

# From Refuse to Reuse: How Much do Consumers Know about the Reclaimed Lumber Industry?

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## Abstract

Wood has thousands of uses and the industry plays an important role in the US economy. There are many sectors within the industry such as the lumber, engineered wood products, pulp and paper products, and reclaimed lumber sectors. However, most consumers are unaware of the importance and the diversity of the industry. Reclaimed lumber is one particular sector that can have a great economic and environmental impact among communities. In 2021, an online survey was conducted to assess consumer knowledge of the reclaimed lumber sector and perceptions and attitudes toward the sector and reclaimed lumber products. Of the 1,516 respondents, 59 percent indicated being somewhat knowledgeable of the wood products industry but only 44 percent felt they were knowledgeable of reclaimed lumber. Caucasian and male respondents were more likely to indicate they were knowledgeable. Although respondents had somewhat negative responses toward the environmentally friendliness of the industry, their responses toward the environmental and economic benefits of reclaimed lumber products were positive. The information obtained from this study will be beneficial to companies that are interested in creating strategies to market new or innovative products to reach new or existing customers.

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The wood products industry is a leading contributor to the US economy. Accounting for approximately 4 percent of the total US manufacturing gross domestic product, it is one of the country's most important sectors (Forth 2018). As of 2018, the industry produced about US\$210 billion in products annually (Forth 2018). Not only are wood products companies recognized for their economic contributions, but they also are important employers. They are noted as one of the top 10 employers in the manufacturing sector employing nearly 900,000 people, placing the industry on the same scale as the automotive, chemicals, and plastic industries (Forth 2018).

The industry also is considered one of low environmental impact because wood is a renewable resource (USDA Extension Foundation 2022). Wood is a versatile raw material and naturally possesses the ability to sequester carbon, which is chemically stored in the wood (Falk 2009, Falk et al. 2013). The carbon usually stays in the wood up until the natural end of its life cycle. It also requires less energy consumption and fossil fuel to produce wood products than to manufacture concrete and steel (Southern Forest Products Association 2022). Also, unlike other materials, the majority of the energy needed to produce wood products is derived from renewable energy sources

(Adhikari and Ozarska 2018), which is another benefit of the wood products industry.

While the industry delivers significant contributions to the US economy and the environment, there is always room for improvement. According to the Environmental Protection Agency (EPA 2020), in 2015, the United States generated 39 million tons of wood debris from construction and demolition. Of this amount, 69.2 percent was sent to landfills and 30.8 percent was sent for second use, such as compost, mulch, and manufactured products. However, less than 1 percent was used to manufacture products. As waste production continues to grow, there are opportunities to reduce this waste through recycling (Hoornweg et al. 2013, Blair and Mataraarachchi 2021).

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Recovering and repurposing lumber from waste streams gives wood a “second life” and decreases the amount of landfill waste. Most wood from demolition processes is sent to landfills where the wood either deteriorates or is burned, emitting greenhouse gases into the atmosphere (Falk and McKeever 2012, Hossain and Poon 2018). Thus, wood reuse promotes the continuation of carbon storage, which helps to reduce the carbon footprint. The wood products industry has an opportunity to further their involvement in the sustainability movement and provide additional jobs through the use of reclaimed wood.

Reclaimed wood is material salvaged from abandoned buildings and other waste streams and repurposed into new wood products. It is an important resource with the potential for more innovative uses to support the sustainability agenda. Most reclaimed wood comes from demolition processes for vacant and abandoned buildings, but there are other sources of reclaimed lumber as well. This includes old barns, decommissioned watercraft, train stations, box cars, mills, and wine barrels (Mitchell 2016).

While the use of reclaimed lumber can have environmental impacts, its economic benefits also can affect local communities (Diyamandoglu and Fortuna 2015). Salvaging efforts can help employ people locally by creating jobs for those suffering from employment barriers (US Forest Service Northern Research Station 2018). Prior studies have documented these benefits and the effect of reclaimed lumber use (Horne-Brine and Falk 1999; Falk and McKeever 2012; Pitti et al. 2019, 2020). Pitti et al. (2019) investigated the marketing practices of reclaimed lumber companies and found that these companies were able to command a higher price for their products. Salvaged lumber often has unique qualities that attracts consumers and drives market demand. These qualities offer various advantages that the wood products industry may capitalize on (Horne-Brine and Falk 1999, Falk et al. 2013). However, although most reclaimed lumber companies have direct relationship with their customers, inadequate marketing efforts are likely to create issues for companies in the future (Pitti et al. 2019).

Studies show that knowledge of a product or industry has an effect on consumers’ purchasing decisions and consumer perceptions of a product (Gazal et al. 2019, Montague et al. 2019). Studies also show that there has been a growth in environmental marketing and that consumers react positively toward eco-friendly products and companies (Hansen et al. 2014, Nielsen 2018, Alamsyah et al. 2020).

Although there have been numerous studies that investigate the benefits and market potential of reclaimed lumber, there are few that have looked at consumer knowledge of or perceptions on reclaimed lumber, its use, and the benefits of use. To fully understand consumer’s perceptions of reclaimed lumber and its use in the manufacture of secondary wood products, we wanted to first understand their awareness and perceptions of the wood products industry and the reclaimed lumber sector or industry. The questionnaire for this research was divided into two sections, one that focused on consumers and the industry or sector and one that focused on consumers and reclaimed products. This article focuses on consumers and the industry or sector. The objectives of this study were to (1) determine the current knowledge consumers possess regarding the wood products industry and the reclaimed wood sector, (2) determine how knowledgeable consumers are on demolition

and reclaimed wood processes, and (3) understand their knowledge and perception of the effects these processes have on local communities.

## Methods

### Questionnaire development

The data used in this study were collected through an online survey. The questionnaire was designed based upon relevant topics found in research articles and from informal conversation with Forest Service and industry professionals that work in the reclaimed lumber field. The questionnaire consisted of 44 questions. Questions were organized in multiple formats that included five-point scale, open-ended response, dichotomous (yes or no), categorical (ranking), and multiple-choice.

