

Hardwoods in U.S. Wood Pallet Production

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ABSTRACT

Research indicates that in 2006, 7.26 billion board feet (approximately 17.1 million m³) of new solid wood was utilized by the U.S. wood pallet and container manufacturing industry. During the same year, the study estimates that 5.09 billion board feet (approximately 12.0 million m³) were recovered mostly from used pallets for reuse and recycling. This paper reports the results of a series of studies, conducted over 14 years, on the use of wood by the U.S. wood pallet and container industry. This manuscript presents data estimating the volumes of new wooden materials, separated by hardwoods and softwoods, used by the U.S. wood pallet and container industry. In fact, the U.S. wood pallet and container industry is a major consumer of hardwoods in the U.S. This manuscript also provides information on the treatment of pallets for international shipments by U.S. wood pallet and container manufacturers to reduce the spread of disease and invasive insects.

1. INTRODUCTION

A series of five studies (Bush et al. 2002, 1998a, 1998b, 1998c, 1997b, 1995) conducted by Virginia Tech in collaboration with the USDA Forest Service, have tracked activity in the U.S. wood pallet and container industry between 1992 and 2006 (a 2011 study is being planned). These studies documented trends in wood use and pallet production within the industry, both new and recovered. This paper focuses on the production of new pallets and the use of new wood materials. Pallet recovery, repair, reuse, and recycling activity data also were collected and have been published (Bush et al. 2009a, 2009b, 1998b, 1997a, 1995, Bejune et al. 2002a, 2002b).

Each of the five studies attempted to include all U.S. companies that were involved in the production of pallets and/or containers. The first four studies included all identifiable firms in the then used Standard Industrial Classification (SIC) codes 2441 (wood boxes and shoo), 2448 (wood pallets), and 2449 (wood containers not elsewhere classified). The most recent (2006) study utilized a slightly different definition of the industry due to the change by federal agencies from the Standard Industrial Classification (SIC) system to the North American Industry Classification System (NAICS, U.S. Census Bureau 2011). The North American Industry Classification System superseded the SIC system and NAICS 321920 subsumed SIC 2441, 2448, and 2449 as well as 2429 (Special Product Sawmills) and 2499 (Wood Products, NEC). As a result, the two definitions of the industry differ slightly.

For a variety of reasons, not all firms provide data. Therefore, the studies estimated industry totals using the data collected and extrapolated totals using an independent measure of industry size, the number of employees as reported by the U.S. Department of Labor, Bureau of Labor Statistics (Bureau of Labor Statistics 2011). Estimates of the total number of employees in the industry were thought to be more reliable than those of the number of firms participating in the industry and were used for this reason.

2. THE U.S. WOOD PALLET AND CONTAINER INDUSTRY IN 2006

From a sample of 2,560 unique firms, over 450 firms (response rate of 17.4%), representing over 590 production facilities throughout the U.S., provided information about their business activity in 2006. Firms in

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the Midwest (35.2% of all production facilities) and South (30.3%) accounted for the majority of respondents, followed by the Northeast (17.2%) and the West (16.6%).

Approximately 57% of the firms reported that new pallet production was their primary source of revenue in 2006. Recovered, repaired, and/or remanufactured pallets were the primary source of revenue for 25% of the firms. Regardless of the primary source of revenue, over three-quarters of responding firms (78.3%) reported that they produced some new pallets and more than one-half (55.5%) were involved in pallet recovery, repair and/or remanufacturing.

On average, production of new pallets was 304,160 per firm in 2006 (note that this is per firm, not per production location). Approximately 21% of the pallets produced in 2006 were heat treated by the manufacturer and less than 1% were fumigated. However, heat treatment or fumigation may occur after the manufacturer sells the pallet.

Over 70% of firms utilized hardwood lumber and/or cants in their operations and approximately 62% utilized some softwood lumber and cants. Overall, the industry used 63.6% (by volume) hardwood and 36.4% softwood material in 2006 (Figure 1). This compares to an estimated 68.8% hardwood usage in 1992 and a high of 71.7% hardwood usage in 1995.

