Perception Drivers for Treated Wood by U.S. South Homebuilders and Remodelers

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ABSTRACT

There are approximately 106 million installed housing units in the United States (U.S. Census Bureau 2004) of which 50 percent are single-family structures (NAHB 2000). The potential for the use of treated wood products in construction is considerable, especially in the U.S. South for termite protection and to mitigate moisture related decay. This research investigates the perception about treated wood and the drivers of treated wood image among the Southern U.S. homebuilders and remodelers. The results show that overall the Southern home builders and remodelers have a very positive perception of treated wood products. The perception is positively related to perception of treated wood products' safety, price premium (compared to untreated wood), and environmental friendliness. Also, exposure and trust on treated wood supplier communication has a positive effect on the overall perception. Homebuilders and remodelers who formed their opinion based on information from other builders hold a more positive perception on treated wood compared to those who formed their opinion based on information gained through media.

Keywords: treated wood products, perceptions, image, Southern United States, homebuilders, remodelers

INTRODUCTION

The potential for the use of treated wood products in construction is considerable, primarily in the U.S. South for termite protection and to mitigate moisture related decay. It has been estimated that damage to wood structures by termite damage in the U.S. is $2 billion annually (Lemaster, et al. 1997; United States Department of Agriculture, 2002). While treated southern yellow pine products (SYP) constitute the bulk of treated wood species inputs (44 percent of all SYP is currently treated), the potential size of this end-use market suggests that the South may not have the capacity to be self-sufficient. Further, in certain construction end-uses, particularly wall framing, builders prefer spruce-pine-fir (S-P-F), Douglas-fir and hem-fir.

Unlike Hawaii, where the use of treated wood framing lumber and panels is the norm, market penetration of such products is not high in the U.S. South. It is estimated that the use of treated SYP in residential framing totaled 708 million board feet in 2003 (Southern Forest Products Association 2005). By comparison, the potential treated construction lumber market for the U.S. South new residential construction alone is roughly 4.5 billion board feet annually assuming that the region transitions to complete termite protection of all wood members (Southern Forest Products Association 2005.)

U.S. housing and construction

There are approximately 106 million installed housing units in the United States (U.S. Census Bureau 2004) of which 50 percent are single-family structures (NAHB 2000) (**Table 1**). In addition, 37 percent of single-family houses are located in the South relative to 24 percent in the Midwest, 20 percent in the West and 19 percent in the Northeast (NAHB 2000).

Table 1. U.S. housing facts based on the American Housing Survey for the United States 2003 (U.S. Census Bureau 2004; NAHB 2005)

Population:	270 million (76 percent urban, 24 percent rural)
Total occupied housing units:	106 million (approx. 50 percent single-family)
Number of housing starts:	1.85 million (81 percent single-family)
Median family income:	$41,775
Median home price:	$140,201
Ownership rate:	68 percent
Median size:	1,756 sq. ft.
Bedrooms:	2 or less (38 percent); 3 (42 percent); 4 or more (20 percent)
Bathrooms:	1-1/2 or less (55 percent); 2 or more (45 percent)
Garage:	2 car (65 percent)

The Western Wood Products Association (2005) reported lumber consumption to hit an all-time high of 61.8 billion board feet in 2004, an increase of 8.4 percent above the previous high set the previous year. This is as a result of low interest rates and strong refinancing activity. Residential construction, repair, and remodeling have driven the growth in lumber consumption. Increased housing starts pushed residential lumber use to a record 26.7 billion board feet and busy existing home sales market pressed repair and remodeling lumber use to 19.5 billion board feet (The Western Wood Products Association 2005). HUD (2001) reports that by the late 1900s, detailed statistical data on new housing construction (such as collected by the U.S. Census and

the NAHB Research Center's Builder Practices Survey) had become readily available. Some basic housing construction statistics related to home framing are summarized in **Table 2**.

