Appalachian Hardwood Product Exports: An Analysis of the Current Chinese Market

Jingxin Wang
Jinzhuo Wu
David B. DeVallance
James P. Armstrong

Abstract

A mail survey of Appalachian hardwood product exporters was conducted in the fall of 2008 to analyze the export practices for Appalachian hardwood products, specifically the volume of hardwood products exported to the Chinese market, their preferred species, and potential and existing trade barriers between US producers and Chinese customers. Results of the survey showed that the most frequent export destinations of Appalachian hardwood products were Europe, China, Canada, Mexico, and Japan. In 2007, approximately 11.4 million board feet (MMBF, Doyle scale) of hardwood logs and 145.3 MMBF of hardwood lumber were exported to China by the respondents. Approximately 37 percent of the respondents who exported hardwood products to China exported red oak logs, followed by white oak, black walnut, black cherry, and hard (sugar) maple. The top species of hardwood lumber exported to China were red oak, white oak, yellow poplar, black walnut, hickory, cherry, hard maple, and soft maple. Respondents indicated that transportation freight costs and payments are the limiting factors when considering expanding business overseas. The continued decreasing hardwood price has put more pressure on hardwood products exporters to maintain profit margins. Because of the current economic downturn, hardwood production in the Appalachian hardwood region has declined by more than 40 percent. Exports of hardwood products to China will be affected to some extent. However, it is expected that China will remain an important overseas market in the near future.

Wood products are an important internationally traded commodity that can significantly affect the balance of trade (i.e., net exports) of many countries (Peck 2002). The United States is the world's foremost manufacturer of forest-related products and accounts for approximately one-quarter of the world's total production (South Carolina Forestry Commission 2009). Exports of US hardwood products such as hardwood lumber, logs, and veneer expanded to $2.68 billion in 2007, which relates to a 22 percent increase from $2.19 billion in 2003 (US Department of Agriculture [USDA] 2009). China has emerged as the second-largest export market for US hardwood products, trailing only Canada. Additionally, the value of forest products exported to China has doubled over the past 5 years. In 2007, the major hardwood products (i.e., logs and lumber) exported to China was valued at $442 million, accounting for 77 percent of total forest products exports to China. The proportions of hardwood products exported to China (by value) were 39 percent hardwood lumber, 33 percent hardwood logs, and 5 percent hardwood veneer (USDA 2009). China's demand for imported wood products, specifically the increase of imported US forest products, was stimulated largely by China's booming housing market, nationwide logging ban on natural forests, and reduced tariff on forest products. As a result, China has become an important marketplace for US forest product exporters.

Most of the US hardwood resource and industry is located in the eastern states. The Appalachian region has more than 65.4 million acres of hardwood timber resources and is

The authors are, respectively, Associate Professor, Graduate Research Assistant, Assistant Professor, and Associate Professor, Div. of Forestry and Natural Resources, West Virginia Univ., Morgantown (jxwang@wvu.edu, jwu4@mix.wvu.edu, David.DeVallance@mail.wvu.edu, Jim.Armstrong@mail.wvu.edu). This manuscript is published with the approval of the Director of West Virginia Agric. and Forestry Experimental Sta. as Scientific Article No. 3069. This paper was received for publication in October 2009. Article no. 10694.

Forest Prod. J. 60(1):94–99.

responsible for more than 55 percent of the hardwood lumber produced in the eastern United States (US Department of Commerce [USDC], Bureau of the Census 2005). Hardwood sawmills in the Appalachian region range in capacity from less than 100,000 board feet to more than 50 MMBF per year (Luppold 1995, Luppold et al. 2000). The decline of US housing market—and thus a dramatic fall in wood products demand—has forced hardwood producers to cut manufacturing by more than 40 percent (Dye 2009). Remaining viable and competitive, given the current declining market, has become a major concern for hardwood industry. These challenging times require innovative marketing for forest-related industries and better knowledge of foreign forest products markets and marketing strategies. A better understanding of Appalachian hardwood producers' current export practices is necessary to expand hardwood trade between the Appalachian region and China.