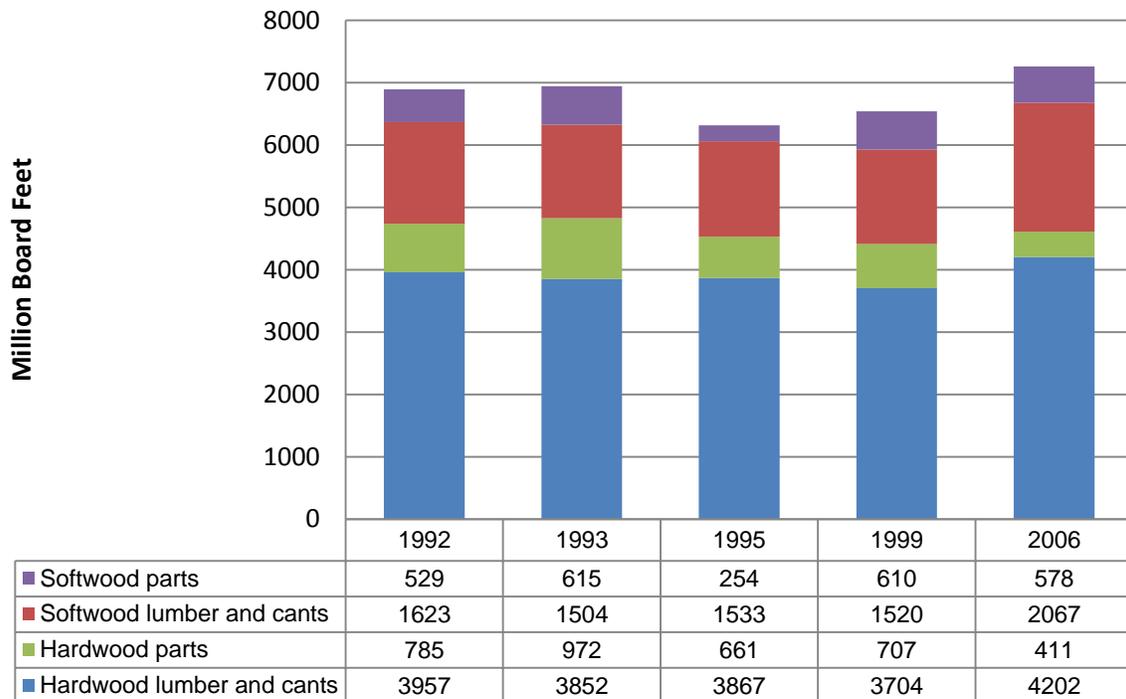


Figure 1. Estimates of new wood volumes used by the United States Wood Pallet and Container Manufacturing Industry by species and form: 1992 to 2006 (Note that studies prior to 2006 included firms in Standard Industrial Classifications 2441, 2448, and 2449. The 2006 study included firms in North American Industry Classification System code 321920).

Within the hardwood category, 61.2% (by volume) of the lumber, cants, and parts used were of mixed species (i.e., no species separation) in 2006. Mixed species meant that the pallet producer just wanted hardwoods and not a specific species. The most commonly utilized single species was oak (26.9% of total hardwood use by volume). Maple accounted for 7.2% and other hardwood species accounted for 4.7%. The southern pine species group accounted for 53.5% of softwood lumber, cant, and part use in 2006. The spruce/pine/fir species group accounted for another 35.5% of use by volume and Douglas-fir use was 3.8% of softwood volume. Species (both hardwood and softwood) imported from outside of North America accounted for an estimated 2.3% of wood volume used by the U.S. wood pallet and container industry in 2006.

Table 1 provides our estimates of species use by region of the United States. As might be expected, wood species use differed by region. Firms in the South use the largest proportion of oak in their production, while

firms in the Northeast used the largest proportion of maple of all U.S. regions. The West was the only region in which firms did not use a large proportion of mixed hardwoods, relying instead on western hardwood species such as alder and on softwood species. With an estimated 9% of total volume of their species mix, firms located in the Northeast used the largest proportion of species imported from outside of the U.S. (most likely from Canada).

Table 1. United States Wood Pallet and Container Manufacturing Industry use of lumber, cants, and parts by species or species group and region in 2006.

Species or species group	Use by species in percentage of total reported volume			
	West	Midwest	Northeast	South
Oak	8.9	19.7	8.8	35.0
Maple	0.0	6.1	11.9	2.7
Mixed hardwoods (no species separation)	6.3	59.3	55.9	40.8
Other North American hardwood species	23.7	3.1	5.9	2.5
Spruce/Pine/Fir species group	13.2	6.9	3.5	3.2
Douglas-Fir	19.2	0.2	0.0	0.0
Southern Pine species group	0.5	3.2	4.8	15.4
Other North American softwood species	28.2	0.5	0.3	0.3
Species imported from outside of North America	0.0	1.1	9.0	0.1

Based on this study’s estimates, the U.S. wood pallet and container industry produced 441 million new pallets in 2006 (Figure 2). This represents a modest 2.8% increase over estimated production of 429 million in 1999 and a 7.3% increase from production in 1995 (estimated to be 411 million units).