The first section included questions related to demographics. The demographics section consisted of nine questions. These questions included age, gender, race or ethnicity, state of residence, etc. This was necessary to understand the demographic make-up of the respondents. Questions in the second section focused on the wood products industry in general, while the third section asked questions specifically about the reclaimed wood sector. Other sections included open-ended responses in which consumers were asked what they thought of when hearing the term “reclaimed wood.” Other open-ended responses asked that respondents list any wood products companies with which they were familiar. Respondents also were given a chance to provide any additional comments near the end of the survey. Before the finalized version was sent out, colleagues were asked to review the questionnaire. This was to ensure that the questionnaire was concise and not missing any relevant information.

### Data collection

The online survey was distributed by Dynata, formerly known as Research Now Survey Sampling International (SSI), a company that provides data collection services for marketing research studies. Dynata serves both large and small businesses, colleges or universities and “nearly 6,000 market research, media and advertising agencies, publishers, consulting and investment firms, and corporate customers around the world (Dynata 2020).

Dynata offers a variety of recruitment methodologies to help meet unique project requirements. One such method is panel-based sampling, which helps identify and recruit respondents to participate in the survey taking process. Each recruitment channel delivers a different population with slightly different results (Dynata 2020). Each survey is distributed to a specific panel based upon the clients’ study requirements. Some study requirements might include specific demographics and a set quota for the number of responses. Within this process, respondents are allowed a one-time, single response. The survey is then closed once the target quota is met with the complete number of responses. For the purposes of this research, the authors felt the use of panel-based sampling would provide the best approach for data collection.

In recent years, online participant panels have grown in popularity. The use of Internet surveys is a cost-effective tool that enables quick access to large and diverse samples (Hays et al. 2015). Internet surveys also are less time consuming than traditional methods used to obtain data and

allow for a smoother survey taking process without facing question fatigue (Farrell and Peterson 2010, Dillman et al. 2014, Hays et al. 2015).

*Bias potential.*—There is always some degree of bias presented in published studies (Pannucci and Wilkins 2010). This is especially true in online surveys. Therefore, it was imperative to consider the possibility of bias potential in this study. One way this study sought to reduce bias potential was by setting parameters on the demographics. For example, the quotas for specific categories such as gender and race were set based on the actual estimates from the 2020 US Census. This ensured that the sample was as representative of the population as possible. This study had two “waves” of responses, so another way this research sought to reduce bias potential was to test early respondents against late respondents. This is a standard procedure for testing nonresponse bias. Other studies have adopted this approach to calculate the nonresponse bias from online surveys in which the number of nonrespondents is unknown (Cai and Aguilar 2014, Montague et al. 2019, Stout et al. 2020). The basic assumption of this procedure is that late respondents are representative of nonrespondents (Lin and Schaffer 1995, Montague et al. 2019). Responses to a question as to whether respondents were knowledgeable of the wood products industry was used to test bias. The Kolmogorov-Smirnov test (K-S test) resulted in a K-S statistic of 0.12, which confirms that the two samples came from the same distribution and thus indicated that there was no statistical difference among respondents that completed the survey early and those that completed it later.

*Pretesting the survey.*—This survey underwent one round of pretesting before distribution of the final version. There are multiple methods to pretest a survey. The pretest method of choice for this survey, was to conduct a pilot study of a small number of people from the desired sample population before mass distribution (Dillman et al. 2014).

The pretest was administered by the panel-based sample company Dynata. The survey was issued to approximately 125 respondents for a “soft launch” prior to the full field launch. At the end of the survey, respondents were asked (if desired) to provide feedback in the open-ended box. Feedback from respondents in the soft launch allowed for corrections to be made in the final questionnaire. From the pretest, 86 responses were deemed usable. Approximately 29 responses were discarded because those respondents did not fully participate nor complete the questionnaire.

Following the pretest, a few changes were made. Of these changes, definitions were reduced for lighter reading and some questions rearranged. One question underwent a complete format change while the wording was revised in others. These questionnaire changes resulted in the final version of the questionnaire.

*Sample collection.*—The only requirement for participation in this study was that respondents were a minimum of 18 years of age or older. A quota was set for the demographics based upon US Census data. Dynata distributed the survey to a random sample of US citizens from an online panel. The original goal was to reach a target number of 1,500 responses. Responses were collected until the target number was reached. The full field launch of the first wave occurred from August 26, 2021, to September 1, 2021.

From the first wave of responses, only 1,444 were considered usable completes. This included the initial 86 usable responses incurred from the pretest. A second wave

was launched in an attempt to fulfill the 1,500-response quota. The second wave occurred from September 1, 2021, to September 2, 2021. The second wave garnered 72 usable responses. The overall total number of complete responses from both waves was 1,660. However, approximately 144 responses were removed because it was determined that those respondents selected random responses; based on the time of survey completion, it was determined that those respondents did not offer viable responses and rushed through the survey. This filtration resulted in 1,516 usable responses.

## Data analysis measures

The statistical program SAS Analytics Software<sup>®</sup> was used to analyze survey data. Descriptive statistics including frequencies, means, and modes were calculated for each individual question. The chi-square ( $\chi^2$ ) test of independence and *t* tests were calculated to identify associations between respondent demographics and select questions. Analysis of variance (ANOVA) was used to identify significant associations between select demographics and three Likert-like statements. An important statement was selected from each questionnaire section and paired with three demographic variables. These variables were gender, race, and education. The significance level for this study was  $\alpha = 0.05$ . In statistical analysis *t* tests are used when comparing two group means, a one-way ANOVA analysis is used to compare means of more than two groups, and a chi-square test is used to explore the relationship between two categorical variables (Whatley 2022).

## Results and Discussion

### Demographics

Each respondent was asked to provide standard demographic information. This included gender, age, race, region, community type, and level of education. Of the responses received, 1,516 were deemed usable. The demographic breakdown of the 1,516 usable survey responses showed that 51 percent of respondents were female and 49 percent were male. This corresponds with the 2020 US Census data where females make up 51 percent of the population and males make up 49 percent (US Census 2020). Prior to survey distribution, respondents were categorized by six different age groups. Of the respondents, the largest age group were individuals 65 or above (22%), followed by individuals 35 to 44 years of age (19%) and 45 to 54 years of age (19%; Table 1).

