline in lumber production over the same time period has been a much higher 78.9%. This suggests that mill closures have not been limited to just the small, rural "mom and pop" sawmills.

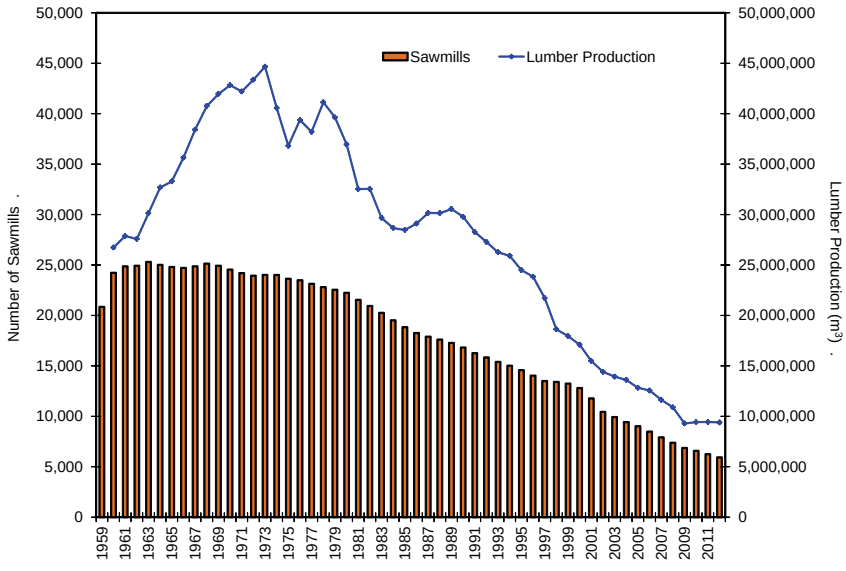

Figure 1. Number of sawmills and lumber production in Japan, 1959-2012. *Source: MAFF, various years.*

The number of sawmills in 2012 is estimated to have been 5,927, a decline of 57.2% from 1996. Meanwhile, the number of employees in the sawmill industry fell to 33,479 in 2010 (the most recent year data is available), a decline of 66.3% since 1996, Table 1. Similarly, lumber production declined 60.6% between 1996 and 2012. The data presented in Table 1 shows that substantial numbers of mill closures occurred across every region of Japan between 1996 and 2012. The decline in regional lumber

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Director's Notes

University of Washington
School of Environmental & Forest Sciences
Box 352100
Seattle, Washington
98195-2100
Phone: 206-543-8684
Fax: 206-685-0790
www.cintrafor.org

The Center for International Trade in Forest Products addresses opportunities and problems related to the international trade of wood and fiber products. Emphasizing forest economics and policy impacts, international marketing, technology developments, and value-added forest products, CINTRAFOR's work results in a variety of publications, professional gatherings, and consultations with public policy makers, industry representatives, and community members.

Located in the Pacific Northwest, CINTRAFOR is administered through the School of Environmental & Forest Sciences at the University of Washington under the guidance of an Executive Board representing both large and small companies, agencies, and academics. It is supported by state, federal, and private grants. The Center's interdisciplinary research is carried out by university faculty and graduate students, internal staff, and through cooperative arrangements with professional groups and individuals.

Following strong growth in 2011 (+11.8%), US wood exports displayed only modest gains in 2012, increasing by just 0.3% (Table 1 and Figure 1). Export results were mixed in 2012 with some markets showing relatively large gains, while others registered substantial decreases. US wood exports to Canada (+3.3%), Mexico (+13.4%) and the UK (+45.1%) showed strong growth while exports to China (-14.3%) and South Korea (-20.5%) fell sharply. Wood exports to Japan were down only slightly (-.5%) in 2012. The largest regional market for US wood products in 2012 remained Asia (over 40% export share) followed by the NAFTA region (36%) and the EU (12%). Despite the large role of the Asian region in US wood exports, exports to Asia declined by 7.8% in 2012, primarily due to weakness in Chinese demand. In contrast, exports within the NAFTA region were up by 3.4% in 2012 while exports to the EU region increased by over 4% in 2012, with strong increases in the UK (+45.1%), Turkey (+39.5%) and the Netherlands (+132%). It is interesting to note that US wood exports have rebounded strongly since the financial crisis of 2009 which saw US wood exports plunge by 24.7% to $5.2 billion (a drop of almost $1.3 billion). Between 2009 and 2012, US wood exports rose by 46% to reach $7.6 billion, with exports to China jumping by 215% to $1.64 billion.

Table 1. Value of US wood exports, by product and market ($millions)

	2005	2006	2007	2008	2009	2010	2011	2012	2013e	'11/'12	'12/'13*
Total	$5,850	$6,277	$6,534	$6,506	$5,216	$6,786	$7,587	$7,608	$8,338	0.27%	9.60%
Lumber	$1,972	$2,210	$2,056	$1,782	$1,507	$2,165	$2,475	$2,556	$2,820	3.26%	10.34%
Logs	$1,507	$1,515	$1,750	$1,732	$1,379	$1,874	$2,231	$1,987	$2,351	-10.9%	18.32%
Chips	$221	$202	$276	$352	$303	$351	$367	$526	$586	43.38%	11.43%
Builders' Joinery	$320	$364	$426	$482	$343	$417	$431	$432	$446	0.45%	3.02%
Plywood	$187	$210	$251	$292	$211	$352	$347	$380	$466	9.44%	22.77%
Canada	$2,058	$2,195	$2,225	$2,202	$1,752	$2,102	$2,117	$2,186	$2,306	3.26%	5.47%
China	$472	$547	$575	$520	$545	$1,163	$1,914	$1,640	$2,215	-14.3%	35.04%
Japan	$728	$714	$667	$726	$517	$634	$733	$730	$807	-0.49%	10.61%
Mexico	$500	$576	$543	$511	$412	$482	$513	$582	$602	13.45%	3.29%
UK	$201	$196	$244	$225	$179	$212	$211	$306	$494	45.08%	61.20%