The recently amended Lacey Act will have significant impacts on the forest products trade between the United States and China. Approximately 30 percent of US hardwood imports are from suspicious or illegal sources, according to the US International Trade Commission (Missouri Timber Price Trends 2007). The amended Lacey Act will require US importers to file declarations that specify scientific names, species, and countries of harvest for any wood raw material in a final product. As the second-largest supplier of wood products to the United States, most of China's wood product exporters sourced their raw wood materials from countries where illegal harvesting and other legal violations are well documented by the Lacey Act (Gregg and Porges 2008). It is expected that sales of certified wood products in the US market will increase as a result of the amended Lacey Act. As of February 2009, 660 wood product companies in China have obtained Forest Stewardship Council (FSC) Chain of Custody certification (China Forest Certification Network 2009). To export final products to the US markets, Chinese hardwood buyers may require imported raw materials (e.g., logs and lumber) from the United States to be from legal and sustainable sources. A problem facing the US hardwood industry is that less than 5 percent of US hardwood forestlands are certified under any system, including the FSC, the Sustainable Forestry Initiative, and the American Tree Farm program. While there is a very low risk of US hardwoods being derived from illegal or controversial sources (Goetzl et al. 2008), a greater effort is still needed to ensure the sustainability and legality of US hardwoods.

The objectives of this article are to (1) identify the export destinations of Appalachian hardwood products, (2) investigate the approximate volume of hardwood products exported to China and identify the preferred wood species, (3) examine potential and existing trade barriers between US producers and Chinese customers, and (4) discuss some ongoing issues related to the hardwood industry in the region.

Methods

A formal mail survey of US Appalachian hardwood exporters was conducted to gather specific market information from their experiences in exporting to China. The survey was designed using Dillman's tailored design method (Dillman 2000). The mailing list of Appalachian hardwood exporters was obtained from the American Hardwood Export Council (2008), the National Hardwood Lumber Association (National Hardwood Lumber Association [NHLA] 2008), and other state agencies. Each mail survey contained a cover letter, a questionnaire, and a postage-paid return envelope. Approximately 1,800 companies were selected as potential hardwood products exporters to represent a preliminary sample frame of all hardwood companies in the Appalachian region. The surveys were conducted in 2008, and the data collected were from 2007. The first surveys were sent to companies in West Virginia in June, and the second surveys were sent to other Appalachian states (Virginia, Kentucky, Pennsylvania, Ohio, Maryland, Tennessee, North Carolina, Mississippi, New York, Alabama, and Georgia) in December. The questions were designed to get answers related to concerns about conducting business overseas, annual production capacity, export destinations of hardwood products, China's market share, volume and species of hardwood products exported to China, the grading rules used, categories of Chinese buyers (import distributor, manufacturer), any potential business barriers, and future trends. Returned surveys were examined for completeness and usability and were then entered into Excel spreadsheets and analyzed using the Statistical Analysis System.

Results

Response rate

Two hundred fifty-five responses were received, of which 241 surveys were usable. Two hundred sixteen surveys were returned undeliverable because of address changes, which reduced the sample size to 1,584. Therefore, the adjusted response rate was 15 percent. Of the respondents, 28 percent reported that they exported hardwood products, and 13 percent and 25 percent of the respondents exported hardwood logs and hardwood lumber, respectively, in 2007. These responses were used in the following analysis.

Export destinations

The national profile of US hardwood product exports showed Canada, China, Italy, Spain, Mexico, United Kingdom, Vietnam, Germany, Hong Kong, and Japan as top export destinations, respectively (USDA 2009). Stringent forest management laws on Canada's government lands make US logs more economically attractive in Canada, even with the added transportation costs. The exchange rate has also been helpful to Canadian importers in recent years. China was the second-largest importer of US hardwood products. It is worth noting that Vietnam has become a rapidly growing market, as export value nearly doubled within the past 4 years. In terms of this study, the frequencies of export destinations of Appalachian hardwood products are summarized in Figure 1. Europe was the most frequent export market for Appalachian hardwood products, followed by China (66%), Canada (49%), Mexico (34%), and Japan (33%). Results showing Europe as the largest export market for Appalachian hardwoods were consistent with findings of a previous survey conducted in 2002 by Hammett et al. (2009). Additionally, some respondents expressed interest in exporting to China. To facilitate their business, however, further information is needed regarding trading processes, custom requirements, targeting potential customers, and preferred payment methods.

