Hardwood Lumber Buyer Purchase Attributes and Relationships with Suppliers

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Abstract

The purpose of this study was to examine product and supplier attributes that influence purchase decisions of hardwood lumber buyers in the United States. Specifically, this article explores the influence of buyer–seller relationships compared with other attributes. Results of an electronic survey of 78 hardwood lumber buyers in the United States (National Hardwood Lumber Association's hardwood lumber buyers list) show that product quality, followed by relationship with suppliers, overall service, and price are the top four attributes that affect purchase decisions.

Respondent hardwood lumber buyers purchased more than 50 percent of their lumber volume in 2006 from their top two suppliers (Supplier 1 accounted for about 32% and Supplier 2 accounted for 19% of the total purchase volume). When comparing their top supplier with their second most important supplier, buyers indicated that the top supplier provided higher overall satisfaction, seemed more willing to invest resources and time, and had a greater long-term focus. Our results indicate that unless a supplier is the top supplier, opportunities for partnership and future profitability may not be realized.

The hardwood lumber industry has experienced several changes in the last 50 years as a result of changes in hardwood sawtimber inventory and customer demand. In 1950, few sawmills produced more that 3 million board feet (7,080 m^3) of lumber annually. More recently, however, the industry has been dominated by sawmills producing almost double their production of the 1950s (Powell et al. 1994, Luppold and Baumgras 2000). Most of these production increases were due to improvements in production technology and customer demands for furniture, flooring, cabinets, mouldings, and other hardwood lumber markets—domestic as well as export (Luppold and Baumgras 2000).

Currently, however, most US logging and sawmill companies are under duress due to the combination of a depressed construction market, a global economic crisis, and changing consumer tastes. Additional challenges include the increased use of ready-to-assemble casegoods in the domestic market, competitively priced hardwood lumber products from foreign countries, and construction downturns that have slashed demand of hardwood lumber for markets such as furniture, flooring, and moulding and millwork. Demand in 2008 was estimated to be 8.6 billion board feet, a 36 percent decline since 1999 (Manchester et al. 2009). As a result of weaker demand, prices have declined 10 to 30 percent during the same time period, depending on the species and grade. The resulting dramatic decrease in both demand and prices has led to significant cost rationalization and reduced capacity within the hardwood industry, with many of the larger suppliers reducing shifts or closing their inefficient mills, and many smaller firms exiting the industry (Manchester et al. 2009).

In order to compete more effectively in this dynamic marketplace, domestic suppliers in the hardwood industry need improved strategies to offer the most value to their buyers to keep them over the long term. Past studies report that this value for a commodity product such as hardwood lumber may be delivered through improvement in product quality (Bush et al. 1991, Idassi et al. 1994, Wu and Vlosky 2000, Luppold and Bumgardner 2004, Tokarczyk and Hansen 2006, Spetic et al. 2007) through service differentiation such as on-time and speedy delivery, product warrantees, open communication with suppliers, etc. (Smith 2002, Dasmohapatra and Smith 2008) and by maintaining a better relationship or partnership with the customers over the long term (Bush et al. 1991, Idassi et al. 1994, Smith 2002, Dasmohapatra and Smith 2008). Of the above

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attributes, relationship value has received the least attention in the wood products marketing literature.

General marketing articles suggest that the dimensions of relationships with buyers are intangible in most cases and difficult to quantify but may be profoundly critical for companies, especially in commodity markets, for a higher competitive advantage (Ravald and Gronroos 1996, Richards and Jones 2008). Ravald and Gronroos (1996) suggest that during normal economic times, partnership-based relationships may provide higher profitability, and during tough economic times these relationships sustain and keep businesses afloat.

Studies focused on hardwood lumber also emphasize that close personal relationships moving toward long-term partnerships between the buyer and the supplier will be necessary to ensure the creation and delivery of a higher customer value (Bush et al. 1991, Idassi et al. 1994, Smith 2002). The data on hardwood lumber buyers in Smith's (2002) study specifically indicates a correlation between perceived value of a supplier, the volume of hardwood lumber purchased from it, and the length of relationships. As the length of relationship increases, so does the volume purchased from a supplier as well as the perceived value of the supplier's offerings. The relationship may begin to become even important as more and more suppliers look to sell to a distressed marketplace.