**Source: All trade data from Global Trade Atlas; 2013 estimates are based on January-April 2013 trade data.*

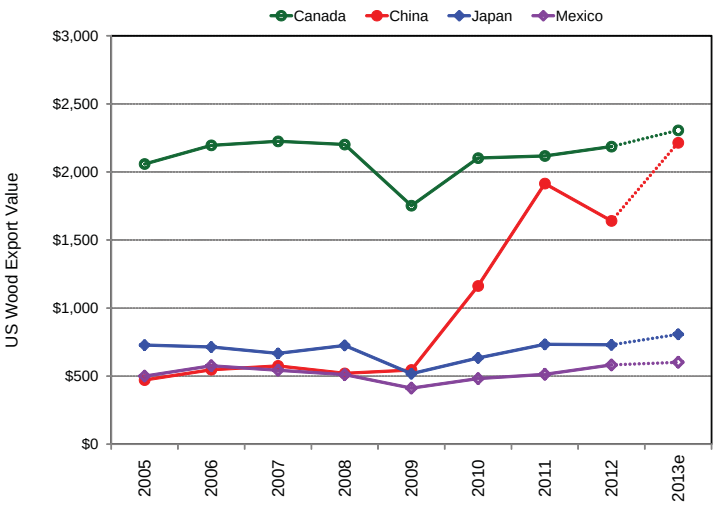

Figure 1. Value of US wood exports, by market ($millions).

Table 2. Value of US log and lumber exports ($millions)

	2005	2006	2007	2008	2009	2010	2011	2012	2013e	'11/12	'12/13
Logs											
Total	$1,507	$1,515	$1,750	$1,732	$1,379	$1,874	$2,231	$1,987	$2,351	-10.9%	18.32%
China	$164	$175	$244	$241	$244	$646	$1,083	$814	$1,162	-24.8%	42.61%
Japan	$482	$473	$433	$444	$300	$315	$362	$376	$485	3.83%	29.06%
Canada	$439	$424	$356	$316	$303	$318	$281	$304	$333	8.04%	9.36%
Lumber											
Total	$1,972	$2,210	$2,056	$1,782	$1,507	$2,165	$2,475	$2,556	$2,820	3.26%	10.34%
China	$225	$297	$253	$213	$244	$459	$752	$743	$917	-1.21%	23.40%
Canada	$529	$541	$513	$464	$334	$455	$425	$461	$504	8.40%	9.41%
Mexico	$189	$234	$216	$196	$162	$195	$209	$241	$254	15.50%	5.06%
Japan	$81	$98	$92	$110	$116	$172	$201	$205	$202	1.74%	-1.26%

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Logs and lumber exports represent the bulk of US wood product exports, with a market share of 62% in 2012. Log exports, while showing strong growth between 2009 and 2012, were down by almost 11% in 2012 (Table 2 and Figure 2). By far the largest declines in log exports were observed in China, where the value of log exports fell by $269 million (-24.8%), and South Korea, where the value of log exports fell by $41 million (-26%). High inventories and weak demand within the infrastructure sector dampened the demand for imported wood in China during the second half of the year. In contrast, there was strong export growth in a number of new, emerging markets such as Vietnam (+7%), India (+106%) and Thailand (+69%) in 2012. The situation was brighter with lumber where exports were up by 3.3% and the value of exports reached their highest level in more than 25 years (Table 2 and Figure 3). While exports were down slightly in China, the other major markets all showed strong growth, particularly Mexico. As was the case with log exports, growth in lumber exports to new, emerging markets such as Vietnam (+32.4%), Indonesia (+3.2%), Thailand (+84%) and Malaysia (+37%) was particularly strong and this trend could bode well for the future.

Looking forward, the preliminary trade data for the first four months of this year suggest that 2013 will likely be a very strong year for US wood exports (Tables 1 and 2). If this trend continues throughout the year, US total wood exports would increase by 9.6% to $8.3 billion, the highest level in over 25 years! US wood exports to Asia are projected to increase by 22% in 2013. Particularly strong growth is being forecast in China (+35%) as inventory levels have now fallen and fiscal stimulus measures have begun to stimulate the economy, and Japan (+11%) where a looming consumption tax increase, (from the current 5% to 8% in 2014) has motivated people to move their home building plans forward. Similarly, US exports within the NAFTA region are expected to rise by 8.6% while exports to the EU region could increase by more than 5% this year, with strong growth forecast in the UK (+ 61.2%), Belgium (+64%) and Germany (+14%). US wood exports to new and emerging markets are projected to continue their gains into 2013 with exports to Vietnam growing by 9.9% while exports to Thailand and Malaysia will grow by 21.2% and 4.6% respectively. These new and emerging markets in Asia are rapidly becoming bigger players in the mix of US wood exports. In part this is due to their lower cost structure in the production of wooden furniture and flooring relative to China where production costs have been slowing creeping up. But the role of timber legality legislation (especially in the US, the EU, Australia and Japan) in influencing raw material sourcing decisions cannot be overlooked. Given the growing importance of these emerging markets in Asia, CINTRAFOR will be conducting baseline research to better understand how imported wood is being used as well as the future potential for US wood products in these markets.

If there was any upside to the housing crisis it was this: the US forest products industry rediscovered the importance and strategic value of off-shore markets. In 2012, US wood exports were more than 30% higher than they were in 2005 (the year ***before*** the housing crisis hit). US wood exports were up in every major export market and for every major wood product category during this period. The housing crisis clearly demonstrated the role of market diversification is reducing a firms' exposure to risk when it is too focused on a single market, as was the case with most forest products manufacturers in the US. We can only hope that the remaining firms in the industry take this lesson to heart and maintain their presence in off-shore markets even as the demand for wood products recovers in the US.