Table 2. Basic new housing construction statistics in late 1900's (based on area) (Source: HUD 2001)

Framing Type	Characteristics
Floor	Type: Lumber, 62 percent; wood trusses, 9 percent; wood I-joists, 28 percent Size of Lumber: 2x8, 8 percent; 2x10, 70 percent; 2x12, 21 percent Species of Lumber: SYP 39 percent, DF 23 percent, other 37 percent
Wall	73 percent 2x4 @ 16"; 5 percent 2x4 @ 24"; 17 percent 2x6 @16"; 3 percent 2x6 @ 24"
Roof	6 percent rafters; 29 percent I-joists; 65 percent wood truss

Most homes are built following locally adopted and modified national model building codes offered by one of three private code development organizations. These codes include the Uniform Building Code, National Building Code, and Standard building Code, as well as the One- and Two-family Dwelling Code (OTFDC) developed by CABO, an umbrella for the three national model code organizations (HUD 2001).

Goetzl and McKeever (1999) reported that the building codes generally limit protected combustible construction (to which exterior wood-framed buildings belong) to four stories or less. However, the safety, technical integrity, and strong structural performance of wood buildings are being recognized by these building codes. The three building codes are now amalgamated into an International Building Code addressing consistency and simplicity issues in building regulations in the United States.

Treated wood in home construction

In the United States, homeowner wood replacement costs approximately $500 million annually as a result of termite-damage. To prevent or at least minimize wood degradation, houses should be properly designed and built. Treated wood products can play a part in homeowner efforts to protect their investment by minimizing this degradation. In addition, the use of treated wood has an environmental aspect; it has been estimated that an additional 226 million trees would need to be harvested every year in the U.S. if wood preservatives were not used (Forest and Wildlife Research Center Mississippi State University 2001).

It takes approximately three 45-year-old trees to build just a backyard deck. If using untreated lumber, the deck needs to be replaced every few years. But when building it with properly pressure treated lumber, the deck will last up to 50 years. Wood's expanded life cycle saves thousands of dollars on maintenance, saves trees in our forests (CITW 2003).

THE STUDY

This study was conducted using mailed surveys to home builders/remodelers throughout the U.S. South (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee.) The objectives were to (1) better understand their general attitudes and perceptions about treated wood, (2) identify their demand drivers for treated wood, and (3) investigate drivers of treated wood image and perception. In general, sampling, survey procedures, follow-up efforts and data analysis were conducted in accordance with well-documented and verified techniques (Malhotra 1993; Dillman 2000; Fowler 1996; Hair et al. 1992). Mail survey procedures included a pre-notification letter, a cover letter accompanying the questionnaire, and a reminder follow-up postcard. Population information came from 2002 U.S. census data and was purchased from Best Lists, a national survey list company.

The largest 1,900 homebuilder/remodelers by 2002 corporate revenue were surveyed at the corporate headquarters level. This stratum was selected because large companies are typically industry practice leaders and influencers. Of the initial mailing, 138 surveys were returned as undeliverable or inappropriate. 229 completed surveys were returned and all were usable for an adjusted response rate of 13 percent.

Previous studies have shown that response rates of 15-35 percent from general U.S. industrial populations may be expected (Adams 1986; Boyd et al. 1981; Donald 1960; Hochstim 1967). Obtaining acceptable business-to-business survey response rates are often more challenging than with consumers due to the added difficulties in locating appropriate key respondents a priori (Hansen et al. 1983). Non-response bias was measured by using a two-tailed t-test conducted on percent of companies by state and by size (by 2003 sales), comparing respondents and companies that fell into the non-response/undeliverable category. No difference in state distribution nor company size was detected at α=.05.

RESULTS

Demographics

Both homebuilders and remodelers were surveyed. Twenty-eight percent of respondents are strictly home builders, 51 percent are remodelers/renovators, and 21 percent are both. All states included in the study are represented by respondents as follows (n=223): Florida (26 percent of respondents), North Carolina (20 percent), and Georgia (14 percent), South Carolina (11 percent), Louisiana (9 percent), Tennessee (8 percent), Mississippi (5 percent), Alabama (5 percent), and Arkansas (3 percent).

Typical of the fragmented small-company homebuilding/remodeler industry, a majority of respondents (87 percent) had revenues in 2002 of $10 million or less. Seven percent of respondents had sales of $10 million-$24 million and two companies had sales of over $500 million. Consistent with sales revenue, just over half of respondents (51 percent) had 10 or fewer employees in 2002. One-third of respondents had 11-25 employees, 10 percent had 26-50 employees and 6 percent had more than 50 employees.