Objectives

The main objective of this study was to determine the relative importance of purchase attributes according to the hardwood lumber buyer in the United States, with a special focus on the value of relationship vis-à-vis other product and service attributes. Additionally, the study examined various relationship dimensions such as length of relationship, relationship objectives, future business, and price and supply terms in the relationships between suppliers of hardwood lumber and buyers. The study especially concentrated on the differences in relationship dimensions between the buyers' top two suppliers. Prior research indicates that behavioral changes among customers are intensified when differences in value are measured against competition (Gale 1994, Jones and Sasser 1995). This competition is most significant between the top two suppliers because in most commodity product markets, the top two suppliers account for a substantial share of the customer's purchases and they consistently seek to improve their relationships to be the top-ranked supplier (Eggert et al. 2006). As a result, an in-depth study of the top two suppliers will indicate the most deterministic and relevant relationship dimensions that suppliers should target (Eggert et al. 2005).

Methodology

Sample

The National Hardwood Lumber Association's (NHLA) membership directory of hardwood lumber buyers was used to generate the sample frame for this study. The directory included 1,058 hardwood lumber buyers from the United States and Canada, which represents the majority of the firms involved in this business. The directory included sawmills (suppliers of hardwood lumber) and companies located in Canada, which were taken out of the sample for a total of 711 valid contacts in the United States.

Survey design

A survey (questionnaire) was designed based on a literature review of the purchase factors in the hardwood lumber industry and other commodity markets. Past studies indicated that product quality and price are the most important purchase factors for hardwood lumber buyers, although the specific quality attributes may differ based on the type of hardwood lumber application (Bush et al. 1991, Idassi et al. 1994, Wilson and Vlosky 1997, Smith 2002). Following product and price, supplier attributes such as service and geographic location are also found to be relatively important in the hardwood lumber industry (Bush et al. 1991, Forbes et al. 1994, Smith 2002). Studies on other commodity markets report the importance of brand names, relationships, and environmental friendliness of products in business to business buyers' purchase decisions (Wilson 1995; Simpson and Wren 1997; Ulaga and Eggert 2003; Eggert et al. 2005, 2006; Aguilar and Vlosky 2008). The survey included 27 questions encompassing a list of potential attributes driving hardwood lumber purchase decisions.

Data collection

The survey instrument was designed to gather information electronically from the target sample of 711 buyers of hardwood lumber across the United States. The electronic survey was first pilot tested in the fall of 2007 with eight professionals from academia and industry to assess its validity, reliability, clarity of wording, and relevance. The modified survey was e-mailed to all 711 contacts in the sample frame in December 2007, along with a cover letter describing the study.

About 49 completed surveys were obtained after the initial e-mail, yielding a response rate of 6.9 percent. Two weeks after the initial e-mail, a reminder e-mail was sent to all those who did not respond to the first e-mail. Three more reminders were sent to the nonrespondents at approximately 3-week intervals to generate a higher response rate. A total of 78 completed responses were obtained at the end of the survey period (March 2008).

From the initial list of 711 contacts, 169 e-mails were undeliverable (e.g., defunct business, e-mail errors for which no new contacts were available). A total of 78 valid responses were obtained from an adjusted sample of 542, yielding a response rate of 14.4 percent.

Nonresponse bias

Nonresponse bias was measured to compare differences in responses between early respondents ($n = 49$) and late respondents ($n = 29$) at the 0.05 level of significance (using independent sample t test). Early respondents were categorized as those who responded after the initial e-mail, and late respondents were those who responded after the e-mail reminders (Armstrong and Overton 1977). Variables such as attributes affecting hardwood lumber buyers' purchase decisions, number of years in business, duration (in years) of working relationships with suppliers, purchase volume, and buyer satisfaction with suppliers were compared for the two groups for the nonresponse bias analysis. Results of the t test (significance level or $\alpha = 0.05$) revealed no statistically significant differences between the early and the late respondents across the aforementioned variables.