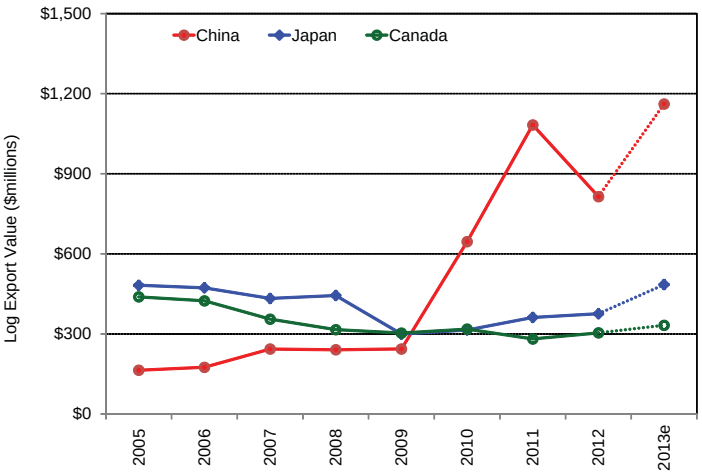

Figure 2. Value of US log exports, by market ($millions).

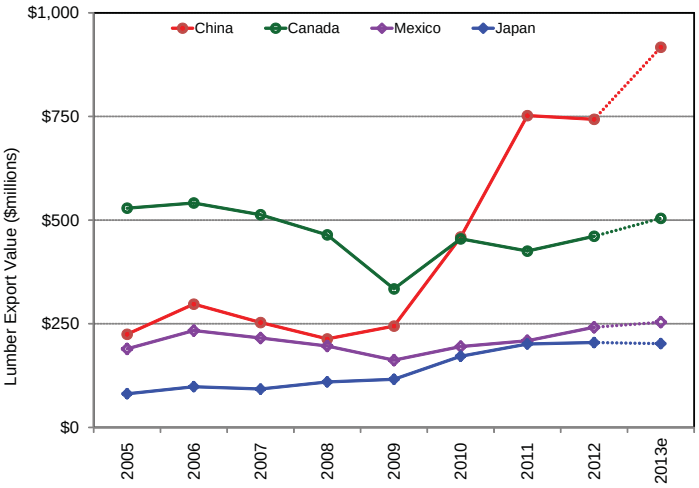

Figure 3. Value of US lumber exports, by market ($millions).

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production during this period ranged from 29.6% in the Kanto region to 78% in Chubu (Map 1). This trend has been extremely worrisome to the Japan Forestry Federation (Zen Mokuren) and the Japan Ministry of Agriculture, Forestry and Fisheries (MAFF), and many efforts have been made to support the forestry and sawmill industries in rural regions, including the recently implemented Revitalization Plan.

Several measures of sawmill productivity are provided in Table 2, although the reader should keep in mind that these numbers are averages. Given the wide variation in sawmill size in Japan it is perhaps better to consider the lumber production per employee data. Based on this data, the more productive sawmills in 2010 were located on the island of Hokkaido as well as in the Chugoku and Shikoku regions. In contrast, sawmills with the lowest productivity were located in the Kanto, Kinki and Chubu regions. The data also show that both the number of workers and the average lumber production per sawmill has been declining across almost every region in Japan. However, a recent trend towards investing in new and larger sawmilling facilities means that sawmill productivity (measured in terms of lumber production

Map 1. Regions in Japan.

Table 1. Number of sawmills, employees, and lumber production (m^3) in Japan, by region.

Region	1996			2004			2010		
	Sawmills	Employees	Production	Sawmills	Employees	Production	Sawmills	Employees	Production
Total	**13,990**	**99,464**	**24,206,000**	**9,407**	**55,118**	**13,603,000**	**6,519**	**33,479**	**9,415,000**
Hokkaido	482	7,149	2,115,000	269	3,600	1,276,000	192	2,165	814,000
Tohoku	2,014	15,467	3,778,000	1,356	7,878	1,842,000	933	4,912	1,175,000
Kanto	1,694	8,929	1,552,000	1,121	4,714	802,000	767	3,321	1,092,000
Chubu	3,784	22,779	4,773,000	2,505	12,201	2,344,000	1,606	6,274	1,052,000
Kinki	2,234	14,167	3,075,000	1,531	8,023	1,363,000	1,133	4,655	997,000
Chugoku	1,044	8,831	2,894,000	707	5,493	2,282,000	471	3,266	1,388,000
Shikoku	827	7,139	2,481,000	587	4,197	1,326,000	404	2,554	863,000
Kyushu-Okinawa	1,911	15,003	3,538,000	1,331	9,012	2,368,000	1,013	6,332	2,034,000

Source: MAFF, various years.

Table 2. Productivity of Japanese sawmills between 1996 and 2010.

Region	Production per Sawmill (1,000m^3)			Production per Employee (m^3)		
	1996	2004	2010	1996	2004	2010
Total	**1,730**	**1,446**	**1,444**	**243**	**247**	**281**
Hokkaido	4,388	4,743	4,239	296	354	376
Tohoku	1,805	1,358	1,259	236	234	239
Kanto	866	715	1,423	159	170	329
Chubu	1,417	936	655	215	192	168
Kinki	1,415	890	879	207	170	214
Chugoku	2,480	3,228	2,946	281	415	425
Shikoku	2,766	2,259	2,136	324	316	338
Kyushu-Okinawa	1,601	1,779	2,007	200	263	321

Source: MAFF, various years.

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per employee) has actually increased in almost every region with the exception of Chubu.

The log input data shows that Japanese sawmills that process imported logs tend to have a higher level of lumber production (Tables 3 and 4). In 2010, the average annual lumber production for sawmills that process domestic logs was 1,023 m^3, while it was 1,582 m^3 for mills that process imported logs. This is hardly surprising, given the fact that imported sawlogs, in general, have a larger diameter and are higher quality than domestic sawlogs. As a result, we would expect that sawmills processing imported sawlogs would be more efficient with a higher level of productivity. It is interesting to note that in 2004, the volume of domestic logs being processed by sawmills exceeded the volume of imported logs being processed for the first time in more than a decade. The highest share of imported logs were found

Table 3. Summary statistics for softwood sawmills in Japan, by region, 2010 (production volume in m^3).

