HARDWOOD TIMBER PRODUCT MARKETS: A FOCUS ON SMALL-DIAMETER

By

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ABSTRACT: Reviews major solid wood and fiber markets. Discusses studies of "brown" maple acceptance including consumer preferences and knowledge. In conclusion, we review rubberwood attributes and its use in the manufacture of numerous wood products.

INTRODUCTION

Our goal is to find markets for low-grade hardwoods with the emphasis on solid wood. We are looking for opportunities to utilize small-diameter timber removed during thinning operations with management objectives that do not necessarily include improving the quality of future harvests. If the cost of the thinning operation can not be spread over future harvests, it must be subsidized or paid in part, or in whole, by the material removed.

First we review roundwood production and its major components-excluding firewood. We then look more closely at hardwood fiber markets, particularly the growing engineered product sector, and the major markets for solid hardwood. There are eight solid hardwood markets-pallets, furniture, dimension and components, exports, millwork, cabinets, flooring, and rail ties. With just one exception-wood pallets-hardwood lumber consumption within these sectors is estimated to have increased during the past decade by anywhere from 30 to 120% (Hansen and West 1998).

To test consumer preferences, we review results of a perception study on "brown" hard maple. Results are from three independent surveys conducted at the Greensboro Equipment Fair, Greensboro, North Carolina; the New York State Fair, Albany, New York; and Interzum, Hanover, Germany. We then discuss the role of technology and the importance of the consumer in the entire equation. We conclude by summarizing the rubberwood success story, which provides optimism for small-diameter, low-grade utilization in the United States.

ROUNDWOOD CONSUMPTION

Table 1 shows roundwood consumption of four major product groups-sawlogs, veneer logs, pulpwood, and composite products-for 1986 and 1996. Combined, these products in 1996 accounted for the production of 13.69 billion cubic feet of hardwood and softwood roundwood. Sawlogs alone accounted for more than half the total. Pulpwood accounted for more than 1/3, while veneer logs accounted for more than 9%. The remaining 2.5% was used in rapidly growing engineered wood products.

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Table 1. Hardwood composition of U.S. roundwood production, selected products, 1986 and 1996.

Product	Total hardwood and softwood		Hardwood content	
	1986	1996	1986	1996
	----Million cubic feet----		----Percent hardwood----	
Sawlogs	7,063	7,044	23.6	27.9
Veneer logs	1,535	1,249	6.6	12.6
Pulpwood	N.A.	5,037	N.A.	43.5
Engineered wood products	N.A.	361	N.A.	68.4
Combined pulp and engineered	4,788	5,398	35.2	45.2
Total	13,386	13,691	25.8	33.3

Adapted from the Forest Inventory and Analysis, Timber Products Output (TPO) Database Retrieval System (http://www.srsfia.usfs.msstate.edu/rua/tuo) and from Table 50 in Haynes (1990).

Of particular interest is the increasing hardwood content. The hardwood component of sawlogs increased more than 18%, the hardwood component of veneer logs increased more than 90%, and the hardwood component of the combined pulpwood and engineered wood product sectors increased by more than 28%. Clearly, hardwood has become increasingly important during the past decade in meeting the markets demand for solid wood and wood fiber-based products.

HARDWOOD FIBER MARKETS

Hardwood fiber markets consist of three sectors-pulp mills, chip mills, and engineered product mills. Pulp mills represent huge investments ranging today from ½ billion to a billion dollars. They also consume huge amounts of wood fiber. During the past few years, however, total pulpwood capacity in North America fell by some 2.7 million tons (Frost 1999). This was roughly 7 percent of global capacity. The decline was due to mill closures, which led to more and more wood fiber being supplied from outside the region. South America, in particular, is poised to supply increasing amounts of solid wood and wood fiber to the wood products industry in the United States (Flynn 1996).

Chip mills supply pulp mills. They are relatively portable and located near the resource. They are not very popular with environmentalists and are the subject of increasing concern and lawsuits (Anonymous 1998, Wirth 1998).

Engineered wood product mills manufacture a number of varied products including: particleboard, Oriented Strand Board (OSB), Medium Density Fiberboard (MDF), Laminated Veneer Lumber (LVL), and Structural Composite Lumber (SCL). According to the American Plywood Association, production of LVL and OSB will increase 250% by the year 2000 from the 1992 level (Adair 1999). During the same time, MDF production will double. Particleboard production on the other hand will increase about 30%, while production of plywood will be less than 90% of its 1992 level. Production of the engineered wood I-joist, which uses both LVL and OSB in its manufacture, is expected to increase nearly 350% by 2000 from 1992 levels.