Builders/remodelers treated wood use and perceptions

Treated lumber products are used in many applications in homes built or remodeled by respondents (**Table 3**). First ranked was treated wood decks/outdoor stairs (97 percent of respondents) outdoor structures (89 percent of respondents) followed by fencing (88 percent of respondents) and landscaping (82 percent). 70 percent of respondents said they have

built/remodeled treated wood wall/roof/floor/framing systems and 45 percent said they had built/remodeled treated permanent wood foundations. This indicates that market penetration for framing and foundations has taken place at the builder/remodeler level and can be used as a selling point for further residential market development for these applications in these industry sectors.

Table 3. Treated Lumber Products Applications in Homes Built or Remodeled (Percent of respondents; multiple choices possible)

Decks and outside stairs	97%
Outdoor structures	89%
Fencing	88%
Landscaping	82%
Wall/roof/floor framing in your home	70%
Home exteriors	58%
Playground sets	58%
Outdoor furniture	54%

Respondent opinions about treated wood were formed in a number of ways. By far, the most cited means are other builders/remodelers and trade magazines (36 percent and 33 percent of respondents, respectively. Newspapers were a distant third (8 percent of respondents).

Respondents were asked about their familiarity with various preservative treatments or chemical compounds. They are most familiar with creosote (76 percent of respondents) followed by CCA (72 percent), Penta (38 percent), Borates (38 percent), and Silver Nitrate (23 percent). They are least familiar with Alkaline Copper Quat (ACQ) (17 percent of respondents), Copper Azole (CA) (12 percent of respondents), and Oxygenated Zinc (AZ) (9 percent of respondents).

Wood is but one building material that builders/remodelers can specify. The most important criteria for respondents in making their purchase decisions is "resistance to wood destroying insect" (4.7 on a 5-point scale of importance: 1=not important at all; 3=somewhat important; 5=very important) (**Table 4**). Seventy-six percent of respondents feel this was Very Important. This is closely followed by "effective years in service" (4.6) and "low maintenance" (4.6). All of these have implications for treated wood use.

Table 4. Importance of Criteria in Building Materials Purchase Decisions (Percent of Respondents)

Purchase Criteria	Not Important At All 1	2	Somewhat Important 3	4	Very Important 5	Mean
Resistance to wood destroying insects	0%	0%	5%	17%	76%	4.7
Effective years of service	0%	0%	6%	24%	69%	4.6
Low maintenance	0%	2%	9%	32%	57%	4.4
Resistance to harsh climate	2%	3%	16%	24%	54%	4.3
Health risks from material exposure	5%	11%	27%	17%	40%	3.8
Cost	5%	6%	34%	20%	35%	3.7
Free from as many chemicals as possible	8%	13%	35%	12%	32%	3.5

The apparent need to educate this industry segment is clear. Responses to a follow-up statement "I would like more information on proper use, handling and disposal of treated lumber" supports this with 42 percent of respondents strongly agreeing and 22 percent somewhat agreeing.

Another general question has to do with the willingness-to-pay a premium for treated wood over the non-treated alternative. 54 percent of respondents agreed that they would pay such a premium (either somewhat or strongly agree) while only 17 percent disagreed with this notion (either somewhat or strongly disagree).

Respondents were then asked about the level of premium that they thought their customers would pay for treated lumber over the non-treated alternative. A hypothetical base non-treated lumber price of $500/MBF was posed. 24 percent of respondents would not specify treated lumber if it had any premium while 66 percent of respondents believe that a premium is warranted. Consistent with the fact that the premium for treated wood over the non-treated alternative ranges from 25 percent to 50 percent, 35 percent of respondents believe that the premium should be more than a 5 percent increase over the base non-treated wood price.

Trust is an important part of the relationship between buyers and sellers. This is particularly important for treated wood products exchange partners due to unique handling and safety issues. It is important for manufacturers and other entities involved in the treated wood value chain to understand what perceptions exist regarding trust.