Region	Domestic Sawmills	Imported Sawmills	Domestic Lumber Production	Imported Lumber Production	Production/Mill (Domestic Logs)	Production/Mill (Imported Logs)	Domestic to Imported ratio
Total	6,048	2,042	6,185,000	3,230,000	1,023	1,582	64.7%
Hokkaido	192	40	793,000	21,000	4,130	525	786.7%
Tohoku	912	285	1,041,000	134,000	1,141	470	242.8%
Kanto	699	189	494,000	592,000	707	3,132	22.6%
Chubu	1477	752	585,000	467,000	396	621	63.8%
Kinki	1006	366	461,000	536,000	458	1,464	31.3%
Chugoku	419	165	385,000	1,000,000	919	6,061	15.2%
Shikoku	359	111	484,000	379,000	1,348	3,414	39.5%
Kyushu-Okinawa	984	134	1,936,000	96,000	1,967	716	274.6%

Source: MAFF, various years.

Table 4. Log input volumes for sawmills in Japan, by region and log type.

Region	1996 Log Sources (1,000 m^3)			2004 Log Sources (1,000 m^3)			2010 Log Sources (1,000 m^3)		
	Total	Domestic	Imported	Total	Domestic	Imported	Total	Domestic	Imported
Total	35,545	16,154	21,705	21,705	13,246	14,203	15,762	10,582	5,180
Hokkaido	3,713	2,526	2,432	2,432	2,068	884	1,619	1,548	71
Tohoku	5,615	3,062	2,929	2,929	2,445	1,779	2,039	1,868	171
Kanto	2,166	1,223	1,185	1,185	978	613	1,814	819	995
Chubu	6,984	1,726	3,639	3,639	1,366	3,901	1,578	923	655
Kinki	4,420	1,647	2,040	2,040	1,331	1,766	1,535	743	792
Chugoku	4,337	1,102	3,892	3,892	897	2,780	2,410	658	1,752
Shikoku	3,369	1,308	2,047	2,047	1,050	1,500	1,401	801	547
Kyushu-Okinawa	4,941	3,560	3,541	3,541	3,111	980	3,366	3,216	147

Source: MAFF, various years.

Table 5. Ratio of specific log imports to total log imports.

Region	1996			2004			2010		
	Domestic Ratio	Imported Ratio	US Share of Imports	Domestic Ratio	Imported Ratio	US Share of Imports	Domestic Ratio	Imported Ratio	US Share of Imports
Total	0.45	0.55	0.66	0.53	0.47	0.58	0.67	0.49	0.69
Hokkaido	0.68	0.32	0.49	0.79	0.21	0.29	0.96	0.05	0.89
Tohoku	0.57	0.43	0.67	0.66	0.34	0.39	0.92	0.09	0.75
Kanto	0.49	0.51	0.80	0.71	0.29	0.72	0.45	1.21	0.96
Chubu	0.26	0.74	0.57	0.31	0.69	0.31	0.58	0.71	0.31
Kinki	0.32	0.68	0.71	0.47	0.53	0.58	0.48	1.07	0.33
Chugoku	0.40	0.60	0.75	0.19	0.81	0.85	0.27	2.66	0.83
Shikoku	0.32	0.68	0.66	0.45	0.55	0.62	0.57	0.68	0.63
Kyushu-Okinawa	0.61	0.39	0.64	0.86	0.14	0.61	0.96	0.05	0.63

Source: Japan Ministry of Agriculture, Forestry and Fisheries, various years.

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Table 6. Number of sawmills in Japan, by number of employees and region, 2010.

Region	Sawmills	<4	5-9	10-19	20-29	30-49	50+
Total	6,519	4,344	1,398	555	134	54	34
Hokkaido	192	30	74	67	11	6	4
Tohoku	933	597	217	80	29	7	3
Kanto	767	565	139	51	6	3	3
Chubu	1,606	1,182	300	105	11	7	1
Kinki	1,133	828	228	56	9	9	3
Chugoku	471	313	104	30	12	5	7
Shikoku	404	233	106	39	16	8	2
Kyushu-Okinawa	1,013	596	230	127	40	9	11

Source: MAFF, various years.

in the Chugoku, Kanto and Kinki regions and the share of US logs in the imported log mix in 2010 exceeded 50% in every region except Kinki and Chubu (Table 5).

Number of sawmills, by size

As discussed earlier, many of the sawmills in Japan are extremely small and inefficient "mom-and-pop" type operations. This is a carryover from the period extending roughly from 1950-1975 when most of the single family houses in Japan were built on-site using the traditional post and beam method. The structural components for traditional post and beam houses built during this period were generally produced by skilled carpenters who cut the many structural members with their complicated joints and connectors by hand on the construction site. Most of these houses had very traditional architectural designs and utilized extensive amounts of interior wood paneling, moulding and millwork, particularly in the tatami room. It was this demand for high quality custom-cut moulding and millwork lumber products that supported the development of the sawmill sector that exists in Japan today.

Unfortunately, the transition of the homebuilding industry away from hand cutting the structural house components on the construction site to the manufacturing of structural components by highly precise CAD/CAM machine centers within precut facilities had an adverse impact on these smaller traditional sawmills because they could not produce kiln-dried lumber to the exacting specifications required by the post and beam precut manufacturers. Similarly, the declining demand for traditional tatami rooms among younger Japanese home buyers, who prefer western-style architectural designs with their more open floor plan, further reduced demand for the type of lumber products manufactured by these smaller sawmills. The demographic sawmill data presented in Table 6 clearly shows the small size of most sawmills in Japan, even in 2010. Despite the closure of a huge number of sawmills over the past decade, fully 66.6% of the sawmills in Japan still employ four or less workers while an additional 21.4% employ between 5 and 9 workers. In contrast, less than 4% of all sawmills operating in Japan in 2010 employed twenty or more workers. Clearly the sawmill industry in Japan continues to be characterized by the small "mom-and-pop" sawmills located primarily in rural areas and processing domestic sugi and hinoki logs for use by local builders. Without a doubt there is still much room for industry consolidation and the closure of many small, inefficient sawmills in order to improve the efficiency and competitiveness of the sawmill sector in Japan.