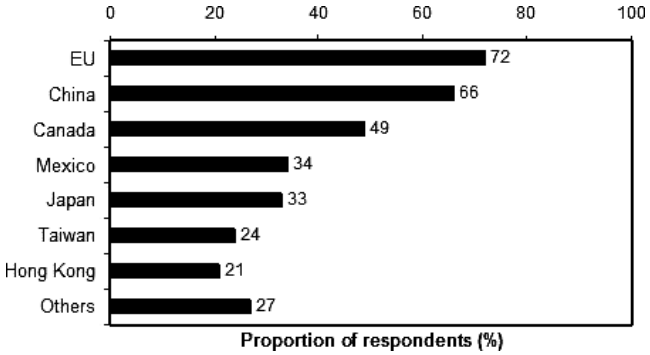

Figure 1.—Proportion of respondents that export hardwood products to each destination in 2007.

Concerns about conducting business overseas

The respondents were asked their major concerns about conducting hardwood business overseas, including tariff, transportation freight, packaging requirements, payments, customs, marketing, consumption culture, and foreign language skills. Transportation freight and payments were the top concerns (Fig. 2), followed by marketing, foreign language skills, customs, and tariffs, respectively. Some respondents indicated freight and payment as the two factors limiting expansion of their overseas business. Transportation freight varies depending on products being shipped, species, grades, and destinations. For example, for a cost, insurance, and freight (C.I.F.) price of $2,500 per thousand board feet (MBF) for red oak veneer logs exported to Shanghai, China, the freight (including insurance and phytosanitary certificate) and fumigation cost would be approximately $2,900 per container, 23 percent of the total sale price ($12,400), given that one container holds about 3.8 MBF of logs. If walnut veneer logs were at $6,000 per MBF of C.I.F. price, the freight and fumigation cost would be about 12 percent. The same principle would apply to lumber as well. Lumber, however, does not require fumigation, and depending on the species, 10 to 24 MBF of lumber per container can be shipped. In regard to payment, several methods can be used to pay for traded hardwood products. Typical payment methods include cash in advance, letters of credit, documentary collections, and open accounts. Of these methods, letters of credit provide the most security and are recommended for international traders. Security of payment is important, as there have been multiple reports of nonpayment or product refusal/claims once delivered to the export destination. These nonpayments were attributed to buyers not having enough cash or credit or no longer needing the delivered products (Virginia Department of Agriculture and Consumer Services 2008). Additionally, hardwood exporters reported having realized the importance of foreign language skills in conducting business overseas. The importance of foreign language skills is consistent with results from Hammett et al. (2009), who reported that 44 percent of survey respondents within the Appalachian hardwood lumber industry had an export manager who spoke a foreign language.

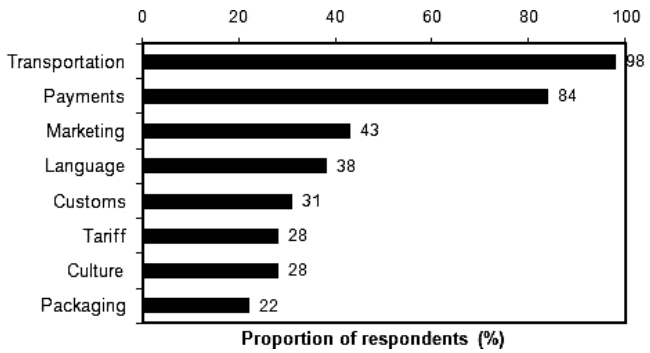

Figure 2.—Major concerns about conducting international hardwood trade.

Production capacity

In a previous study, the average annual lumber production, in 2002, of hardwood exporters in the Appalachian reigon was reported as 12.43 MMBF (Hammett et al. 2009). For the purpose of this study, the surveyed hardwood exporters selling to China ($n = 44$) were divided into five groups based on annual production capacity. Approximately 43 percent of the respondents produced more than 10 MMBF (large scale) of hardwood lumber. These exporters were major hardwood product producers in the Appalachian region as well as North America. Nine, 11, and 11 percent of the respondents produced 7.5 to 10 MMBF (medium to large), 5 to 7.5 MMBF (medium), and 2.5 to 5 MMBF (medium to small) of hardwood lumber, respectively. Fourteen percent of the respondents were small-scale exporters and produced less than 2.5 MMBF of hardwood lumber annually. The remaining 12 percent of respondent companies did not reveal their annual production. The relationship between annual production capacity and their export proportions of the surveyed companies was analyzed, and we found no statitistically significant difference between these two factors (Table 1). The export proportion for the large-scale producers (i.e., those producing more than 10 MMBF) varied from 5 to 95 percent. For the medium to large producers, the export proportion ranged from 35 to 75 percent. Most of the large-scale hardwood product producers exported 20 to 40 percent of their total production to international markets. On average, approximately 31 percent of their exports went to China ($n = 16$, SD $= 18\%$).