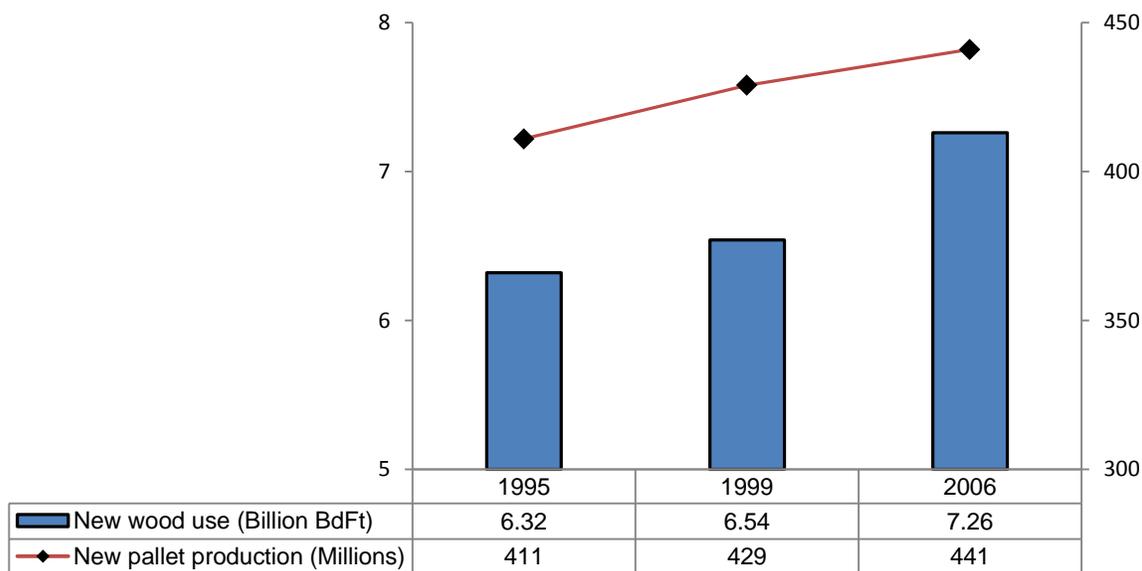


Figure 2. Estimates of new wood use and new pallet production by the United States Wood Pallet and Container Manufacturing Industry from 1995 to 2006 (Note that studies prior to 2006 included firms in Standard Industrial Classifications 2441, 2448, and 2449. The 2006 study included firms in North American Industry Classification System code 321920).

The majority of the estimated 441 million pallets produced in 2006 were stringer type and not block type pallets. Stringer type pallets have long center structural boards that separate top and bottom deckboards. Deckboards are separated by blocks in block type pallets. Block style pallets are more popular in Europe. Our survey in the U.S. showed that multiple-use stringer pallets were 41.9% of total pallet production and limited-use stringer pallets accounted for 38.2% in 2006 (Table 2). Multiple-use pallets are generally made to last

longer and cost more than limited-use pallets. Block pallets were approximately 6% of production while skids (single sided pallets or platforms) and other types of pallets accounted for approximately 14% of production.

Table 2. Types of new wood pallets produced by the United States Wood Pallet and Container Manufacturing Industry: 1999 and 2006.

Pallet type	Production by type	
	1999	2006
Limited-use block pallets	6.0	1.9
Multiple-use block pallets	5.7	4.0
Limited-use stringer pallets	37.7	38.2
Multiple-use stringer pallets	42.4	41.9
Skids and other types of pallets	8.2	13.9

(% based on number of units)

A variety of pallet sizes were produced in 2006 with 48 by 40 inches being the most common single product (26.9% of production). In fact, the production of new 48 by 40 inch pallets was expected to be a greater percentage of overall production since this type of pallet is widely used. However, this pallet type is well supported by the recovery and repair industry and supply from these firms may moderate demand for new 48 by 40 inch pallets.

Some regional differences in business activity were noted. Firms located in the western U.S. were more likely to list pallet recovery, repair, and/or remanufacturing as their primary source of revenue than were firm in other regions (Bush et al. 2009a). The majority of firms relying on the production of pre-cut pallet parts instead of cants and lumber as their primary source of revenue were located in the Midwest. On average, firms located in the South were the largest in terms of new pallet production in 2006. Western and northeastern firms, on average, produced more recovered, repaired, or remanufactured pallets than new pallets. On average, firms produced 304,000 new pallets. The number was just over 208,000 per firm on recovered pallets. Firms in the South, West, and Midwest heat-treated between 22% and 24% of the pallets they produced while firms in the Northeast heat-treated approximately 11% of their pallet production. Less than 1% of all pallets were treated by manufacturers using fumigation. The Northeast (1.3%) and the South (0.8%) regions were the biggest users of fumigation. Zero pallets were fumigated in the Midwest and 0.1% in the West.