Engineered wood products are important not only because of their potential to use increasing amounts of low-grade and small-diameter hardwoods, but also because they are introducing hardwoods in large volumes to a nontraditional market sector-housing. For instance, nearly

70% of the OSB produced is used in new residential housing, while another 14% is used in repair and remodeling projects in existing homes (RISI 1999). OSB dominates the roof, floor, and wall sheathing markets (Anonymous 1996). Interestingly, OSB manufacturers are looking to expand product use in the industrial sector as well.

SOLID HARDWOOD MARKETS

Hansen and West (1998) estimated hardwood lumber consumption by major use at 13.2 billion board feet in 1997 (Table 2). This reflected an overall increase of 24% from 1991. Hardwood flooring—the Dow Jones of the wood products industry—was the leader with a 120% increase in consumption of hardwood lumber (NOFMA 1999) (Figure 1).

Table 2. Estimated hardwood lumber consumption, by industry, 1991 and 1997.

Industry	Hansen/West 1997	Dempsey/Luppold 1991	Change 1991/1997
	----Billion board feet------		Percent
Pallet	4.5	4.6	(-2)
Furniture	3.0	2.0	50
Dimension	2.5	1.3	92
Export	1.4	1.0	40
Moulding & millwork	1.3	1.0	30
Cabinet	1.2	0.9	33
Flooring	1.1	0.5	120
Rail ties	0.8	0.6	33
Total	13.2	10.7	24

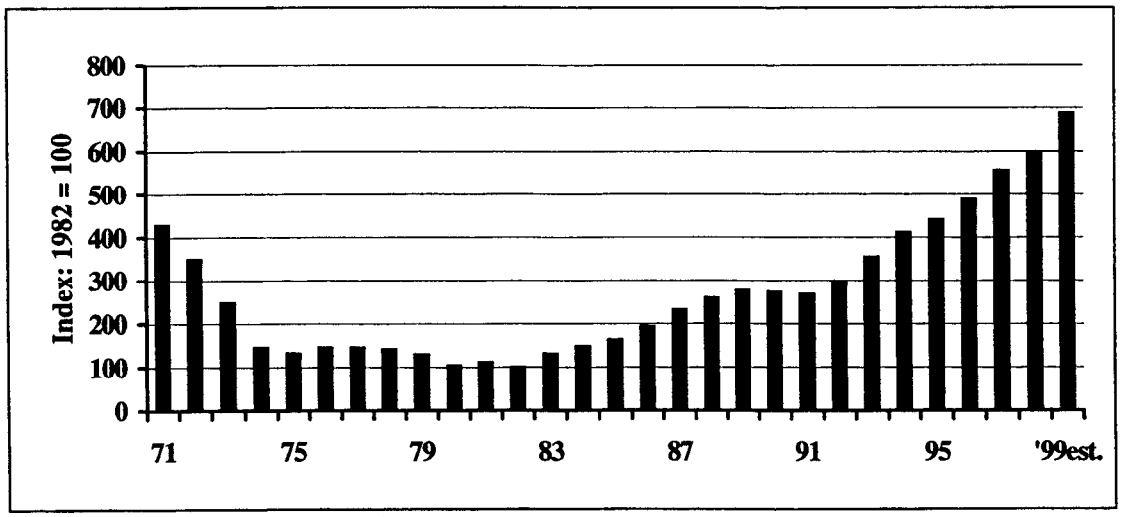

Figure 1. Estimated hardwood flooring production, 1971 to 1999.

During this same period, dimension and component manufacturers increased consumption by more than 90%. Hardwood dimension and component manufacturers hold a unique position within the industry. Not only do they consume lumber, but also their product output—hardwood dimension—is used in several other products among which are furniture, millwork, cabinets, and exports. In surveys of the furniture industry's wood use, both lumber and dimension use are treated similarly and are reported in units of thousand board feet. However, this minimizes total wood use since each board foot of dimension represents the equivalent of approximately 2 board

feet of hardwood lumber. Using lumber equivalents to account for dimension use, the furniture industry's use of hardwood lumber increases from 2.6 billion board feet to 3 billion board feet in 1997 (Hansen and West 1998).

Likewise, because U.S. exports of hardwood lumber include increasing amounts of dimension or material that is either trimmed to specific widths or lengths, Commerce Department estimates of U.S. exports of hardwood lumber fail to account for "true" wood use in lumber equivalents. Although this is a side issue, we believe it is important to account for such differences as we attempt to keep track of the major uses of hardwood and expected trends.