Hardwood products exported by volume

The total US hardwood log exports, excluding alder, to China in 2007 was approximately 84 MMBF (assuming 1 MBF $= 4.59$ m^3; USDA 2009). According to the survey results, approximately 11.4 MMBF of Appalachian hardwood logs were exported to China by the respondents in 2007. As compared with a previous study (Wang et al. 2010), a similar amount of hardwood was found to be imported by Chinese consumers from the Appalachian region. During the same period, the United States exported about 242 MMBF of lumber (hardwood and softwood) to China, of which 87 percent was temperate hardwood lumber (88% of the total lumber exported in terms of value; USDA 2009). The total surveyed volume of Appalachian hardwood lumber exported to China was 145.3 MMBF, accounting for 69 percent of the total US hardwood lumber exports to China. Figure 3 shows percentages of hardwood logs and lumber exported to China by states within the Appalachian region. West Virginia, Ohio, and Virginia were the top three

Table 1.—Export proportion and lumber product (grade and species) mix by annual production capacity (n = 30).[a]

	Frequency (%) of lumber products exported by production capacity (MMBF)				
	Large (>10) ($n = 16$)	Medium–large (7.5–10) ($n = 4$)	Medium (5–7.5) ($n = 4$)	Medium–small (2.5–5) ($n = 4$)	Small (<2.5) ($n = 2$)
Export proportion					
Minimum	5	35	2	20	40
Mean	27	49	28	59	40
Maximum	95	75	70	85	40
Grade exported					
FAS	24	16	5	30	10
Select	5	0	1	3	0
No. 1 Common	52	56	56	15	54
No. 2 Common	19	28	38	52	36
Species exported					
Ash	19	0	25	0	50
Black cherry	44	25	0	25	0
Black walnut	38	50	25	50	50
Hard maple	25	50	25	0	0
Hickory	31	50	0	50	0
Red oak	88	75	75	50	50
Soft maple	19	50	25	0	0
White oak	88	50	50	75	50
Yellow poplar	75	100	50	75	50

[a] The exporters who did not reveal the export proportion and product mix were not included.

hardwood logs exporting states, respectively, to the Chinese market. West Virginia was also the largest hardwood lumber exporting state to the Chinese market, followed by Virginia and Mississippi, respectively. In terms of value-added wood products (i.e., lumber, plywood, veneer, wood containers, flooring and trusses, manufactured homes, and prefabricated wood buildings, etc.) exported to China, West Virginia ranked fifth in the Appalachian region, following North Carolina, Virginia, Georgia, and New York (USDC 2009).

Hardwood products exported by species

The Appalachian region is home to a variety of hardwood species, such as oak, maple, cherry, yellow poplar, walnut, ash, beech, birch, hickory, and basswood. Oaks represent the largest and most important regional hardwood species in terms of growing stock. Our survey showed that red oak makes up 35 to 70 percent of total production for most hardwood producers. Various species of hardwood products are exported from the Appalachian region to China. Approximately 37 percent of the respondents exporting hardwood products to China exported red oak logs, followed by white oak (29%), black walnut (20%), black cherry (14%), and hard (sugar) maple (11%) logs. The frequency of hardwood lumber exported out of Appalachian region by species was as follows: red oak (66%), white oak (66%), yellow poplar (66%), black walnut (37%), hickory (29%), black cherry (26%), hard maple (23%), and soft maple (17%). According to the national statistics, the top five species of US hardwood logs exported to China (by value) were black walnut, red oak, yellow poplar, white oak, and cherry, and the top five hardwood lumber species were yellow poplar, red oak, western red alder, white oak, and maple (USDA 2009). The frequencies of lumber products exported, in percentage, by species and production capacity are shown in Table 1. For example, 88 percent of large-scale companies exported red oak and white oak lumber. Overall, by proportion, red oak, white oak, and yellow poplar were the major lumber species exported by the surveyed companies (Table 1).