In terms of racial background, 76 percent of respondents identified as Caucasian (white), 10 percent as African American (black), 8 percent as Asian, and 6 percent identified as Other. The racial makeup of this study also

Table 1.—Age group percentage of survey respondents.

Age group	Percentage <sup>a</sup>
18–24	7
25–34	16
35–44	19
45–54	19
55–64	17
65 or above	22

<sup>a</sup> Percentages are rounded to the nearest whole number.

corresponds with the 2020 US Census, which reported 76 percent as Caucasian, 13 percent as African American, and 6 percent as Asian (US Census 2020). The current educational background revealed that 29 percent of respondents held a bachelor's degree, 24 percent held advanced degrees, 19 percent held a high school degree or less, 15 percent had some college (no degree), and 13 percent held an associate's or technical degree. This differs slightly from the 2020 US Census where individuals identified as having a high school degree or less made up the largest percentage (38%). The second largest group being those holding a bachelor's degree (22%), followed by individuals with some college (17%), those with professional degrees (13%), and individuals who received an associate's or technical degree (10%).

When asked about their marital status, over half of respondents identified as married (55%), approximately 24 percent as single, 10 percent as divorced, 7 percent as living with a partner, and 4 percent as widowed. When asked to indicate their region of residence, 40 percent stated that they lived in the South, 21 percent in the Northeast, 20 percent in the West, and 19 percent in the Midwest. The majority of respondents also stated that they live in suburban communities (47%), while 33 percent reside in urban communities, and 20 percent in rural communities.

### Knowledge of industry

To understand consumers' current knowledge levels of the wood products industry, respondents were asked to describe how knowledgeable they are regarding the wood products industry. The majority (59%) of respondents indicated being a somewhat knowledgeable audience. The remaining portion (41%) indicated that they held no knowledge whatsoever. A Pearson's chi-squared test detected significant association between respondent's knowledge of the industry and race ( $P \leq .001$ ). Respondents that identified as Caucasian were more likely to have prior knowledge of the wood products industry than were their counterparts. Results suggest that wood products knowledge or awareness is not equal among racial groups, thus prompting room for improvement. The wood products industry, traditionally, has been known as a Caucasian-dominated field. This might be a reason that individuals who identified as Caucasian might be more knowledgeable on the subject (Stout et al. 2020). In addition to race, chi-square tests between other demographics (gender, age, education, community type, and region) and respondent's knowledge levels resulted in statistically significant associations. Males, respondents with advanced degrees, and respondents in urban locations also were more likely to have prior knowledge of the wood products industry. These results align with previous studies that show males and individuals that were highly educated were more likely to know more about the wood products industry and have more positive attitudes to the industry (Toppinen et al. 2013, Stout et al. 2020, Montague et al. 2021).

Respondents who stated that they did have some knowledge regarding the industry ( $n = 901$ ) were asked to identify from where or whom they had learned about the industry. As shown in Figure 1, most respondents had heard about the industry through family (31%) or friends (22%), followed by online (17%), TV (15%), and social media (14%). It is no surprise that family and peers play an important role in informal learning. In an age where social

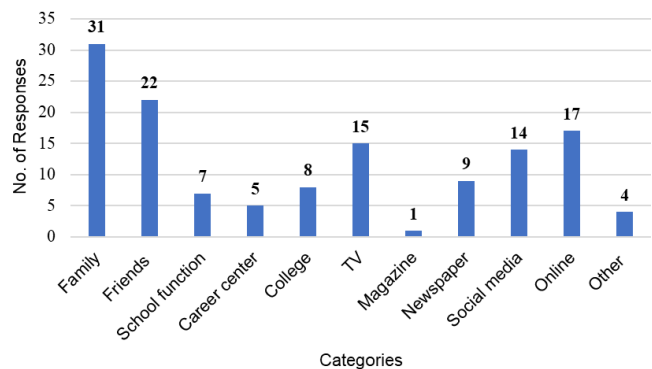


Figure 1.—Percentages of where respondents had learned about the wood products industry. Percentages rounded to the nearest whole number.

sharing and “influencing” are prominent in everyday living, people seem to value the information they learn from their peers (Emporia State University 2020). Younger generations have even adopted new collaborative mindsets from encouraged informal knowledge sharing (Emporia State University 2020). Word-of-mouth is popular and can influence what a person knows without that person doing extensive research.

The finding of respondents learning information online is not surprising. The Internet is an important source of information with a wide coverage and extremely fast access (Al Hassan 2015). Within seconds, knowledge can be at anyone's fingertips. Since its debut, people have become more comfortable with using the Internet as an information outlet. Cable television is also another outlet for information sharing. Many people learn with TV programs like HGTV and the DIY Network, both of which feature nonstop renovations that cover a wide range of projects and budgets (D'Costa 2015). From hardwood floors to high-end kitchen cabinets, wood renovations are common on these programs.

Most people use social media platforms to network with friends, or for entertainment pleasures. However, social media also is heavily used to gather information, and information gathering is listed as one of the top three reasons for social media use (Montague et al. 2019). With different gossip blogs and news outlets having major presence on various social media platforms, consumers are exposed to more information daily through social media alone. However, Montague et al. (2019) also determined that while many use social media to gather information, they do not use it heavily to find information on wood products. This indicates that there may be an opportunity for the industry to increase the promotion of products and information dissemination through social media. The options “school function,” “career center magazine,” and “other” scored relatively low compared with the other options listed (Fig. 1). For those that chose “Other,” most of the respondents themselves had career experience working in the wood products industry or related field.

To further understand how respondents learned about the industry, respondents were then asked if they have any immediate family that had any experience working in the field. A large number of respondents (68%) did not have any family working within the field. Twenty-six percent did have family members with experience in the field, while the remaining 6 percent were unsure. This large percent of

responses could suggest that most respondents are learning their information from outside sources such as word-of-mouth, among friends, or from reading information online. Perhaps people indulged in self-learning during the COVID-19 pandemic because most people have taken an interest in DIY (Do It Yourself) projects/home renovations (Zhang and Stottlemeyer 2021). Self-learning and the desire to learn how to accomplish a project could easily influence where people gather their information.