Generally, the major sectors of hardwood lumber use can be arranged by the predominate grade of lumber utilized. Exports are dominated by FAS and Select grades. Millwork, dimension, furniture, and cabinets are dominated by Select and l-Common grades. 2- and 3-Common grades are used mostly in flooring, pallets, and rail tie manufacture. Recent advances in technology and increases in the price of the highest grades have resulted in some dipping down into the wood basket by dimension, millwork, furniture, cabinet, and flooring manufacturers. Prices published in *Pallet Profile Weekly* suggest that pallet manufacturers also may be looking at alternative wood sources, such as small-diameter logs, as increases in the prices of hardwood cants have significantly exceeded increases in pallet prices since mid- 1992 (Figure 2).

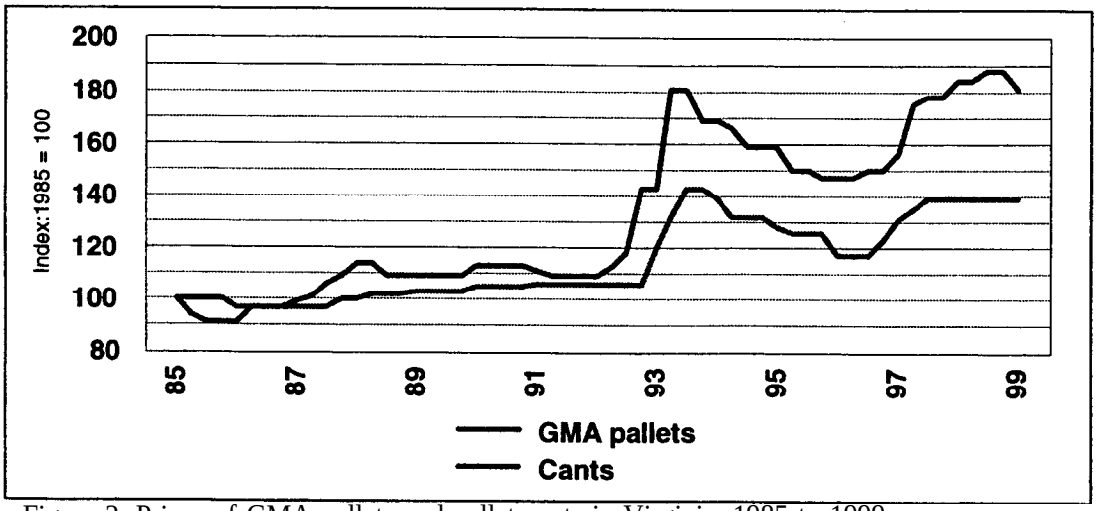

Figure 2. Prices of GMA pallets and pallet cants in Virginia, 1985 to 1999.

Although furniture manufacturers generally use the better grades of lumber, most furniture is made of relatively short pieces of wood glued and fastened together. Araman et al. (1982) surveyed solid wood part-lengths used by furniture and kitchen cabinet manufacturers, including manufacturers of solid wood, veneered wood, and upholstered furniture and recliners. Fifty percent of all parts used in any sector were 33 inches or less in length. Two-thirds were 45 inches or less. A solicitation by Aristokraft, Inc. for solid red oak rough dimension lumber for frame rails, stiles, mullion, fillers, and drawer fronts called for parts between 15 and 36 inches. It is apparent from these data that the physical constraints imposed by low-grade, small-diameter hardwood would not pose a significant problem to their use so long as processing costs can be kept competitive.

The next big hurdle is technology for handling, drying, and color matching short pieces and looking at the material in nonconventional ways that make processing economically acceptable and competitive. While scanning and color technologies along with computer simulation are in

place in a number of operations to help with much of this, areas still needing attention are efficiency in throughput and manufacturing flexibility. The big questions that remain are whether small-diameter, low-grade materials can be economically competitive and meet with consumer acceptance.

CONSUMER PREFERENCES

Ultimately, it is the consumer who may have the most to say about use of small-diameter, low-grade materials by choosing what is acceptable and what is not. But will the consumer know what the new product is made of and, will the consumer care? How the consumer decides value—the trade-off between price and quality—will have a considerable impact on what is acceptable and what is not.