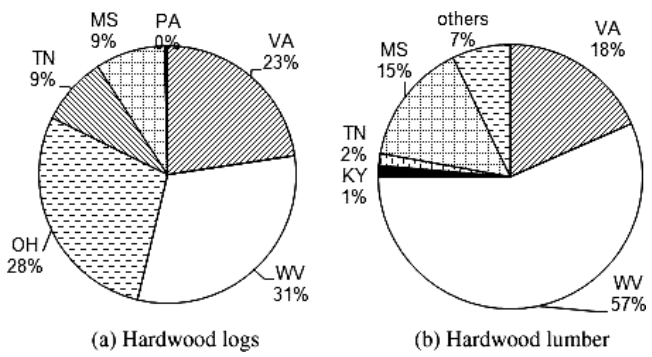

Figure 3.—Hardwood logs (a) and lumber (b) exported to China by state.

Hardwood products grade

Respondents were asked to mark the grading rules used and the percentage of hardwood lumber exported to China by grade. Approximately 74 percent of the respondents used NHLA rules to grade their lumber, and 38 percent used propriety grading rules. Because of growing export markets, Hammett et al. (2009) reported that Appalachian hardwood producers increased production of higher-grade lumber (i.e., FAS/1-Face or Selects). Thirty-four of 44 respondents (77%) who exported to China indicated their proportions of exported hardwood lumber and respective grades. The frequency of lumber products exported, as a percentage, is shown in Table 1. For large-scale companies, 52 and 19 percent of their lumber exports were No. 1 Common and No. 2 Common, respectively. However, there was no clear trend regarding the specific grades exported by companies

Table 2.—Summary of proportion of hardwood lumber exported by grade, in percentage (n = 34).

Lumber grade	Overall[a]	Minimum	Mean	Maximum
FAS	50	3	20.7	100
Select	9	5	2.5	60
No. 1 Common	68	10	46.5	100
No. 2 Common	59	10	27.3	75

[a] Overall refers to the percentage of respondents with respect to hardwood lumber grades. Often exporters export hardwood lumber of multiple grades.

of different production scales. Regarding all the respondents exporting hardwood lumber to China, approximately 50 and 9 percent of them exported FAS and Select hardwood lumber, respectively. Additionally, there was a wide variation in the export percentage of FAS lumber among the respondents, ranging from 3 to 100 percent (Table 2). The most frequently exported hardwood lumber grades were No. 1 Common and No. 2 Common and accounted for 68 and 59 percent of the respondents, respectively. This result is slightly different from a previous study by Bowe et al. (2007) that indicated that FAS and No. 1 Common were the top two grades exported from the United States to China.

Future trends in hardwood exports

As a response to globalization, the Appalachian hardwood industry has worked to develop better customer relations, searched aggressively for new markets, and sold a larger proportion of production in export markets (Buehlmann et al. 2007). Respondents were asked about actions they plan to take in the coming years given the current state of domestic and foreign (e.g., China) hardwood markets. Most respondents said that they will actively promote their products by traveling to make new contacts and serve overseas customers. Thirty-two percent of the respondents who export to China indicated that they will increase exports, 9 percent will reduce their exports, and 41 percent will remain at the same level. Some hardwood companies experiencing problems during the trading process or impacted by the domestic housing market decided to reduce production and further decrease exports. Most companies, however, chose to either increase exports or stay at an unchanged level, thus indicating that they regard China as an important oversea market in the near future. Even though export markets do not make up a large percentage of the demand for hardwood products, some manufacturers have sought out and found success in foreign markets such as China.

Discussion

Appalachian hardwood products have been exported to more than 150 countries throughout the world. China has become the second-largest consumer of US hardwoods, trailing only Canada. Russia, the largest wood supplier to China, is scheduled to increase export tariff on logs to 80 percent at the end of 2009 (CIBC World Markets 2007). If increased, this presents a strong export growth opportunity for the US hardwood industry. American hardwood products are generally more expensive than equivalent products from China, Southeast Asia, Africa, or Russia. The weak US dollar, however, can improve US wood products' competitiveness and make them more affordable in the Chinese