Accordingly, respondents were asked to rate their level of trust for different agencies and entities to have the responsibility of providing builders, remodelers, and consumers with treated wood product safety and handling information. The National Association of Homebuilders, universities and research laboratories were ranked first as the most trusted entities (all 2.6 on a 3-point scale of trust) followed by the Centers for Disease Control (2.4). Companies that manufacture preservatives (2.1), sell treated wood products (2.1), treaters (2.1), and treated wood associations (2.3) all were trusted between "a little" and "a lot" by respondents. Least trusted were attorneys (1.3).

In 2001, the Environmental Protection Agency (EPA) announced a voluntary industry phasing out of CCA-treated wood for non-industrial uses. We asked respondents how familiar

they were with details of this transition. On a 5-point continuous scale of awareness (1=not aware at all to 5=very aware), 56 percent of respondents were on the "not aware" side of the midpoint with 36 percent being "not aware at all". 20 percent were on the "aware" side of the midpoint with 9 percent of respondents being "very aware" (n=226).

For respondents and their clients, we asked what effect they expected from a switch to "new generation" preservatives. 58 percent did not know. On a 5-point continuous scale from 1=very negative to 5=very positive), 13 percent of respondents were on the "negative" side of the midpoint with 3 percent stating effects from such a transition would be "very negative". 13 percent of respondents were on the "positive" side of the midpoint with 5 percent of respondents saying that the transition would be "very positive" (n=221).

Respondents were asked their opinion of efficacy of various treatments in protecting houses against termites. Aside from not using wood at all, the top ranked practice was the use of preservative treated wood (4.2 on a 5-point scale: 1= does not protect at all; 3=protects somewhat; 5=greatly protects). This was followed by soil pesticides (3.6) and fumigation (3.4). Least ranked was using untreated wood (1.1) and using a graded gravel ground barrier (2.1).

Drivers of treated wood perceptions

On a 5-point perception scale, overall, respondents have a very positive perception of treated wood products. Forty-one percent had an extremely positive perception and 41 percent had a somewhat positive view. Only 1 percent of respondents had an extremely negative opinion and 3 percent had a somewhat negative view about treated wood. Fifteen percent fell at the midpoint. (n=227).

In order to probe the drivers of treated wood perceptions, two statistical techniques; factor analysis and multiple regression, were used. Sixteen scale items from the survey were used in these analyses (**Table 5**). Cases that had missing values for any of the variables were omitted from the analysis, yielding a listwise sample size of 180 of the 229 surveys that were returned. Thus, the sample size is suitable for both factor and multiple regression analysis.

Table 5. Analysis Variables: Descriptive Statistics

	N	Min	Max	Mean	Std. Deviation
Dependent variable:					
Perception of treated wood	227	1	5	4.20	.831
Independent variables:					
Safe for outdoor human contact application	227	1	5	4.01	1.043
Safe to handle and dispose	227	1	5	4.01	1.020
Safe for playground	225	1	5	3.29	1.316
Safe for builders	226	1	5	3.81	1.141
Safe for residents (indoor application)	222	1	5	2.81	1.256
Safe for animals	225	1	5	3.44	1.183
Understand the concept of wood treating	226	1	5	3.91	1.084
Reduce deforestation	225	1	5	3.30	1.109
Trust suppliers' claims	226	1	5	3.04	1.028
Manufacturing does not harm environment	219	1	5	2.91	.942
Disposal does not harm environment	221	1	5	2.97	1.144
Emits odor	225	1	5	2.94	1.144
Get price premium	205	1	5	3.31	1.587
Pay price premium	226	1	5	3.59	1.136
Protects against termites	220	1	5	4.15	.998

Factor analysis

A principal component factor analysis and varimax rotation was conducted in order to find underlying dimensions in the data set. Significant correlations ($\alpha = .05$) in the correlation matrix; Bartlett test ($\leq .0001$) of the overall significance of the correlation matrix; overall measure of sampling adequacy (MSA) (.842); individual measures of sampling adequacy (>.50); and small partial correlations all confirm that factor analysis is an appropriate data analysis method for the data set.

The principal component factor analysis identified strong intercorrelations among the independent variables. The factor analysis ascertained four unique dimensions that could be used to address different facets of home builders and remodelers perception about treated wood (**Table 6**). The latent root criterion (eigenvalue ≥1) was used in extracting the factors. The four factors explain about 63 percent of the total variance in the 14 variables.

