Small enterprises' importance to the U.S. secondary wood processing industry

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ABSTRACT

The past decades have seen numerous U.S. secondary wood processing companies shift their production to overseas locations, mainly in Southeast Asia. The remaining companies have been hit hard by the downturn in housing markets and the following recession. Thus, many large customers of the U.S. hardwood lumber industry have reduced or stopped the purchase of products, leaving mostly smaller firms as the drivers of demand for the U.S. hardwood industry. Therefore, it has become important to understand these small firms' needs in the current business environment.

This study consisted of a mail survey asking participants in six U.S. states questions to help determine the unique characteristics of small firms in the woodworking industry. Both large and small firms attributed much of their success to their manufacturing capabilities and leadership prowess. However, small firms used less formal paths to gather information and planned less investments. Small firms, in general, also purchased more hardwood lumber using hardwood distributors and requested fewer specialized services from their lumber suppliers.

1. INTRODUCTION

The U.S. manufacturing sector has experienced many challenges during the past decades, with manufacturing employment recently reaching its lowest level since 1950 (Pierce and Schott 2012, Forbes 2004) and problems being exacerbated further by the recent economic recession (International Forest Industries 2009). The major driver behind the decline of U.S. manufacturing competitiveness in many sectors is the ongoing globalization of trade. Unfortunately, these trends have affected many parts of the wood products industry, with U.S.-based hardwood lumber-consuming industries such as furniture, flooring, and millwork being especially hard hit by the worldwide opening of markets for goods and services. More recently, U.S. woodworkers also have been impacted by the housing and global financial crisis, which has dampened demand for construction-based wood products such as cabinets. The decline in manufacturing operations producing hardwood-based products has resulted in a corresponding decline in the demand for hardwood lumber as well. These declines affected the industries and forest landowners upstream from the final manufacturer (Grushecky et al. 2006).

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To counteract these unfavorable trends, efforts are needed to support and grow local, regional and national industries using U.S. hardwoods. The increasing importance of the customized economy, where customers expect products and services to be customized to their needs and expectations (Schuler and Buehlmann 2003, Lihra et al. 2008, Buehlmann and Schuler 2009), call for nimble entities that are able to interact with individual customers and quickly deliver the desired product or service. Small enterprises are well positioned to provide high levels of customization while also being able to profit from those trends. Their size makes them flexible to tailor products and services to particular market niches and needs, which helps them overcome some of the other inherent disadvantages of being small (Penrose 1995). Several studies have highlighted the importance of small enterprises* and their crucial role in economic and social welfare (Storey 2003, Mulhern 1995). Such enterprises provide local employment, supply needed products and services to local end-users and enterprises, are flexible and innovative, and have the potential to grow into larger, national and international enterprises over time.

For example, Bumgardner et al. (2011) showed the potential of small businesses serving a market niche and being located in a local industry cluster. The Amish wood furniture cluster in Ohio, consisting of nearly 500 companies with a median size of 4 employees, expanded operations while U.S.-based manufacturing in the broader U.S. furniture industry declined. Nearly all of these Amish furniture firms are small enterprises, focusing on narrow market segments and sourcing wood materials and components from local and regional markets.

The objective of the current study was to better understand the importance of small enterprises active in the secondary U.S. forest products industry in the current business environment. Although small enterprises are becoming increasingly important to hardwood lumber demand in the United States, they might at the same time present new challenges to hardwood suppliers, as smaller orders to more customers must be facilitated (Buehlmann et al. 2010). Six eastern hardwood states were included in the study, including Virginia (VA), West Virginia (WV), Ohio (OH), Wisconsin (WI), Tennessee (TN), and North Carolina (NC). Questions pertaining to the competitive attributes of small firms were analyzed. Also of interest were the sourcing practices and informational and training needs of smaller wood products firms. Such information is important in assisting the secondary hardwood industry and determining research priorities, especially for the numerous smaller firms that are increasingly important to the U.S. hardwood market.

2. METHODS

2.1 QUESTIONNAIRE

Secondary hardwood forest products manufacturers in the study states were surveyed in 2011 using Dillman's (2009) Total Design Method. A questionnaire was developed and pre-tested by members of academia and five secondary hardwood forest products manufacturers, resulting in some questionnaire adjustments. The final questionnaire consisted of 26 questions and covered aspects related to firm characteristics, perceptions about the competitive environment, supply chain issues, and information needs. The survey employed questions with categorical responses, rating responses (5-point scales), and open-ended questions (qualitative responses).