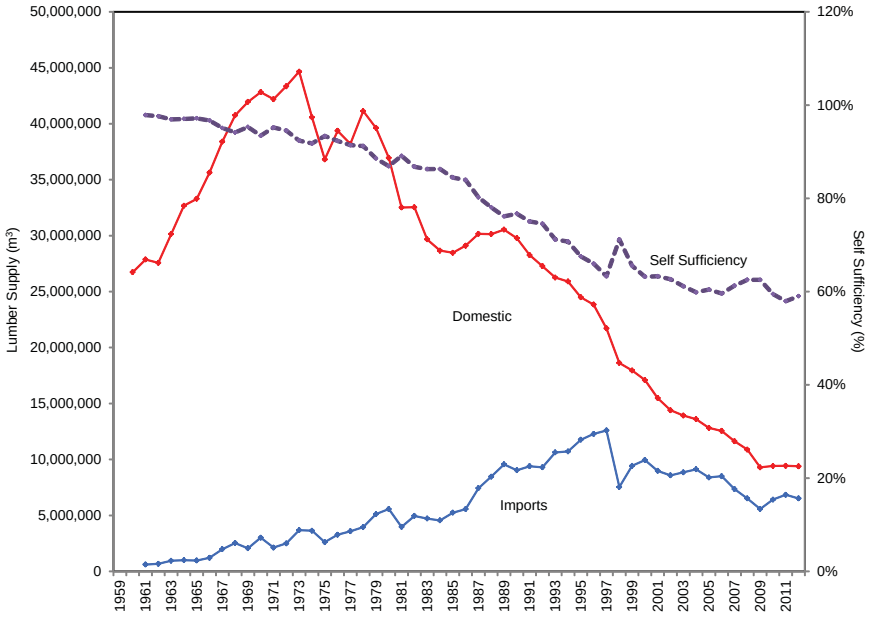

Figure 2. Trends in the Japanese lumber supply and self-sufficiency

Summary of Trends in the Japanese Sawmill Industry

Japanese self-sufficiency in lumber

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dropped from 98% in 1961 to 59% by 2012 (Figure 2). While some of this drop can be attributed to rising imports, the biggest factor has been a huge drop in domestic production as described earlier. Between 1973 and 2012, lumber consumption in Japan dropped by two-thirds from 48.3 million m^3 to 15.9 million m^3.

There are a variety of factors that adversely affect the competitiveness of Japan's sawmill industry. These factors include the structure of the industry itself, including rising production costs and the small, regional structure of the sawmill industry, lack of coordination within the supply chain, lack of investment in efficient processing and kiln-drying technology, regulatory reform within the residential construction industry that has affected the demand for lumber produced from domestic species, the transition to pre-cut structural components in the post and beam industry, the continued strength of the yen, and imports of lower price, high quality logs and lumber.

Foreign suppliers continue to export large volumes of wood products to Japan. Generally these imported wood products are lower priced with less price volatility and higher quality than domestically produced wood products and local Japanese sawmills find themselves at a competitive disadvantage in many of the larger urban markets, particularly within the new price sensitive market environment that exists within the homebuilding sector. While competition is somewhat less intense in rural markets, many foreign suppliers are actively looking to expand their sales into these markets as well. There is little doubt that competition within the Japanese lumber market will continue to increase. The increasingly competitive business environment will force more consolidation and closures within Japan's sawmill industry, particularly within the huge 'mom-and-pop' segment of the industry.

Thus, in order to remain viable, domestic lumber manufacturers must develop a strategy that will allow them to compete within the new business environment. However, rather than undertake the reforms and consolidation required to become internationally competitive, many companies and industry associations within the Japanese sawmill and forestry sectors continue to seek regulatory relief from competition through a variety of non-tariff regulatory constraints and subsidies. For example, the pre-cutting industry, which manufactures the structural components for over 80% of the post and beam houses built in Japan, requires kiln-dried lumber that is straight and machined to highly accurate tolerances as a raw material input to their manufacturing process. In response, most imported lumber is now kiln-dried and cut to the exacting specifications required by pre-cut manufacturers. However, despite this change in material specification within the largest demand segment for structural lumber, the domestic Japanese sawmill industry has been extremely slow to change. In fact, by 2012, only about one-quarter of the structural softwood lumber produced in Japan was kiln-dried (27.9%) and in 2009 only 17.3% of Japanese sawmills had invested in kiln-drying facilities.

Regulatory constraints and subsidies designed to protect the domestic wood manufacturing industry cover a range of options. For example, in 2004 a new association was formed to promote the use of domestically produced timber, particularly sugi and hinoki, within the Japanese market. This association, (named the Domestic Wood Lumber Association), was also tasked with developing export markets for domestic logs, particularly in China. The initial membership of this association was 27 companies. In response, log exports from Japan to China, while still small, have jumped from 7,000 m^3 in 2003 to almost 115,000 m^3 in 2012. Also, as a result of programs supported by MAFF and Ministry of Land, Infrastructure, Transport and Tourism (MLIT), many prefectures and local governments currently offer subsidies to wooden home builders who utilize a specific percentage of domestic timber in their homes (generally 50% or more). In 2012, it was found that 42 out of 47 prefectures provide some type of subsidy to encourage the increased use of domestic timber in wooden houses.

In 2006 the Forestry Agency introduced a program euphemistically called the "New Production System" that is aimed at increasing the demand for domestic lumber through a program of subsidies targeted at streamlining the lumber distribution system and increasing the competitiveness of lumber manufacturers. The goals of the program are to: 1) improve the efficiency of the lumber distribution system, 2) encourage consolidation and the formation of lumber processing cooperatives, 3) improve the supply of timber to domestic processors and 4) support the profitability of forest owners practicing sustainable forest management. The New Production System Program (a name for the subsidy program) has been followed up with the Forest & Forestry Revitalization Plan which provides subsidies and support to promote the harvest and processing of domestic timber. To date this program has had mixed results within the sawmill industry. For example, while the production of domestic lumber increased slightly between 2009 and 2012, as did the self-sufficiency rate, the sawmill industry still saw the closure of almost 900 sawmills during this time period.