Table 6. Rotated Component Matrix

	"Safety"	**"Supplier communication"**	**"Environmental friendliness"**	**"Price premium"**	**Communality**
Safe for outdoor human contact application	**.701**	.238	.188	6.941E-02	.588
Safe to handle and dispose	**.671**	.409	.171	.114	.660
Safe for playground	**.837**	1.983E-02	.191	5.090E-02	.741
Safe for builders	**.837**	.264	7.493E-02	9.716E-03	.776
Safe for residents (indoor application)	**.718**	-3.184E-02	-2.500E-02	-6.458E-02	.522
Safe for animals	**.802**	9.559E-03	.133	2.026E-02	.662
Understand the concept of wood treating	9.202E-02	**.689**	-9.533E-02	.152	.516
Reduce deforestation	9.906E-03	**.784**	.134	-8.325E-02	.640
Trust suppliers' claims	.244	**.635**	3.916E-02	.191	.501
Manufacturing does not harm environment	.341	.172	**.688**	-1.683E-02	.619
Disposal does not harm environment	.373	-2.150E-02	**.737**	-5.436E-03	.683
Emits odor	7.702E-02	3.240E-02	**-.690**	-5.018E-02	.485
Get price premium	-1.828E-02	-1.491E-02	.143	**.888**	.810
Pay price premium	8.241E-02	.397	-.143	**.693**	.665

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

In naming the four factors, all significant factor loadings were used in the process, but variables with higher loadings had greater influence on the factor name. The chosen cut-off point for interpretation of the loadings was ±.60.

The first factor has six significantly high loadings (.671-.837), which are all related to perceptions on safety of treated wood, consequently the factor is named as "Safety".

The second factor loads highest on: "Reduce deforestation" (.784), "Understand the concept of wood treating" (.689), and "Trust suppliers' claims" (.635). One of the core messages the treated wood industry has been promoting is that treated wood products reduce deforestation as they lengthen durability of wood construction and thus reduce need for harvesting. Also, education of builders about the wood treating process has been one of the treated wood suppliers' marketing communication goals. Hence, the three variables in factor 2 describe exposure and trust on "Supplier communication".

The third factor has high positive loadings for "disposal does not harm environment" (.737) and "manufacturing does not harm environment" (.688), and negative loading on "emits odor" (-.690). Thus, the variables have a negative relationship, e.g. when the home builders

perceive that the treated wood emits strong odor, their perception of environmental friendliness decreases. Accordingly, the factor can be named as "Environmental friendliness".

The highest loadings on the last factor go to price related variables; "get price premium" (.888) describes perception on ability to extract price premium from customers and "pay price premium" (.693) describes willingness to pay price premium compared to untreated wood, thus the factor is named "Price premium".

From the 15 independent variables in Table 5, one variable was drawn from the final factor analysis and was decided to be treated as an individual independent variable in the following multiple regression. Perception of treated wood building products' performance against termites is such crucial characteristic in the Southern U.S. that the variable "protects against termites" was added into the regression model on its own due to its theoretical importance and relatively low loading (.592) and communality (.370) in the factor solution.

The factor solution was validated by split sample validation (Hair et al. 1992). The data set was split in half into an estimation sample containing 92 observations and a validation sample with 93 observations. This split still allowed 6.5 times as many observations as variables per sample and thus was appropriate for factor analysis. Four-factor solutions were pre-specified for each sample. The overall correlations were significant for both the estimation and the validation sample. In the estimation sample, MSA was equal to .757, the Bartlett's Test was significant at .000 level, and the four factor solution explained 62 percent of the variability. In the validation sample, MSA was equal to .835, Bartlett's Test was significant at .000 level, and 66 percent of the variation was explained by the solution. In general, both samples produced results that were similar to those in the original sample (i.e., 185 observations).

Attempt was made to use summated scales for the identified factors, but the internal consistency (Cronbach's α) measures (**Table 7**) for the summated scales were overall very low (calculated with the original sample): Safety (α=.87), supplier communication (α=.53), environmental friendliness α=.58, and price premium (α=.468). Only the "Safety" scale exceeds the recommended level of .70. Thus, the factor scores will be used in further statistical analysis.