Respondents were also asked whether they were familiar with at least one wood products company in general. Nearly half (49%) of the respondents stated that they were not familiar with one wood products company. Thirty-three percent acknowledged that they were familiar with at least one company, while 18 percent were unsure. The respondents that chose “yes” ( $n = 500$ ) were then asked to list that company. Frequent responses mentioned notable companies such as Weyerhaeuser, Georgia Pacific, Home Depot, Lowe’s, 84 Lumber, and YellaWood. Weyerhaeuser and Georgia Pacific are known as two of the largest wood products companies in the world, bringing in nearly US\$7.1 billion in revenue (Kolmar 2021). Therefore, it makes sense that Weyerhaeuser and Georgia Pacific were some of the frequently mentioned companies. Those same respondents also were asked if they knew whether the companies they listed worked with salvaged lumber. Almost half of the respondents (49%) stated that they were unsure. The remaining responses were split between “yes” (24%) and “no” (27%; Fig. 2). The reason that a large number of respondents were unsure could be because most of the companies mentioned either do not use reclaimed wood, or do not broadcast their use of reclaimed wood.

Respondents were then asked to identify when they last purchased a wood product. A large portion of the respondents (46%) had purchased a wood product less than six months prior to their participation in the survey. Eighteen percent of the respondents could not remember when they last made a purchase. Similarly, another 18 percent of the respondents indicated that they had made a

purchase within 6 months to a year prior to participation in the survey. Thirteen percent of respondents made purchases 2 to 5 years prior to the survey. The remaining 6 percent stated that they had made purchases more than 5 years ago.

This is on par with the increase in wood products sales during the pandemic. Consumers across the nation went from hoarding toilet paper to buying lumber for DIY projects, which contributed to skyrocketing prices (Zhang and Stottlemeyer 2021). Staying at home for a large portion of the pandemic encouraged many people to perform home repairs or upgrades for amenities such as outdoor decks or the purchasing of new wooden furniture (Zhang and Stottlemeyer 2021).

For those that responded that they did not purchase wood products within the past year or so, perhaps they are unsure of what is classified as a wood product. There are over 5,000 types of wood products, so it is very unlikely that there were any respondents who did not purchase any wood products within the past year. Perhaps those respondents that indicated that they did not purchase wood did not realize that they were consuming wood products. This could signify a lack of knowledge or awareness among consumers, as suggested in similar studies. For example, Montague et al. (2019) discovered that consumers seem to only identify lumber as wood products. This could be another indicator that the industry might have an issue with the promotion of wood products.

To get an idea of the type of wood products consumers use, respondents were asked which products they were most willing to buy. Respondents indicated they were more willing to buy furniture (37%) and paper (25%) than any other wood product. Options such as kitchen cabinets (6%), fuelwood or charcoal (3%), and composites (oriented strand board, particleboard, flake board; 2%) seemed to be less popular. One percent of the respondents stated that they would be willing to buy other wood products not listed. These products include items such as birdhouses, kitchen table sets (which would be classified as furniture), and wood pellets.

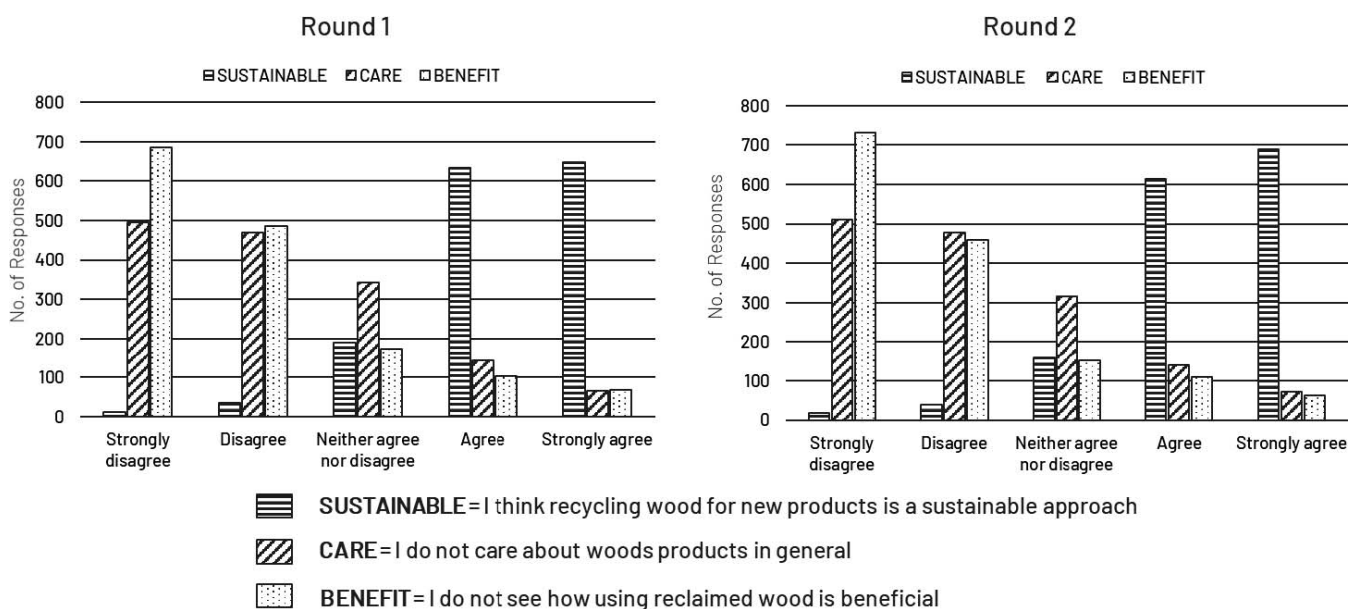


Figure 2.—Comparison of Rounds 1 and 2 of consumers' attitude toward reclaimed wood products.