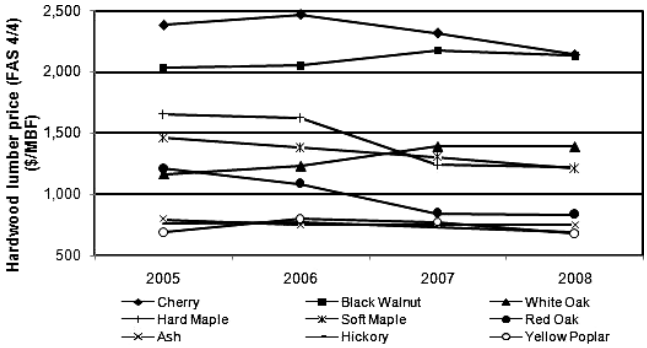

Figure 4.—Hardwood lumber price in the Appalachian region (Hardwood Market Report 2008, Hoover and Preston 2008).

market. Regional differences in taste, income levels, and acceptance of foreign products must be considered when conducting business with China as well as a sound understanding of cultural differences within the country (Trachtenberg 1997). Appalachian hardwood logs primarily enter through metropolitan areas in eastern and north-central China (e.g., Beijing and Shanghai). Hardwood lumber importers are located mainly in eastern, southern, and north-central China (Wang et al. 2010). A small percentage of wealthy Chinese in these regions represents a large and growing market for US hardwood exporters.

While exports of Appalachian hardwood products to China have steadily increased in recent years, the US hardwood industry has experienced increasing expenses, decreasing prices, and soft markets for wood products. Figure 4 shows the trend of Appalachian hardwood lumber prices over the past 4 years. The price of red oak, the most abundant Appalachian hardwood species, has dropped 31 percent from its peak value in 2005. With regard to international trading, the average red oak selling price for FAS from the Appalachian region has dropped nearly 40 percent (from $3,776/MBF to $2,242/MBF) over the past 4 years. Meanwhile, production costs have gone up 25 to 40 percent during the same period. A potential increase in phytosanitary certificate costs from $50 to $99 per container will also pose export challenges for US hardwood industries.

Freight rates increases and container shortages are increasing problems for hardwood exporters. Our study showed that 55 percent of respondents export their products via East Coast ports such as Savannah, Charleston, Norfolk, and New York, while 11 percent export via West Coast ports. West Coast congestion and costly long-distance inland transportation are the main reasons that most people choose East Coast ports. Transportation cost for a hardwood sawmill located in an inland state, such as West Virginia, accounts for a large proportion of product price. Transportation cost, at its highest point last year, was nearly equal to the value of 4/4 No. 2 Common poplar. While domestic housing and financial markets have slumped, many companies reported a rise in their export business that helped offset the domestic market's downturn. Naka et al. (2009) reported that 92 percent of hardwood exporters had container-loading facilities. A shortage of shipping containers, however, has hindered the industry's ability to get their products to market. The container shortage, coupled with rising demand, could push container pricing to a high level.

Summary and Conclusions

Our study showed that approximately 11.4 MMBF of hardwood logs and 145.3 MMBF of hardwood lumber were exported to China by the respondents in 2007. Approximately 37 percent of the respondents who exported hardwood products to China exported red oak logs, followed by white oak, black walnut, black cherry, and hard (sugar) maple. Red oak, white oak, yellow poplar, black walnut, hickory, cherry, hard maple, and soft maple were the top species of hardwood lumber exported to China. It was noticed that a majority of large companies exported red oak, white oak, and yellow-poplar lumber. Meanwhile, there was no clear trend regarding the specific grades exported by companies of different production scales. Based on the survey, we found that freight costs and payments are the limiting factors for hardwood producers when considering expanding their business overseas. The continued decreasing hardwood price makes it difficult for Appalachian hardwood producers to maintain profit margins. Because of the current housing market, there is reason to believe hardwood exports will become increasingly important for the US hardwood industry in the near future. China continues to show strong demand for forest products because of the Chinese government's stimulus package, housing construction and decorations, existing facilities, technology improvement, and cost advantages (Wang et al. 2010). Given these factors, China has the potential to be an increasingly important export destination for Appalachian hardwood producers.

Acknowledgments

The authors acknowledge the USDA Forest Service, Wood Education and Resource Center, for providing financial support to this study.

Literature Cited

American Hardwood Export Council (AHEC). 2008. Supplier directory. AHEC, Washington, D.C.

Bowe, S. A., M. S. Bumgardner, and X. Wang. 2007. An assessment of hardwood lumber markets in China. *In:* Proceedings of 15th Central Hardwood Forest Conference, D. S. Buckley and W. K. Clatterbuck (Eds.), February 27–March 1, 2006, Knoxville, Tennessee; USDA Forest Service Southern Station, Asheville, North Carolina. pp. 460–469.