Statistical analysis

All statistical analyses were performed using SPSS16 and Microsoft Excel. All tests were conducted with an α level of 0.05.

One-sample *t* tests were performed to examine the differences in the reported means of the importance attributes associated with hardwood lumber purchases. These *t* tests were performed by setting the test value for each attribute to 4 (neutral value). The one-sample *t* test accounted for variance in the responses of the attributes and reports whether the attributes were statistically significantly different from each other ($\alpha = 0.05$).

Results and Discussion

Respondent profile

Respondent firms were primarily located in the southern United States (54.5%), followed by the Midwest (26%), the Northeast (14.3%), and the West (5.2%; Fig. 1).

Among study respondents, approximately 49 percent were corporate personnel (CEO, owner, president, vice president), 15 percent were purchasing and raw material managers, 14 percent were sales directors, 13 percent were operation managers, and 9 percent were general managers.

Respondents were asked to indicate the number of years their company had been in business (as of 2006). The average length of years in business reported by the respondent companies was 31.6 years. About three-quarters of the respondent companies were in business for more than 20 years.

Approximately one-half of the survey respondents were hardwood lumber distributors or retailers (32% and 18%, respectively). Other respondent lumber buyers belonged to the following business categories: flooring (9%), millwork and moulding (9%), furniture residential (6%), pallets and containers (5%), cabinets including kitchen, office, and vanity (4%), furniture office (1%), and others (15.7%). The category ''others'' included dimension stock, stair parts, musical instruments, and specialty wood working.

Volume of hardwood lumber purchase

Respondent hardwood lumber buyers reported that they purchased lumber generally from a large number of suppliers (from 5 to 200 suppliers) depending on their needs. However, on average, more than 50 percent of total respondent purchases of hardwood lumber in 2006 were from two top suppliers in terms of volume purchased across all sources. The top ranked supplier held the highest share of the hardwood lumber purchase volume with a mean of 31.7 percent of the buyers' purchases in 2006. Respondent firms purchased a significantly smaller portion (18.9%) of their total hardwood lumber in 2006 from their second ranked supplier (significant difference at $\alpha = 0.05$, using *t* test). About 47 percent of the buyers' hardwood lumber in 2006 came from the remaining suppliers (Table 1). These results are consistent with an earlier study of hardwood lumber buyers reporting that hardwood lumber firms buy most of their lumber from their top two or three suppliers (Smith 2002).

Attributes driving the hardwood lumber purchase decision

Regardless of the supplier firm, study respondents were asked to rate their perception of attributes important in their

*Figure 1.—Respondent distribution by region in the United States (*n = *78).*

Table 1.—Volume of hardwood lumber purchased by respondents from their top two suppliers (n = 78).

Supplier	Volume of purchase (%)[a]	*t*	*P*[b]
1	33.4	6.04	0.000
2	19.9		

[a] Volume of purchase from all other suppliers = 46.7%.
[b] Test of significance between Suppliers 1 and 2 using paired sample *t* test at 0.05 significance level ($P < 0.05$ indicates statistical validity).

hardwood lumber purchase decision (on a 7-point rating scale, with 1 = not at all important, 4 = neutral, and 7 = most important).