Japanese Plywood Industry

Plywood production, by product type

Similar to the lumber industry, the plywood industry experienced a period of rapid growth in the

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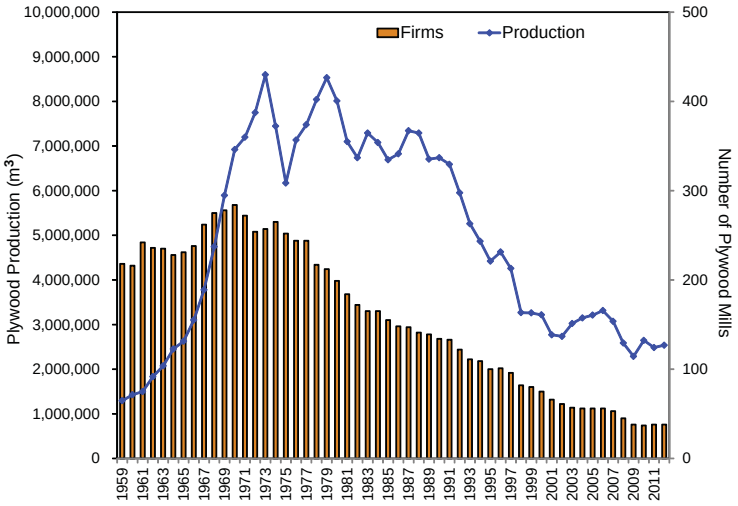

Figure 3. Trends in the number of plywood mills and plywood production between 1970 and 2012.

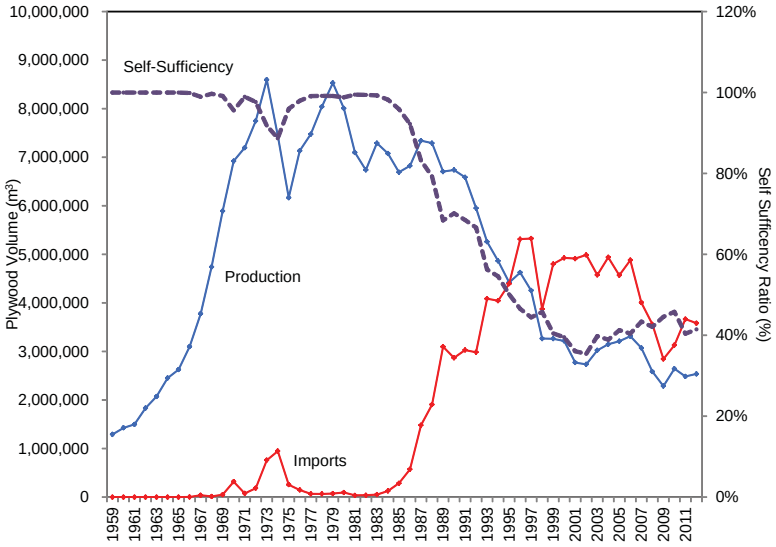

Figure 4. Japanese plywood production, imports and self-sufficiency, 1961-2012e.

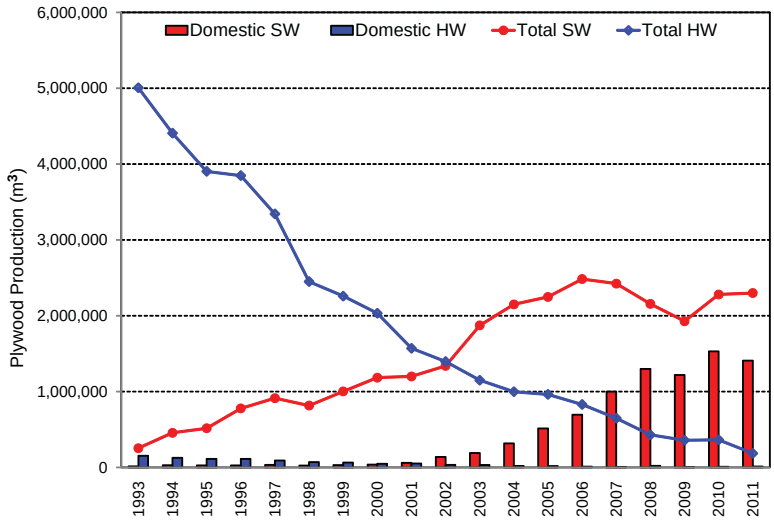

Figure 5. Trends in Japanese production and imports of hardwood and softwood plywood.

post-war period through the early 1970's followed by declining domestic plywood production and the closure of a large number of plywood mills, (Figure 3). The consolidation and closure of mills within the plywood industry is due to a somewhat different dynamic than that which affected the sawmill industry. In the early 1960's, the Japanese plywood sector experienced tremendous growth as they imported low cost tropical hardwood logs from southeast Asia and produced plywood for both domestic consumption and export. The emergence of competing plywood industries, first in South Korea and later in Indonesia and Malaysia, forced the closure of many plywood mills in Japan beginning in the early 1970's. However, the combination of increasing demand for plywood during the Bubble Economy and a shrinking plywood production base resulted in a jump in plywood imports between the mid-1980's and the mid-1990's (Figure 4). Plywood imports remained relatively constant through 2006 and the start of the global financial crisis. Plywood imports began rising again in 2009 and particularly in 2011 when the Great Tohuku earthquake destroyed and damaged several plywood mills in northern Japan.

Since 1970, the number of plywood mills in Japan has declined from 284 to an estimated 38 in 2012 while plywood production declined from 6.9 million m^3 to 2.5 million m^3, a 63.3% drop. From 1993-2012, hardwood plywood production has fallen from 5 million m^3 to 186,100 m^3, a drop of 96.3% while the production of softwood plywood has increased from 254,000 m^3 to 2.3 million m^3. The material input statistics provided by MAFF show that the Japanese plywood sector has successfully transitioned from processing imported tropical hardwood logs to imported Russian softwood logs to now using primarily domestic softwood logs (Figure 5). In 2012, it is estimated that almost two-thirds of the logs processed by Japanese plywood manufacturers were domestically produced with another quarter being sourced from North America. In the space of just twenty years, the Japanese plywood industry has made a dramatic switch in raw material supply and successfully transitioned from the production of hardwood plywood to softwood plywood, with the share of softwood plywood production increasing from 4.8% in 1993 to 92.5% in 2011, representing a stunning transition within the Japanese plywood industry.