2.2. DATA COLLECTION

An address list was compiled using state directories supplied by researchers or extension professionals in the study states. Addresses for OH were compiled by Virginia Tech using Manta's online business listings, the manufacturer index of the Wood Products Manufacturers Association, and the membership list of the Architectural Woodwork Institute. The final list contained 4,980 firms.

After the initial mailing in the spring of 2011, a reminder postcard, another questionnaire with accompanying letter, and one last reminder postcard were mailed with a two-week separation between each mailing. At the closing of the survey, 395 usable questionnaires were obtained. For another 337 entities, responses either were not usable (many being primary manufacturers not included in the target population) or the company had gone out of business, etc. After accounting for these firms, the adjusted response rate was 9 percent. Usable responses were obtained from each of the six states (as well as a few in other states), while some respondents chose to not indicate their state: VA (n=99), NC (n=83), WI (n=81), OH (n=75), WV (n=21), TN (n=12), other states (n=12), state not indicated (n=12).

* In the U.S., small businesses are those with less than 500 employees, according to the Small Business Administration. In the EU, small business have less than 50 employees and medium sized businesses less than 250 employees. For studies in forest products, small firms have been defined as much smaller, for example with fewer than 20 employees (Bumgardner et al. 2011).

Nonresponse bias was assessed by comparing early and late respondents, assuming there is a continuum from early respondents to late respondents, and that late respondents can be used as a proxy of nonrespondents (Lahaut et al. 2003). Respondents were categorized as early respondents (n=267) or late respondents (n=128) depending on whether they returned the questionnaire from the first or second mailing. Four categorical variables were analyzed using Chi-Square tests of independence, including number of employees, sales in 2010, change in sales from 2010 to 2011 (better, worse, or unchanged), and type of product produced (cabinets, furniture, architectural millwork/fixtures, and other). None of the tests were significant indicating that early and late respondents were similar in terms of size, performance, and product types produced, and thus that nonresponse bias was not a major factor in the study. However, some caution is warranted in interpreting the results given the low response rate.

Responses were obtained primarily from company owners (53 percent), and also from persons in corporate or operations management (32 percent), production management/engineering (4 percent), marketing, sales, and design (3 percent), and 8 percent either worked in other positions or indicated more than one of the above categories (8 percent). In terms of products manufactured, kitchen/bath cabinet companies represented 22 percent, followed by architectural millwork/store fixtures (16 percent), furniture (including household, upholstered, institutional, 14 percent), wood components (10 percent), flooring (6 percent), wood windows/doors (3 percent), and 29 percent indicated another product type or produced a combination of the above. Most respondents operated at higher price-points, with 75 percent indicating their price point was either medium or medium-to-high. Most respondents also indicated that they produced mostly made-to-order (61 percent) or semi-custom (21 percent) products, with only 16 percent producing stock items and 2 percent producing in multiple categories.

Hardwood lumber was, with an average of 45 percent, the largest component of wood materials costs for responding companies, followed by composite and engineered products (27 percent), softwood lumber (17 percent), dimension and components (7 percent), and other (4 percent). Fourteen percent of respondents indicated that their firm has increased the use of imported finished products over the past 5 years, while 21 percent indicated that their company had increased the use of imported components or lumber over the same period. Conversely, only 16 percent of respondents indicated that their firm had increased the export of their products outside of the United States over the last 5 years. Eighty-one percent of respondents worked in a single-facility company and 63 percent of respondents worked in a company with less than 20 employees. Similarly, 52 percent of respondents reported sales of $1 million or less and another 25 percent had sales between $1 million and $5 million. Thus, the sample generally reflected the perceptions and practices of small firms, although further breakdown by small and large firms was used in the following analyses to help further discern characteristics of small firms.

3. RESULTS AND DISCUSSION

Factors important to business success

Respondents were presented with a list of fourteen factors and asked to choose four that they perceived to be the most important to the success of their business. Seven of the factors were classified (by the researchers, consistent with Rogoff et al. (2004)) as being external to individual firms and seven were classified as internal factors, but this was not indicated on the questionnaire. The results are shown in Table 1. Respondents chose *manufacturing capabilities* the most frequently, followed by *general economic conditions*, and *cost of raw material and energy inputs* as the top three factors. While there was a general trend of external factors being rated as less important overall (four of the bottom five), external factors also represented two of the top three positions. Thus, in general, both types of factors were seen as impacting the success of secondary wood products manufacturers in the current business environment. Many internal factors such as marketing activities, human resources management, and owner/manager characteristics also were rated relatively highly.