Table 7. Composite scale reliability analysis (Cronbach's α)

	"Safety"	**"Supplier communication"**	**"Environmental friendliness"**	**"Price premium"**
N of cases	220	225	211	203
Mean	21.29	10.26	7.91	6.92
Std. dev.	5.47	2.31	2.37	2.23
# of variables	6	3	3	2
Cronbach's α	.8742	.5316	.5752	.4676

Multiple regression analysis

Multiple regression analysis was used to test for significant effects of factors affecting respondents' overall image of treated wood. Specifically, the focus was on identifying attitudinal factors that made contribution to the overall perception of treated wood.

Factor scores of the previously explicated four factors were used as independent variables in the regression analysis. Using four factors rather than the 14 variables allowed to reduce multicollinearity and to achieve greater parsimony of the results. Addition to the factor scores, one performance related independent scale variable ("protects against termites"), two nominal

variables ("perception formed based on information from other builder", "perception formed based on information from media"), and an ordinal control variable ("revenue") were introduced into the model. The categorical variables were first coded into dummy variables and then used in the regression analysis. The revenue variable had originally eight levels, but due to great number of smaller companies it was recoded to have only two levels; "revenue over $10 million" and "revenue under $10 million".

Hypotheses

Six hypotheses were formulated and tested to investigate the relationships between the overall perception on treated wood and perception on safety, environmental friendliness, price premium, and termite protection capability; exposure and trust to supplier communication; and information source in forming perception about treated wood products.

H1: Perception on treated wood products' safety has a positive relationship with overall perception on treated wood

H2: Exposure and trust to supplier communication has a positive relationship with overall perception on treated wood

H3: Perception on treated wood products' environmental friendliness has a positive relationship with overall perception on treated wood

H4: Perception on treated wood products' price premium to untreated wood has a positive relationship with overall perception on treated wood

H5: Perception on treated wood products' termite protection capability has a positive relationship with overall perception on treated wood

H6: Perception on treated wood products formed based on information obtained from other builders is more positive than perception formed based on information gained through media

The model: drivers for overall treated wood perception

Due to violations in homoscedasticity of error terms and large number of outliers, square root transformation of the dependent variable was performed. After the transformation the data set was carefully re-examined for outliers and influential cases. A plot of studentized residuals showed four observations that might be considered as outliers. Examination of residuals and influence diagnostics confirmed the outlier status for these observations. Consequently, four observations were eliminated from the data set as unrepresentative of the general population.

After deleting the outliers, the regression model was re-run and residuals of the regression variate were examined for linearity, normality, homoscedasticity, and independence of the error terms. Examination of normal probability plot, partial regression plots, studentized residual plots, and the White-test for homoscedasticity did not reveal violations of linearity or normality, independence, and homoscdasticity of the error terms. Tolerance values were all close

to 1, variance inflation factors (VIF) were small, and none of the condition indices exceeds 30, hence there is no evidence of multicolinearity.

Confirmatory analysis was chosen for the regression model estimation. With the sample size of 173 and 8 independent variables (**Table 8**), the data set is able to detect significant relationships with R^2 values of around 10 percent and above at a power of .80 (α=.05).

The estimated model for drivers for overall perception of treated wood has a good fit, with R^2 = .57 ($F(8,172) = 27.434$, $p < .000$). According to the estimated model, the predictive equation for the "Perception of Treated Wood" measure is:

Perception of Treated Wood² = 14.688 + 3.749 * Safety + 1.016 * Supplier Communication + 0.799 * Environmental Friendliness + 0.867 * Price Premium + 0.858 * Protects Against Termites + 2.671 * Information From Other Builders – 1.193 * Information From Media - 1.336 * Revenue over $10 million

Beta coefficients allow for direct comparison among independent variables in terms of their contribution to the regression variate. Perception of treated wood's safety (b =.595, p<.000) made the greatest contribution to the variate. The second most influential was other builders as information source in forming the opinion about treated wood (b = .206, p<.000). Supplier communication (b = .164, p<.003), price premium (b = .137, p<.011), protection against termites (b = .138, p<.014), and environmental friendliness (b = .125, p<.016) had also a positive and significant effect on the overall perception of treated wood. Media as information source (b = -.092, p<.088) in forming the opinion had a marginally negative effect on the overall perception on treated wood. Difference between media (b = -.092) and other builders (b = .206) as the information source was found statistically significant ($F(1,165) = 12.59$, $p < .05$), hence supporting hypothesis 6. In summary, all hypotheses were supported. The size control variable revenue (b = -.071, p<.186) did not have an effect on the treated wood perception.