## Knowledge of Reclaimed Wood

Before asking questions to gauge perceptions, respondents were asked general questions about reclaimed wood. When asked if they had ever heard of reclaimed wood before, a majority of respondents (55%) stated “yes.” Thirty-three percent stated that they had not heard of it, while the other 12 percent were uncertain. Additionally, respondents were asked if they knew what reclaimed wood was. The results were similar with 44 percent stating “yes,” and 37 percent replying “no,” and the remaining 19 percent selecting “unsure.” Respondents also were asked if they were aware that reclaimed wood was a separate sector of its own. Over half of the respondents (60%) indicated that they were unaware of this, with the remaining 40 percent indicating that they were aware.

## Perceptions of employment opportunities with reclaimed wood

After examining their levels of knowledge, respondents were given a set of Likert-type questions to determine their perception on wood products and reclaimed lumber. They were then given information regarding the benefits of reclaimed wood. One such benefit included potential job creation in low-income neighborhoods. Respondents were informed that the reclaimed wood industry can increase job exposure for individuals who have a hard time finding labor and were then asked whether learning this information changed their initial perceptions of reclaimed wood. The majority of respondents (69%) agreed that their initial perceptions had changed.

To test to see whether perceptions had truly changed, after receiving additional information, respondents were presented with the same statements a second time. Initial responses (prior to being given information) indicated that respondents already had a positive view of reclaimed wood. However, after learning about the potential to create job exposure, responses showed an more positive outlook (Fig. 2). In addition, Table 2 shows that a majority of respondents (88%; mean of 4.28) were inclined to agree with the statement “reclaimed wood can be profitable for communities.” General agreement with that statement suggests that most respondents do see the value of reclaimed wood. One person even expressed thanks for this survey, stating that working with reclaimed lumber is how they have supported themselves financially. Of the respondents, a little over half (51%) indicated that they have personally thought about recycling wood (Table 2). Previous studies have indicated that recycling is a cultural norm in America and that American consumers care about recycling and the environment (Carton Council 2016). The small number of

respondents that recycle wood may indicate that the public may not be fully informed on the recyclability properties of wood.

Likewise, the majority of respondents fluctuated between agreeing with (49%) and remaining neutral about (27%) whether they thought about what happens to wood once it had been demolished from old buildings (mean = 2.99; Table 2). Although many do not think about recycling wood personally, 73 percent of respondents were more likely to disagree (mean = 1.62; Table 2) with the statement “demolition practices should not recycle wood from old buildings.” This means that respondents do think wood should be recycled from these waste streams instead of being demolished. There is already documentation on the effects of salvaging practices, but these results indicate greater potential for implementation of reclaimed wood within the industry.

## Perception of industry sustainability and waste reduction practices

Before giving respondents statements regarding the environmental impact of the industry, respondents were provided with more information regarding the benefits of reclaimed wood. Respondents were told that the reclaimed wood industry decreases the amount of waste that goes into landfills. Then they were asked if learning this changed their original perceptions of the industry. Sixty-seven percent of respondents indicated that learning this information did affect their initial perceptions of the reclaimed wood industry. The remaining 33 percent did not agree. These results could suggest that respondents lacked an initial understanding of the benefits of recycled wood. Perhaps there is a disconnect in how companies within the industry promote themselves. Research shows that more consumers are looking for sustainable or environmentally friendly products (Hansen et al. 2014, Pätäri et al. 2017, Nielsen 2018, Alamsyah et al. 2020). Understanding the environmental benefits of reclaimed lumber may entice consumers to support recycling wood and reclaimed lumber companies. It also may increase the market demand for reclaimed lumber.

To gain a better understanding of their perceptions of the wood products industry, respondents were asked to consider topics concerning the industry’s relationship with the environment and its waste practices (Table 3). Approximately 89 percent of respondents agreed that reusing wood from demolition sites helps reduce landfill waste. Eighty-seven percent of respondents agreed that they understand the importance of wood products in the world. In addition, 70 percent agreed with the statement that cutting down trees

Table 2.—Respondents’ perceptions about reclaimed wood.

Statement	Mean (mode)	Proportion <sup>a</sup> (%) assigning a rating of				
		5 (strongly agree)	4	3	2	1 (strongly disagree)
Reclaimed wood can be profitable for communities	4.28 (5)	44	44	9	2	1
I have personally thought about recycling wood	3.36 (4)	20	31	25	13	11
I have often thought about what happens to wood once demolished from old buildings	2.99 (3)	16	33	27	14	10
Demolition practices should not recycle wood from old buildings	1.62 (1)	6	9	12	29	44

<sup>a</sup> Values are based on a five-point scale, where 5 = strongly agree and 1 = strongly disagree. Proportions are rounded to the nearest whole number.

Table 3.—Respondents' perceptions toward the industry's relationship with the environment.

Statement	Mean (mode)	Proportion <sup>a</sup> (%) assigning a rating of				
		5 (strongly agree)	4	3	2	1 (strongly disagree)
Reusing wood from demolition sites helps reduce landfill waste	4.37 (4)	51	38	8	2	1
I understand why wood products are important to our world	4.27 (4)	43	44	10	2	1
Cutting down trees for wood products is damaging to forests	3.91 (4)	33	37	21	6	3
The wood products industry does not harm the environment	2.75 (3)	17	23	30	18	12
Recycling wood does not have an impact on communities	1.72 (2)	9	11	14	30	36
Recycling wood does not have an impact on the environment	1.66 (2)	10	14	13	25	38

<sup>a</sup> Values are based on a five-point scale, where 5 = strongly agree and 1 = strongly disagree. Proportions are rounded to the nearest whole number.

causes damage to natural forests, rating it a 4 or 5 on the scale. One respondent stated that “tree companies have destroyed hundreds of acres of beautiful pine forests that once surrounded [her] property. So, [she’s] all for minimizing this destructive and heartbreaking practice.” This seems to be a common perception across survey participants, but it is unclear whether participants are aware of forest sustainability practices and current contemporary views on reforestation and forest resilience. Reforestation efforts are a top priority for national forest management following planned timber harvests or catastrophic events (US Forest Service 2022).