The results in Table 1 were then broken down by firm size to make comparisons between "small" (1-19 employees) firms (n=240) and "large" (20+ employees) firms (n=142). Both groups ranked *manufacturing capabilities*, *economic conditions*, and *costs of raw material/energy* as the most important factors. However, for small firms, *marketing activities* and *owner/manager characteristics* were especially important while *organizational efficiency* and *product characteristics relative to the competition* were especially important for large firms; all four of these factors could be considered as internal to the individual firm.

Table 1: Factors most important to the success of respondents' businesses

Factor	Percent of firms indicating[1]	External (E) or internal (I) to the firm[2]
Manufacturing capabilities (e.g., ability to make profitable products, quality control, efficiency)	63%	I
General economic conditions	57%	E
Cost of raw material and energy inputs	43%	E
Marketing activities (e.g., reaching new customers, good customer service, effective product promotion)	36%	I
Human resources management (e.g., organizational efficiency, ability to hire good people, employee morale)	32%	I
Individual characteristics of owners/managers (e.g., hard work, ethics, knowledge, dedication)	30%	I
Overall consumer expenditures in our company's product class	25%	E
Product characteristics relative to competition	24%	I
Organizational efficiency (e.g., ability to make quick decisions, ease of implementation)	22%	I
Financing opportunities (e.g., loan availability)	13%	E
Regulatory conditions	9%	E
Upper management decision-making (e.g., investments, expansions)	7%	I
Competition-driven innovation	7%	E
Industry-wide technology advancements that improve efficiency/product capabilities	6%	E

[1] Each respondent was asked to check four factors, thus the total is greater than 100%

[2] As predetermined by the authors

Planned investment areas for the next five years

Respondents were presented with a list of fourteen potential areas for investment and asked to indicate in which of these areas they planned to make significant investments during the next five years. Results are shown in Figure 1. The greatest number of firms planned investments in *advertising/marketing communications*, *employee training*, *finishing*, and *sales force expansion/development*. Overall, business management related investments (especially related to marketing and sales) seemed to be generally rated higher than manufacturing investments, with *finishing* and *assembly* being the highest rated manufacturing investments.

In general, large firms planned more investment activity across more areas than did small firms. *Sales force expansion/development* and *employee training* rank especially high as investment targets for large firms. Smaller firms, conversely, plan more investments in *advertising/marketing* and *e-commerce*. Finishing ranked as important to both small (2nd) and large (3rd) firms.

Information sources to learn of trends in the industry

Respondents were asked about their use of several potential sources of information to learn about trends in the industry. *Conversations with customers* were the most frequent way that industry participants obtained information about trends in the industry, followed by *word of mouth from other industry participants* and *magazines/newspapers*.

When separating the responses by small and large firms, some differences could be observed (Figure 2). Conversations with customers remained the leading source for both small and large firms. Large firms, however, made more frequent use of *word of mouth from other industry participants*, *attendance at meetings or workshops*, and *visiting retail and other stores* than did small firms. Information sources relating to designers/consultants, websites/list serves, and magazines/newspapers were all rated similarly, on average, by both small and large firms.