Glue-Laminated Lumber Industry

The 1995 Kobe earthquake provided the impetus for transition within the Japanese housing industry. Dramatic changes to the building code sped up changes that were already occurring within the post and beam housing sector. One of the biggest changes was the transformation of the home

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building process from individual site-built houses that relied on the woodworking skills of carpenters to craft a home to the use of prefabricated structural components that were machined to high tolerances within precut facilities using sophisticated CAD/CAM equipment. This transition required the use of high quality structural lumber that was both kiln-dried (to minimize shrinkage and warp after the machining process) and straight (to prevent jamming in the automated precut machinery). These material requirements facilitated the transition from using solid sawn green lumber to build houses to using kiln-dried solid sawn and glue laminated structural components.

Number of glulam mills, by region

While there has been a tremendous closure of both lumber and plywood mills in Japan since 1960, closures have been less of a factor within the glue-laminated lumber sector. To a large degree, this is because this sector developed later and the transition to precut structural components favored the expanded use of glulam lumber. There were 294 manufacturers of glue-laminated (glulam) lumber in Japan in 2000, with the number of mills dropping to 181 by 2012 (Figure 6). Despite the reduction in firms, production volumes within the industry have remained consistent at around 1.5 million cubic meters. While glulam manufacturers are located across Japan, over half (58%) are located in the northern and central regions of Tohoku, Chubu, and Kinki.

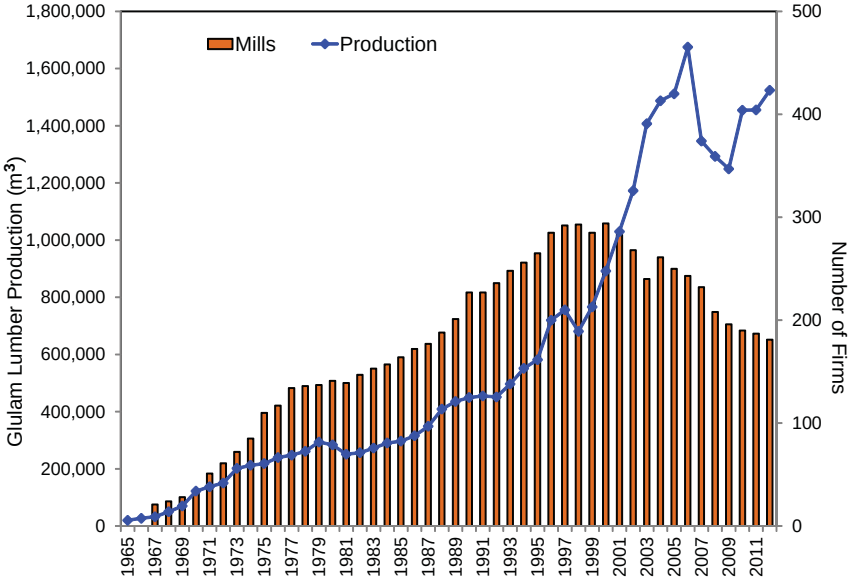

Figure 6. Number of glue laminated lumber mills and production volume in Japan.

Glulam production, by product type

The production of glulam lumber has increased substantially since 1990, particularly since the Kobe earthquake. From 1991-1995, glulam production increased by 27.9% from 455,000 m^3 to 581,800 m^3. In contrast, between 1995-2012 glulam production jumped by over 160%, rising from 581,800 m^3 to a record 1,675,200 m^3 in 2006. The global financial crisis caused glulam production to drop by 25% by 2009 to 1,249,300 m^3. The recent modest recovery in housing starts has helped fuel demand for glulam lumber and production rebounded to 1,524,000 m^3 in 2012.

The mix of glulam lumber products has undergone a significant change over the past twenty years. For example, non-structural glulam lumber production has decreased by 55% while structural glulam lumber production has increased by more than 9 times (Figure 7). Non-structural glulam lumber is classified as overlays, mouldings and millwork products. Overlay products are generally non-structural products used in applications where a high quality appearance is important, for example in a traditional tatami room. The decline in the number of traditional tatami rooms included in new residential construction has reduced the demand for non-structural appearance grade glulam lumber products.

In contrast, the rapid transition to precut post and beam housing has caused a tremendous increase in the demand for structural glulam lumber (Figure 7). In Japan, structural glulam products are often classified into large beams, medium

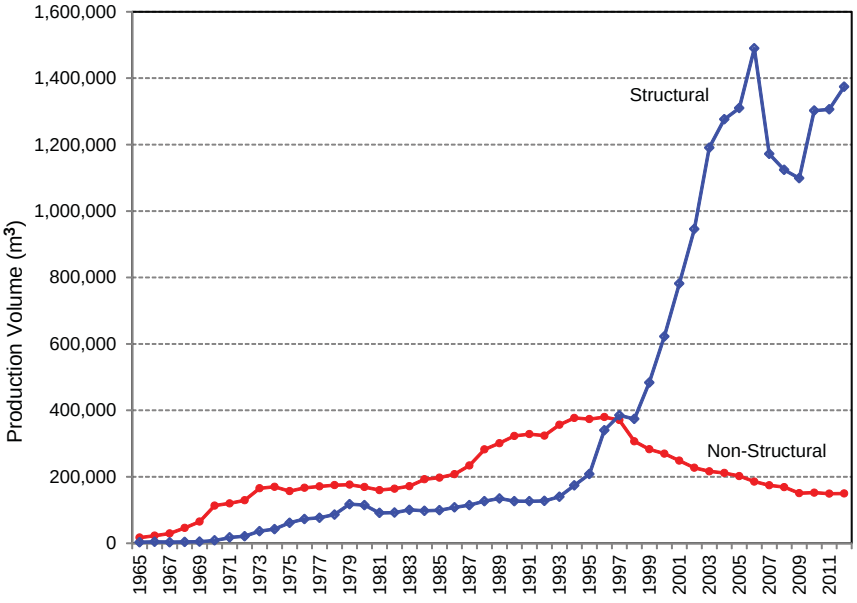

Figure 7. Japanese production of structural and non-structural glulam lumber production.