Results of the one-sample *t* test show that respondent buyers perceived product quality to be the most important attribute (with a mean rating of 6.4) in their purchase decisions (Table 2; $P = 0.000$). Product quality was defined to include all features of the product including dimensional stability, durability, straightness of lumber, etc. Relationship with the supplier was rated the second most important attribute (with a mean rating of 5.8) followed by on-time delivery (mean rating, 5.6), price (mean rating, 5.6), and geographic closeness to supplier (mean rating, 4.7), in that order. Each of the above attributes was found to be significantly different from the neutral value (at $\alpha = 0.05$). As shown in Table 2, the next few attributes rated by the buyers were availability of a range of sizes (mean rating, 4.4), availability of a range of grades (mean rating, 4.4) and availability of a range of hardwood species (mean rating, 4.4) each of which were statistically significant. Volume discount (mean rating, 4.3) and warranty on product (mean rating, 4.3) were not found to be significant attributes once the variance in the dataset was accounted for and thus the ratings for these two attributes should be interpreted with caution. The least important attributes in the hardwood lumber buyer's purchase decisions were packaging (mean rating, 3.6), environmental certification (mean rating, 2.5), and the product brand (mean rating, 2.1).

Table 2.—Mean importance of factors driving hardwood lumber purchase decisions (n = 78).

Attributes	Mean (SD) importance[a]	*t*	*P*[b]
Product quality	6.4 (1.0)	21.8	0.000
Relationship with supplier	5.8 (1.0)	15.5	0.000
Overall service	5.7 (1.3)	11.1	0.000
Prices	5.6 (1.2)	12.1	0.000
On-time delivery	5.6 (1.4)	10.2	0.000
Geographic closeness	4.7 (1.7)	3.5	0.001
Availability range grades	4.4 (1.6)	2.5	0.016
Availability range sizes	4.4 (1.3)	2.9	0.004
Availability range species	4.4 (1.6)	2.0	0.044
Volume discount	4.3 (1.8)	1.5	0.153
Warranty on product	4.3 (2.0)	1.1	0.284
Packaging	3.6 (1.7)	−2.0	0.044
Environmental certification	2.5 (1.7)	−7.9	0.000
Brand	2.1 (1.5)	−11.1	0.000

[a] Mean importance rating using a 7-point importance scale where 1 = not at all important and 7 = most important.
[b] Test of significance using one-sample *t* test setting the test value in the analysis to 4 (neutral importance value) at 0.05 significance level ($P < 0.05$ indicates statistical validity).

These results indicate that variables such as relationship with supplier, overall service, price, and location of the supplier (geography) are important to the buyer only when the quality of the product meets their expectations. It is also interesting that price, typically considered to be one of the one or two most important attributes, is ranked after product quality, relationship, and overall service in terms of its importance in the hardwood lumber purchase decision.

Buyer–supplier relationship

Study respondents were asked to compare their top two (volume) suppliers on several relationship-related attributes on a 7-point agreement scale (Table 3). The six relationship attributes presented measure the extent of commitment and trust in a relationship that the buyer has for the supplier (Eggert et al. 2005, 2006).

Hardwood lumber buyers indicated that they focused on long-term goals in their relationship with their first and second ranked suppliers (mean ratings, 5.2 and 4.8, respectively), with Supplier 1 rated significantly higher than Supplier 2 on this variable ($\alpha = 0.05$). Respondents reported that they were significantly more willing to invest time and resources in their relationship with Supplier 1 as compared with Supplier 2 (mean ratings, 5.2 and 4.7, respectively). In addition, the respondents indicated that they would find it disruptive to end their relationship with both suppliers, with a significantly higher mean rating for Supplier 1 (5.1) than that of Supplier 2 (4.1). This is logical considering the buyers purchased almost one-third of their raw material from their top supplier.

Buyers indicated no difference between their top two suppliers in the supplier's readiness to adjust inventories in times of the buyer's need (mean ratings of 4.2 and 4.0 for Suppliers 1 and 2, respectively). No statistically significant difference ($\alpha = 0.05$) was found between the buyers' top two suppliers on the costs of relationship including switching cost to another partner and cost sharing with suppliers on common activities (Table 3).

Length of relationship between hardwood lumber buyer and supplier.—Study respondents were asked to indicate the length of their relationships with their top two suppliers. On average, the respondents reported a significantly longer relationship with their top supplier (13.1 y) compared with their second most important supplier (11.5 y; Table 4).