In a study of consumer preferences at the New York State fair, ten "brown" hard maple panels of varying color, finish, and stain (mineral streak) were exhibited. Those volunteering to participate were asked to rank the panels on the basis of preference from one (best) to ten (worst). All displayed panels received at least one first place vote suggesting a large degree of variability among consumers as to preference. Further, respondents generally indicated a preference for dark brown without mineral in a cherry finish for livingroom, diningroom, and bedroom applications. By contrast, they indicated a preference for no mineral, and light finishes in kitchen applications. For flooring, they expressed a preference for mixed color with mineral.

Panels also were exhibited and rated at the Greensboro Equipment Fair, Greensboro, North Carolina, and the Interzum Fair, Hanover, Germany. Ratings at Greensboro reflected a manufacturers bias with a clear preference for light colors and no mineral. Interzum respondents reflected European tastes for mixed colors and natural finish but with an absence of mineral stain. However, as in New York, all panels received at least one first place rating.

It is apparent that consumers, taken collectively, have a wide range of tastes and preferences. Thus, if the wide range in tastes and preferences can be matched efficiently to the variety in wood, greater opportunity will be available for use of low-grade, small-diameter materials and lesser used species.

We have seen advertising changes at the retail level. For instance, furniture was frequently advertised or displayed as solid cherry, solid mahogany, and so on. More recently, the term solid wood has been added to the vernacular. The wood could be alder, tulip poplar, red maple, or other less used, less demanded species. Does the consumer really know the difference? We are even seeing the term "all wood" making its way into the showroom. This describes a piece of furniture that most likely has a particleboard or MDF core with a veneer overlay. Again, does the consumer really know the difference among these pieces? And, if the answer is yes, will it ultimately make a difference? How will value come into play?

The young Japanese consumer of today is said to be quite different than his or her ancestors when it comes to wood. The Japanese consumer in the past stressed quality at any price. He or she required the finish on the underside of a piece of furniture to be identical to that on the top, even though it could not be seen. The consumer today is looking more toward value and is willing to compromise on finish and other things. Just as the Japanese consumer may be questioning "Why should I pay for finishing the bottom side if it is never seen?' the American consumer is asking "Why do I need solid cherry, when cherry wood veneer or vinyl overlay is just as acceptable to me?'

COMPOSITE PRODUCTS OR SOLID WOOD?

Both composite products and solid wood seem to provide alternatives for use of low-grade, small-diameter hardwood use. How a particular resource might be directed—composite products, solid products, or both—will depend on who is able to offer the best price (return to log). Although solid wood, value-added products might seem to offer the highest sales revenue, conversion costs and yield losses will likely be greater also. Composites have the advantage of using all the log in a highly efficient manor. Thus, lower product prices may be more than offset by lower processing costs and higher yields.

DISCUSSION AND CONCLUSION

Although utilization of small-diameter timber from thinning operations may seem like a daunting task, we would like to leave you with a reason to be optimistic. That reason is the successful use of rubberwood in southeast Asia and its introduction into markets throughout the United States. Rubberwood comes from southeast Asian rubber trees (Hevea brasiliensis Muell. Arg). Although native to South America, the tree was introduced to southeast Asia in the 1870's where it has flourished (Sandved 1993). Sap from the tree is used to make latex. After 30 to 35 years rubberwood trees become unproductive (Smith et al. 1990). They are subsequently cut and new trees planted in their place. Until 10 to 20 years ago, the cut trees were usually burned on site, used for fuelwood, or used to make charcoal. The typical tree at harvest is small in diameter, quite crooked, and highly susceptible to blue stain fungi and beetle attack. Because they are so crooked, the maximum length of the usable log is about 6 feet. The logs also have a high juvenile and reaction wood content. Yields range from 20 to 30%. Rubberwood use was stimulated in large measure by predicted shortages of ramin, a widely used white wood throughout the region (Smith et al. 1990).

There is probably no worse resource for the production of wood products than rubberwood, yet despite all the negatives, rubberwood use in products today is ubiquitous. A short list of products include strip and parquet flooring found in most home centers, kitchen tables and chairs, furniture parts, stair railings and spindles, cabinet doors and mouldings, cutting boards, bowls, knife blocks, and various kitchen utensils, and game boards. It is even used to make pulp, particleboard, hardboard, MDF, and the list goes on. The use of rubberwood has proven the technological and economic potential of using small-diameter, low-grade material. Part of rubberwood's success emanates from the fact there were no good substitutes for ramin and the region enjoys very low wage rates making the additional handling and processing involved in the use of such a resource economically possible. In the United States, technological advances still to come, may well provide the needed efficiencies to make low-grade, small-diameter hardwood utilization an economic reality.

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