Multiple-use stringer pallets were the largest proportion of regional pallet production in the West and the smallest proportion in the South. Block pallet production, while a relatively small proportion of production in all regions (less than 6% of all pallets produced), was the least common among firms in the West (4.2% of all pallets produced). As compared to other regions, skids and other types of pallets were most commonly produced by firms in the South (6% of all pallets produced in the South, 0.9%, 4.5%, 2.6%, respectively, in the West, Midwest, and Northeast).

3. INDUSTRY CHANGES

Some changes to the questions used in the original 1992 study were made in subsequent studies. This was done to reflect changing needs for information at the time, changing terminology, and issues of particular importance during time periods in which studies were conducted. As a result, not all information was tracked in each of the five studies (1992, 1993, 1995, 1999, and 2006). However, many questions were asked in all or most of the studies and provide insights into industry changes trends.

Species used by firms in the pallet and container industry are an example of such trends. When comparing 2006 to 1992, oak use decreased from approximately 40 to 27% of the total volume of hardwood lumber, cants, and parts used. During the same time, mixed hardwood (no species separation) increased from 33.4% in 1992 to 61.2% in 2006. Among the softwood species, Douglas-fir use dropped dramatically (from 28.8% of softwood lumber, cant, and part volume in 1992 to 3.8% in 2006), while the use of southern pine grew during all but one of the time periods covered by the studies, beginning at approximately 40% of softwood volume in 1992 and ending at approximately 54% in 2006.

Comparing 1999 to 2006, the proportion of total pallet production that consisted of block pallets decreased (11.7% 1999 vs. 5.9% 2006). Empirical observations reveal that between 1999 and 2006 a major buyer of

block pallets began producing them within the company, explaining at least some of the decline in block pallet production as the organization did not participate in the 2006 study. The production of skids and other types of pallets (8.2% 1999 vs. 13.9% 2006) increased (Table 2). The proportion of production that consisted of stringer pallets remained relatively unchanged (80.1% in 1999 and 2006).

Figure 2 provides an estimate of the volumes of new wood (hardwood and softwood parts, lumber, and cants) used by the U.S. pallet and container industry from 1992 to 2006. Total wood use has increased over the period, although use did decrease between 1993 and 1995. Estimates indicate that the industry used 6.89 billion board feet of lumber, cants, and parts in 1992, while this number grew to 7.26 billion board feet in 2006. This growth in overall new wood use reflects growth in the use of both, hardwood and softwood lumber and cants. Also reflected is an increase in the use of softwood parts. The use of hardwood parts, however, decreased between 1992 and 2006. This apparent trend from hardwood to softwood parts may be due to a desire for dried materials (softwood parts typically are produced from kiln-dried softwoods, while hardwood parts are typically green) combined with a general decline in hardwood sawmill production leading to a decreased supply of hardwood parts.

While increases in new wood use are associated with increased pallet production (Figure 2), looking only at the use of new wood material can be misleading as it does not illustrate an important trend in the industry that occurred during the period of the studies – increased wood recovery and reuse. From our industry studies, over 4 out of every 10 pallets purchased in the U.S. in 2006 were a reused, recovered, repaired, or recycled pallet (Bush and Araman 2009a). Research planned for 2011 will provide the U.S. wood pallet and container industry and the U.S. sawmilling industry with updated data on the current use of wood from this industry sector.

4. SUMMARY AND CONCLUSIONS

The wood pallet and container industry in the U.S. consumes major amounts of solid wood to produce needed materials for packaging and moving products in the U.S. and to export markets. Our research indicates that in 2006, 7.26 billion board feet (approximately 17.1 million m³) of new solid wood was utilized to make wooden pallets and containers. During the same year, the study estimates that 5.09 billion board feet (approximately 12.0 million m³) were recovered mostly from used pallets for reuse and recycling. A series of studies conducted over 14 years on the use of wood by the U.S. wood pallet and container industry estimated the volumes of new wooden materials, separated by hardwoods and softwoods, used by the U.S. wood pallet and container industry. Hardwoods, mostly in the form of lumber, cants, and parts have made up two-third of the material used to make pallets and containers over the 14 years. The remainder was softwood materials. In fact, the U.S. wood pallet and container industry has been the largest consumer of all solid wood hardwood production in the U.S. during the 14-year period of our studies. Mixed hardwoods (multiple species) dominated demand for pallet materials within hardwood demand. Stringer type pallets continued as the most popular form of pallets (80%). Block type pallets only made up 6% of production. These percentages would most likely be reversed if we were discussing Europe. We also looked at the treatment of pallets for international shipments by U.S. wood pallet and container manufacturers to reduce the spread of disease and invasive insects. We estimate that 21.4% were heat treated and less than 1% were fumigated.

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