Satisfaction and future relationship with suppliers.—Table 4 shows the level of satisfaction of the respondent buyers with their top two suppliers. On a 7-point satisfaction scale (where 1 = highly dissatisfied and 7 = highly satisfied), respondents indicated a significantly higher mean satisfaction score (5.9) with Supplier 1 as compared with Supplier 2 (5.7).

On being queried about their intention to provide more future business to their top two suppliers, hardwood lumber buyers indicated no significant difference between Suppliers 1 and 2 on the following three statements: (1) this supplier will receive a larger share in the future; (2) we expect to expand our business with this supplier in the future; (3) this supplier will be used more than it is now in the future.

Geographic proximity.—Respondents were asked to indicate their geographic closeness to their top two suppliers. On average, 40 percent of the respondents (Fig. 2) stated that their suppliers were located more than 120 miles from their location. Approximately 45 percent of suppliers were located between 30 and 120 miles from the

Table 3.—Relationship dimensions between buyers and their top two (volume) suppliers (n = 78).

Relationship attributes	Mean agreement[a]			
	Supplier 1	Supplier 2	t	P^b
You focus on long-term goals in this relationship	5.2	4.8	2.27	0.026
You are willing to invest time and other resources into the relationship with this supplier	5.2	4.7	2.79	0.004
It would be disruptive to your company's operations to end the business relationship with this partner	5.1	4.1	5.27	0.000
Readily adjusts their inventories to meet your needs	4.2	4.0	1.41	0.162
The switching costs to another partner for this product would be large	3.4	3.1	1.62	0.109
You share costs with this supplier on common activities (such as distribution, promotion, handling, etc.)	2.9	2.7	1.15	0.252

[a] Mean agreement rating using a 7-point agreement scale where 1 = strongly disagree and 7 = strongly agree.
[b] Test of significance on relationship dimensions between buyers and their top two suppliers using paired sample t test at 0.05 significance level ($P < 0.05$ indicates statistical validity).

Table 4.—Length of relationship, satisfaction, and future expectation of buyers with Suppliers 1 and 2 (n = 78).

Attributes	Mean		t	P^a
	Supplier 1	Supplier 2		
Length of relationship (y)	13.1	11.5	2.04	0.045
Overall satisfaction[b]	5.9	5.7	2.77	0.007
This supplier will receive larger share[c]	4.8	4.7	1.05	0.295
We expect to expand our business with this supplier[c]	4.5	4.7	−0.91	0.365
This supplier will be used more than it is now[c]	4.4	4.6	−1.08	0.284

[a] Test of significance using paired sample t test between Suppliers 1 and 2 at 0.05 significance level.
[b] Mean satisfaction rating using a 7-point scale where 1 = highly dissatisfied and 7 = highly satisfied.
[c] Mean agreement rating using a 7-point scale where 1 = strongly disagree and 7 = strongly agree.

buyers and 10 percent of suppliers were located within a distance of 30 miles from the buyer's location.

Price differential and supplier switching.—Assuming that the price per board foot of lumber was equal for their top two suppliers, respondents were asked to indicate how much Supplier 2 would have to reduce its prices to motivate the buyer to switch between suppliers (i.e., buy more volume from Supplier 2 than Supplier 1 or make Supplier 2 their largest supplier).

Results show that, on average, more than 32 percent of the respondents were highly loyal to their top supplier indicating that under no condition would they change their main supplier of hardwood lumber and switch to the second most important supplier (Fig. 3). About 26 percent of respondents were very price sensitive and indicated that they would make Supplier 2 their top supplier (purchase more volume from Supplier 2) if the price of Supplier 2 was 1 to 5 percent less than that of Supplier 1. About 39 percent of respondents reported their unwillingness to switch their top two suppliers unless Supplier 2 reduced their price by 10 percent with respect to Supplier 1.