When asked whether they thought the wood products industry harms the environment, 40 percent agreed that the industry did not harm the environment. Thirty percent were neutral, indicating respondents did not know how to feel about that statement. This could be because they do not have a lot of information regarding the industry’s environmental practices, thus being unable to hold a strong opinion. According to Krosnick et al. (2002), respondents are more likely to select neutral in response to a statement when they have little or no former knowledge of the subject. This once again brings up the issue of the industry’s current promoting and marketing practices.

When asked about the effect of recycling wood, 66 percent of respondents disagreed with the statement “recycling wood does not have an impact on communities.” Likewise, 63 percent of respondents also disagreed with the statement “recycling wood does not have an impact on the environment.” This implies that the respondents do believe recycling wood is effective. It appears they believe this effect to be positive; one respondent stated, “When I said that there were impacts of reclaimed wood on environment and communities, I meant in a positive way.”

### Perceptions of industry promotion practices

Urban and reclaimed wood firms can vary in terms of stature, credibility, facility management, exporting practices, and length of operation (Pitti et al. 2019). Customer profile also can vary ranging from high-volume corporate customers, such as architecture and design firms, down to the individual buyer (Pitti et al. 2019). Based upon the target audience, marketing practices can differ. Thus, there is a need to determine whether these campaigns are effectively reaching consumers. To gauge their perceptions on promotion practices of reclaimed wood within the industry, respondents were given a series of statements. Each respondent was asked to indicate their level of agreement for each statement (Table 4).

Of the respondents, 85 percent agreed that knowing about the environmental benefits of wood products would be beneficial to consumer opinion. Additional comments support these sentiments. One respondent stated that information regarding reclaimed wood is “really good for the general population to be aware of to help save [the] planet.” Another stated that “climate change can literally exterminate us, [so it is best to] sustain the environment.” Others referred to this information as “thought provoking.” Eighty percent of respondents also agreed that wood products companies should increase awareness of their environmental friendliness. The majority of respondents (58%) disagreed with the statement “Salvaged lumber is not marketable, because it might not be financially beneficial in the long run.” This suggests that reclaimed wood is marketable and that consumers would be more inclined to consider purchase if it were properly advertised.

For years there has been discussions among the industry on how to effectively promote and market wood products (Mater 2005, Panwar et al. 2010, Montague et al. 2016). These results show that consumers are looking for more information on wood products and appreciate the sustainability of reclaimed lumber. This also shows that there is an opportunity for the industry to increase the awareness of reclaimed wood, its benefits, and its uses. Thirty-seven percent of respondents indicated that they learned of the wood products industry through some form of digital media, so increasing industry presence through digital platforms may be beneficial.

Approximately 54 percent of respondents stated that they have not seen any advertisements promoting the use of reclaimed wood. Similarly, 79 percent of respondents agreed that reclaimed wood should be marketed better. A previous study (Pitti et al. 2019) indicated that the majority of active reclaimed wood firms had been operating for less than 10 years. Being fairly new in the industry could pose some challenges. Perhaps the industry could further explore how this barrier might affect marketing techniques implemented thus far. Further, *t* tests and analysis of variance (ANOVA) tests suggest that neither the amount of education, gender, nor race play a role in the way respondents viewed marketing practices.

### Importance of the wood products industry

Respondents were asked to rate how important they believed the wood products industry to be on a five-point Likert scale. Leaning more toward a value of “4” or “5,” 81 percent of respondents were more inclined to consider the industry to be important (mean = 4.13). Only a small

Table 4.—Respondents' attitudes toward the reclaimed wood industry's marketing practices.

Statement	Proportion <sup>a</sup> (%) assigning a rating of					
	Mean (mode)	5 (strongly agree)	4	3	2	1 (strongly disagree)
Knowing how wood products benefit the environment would be beneficial to consumer opinion	4.20 (4)	38	47	13	1	1
Wood products companies should create awareness of their environmental friendliness	4.08 (4)	34	46	16	3	1
Reclaimed wood should be marketed better	4.07 (4)	31	48	18	2	1
Salvaged lumber is not marketable, because it might not be financially beneficial in the long run	1.99 (2)	6	10	27	31	27
I have seen advertisements that promote the use of reclaimed wood	1.91 (2)	10	17	19	28	26

<sup>a</sup> Values are based on a five-point scale, where 5 = strongly agree and 1 = strongly disagree. Proportions are rounded to the nearest whole number.

percentage of respondents selected values “1” or “2,” which label the industry as extremely unimportant (1%) or somewhat unimportant (3%). Fifteen percent of respondents felt neutral toward this statement. An ANOVA test showed there was a significant association between education level and industry importance and between community type and industry importance. Respondents with bachelor’s and master’s degrees were more inclined to understand the significance of the industry. Likewise, respondents in suburban communities were more inclined to understand the significance of the industry. However, this difference could be due to the majority of respondents being from suburban communities. Further research among equal community populations might provide insight on whether individuals think differently among these three community types. Based upon responses from the “additional comments” section, the majority of respondents thought this survey was extremely informative and realize the importance of the industry.

### Conclusion

Data regarding how knowledgeable US consumers are about the wood products industry and their perceptions of reclaimed wood practices were collected through an online survey in 2021. The 1,516 responses provided insight on consumer perceptions of the wood products industry and its current reclaimed wood practices. Although there is a known market for reclaimed wood, there has been limited research pertaining to consumer opinions on usage. Additional consumer research could be beneficial for industry officials to develop and adopt new approaches for promotional and marketing practices.

Results from this study suggest that consumers do possess some knowledge about the wood products industry as a whole. However, while 59 percent of the respondents seem to be aware of the industry, only 44 percent know anything about reclaimed wood. Based on responses, there also seems to be a lack of knowledge on how reclaimed wood can influence economic development in communities. Many indicated being unaware of the opportunities and positive effects associated with the reclaimed wood industry. The majority of the respondents were introduced to new information through this survey. Once they received this information, their initial perceptions and attitudes were altered. This is an indication that the industry could benefit from incorporating innovative strategies for the use of reclaimed wood into their marketing campaigns. Results also suggest that there are present-day outlets that offer opportunities of which the industry can take advantage.