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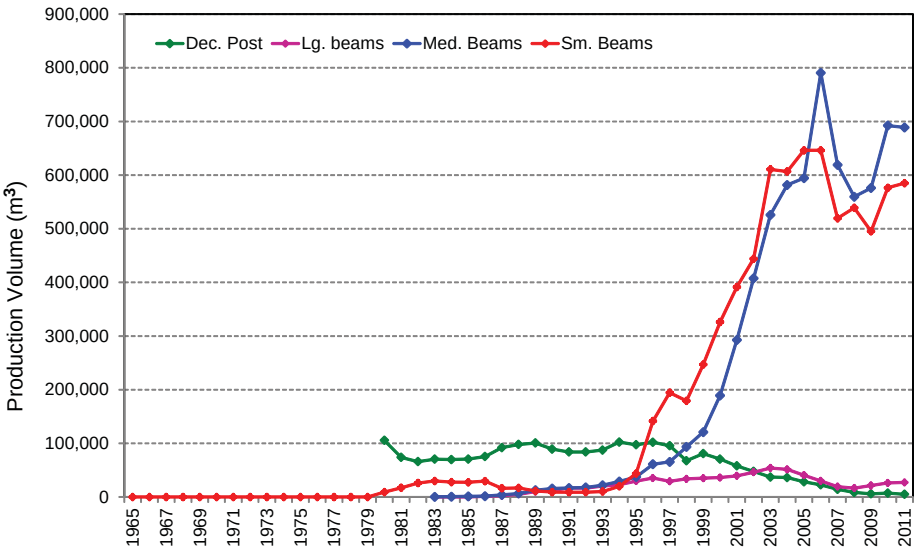

Figure 8. Japanese production of structural glulam lumber, by product.

beams, small beams and decorative posts (Figure 8). Although there is some debate about the exact criteria for each classification, the Japan Laminators Association defines large glulam lumber as having a cross section of more than 300 cm^2 and these products are often used as horizontal beams (*hirakaku*). In contrast, small glulam lumber usually has dimensions of less than 150mm in width and thickness. Small glulam lumber is usually used in vertical post (*hashira*) and some short span beam applications. Medium size beams fall between the two previously mentioned products and can be used as either vertical posts or short to medium span beams. Finally, decorative posts are small size lumber (usually 105mm x 105mm that are used in exposed applications in tatami rooms where high quality and aesthetic appeal are important. Often domestic woods like sugi and hinoki are used as overlays for decorative beams.

Despite the rapid development of the glulam lumber industry and the transition towards precut post and beam housing, imports continue to play an important role in the glulam supply (Figure 9). Over the past ten years, imported glulam lumber has made up about 30% of the supply in Japan and this has decreased slightly over the past fifteen years as a the combination of a strong yen and the higher quality of imported glulam lumber has helped to maintain the competitiveness of imported glulam lumber. Despite this, the self-sufficiency rate for glulam lumber has remained relatively consistent at approximately 70%.

The past twenty years have seen a substantial transition within the Japanese wood manufacturing and housing sectors. Changes in the building codes have driven technological change within the residential construction sector away from site built homes which in turn has driven change in the type of wood products being used to build post and beam homes. The changing demand for wood products has impacted the main wood manufacturing sectors in different ways. The sawmill sector, reluctant to embrace change, has continued to struggle and seen the share of imported wood products increase. Rather than investing in new technologies, most within the sawmill sector appear to be looking towards subsidies and domestic wood policies as the keys to their future success. In contrast, the glue-laminated lumber industry has aggressively invested in new technologies and worked closely with precut manufacturers to develop products that better meet the needs of the new precut post and beam technology. As a result, the self-sufficiency rate within the glulam sector has increased since 2000. In the longer term, the competitiveness of the wood manufacturing sector in Japan would be better served by following the proactive example of the glulam industry than by passively waiting for the delivery of subsidies and domestic wood policies that might benefit Japanese sawmills in the short term but will keep the industry uncompetitive when the subsidies and programs are discontinued in the future, as will inevitably occur given the extremely high level of public debt in Japan.

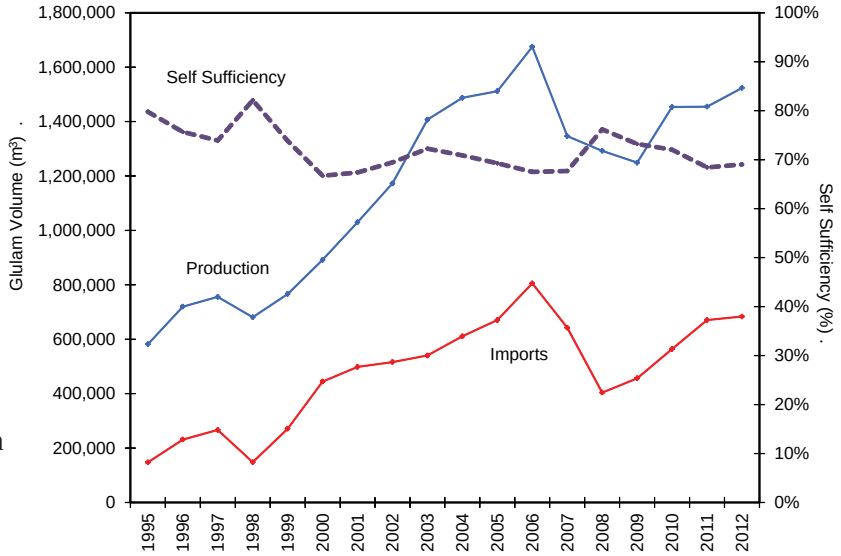

Figure 9. Trends in Japanese glulam lumber supply and self-sufficiency

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