Buehlmann, U., M. Bumgardner, A. Schuler, and M. Barford. 2007. Assessing the impacts of global competition on the Appalachian hardwood industry. *Forest Prod. J.* 57(3):89–93.

China Forest Certification Network. 2009. Directories of Chinese companies receiving FSC forest management certification. www.cfcn.cn/xiang.asp?id=861. Accessed April 6, 2009.

CIBC World Markets. 2007. Russia plans to dramatically increase its export tax on logs. www.bc-forum.org/pdf_pubs/presentation/CIBC_RussiaLogExportTax_022207.pdf. Accessed September 26, 2009.

Dillman, D. A. 2000. Mail and Internet Surveys: The Tailored Design Method. 2nd ed. John Wiley & Sons, New York. 464 pp.

Dye, R. 2009. Challenging times. The 23rd Annual A. B. Brooks Forestry Symposium, February 6–7, 2009; West Virginia Division of Forestry, Charleston.

Goetzl, A., P. Ellefson, P. Guillery, G. Dodge, and S. Berg. 2008. Assessment of lawful harvesting and sustainability of US hardwood exports. www.ahec-europe.org/fileadmin/docs/Seneca_Creek_Study/Seneca_Creek_Study_-_Executive_Summary.pdf. Accessed February 16, 2009.

Gregg, R. and A. Porges. 2008. Amendment to the U.S. Lacey Act: Implications for Chinese forest products exporters. www.illegal-logging.info/uploads/LaceyActBriefChinaEN.pdf. Accessed March 28, 2009.

Hammett, A. L., K. Naka, and B. Parsons. 2009. Changes in Appalachian hardwood lumber exporter practices, 1989–2002. *Forest Prod. J.* 59(3):47–52.

Hardwood Market Report. 2008. Hardwood Market Report. Memphis, Tennessee.

Hoover, W. L. and G. Preston. 2008. 2008 Indiana forest products price report and trend analysis. Purdue Extension FNR-177-W. www.ces.purdue.edu/extmedia/FNR/FNR-177-W.pdf. Accessed June 20, 2009.

Luppold, W. G. 1995. Regional differences in the eastern hardwood sawmilling industry. *Forest Prod. J.* 45(10):39–43.

Luppold, W. G., J. Baumgras, and G. Barrett. 2000. Characteristics of the eastern ''grade'' hardwood sawmilling industry. *Forest Prod. J.* 50(9): 23–27.

Missouri Timber Price Trends. 2007. Washington: Proposed bill seeks to curb trade in illegal timber, January–March. http://agebb.missouri.edu/mkt/timber/arc/v17n1/bull9v.htm. Accessed September 26, 2009.

Naka, K., B. A. Parsons, and A. L. Hammett. 2009. Hardwood lumber industry in the Appalachian region: focus on exports. *Forestry Chron.* 85(1):75–81.

National Hardwood Lumber Association (NHLA). 2008. Membership directory. NHLA, Memphis, Tennessee.

Peck, T. 2002. The international timber trade. *Forest Prod. J.* 52(9): 10–19.

South Carolina Forestry Commission. 2009. Forest management facts. www.state.sc.us/forest/refmgt.htm. Accessed March 1, 2009.

Trachtenberg, E. 1997. China could offer a growing market for U.S. wood exports. www.fas.usda.gov/info/agexporter/1997/March%201997/chinawood.html. Accessed April 15, 2010.

US Department of Agriculture (USDA). 2009. Foreign Agriculture Service online database. www.fas.usda.gov/Ustrade. Accessed March 28, 2009.

US Department of Commerce (USDC). 2009. TradeStats Express online database. http://tse.export.gov. Accessed March 20, 2009.

US Department of Commerce (USDC), Bureau of the Census. 2005. Lumber production and mill stocks 2004. MA 321 (04)-1. USDC, Bureau of the Census, Washington, D.C. 13 pp.

Virginia Department of Agriculture and Consumer Services. 2008. Virginia forest products export news. www.vdacs.virginia.gov/international/pdf/forestnews.pdf. Accessed March 8, 2009.

Wang, J., J. Wu, and J. Armstrong. 2010. An analysis of Appalachian hardwood products in the Chinese market. *Wood Fiber Sci.* 42(1): 71–80.