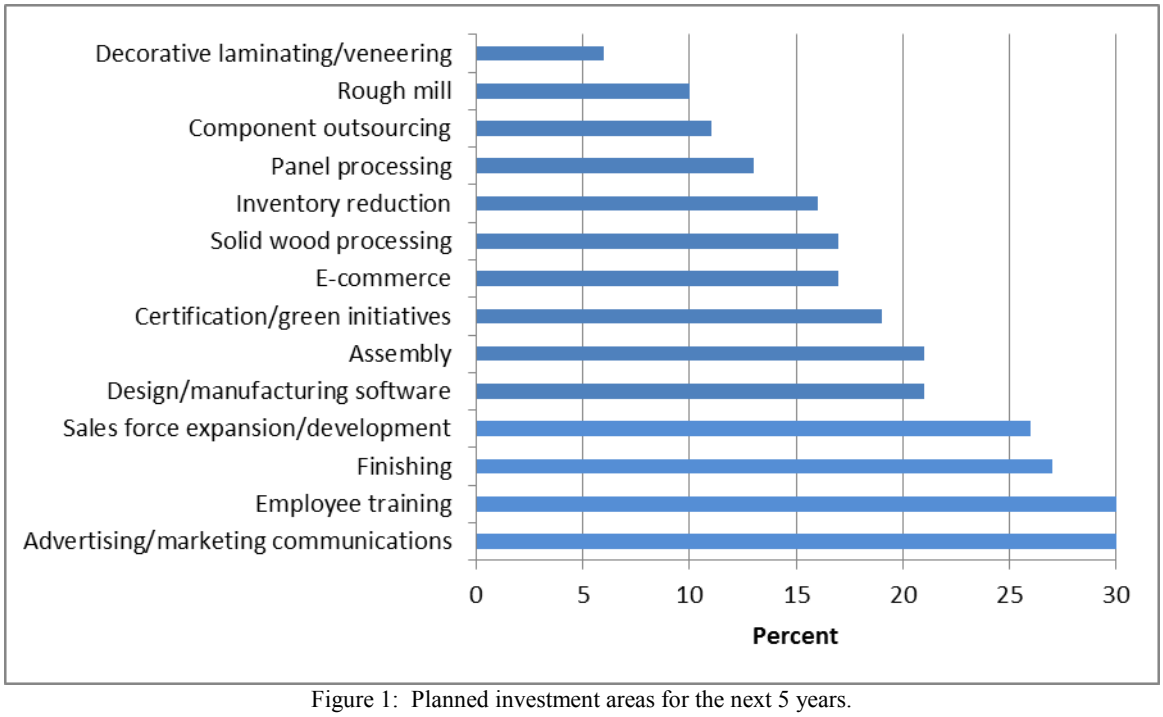

Figure 1: Planned investment areas for the next 5 years.

Areas of Perceived Training Needs

Respondents were presented with an open-ended question asking them to list three individual skills or competencies that, if they personally had more training in, might improve their firm's profitability. By a large margin, the most frequently mentioned area was marketing and sales. This broad area also included those indicating a need to learn more about industry trends, and to better understand internet and online sales. Small firms have been shown to be especially interested in investing in marketing-related skills, and attribute success to marketing activities (Buehlmann et al. 2013). The second most frequently mentioned area was in finance, which included those desiring more training in accounting and costing. Several other areas also received numerous mentions, including management and leadership skills, engineering and manufacturing skills (including technology and woodworking), computer skills, knowledge of lean and continuous improvement, communication skills (including negotiation and motivating employees), design/CAD (Computer Aided Design), general "business" knowledge, and better understanding of legal processes (such as contract law) and regulatory compliance and reporting. Some training areas that were not mentioned as frequently included stress management, chemistry, learning a foreign language, and grant writing.

Hardwood lumber sourcing and services requested

Respondents were asked to indicate the proportion of their hardwood lumber that came from several possible sources, including sawmills, distributors/concentration yards, brokers, and others. Differences existed between the sourcing practices of small and large firms, which were quite pronounced. While large firms sourced 45, 39, and 16 percent of their hardwood by volume directly from sawmills, distributors/concentration yards, and brokers/ other sources, respectively, whereas the percentages for small firms were 29, 59, and 13 percent, respectively. It appeared that distribution/concentration yards were especially important to small firms, a trend also noted in other studies (Buehlmann et al. 2010). However, at the same time, small firms also seemed to request fewer services of their lumber suppliers than did large firms, with only S2S being requested substantially more by small firms than large firms (Figure 3). Large firms, conversely, generally demanded more services overall, particularly, *special grading*, *just-in-time orders*, *color sorting*, *certified products*, and *double-end trim*.