Table 8. Regression Model

Variable Name	Variable description	Related Hypothesis		
Dependent variable			**Standardized**	
Perception of treated wood	Interval (5-point Likert scale)		**Coefficients (b)**	
Independent variables				**Sig.**
Safety	Ratio (factor score)	H:1	**.595**	**.000**
Supplier communication	Ratio (factor score)	H:2	**.164**	**.003**
Environmental friendliness	Ratio (factor score)	H:3	**.125**	**.016**
Price premium	Ratio (factor score)	H:4	**.137**	**.011**
Protection against termites	Interval (5-point Likert scale)	H:5	**.138**	**.014**
Information from other builders	Nominal (Dummy)	H:6	**.206**	**.000**
Information from media	Nominal (Dummy)	H:6	**-.092**	**.088**
Revenue over $10 million	Nominal (Dummy)	Control	**-.071**	**.186**

Notes: R^2 = .57 ($F(8,172) = 27.434$, $p < .000$)

The model was validated by split sample validation (Hair et al. 1992). The data set was split into estimation sample and validation sample. Both the estimation and validation regression model were statistically significant ($F(8,86) = 15.634$, $p<.000$; $F(8,86) = 11.710$, $p<.000$), explaining 62 percent and 55 percent of variation in the dependent measure. Both in the estimation and validation sample all standardized coefficients maintained the same direction as in the original sample. However, significance of the coefficients became volitile. This might be due to decreased sample size and use of factor scores.

SUMMARY AND CONCLUSIONS

There are approximately 106 million installed housing units in the United States (U.S. Census Bureau 2004) of which 50 percent are single-family structures (NAHB 2000). The potential for the use of treated wood products in construction is considerable, primarily in the U.S. South for termite protection and to mitigate moisture related decay. Thirty seven percent of single-family houses are located in the South relative to twenty four percent in the Midwest, twenty percent in the West and nineteen percent in the Northeast (NAHB 2000). To prevent or at least minimize wood degradation, houses should be properly designed and built. Treated wood products can play a part in homeowner efforts to protect their investment by minimizing this degradation.

This study was conducted using mailed surveys to home builders/remodelers throughout the U.S. South. The objectives were to better understand home builders/remodelers general attitudes and perceptions about treated wood, and investigate drivers of treated wood image and perception.

The results show that overall home builders/remodelers respondents have a very positive perception of treated wood products. The treated wood perception among Southern U.S. homebuilders' and remodelers' is positively related to perception of safety, price premium (compared to untreated wood), and environmental friendliness of the treated wood. Also, exposure and trust on treated wood supplier communication has a positive effect on the overall perception. Homebuilders and remodelers who formed their opinion based on information from other builders hold a more positive perception on treated wood compared to those who formed their opinion based on information gained through media. These results can be generalized across small and large companies as the company revenue did not have a significant effect on the treated wood perception.

Thus, the recommendation for the treated wood industry is to increase direct communication to builders, to offset the negative effects of general media on the treated wood perception. The core message in the marketing communication should be treated woods' safety for builders and residents.

Limitations and Future Research

The researchers acknowledge that some additional factors affecting treated wood perception might be missing from the drivers for overall perception model. Thus, further research on identifying and examining these factors is recommended.

Due to weak internal consistency of the summated scales, factor scores were used in the regression analysis. Use of factor scores hinders the replicability of the multivariate models in other data sets. An interesting future research opportunity would be to develop forest industry specific constructs and measurement scales for important attitudinal factors in the forest products marketing. This would not only provide forest industry practitioners and academics with new set of tools to measure market perceptions but also it would further the forest products marketing discipline.

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