These outlets exist through social media, the Internet, and television because most respondents identified these platforms as secondary sources for learning information. Recently there have been multiple DIY shows that have showcased reclaimed wood in projects. Partnering with these shows could be another way to spotlight reclaimed wood and its importance and increase public awareness.

There also appears to be a knowledge gap among the different racial and gender groups of respondents. The wood products industry is a primarily a Caucasian and male-dominated field; therefore, it was not surprising that Caucasian males were more likely to be more knowledgeable than their counterparts regarding the industry and reclaimed lumber. This reflects a need for more extension, outreach, inclusion, and diversity opportunities in this field. Perhaps this could be considered a priority in that diverse teams offer a greater perspective, generate better ideas, and see around corners that allow proper preparation to address challenges (Pierce 2020). Many of the US reclaimed lumber projects are taking place in urban cities, such as Baltimore, Maryland, it seems the industry has a great opportunity to engage and provide information to these diverse communities.

Overall, results of this study show that the industry would benefit from spreading more awareness of wood products and the role these products play in the world. Current research shows the importance of the reclaimed wood sector and how this material can provide more opportunities and economic benefits. The benefits could be even more effective with targeted marketing practices or educational campaigns. Although the primary wood products industry generally does not market directly to consumers, providing information and reaching diverse groups could lead to improvements in diversity, inclusion, and outreach within the industry. Building positive relationships between consumers and the industry could strengthen the market and thus be beneficial in the long run.

Although this research looked at US consumer perceptions and opinions, future research should be conducted on the minority consumer population. This research, as well as other research, has shown that knowledge of the wood products industry is often limited among this population. Research to determine why this may be the case and how to increase awareness and knowledge among this group would be beneficial.

### Limitations

There are limitations to our work that are similar to other research using online surveys. Although panel surveys can



be administered quickly and are usually cost-efficient, there are some disadvantages. Results were obtained from an established panel, so the responses may not necessarily reflect those of other US consumers. In addition, people are often biased when reporting their own experiences. As a result, one should be cautious in generalizing the findings of this study.

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### Literature Cited

Adhikari, S. and B. Ozarska. 2018. Minimizing environmental impacts of timber products through the production process “From Sawmill to Final Products”. *Environ. Syst. Res.* 7(6):1–15.

Alamsyah, D., N. Othman, and H. Mohammed. 2020. The awareness of environmentally friendly products: The impact of green advertising and green brand image. *Manag. Sci. Lett.*, 10(9):1961–1968.

Al Hassan, E. I. K. 2015. Perspectives of using internet on the scientific research among the postgraduate students at the University of Khartoum–Sudan. *World J. Educ.* 5(5):11–20.

Blair, J. and S. Mataaraarachchi. 2021. A review of landfills, waste and the nearly forgotten nexus with climate change. *Environments* 8(8):73.

Cai, Z. and F. X. Aguilar. 2014. Corporate social responsibility in the wood products industry: US and Chinese consumers’ perceptions. *Forest Prod. J.* 64(3):97–106.

Carton Council. 2016. Consumers overwhelmingly believe recycling is important. <https://www.businesswire.com/news/home/20160406005465/en/Consumers-Overwhelmingly-Recycling-Important>. Accessed October 31, 2022.

D’Costa, K. 2015. A story of wood. <https://blogs.scientificamerican.com/anthropology-in-practice/a-story-of-wood/>. Accessed January 17, 2022.

Dillman, D. A., J. D. Smyth, and L. M. Christian. 2014. The internet, phone, mail, and mixed-mode surveys: The tailored design method. John Wiley & Sons, Inc., Hoboken, New Jersey.

Diyamandoglu, V. and L. Fortuna. 2015. Deconstruction of woodframed houses: Material recovery and environmental impact. *Resour., Conserv. Recycl. Adv.* 100:21–30.

Dynata. 2020. Dynata panel book. <http://info.dynata.com/rs/105-ZDT-791/images/Dynata-Panel-Book-2020.pdf>. Accessed November 7, 2021.

Emporia State University. 2020. Importance of learning from your peers. <https://online.emporia.edu/articles/business/importance-of-learning-from-your-peers.aspx>. Accessed December 3, 2021.

[EPA] US Environmental Protection Agency. 2020. Construction and demolition debris management in the united States, 2015. [https://www.epa.gov/sites/default/files/2020-03/documents/final\\_cd-eol-management\\_2015\\_508.pdf](https://www.epa.gov/sites/default/files/2020-03/documents/final_cd-eol-management_2015_508.pdf). Accessed October 26, 2022.

Falk, B. 2009. Wood as a sustainable building material. *Forest Prod. J.* 59(9):6–12.

Falk, R. H., S. Cramer, and J. Evans. 2013. Framing lumber from building removal: How do we best utilize this untapped structural resource? *Forest Prod. J.* 62(7/8):492–499.

Falk, B. and D. McKeever. 2012. Generation and recovery of solid wood waste in the U.S. *BioCycle* August 2012:30–32.

Farrell, D. and J. C. Petersen. 2010. The growth of Internet research methods and the reluctant sociologist. *Sociol. Inquiry* 80(1):11–125.

Forth, K. 2018. How important is the U.S. wood products industry? <https://www.woodworkingnetwork.com/news/woodworking-industry->

[news/how-important-us-wood-products-industry](https://www.woodworkingnetwork.com/news/how-important-us-wood-products-industry). Accessed September 1, 2021.

Gazal, K., I. B. Montague, and J. K. Wiedenbeck. 2019. Factors affecting social media adoption among wood products consumers. *BioProd. Bus.* 4(5):51–62. <https://doi.org/10.22382/bpb-2019-005>

Hansen, E., R. Panwar, and R. Vlosky. 2014. The Global Forest Sector: Changes, Practices, and Prospects. CRC Press, Boca Raton, Florida. DOI: 10.1201/b16186

Hays, R. D., H. Liu, and A. Kapteyn. 2015. Use of internet panels to conduct surveys. *Behav. Res. Methods* 47(3):685–690.