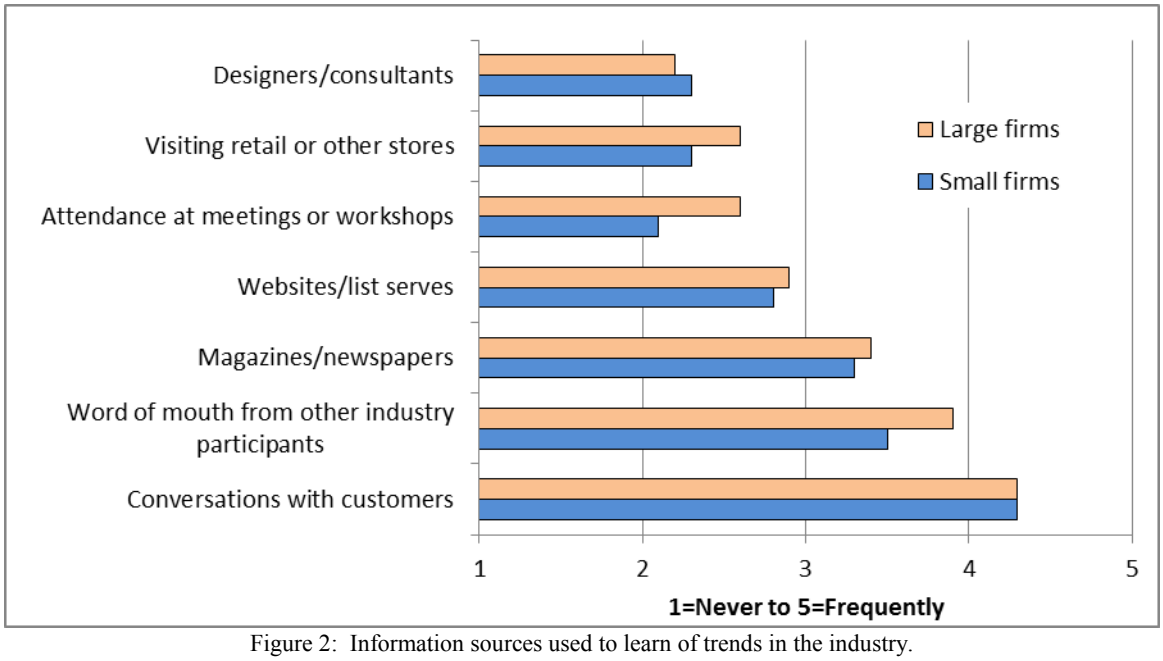

Figure 2: Information sources used to learn of trends in the industry.

Lean practices

The survey also inquired about companies' practices concerning Lean, a management philosophy pursuing more effective and efficient operations through the elimination of waste. Fifty-five percent of all respondents indicated that they are implementing Lean in their operation, while another 9 percent are planning to implement Lean. The remaining 36 percent do not have any plans to pursue Lean in their operations.

Overall, a sizeable portion of the respondents knew about Lean and recognized terms like *lean manufacturing* (68 percent), *lean management* (53 percent), *lean production* (51 percent), *lean thinking* (33 percent), and *Toyota Production System* (29 percent). However, there were notable differences by firm size, with large firms being somewhat more familiar with all of the lean terms investigated (Figure 4). Only in the case of *lean manufacturing* did more than 50 percent of small firms indicate that they had heard of the term.