The aforementioned results indicate that the top supplier

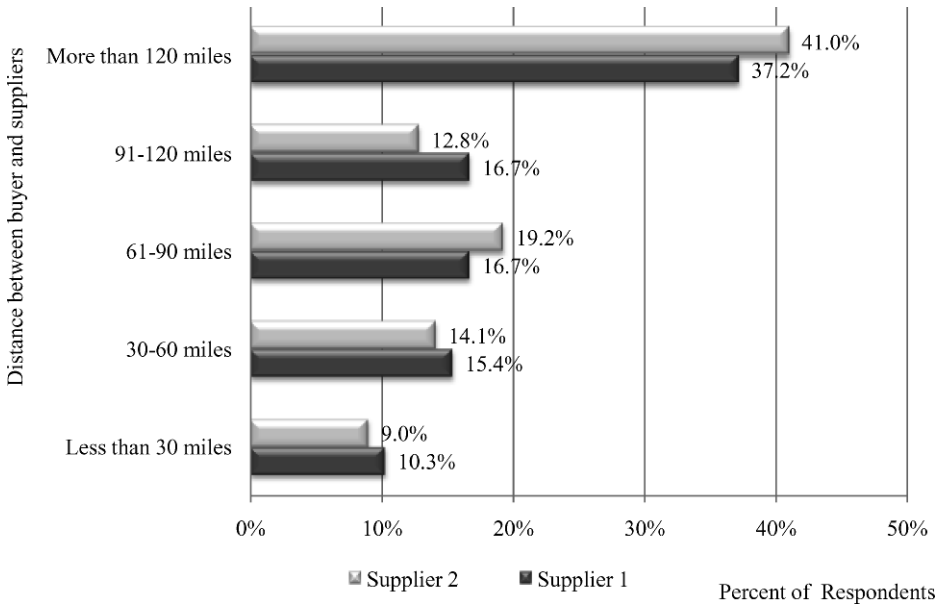

Figure 2.—Respondent geographic distance to their first and second supplier by volume (n = 78).

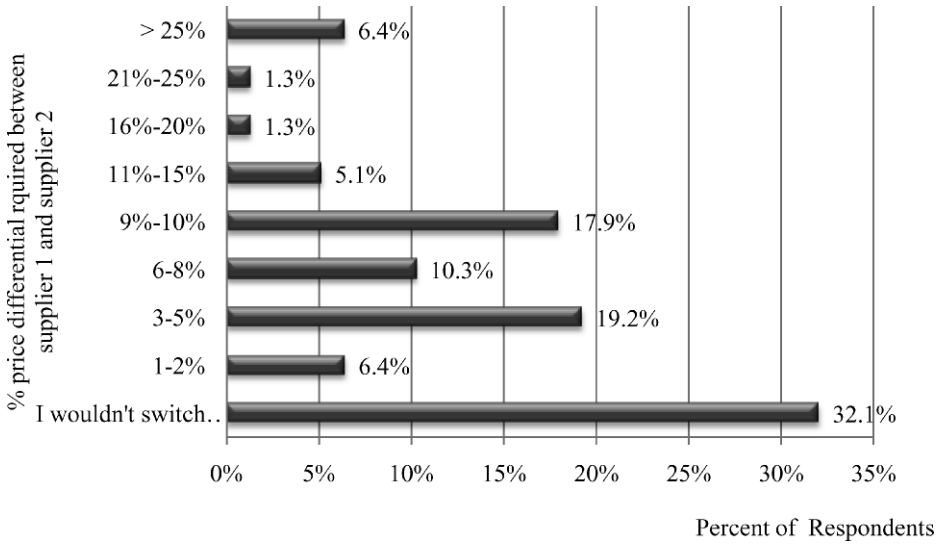

Figure 3.—Buyer's perception of price differential between top two suppliers by volume for supplier switching.

for almost one-third of the responding lumber buyers may be able to receive a price premium for their products. However, it is also important to note that this price premium could only be sustained by the buyer if they are able to make profits. In the event that the top supplier raises prices by 100 or 200 percent, relative to the second supplier, the 32 percent of respondents would, in theory, not switch suppliers and thus may be out of business as the supplier takes advantage of the purchaser's supply inelasticity.