Hornweg, D., P. Bhada-Tata, and C. Kennedy. 2013. Environment: Waste production must peak this century. *Nature* 502:615–617. <https://doi.org/10.1038/502615a>

Horne-Brine, P. and R. Falk. 1999. Knock on wood: Real recycling opportunities are opening up. *Resour. Recycl.* (Aug. 1999):42, 44–46 : ill.

Hossain, M. U. and C. S. Poon. 2018. Comparative LCA of wood waste management strategies generated from building construction activities. *J. Cleaner Prod.* 177:387–397.

Kolmar, C. 2021. 15 Largest forestry companies in the world. <https://www.zipppia.com/advice/largest-forestry-companies/>. Accessed August 9, 2022.

Krosnick, J. A., A. L. Holbrook, M. K. Berent, R. T. Carson, W. M. Hanemann, R. J. Kopp, R. C. Mitchell, S. Presser, P. A. Ruud, V. K. Smith, and W. R. Moody. 2002. The impact of “no opinion” response options on data quality: Non-attitude reduction or an invitation to satisfice?. *Publ. Opin. Q.* 66(3):371–403.

Lin, I. F. and N. C. Schaeffer. 1995. Using survey participants to estimate the impact of nonparticipation. *Public Opinion Q.* 2:236–258.

Mater, J. 2005. The role of the forest industry in the future of the world. *Forest Prod. J.* 55(9):4–10.

Mitchell, R. 2016. Tiny Houses Built with Recycled Materials: Inspiration for Constructing Tiny Homes Using Salvaged and Reclaimed Supplies. Simon and Schuster, New York.

Montague, I., K. A. Gazal, and J. K. Wiedenbeck. 2019. Social media use in the wood products industry: Impact on the consumer purchasing process. *BioProd. Bus.* 4(3):27–40.

Montague, I., K. A. Gazal, J. Wiedenbeck, and J.-G. Shepherd. 2016. Forest products industry in a digital age: A look at E-commerce and social media. *Forest Prod. J.* 66(1/2):49–57.

Montague, I., K. Stout, and R. Shmulsky. 2021. Love it or leave it: What do millennials really think of wood products? *Forest Prod. J.* 71(2):150–160.

Nielsen. 2018. Was 2018 the year of the influential sustainable consumer? <https://www.nielsen.com/us/en/insights/article/2018/was-2018-the-year-of-theinfluential-sustainable-consumer/2/>. Accessed December 3, 2021.

Pannucci, C. J. and E. G. Wilkins. 2010. Identifying and avoiding bias in research. *Plastic Reconstruct. Surg.* 126(2):619–625.

Panwar, R., X. Han, and E. Hansen. 2010. A demographic examination of societal views regarding corporate social responsibility in the US forest products industry. *Forest Policy Econ.* 12(2):121–128.

Pätäri, S., H. Arminen, L. Albareda, K. Puumalainen, and A. Toppinen. 2017. Student values and perceptions of corporate social responsibility in the forest industry on the road to a bioeconomy. *Forest Policy Econ.* 85:201–215.

Pierce, E. 2020. Withstanding future market disruptions and other unprecedented challenges will require diverse teams and inclusive business practices. <https://www.foodbeverageinsider.com/operations/natural-products-industrys-need-diversity-and-inclusion>. Accessed October 30, 2022.

Pitti, A., O. Espinoza, and R. Smith. 2019. Marketing practices in the urban and reclaimed wood industries. *Biopod. Bus.* 4(2):15–26.

Pitti, A. R., O. Espinoza, and R. Smith. 2020. The case for urban and reclaimed wood in the circular economy. *BioResources* 15(3):5226–5245.

Southern Forest Products Association. 2022. Wood & the environment: The environmentally friendly choice. <https://sfpa.org/lumber-info/wood-the-environment/>. Accessed October 31, 2022.

Stout, K., I. Montague, and R. Shmulsky. 2020. Millennial generation perceptions surrounding the wood products industry. *BioProd. Bus.* 5(3):25–36.

US Census Bureau. 2020. QuickFacts. <https://www.census.gov/>

- quickfacts/fact/table/US/POP010220#POP010220. Accessed October 30, 2022.
- Toppinen, A., R. Toivonen, A. Valkeapää, and A. K. Rämö. 2013. Consumer perceptions of environmental and social sustainability of wood products in the Finnish market. *Scand. J. Forest Res.* 28(8):775–783.
- [USDA] US Department of Agriculture Extension Foundation. 2022. Wood Products community of practice. <https://wood-products.extension.org/>. Accessed September 16, 2022.
- US Forest Service. 2022. Reforestation. <https://www.fs.fed.us/forestmanagement/vegetation-management/reforestation/index.shtml>. Accessed August 20, 2022.
- US Forest Service Northern Research Station. 2018. The Baltimore wood project: Finding new lives for urban wood and rowhome properties. [https://www.nrs.fs.fed.us/ufs/local-resources/downloads/CurrentTopics201808\\_Issue5.pdf](https://www.nrs.fs.fed.us/ufs/local-resources/downloads/CurrentTopics201808_Issue5.pdf). Accessed September 10, 2021.
- Whatley, M. 2022. One-Way ANOVA and the chi-square test of independence. *In: Introduction to Quantitative Analysis for International Educators*. Springer Texts in Education. Springer, Cham. pp. 57–74. [https://doi.org/10.1007/978-3-030-93831-4\\_5](https://doi.org/10.1007/978-3-030-93831-4_5)
- Zhang, X. and A. Stottlemeyer. 2021. Lumber and timber price trends analysis during the COVID-19 pandemic. [https://tfsweb.tamu.edu/uploadedFiles/TFSMain/Data\\_and\\_Analysis/Forest\\_Economics\\_and\\_Resource\\_Analysis/Contact\\_Us\(1\)/Lumber%20and%20Timber%20Price-COVID-19.pdf](https://tfsweb.tamu.edu/uploadedFiles/TFSMain/Data_and_Analysis/Forest_Economics_and_Resource_Analysis/Contact_Us(1)/Lumber%20and%20Timber%20Price-COVID-19.pdf). Accessed January 16, 2021.