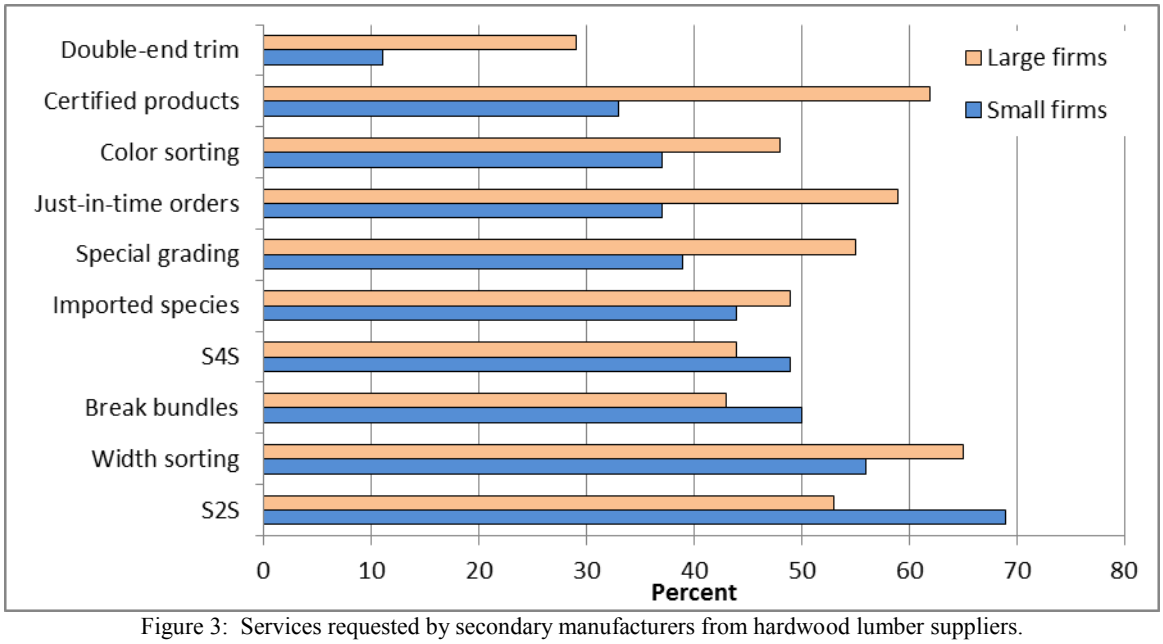

Figure 3: Services requested by secondary manufacturers from hardwood lumber suppliers.

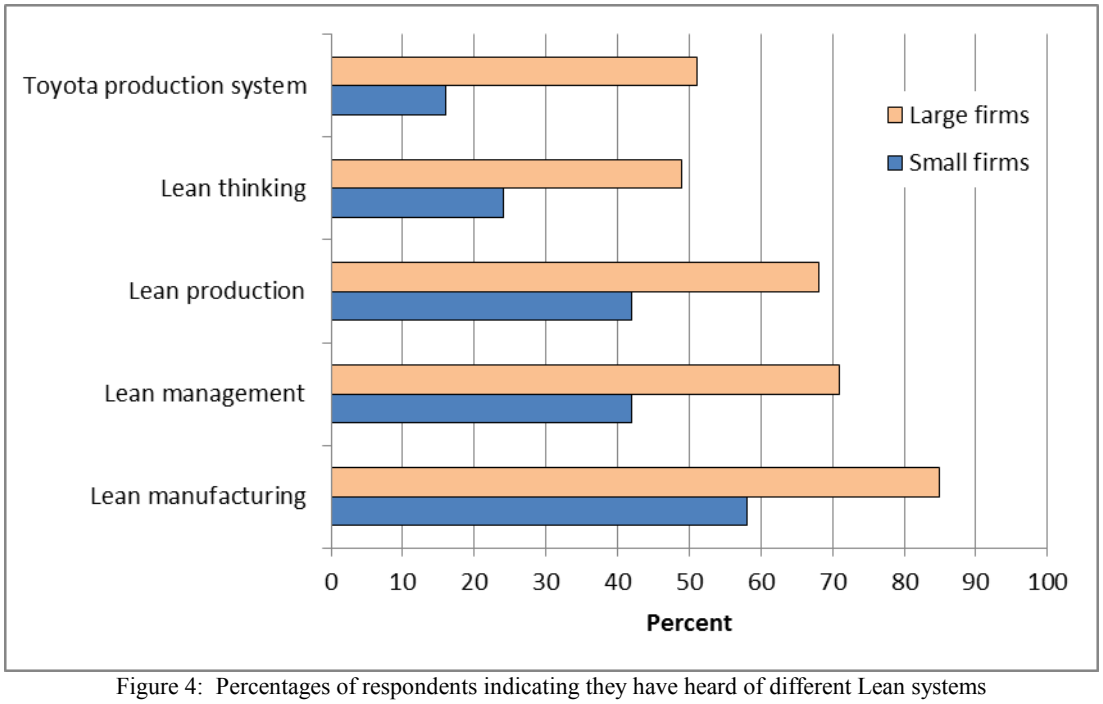

Figure 4: Percentages of respondents indicating they have heard of different Lean systems

4. SUMMARY

This research investigated current perceptions and practices of firms in the U.S. secondary hardwood industry. Focus was given to factors and issues particularly important to small enterprises, defined as firms with less than 20 employees. Such firms ranked their manufacturing capabilities, external economic conditions, and input costs as the most important factors affecting the success of their businesses in the current environment. Small firms' investment plans were found to focus on marketing communications, finishing, and employee training. Also, these small firms rely mostly on conversations with customers to gather information regarding industry trends and rely on distributors & concentration yards to source the majority of their hardwood lumber, even though they requested fewer services from their suppliers. It was encouraging that many firms expressed familiarity with several Lean terms, and a majority of the overall sample reported to be implementing Lean practices, However, most small firms were not familiar with several Lean terms.