Furthermore, in spite of being highly loyal to their top supplier, these 32 percent of respondents are sourcing from more than one supplier. This is probably a supply-based risk management strategy of the buyers to combat the uncertainty of disruption in supply by relying on just one firm for the entire supply, especially in a distressed economic situation (Hendricks and Singhal 2003, Burke et al. 2004).

Finally, respondents were queried about issues or concerns related to their business where they would like improvements. Only 47 percent of the respondents ($n = 37$) completed this open-ended question. Responses were grouped into four major categories shown in Table 5. Respondent buyers' major concerns include increasing global competition that was making business difficult and expensive to sustain (68% respondents), low profit margins that were difficult for long-term survival (55%), problems with consistent supply (49%), and worsening financial health of their customer base (30%).

Summary and Conclusions

The hardwood lumber market is very competitive and there are numerous firms supplying hardwood lumber. Buyers usually have multiple options when choosing a supplier. Nevertheless, the top two suppliers of hardwood lumber accounted for more than one-half of the buyer's purchase transactions by volume. Among the top two suppliers, the top supplier represented about one-third of all transaction volume.

Table 5.—Hardwood lumber buyers' top business concerns (n = 37).

Business concerns	% of respondents
Increasing global competition	68
Low profit margin	55
Inconsistent supply	49
Poor financial health of customers	30

Hardwood lumber buyers perceive differences between their top supplier and their second supplier. On average, buyers reported being associated with their top supplier for a longer period of time and being more satisfied with their top supplier than their second best supplier. Upon deeper inspection of the hardwood lumber buyer–supplier relationship dimensions, hardwood lumber buyers appear to have a higher willingness to invest resources and time in partnering with their top supplier and inevitably may commit to a higher volume of transactions with this supplier as compared with the second supplier. The increased vested interest in the top supplier may result in the second supplier and other suppliers losing out on revenue prospects unless they take steps in building relationships. Furthermore, buyers consider it significantly disruptive to their business to end relationship with their top supplier than with the second supplier.

The results of this study have strong implications for suppliers of hardwood lumber. As indicated, product quality is the most important factor in the purchase of hardwood lumber followed by relationship with the supplier, service quality, and price (in the order of importance). Although price is traditionally one of the most important considerations for purchase of commodity wood products such as hardwood lumber (also true for our study), the results of our study showed that nearly one-third of buyers are loyal to their suppliers and reported that they wouldn't switch suppliers (i.e., make their second supplier their largest volume supplier and buy less from the top supplier) for any price differential. Notably, about 30 percent of responding lumber buyers reported that they would switch their top two suppliers only if there was a 10 percent difference in the price of hardwood lumber between the first and second suppliers.

Another important attribute, geographic closeness to the supplier, seems to be less important compared with other supplier factors (product quality, service, price, and

relationships). More than 40 percent of the suppliers for the respondent buyers were more than 120 miles from their base. Although these results indicate that suppliers' products currently travel longer to reach the buyers, as energy costs and resulting costs of transportation increase, buyers may focus on more local sourcing in the future (Porter 2000, Department of Energy 2009).

Limitations and Future Research

This study has a few limitations that provide useful avenues for future research. The study focused on the lumber buyers' top two suppliers; however, future research could look at the supplier comparisons on purchase attributes between each buyer's top two suppliers as compared with other suppliers. Furthermore, the sample frame of the study was generated from a sole trade association membership list (NHLA) and future research could focus on replicating a similar study on a broader sample frame with a higher number of respondents. Although it is tempting to generalize the results to other sectors within the wood products industry, the scope makes it difficult to do so. Replications of this work on statistically valid samples of different businesses categories and key buying segments (e.g., furniture vs. cabinets vs. flooring) would clearly identify differences among these buyer segments. Future studies could also include simultaneous assessment of attributes when asking firms to indicate their purchase consideration. The study results should be interpreted with caution because of the affect of exogenous variables such as the economic situation, housing sector, prices, lumber markets, etc., that may affect the choice of suppliers.

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