As summarized here and elsewhere (see Buehlmann et al. 2013 for more in-depth analysis and related discussion), small and large firms in the secondary wood products industry can differ in substantive ways. Discerning these differences is critical given small firms' important role in U.S. hardwood markets. Understanding the needs of smaller manufacturers is becoming increasingly important to analyzing demands for hardwood lumber and the associated product specifications and distribution channels.

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6. REFERENCES

Alreck, P. L. 2004. *The Survey Research Handbook,* 3rd ed., McGraw-Hill/Irwin, Boston, MA. 463 p.

Buehlmann, U. and A. Schuler. 2009. The U.S. household furniture manufacturing industry in 2008 – status and opportunities. Forest Products Journal. 59(9):20-28.

Buehlmann, U., O. Espinoza, M. Bumgardner, and B. Smith. 2010. Trends in the U.S. hardwood lumber distribution industry: changing products, customers, and services. Forest Products Journal. 60(6):547-553.

Buehlmann, U., M. Bumgardner, and M. Sperber. 2013. How small firms contrast with large firms regarding perceptions, practices, and needs in the U.S. secondary woodworking industry. BioResources. 8(2):2669-2680.

Bumgardner, M.S., G.W. Graham, P.C. Goebel, and R.L. Romig. 2011. How clustering dynamics influence lumber utilization patterns in the Amish-based furniture industry in Ohio. Journal of Forestry. 109(2):74-81.

Bumgardner, M., U. Buehlmann, A. Schuler, and J. Crissy. 2011. Competitive actions of small firms in a declining market. Journal of Small Business Management. 49(4):578-598.

Dillman, D.A. 2009. *Internet, Mail, and Mixed-mode Surveys: The Tailored Design Method,* 3rd ed., Wiley & Sons, Hoboken, N.J. 499 p.

Forbes, K.J. 2004. U.S. manufacturing: Challenges and recommendations. NABE 2004 Washington Economic Policy Conference. March 25, 2004. url: http://www.whitehouse.gov/cea/forbes_nabe_usmanufacturing_3-26-042.pdf. Accessed on Jan. 6, 2008.

Grushecky, S.T., U. Buehlmann, A. Schuler, W. Luppold, and E. Cesa. 2006. Decline in the U.S. furniture industry: a case study of the impacts to the hardwood lumber supply chain. Wood and Fiber Science. 38(2):365-376.

International Forest Industries. 2009. *Updated softwood lumber market outlook for the US*. http://www.internationalforestindustries.com/-2009/11/19/updated-softwood-lumber-market-outlook-for-the-us/

Lahaut, V.M.H.C.J., H.A.M. Jansen, D. van de Mheen, H.F.L. Garretsen, J.E.E. Verdurmen, and A. van Dijk. 2003. Estimating non-response bias in a survey on alcohol consumption: comparison of response waves. Alcohol and Alcoholism. 38(2):128-134.

Lihra, T., U. Buehlmann, and R. Beauregard. 2008. Mass customization of wood furniture as a competitive strategy. International Journal of Mass Customization. 2(3/4):200-215.

Mulhern, A. 1995. The SME sector in Europe: A broad perspective. Journal of Small Business Management. 33(3):83-87.

Penrose, E. 1995. The Theory of the Growth of the Firm. 3rd ed. Oxford, NY: Oxford University Press. 272pp.

Pierce, J. R. and P. K. Schott. 2012. The surprisingly swift decline of U.S. manufacturing employment. National Bureau of Economic Research (NBER) working paper series. Working paper 18655. http://www.nber.org/papers/w18655. Accessed July 7, 2013.

Rogoff, E.G., M.-S. Lee, and D.-C. Suh. 2004. "Who done it?" Attributions by entrepreneurs and experts of the factors that cause and impede small business success. Journal of Small Business Management. 42(4):364-376.

Schuler, A. and U. Buehlmann. 2003. Benchmarking the Wood Household Furniture Industry: A Basis for Identifying Competitive Business Strategies for Today's Global Economy. USDA Forest Service General Technical Report. GTR-NE-304. 18pp.

Storey, D. J. 2003. Enterpreneurship, small and medium sized enterprises and public policies. In: Zoltan, J., B. David and B. Audretsch (Editors). 2003. Handbook of entrepreneurship research: An interdisciplinary survey and introduction. Kluwer Academic Publishers.