Homebuilder attitudes and preferences regarding southern yellow pine

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Abstract

SYP has for many years provided the homebuilding industry with abundant, cost-competitive products. However, some studies have reported that different user groups perceive that lumber quality in general has decreased in recent years. This study's objective was to ascertain homebuilders' perceptions of SYP lumber quality. The method of data collection was a mail survey questionnaire sent to the largest 500 homebuilders in the United States, as measured by sales in 2000. SYP is still positively regarded by a majority of homebuilders nationwide and is considered a credible resource to use in manufacturing good products. However, a considerable number (though not a majority) of homebuilders do perceive that SYP quality has declined over the past half-century. Some possible reasons for this perceived decline in quality were the fast-grown nature of plantation wood and possible errors in kiln-drying techniques.

Southern yellow pine (SYP) grows throughout the southern United States, with a range stretching from East Texas through Virginia. The name southern yellow pine or southern pine is used to represent a group of four principal pine species: longleaf (*Pinus palustris*), shortleaf (*Pinus echinata*), loblolly (*Pinus taeda*), and slash (*Pinus elliottii*). Lumber from all four species is marketed as SYP and graded in accordance with the grading rules of the Southern Pine Inspection Bureau (SPIB) (2000), approved by the American Lumber Standard Committee (ALSC). SYP has long been the principal tree species in the South for lumber production and has generally increased in production volume from 8,217 million board feet (MMBF) in 1980 to 16,923 MMBF in 1999 (SFPA 2001a). A substantial portion of SYP lumber has always been preservative treated for utilization in decay-prone applications. The introduction of the Formosan subterranean termite to the South has renewed interest in the durability of building materials. Preservative-treated lumber is one of the many alternatives to untreated lumber that homebuilders are considering. In 1999, 5,571 MMBF (36% of total SYP lumber production) was preservative treated as certified by the ALSC (SFPA 2001b).

The main competitors for softwood lumber are concrete, steel, and plastic (Spelter 1996). Steel is not a new construction material, even in the residential market. In 1933, steel-framed homes were exhibited in the "A Century of Progress" display at the Chicago World's Fair. Homebuilders and homebuyers had been slow to embrace steel-framed houses due to the higher price of steel and because builders were more comfortable with lumber (Haws 1993). However, recent research indicates that softwood lumber continues to lose market share in the U.S. residential construction industry and that builders remain concerned about softwood lumber quality, price, and price stability (Eastin et al. 2001). The substitutes investigated in the Eastin et al. study included engineered wood, concrete, plastic lumber, steel, and others. A recent study reported that homebuilders are using substitutes for pressure-treated lumber for residential decks; these substitutes include naturally durable species, concrete, woodfiber-plastic lumber, untreated lumber, and plastic lumber (Shook and Eastin 2001).

Some studies have reported that different user groups perceive that lumber quality in general has decreased in recent years. One study researched perceptions of wood in the highway infrastructure market and found that highway

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decision makers rated wood lower in overall material performance compared to prestressed and reinforced concrete, steel, and aluminum (Smith et al. 2000). Another study found that buyers prefer suppliers who provide high-quality softwood lumber and are willing to pay more for better products (Hansen and Bush 1996). Some have argued that the term "quality" is used more and more by companies and their advertisers, so often in fact that it is running the risk of losing its meaning (Hansen and Punches 1996).

Numerous studies have investigated various wood properties associated with SYP lumber. In general, these studies have shown that most wood properties are less favorable in the fast-grown wood located within the first 5 to 15 growth rings, often known as juvenile wood (Megraw 1985, Bendsten and Senft 1986). There are some attributes that wood possesses that its substitutes do not. Some of these construction advantages include its warmth, comfort, and attractiveness. Further, some of the more established wood products have proven records. Also, wood is considered environmentally friendly (Kozak and Cohen 1999).

Irland (1993) stated that forces such as consumer and builder preferences, relative installation costs, life-cycle costs, and comparative technical features all affect choices between competing construction materials. Softwood lumber, including SYP and other species, is produced by a mature industry (Sinclair and Stalling 1990; Vasconcellos 1991) with a limited repertoire of competitive tools (Hansen and Bush 1996). Shetty (1987) claims that, even in mature industries, quality can be enhanced. It is generally agreed that providing a high-quality product can be a source of competitive advantage (Cravens et al. 1988) and can improve firm performance (Buzzell and Gale 1987, Jacobsen and Aaker 1987, Shetty 1987). Further, it is important to understand quality as perceived by the customer. According to Zeithaml (1988), the measurement of quality has not been adequately studied, even though periodic and accurate measurement is clearly essential to providing a high-quality product (Whiting and Walsh 1986, Shetty 1987). This study is grounded in the premise that perceived lumber quality is a major factor in determining market share. Therefore, the objective of this study was to ascertain homebuilders' perceptions of SYP lumber quality.

The study

Survey methods

In general, sampling, survey procedures, follow-up efforts, and data analysis were conducted in accordance with well-documented and verified techniques (Dillman 1978, Hair et al. 1992, Malhotra 1993, Fowler 1996). The following sections describe these procedures.

The sample frames for the study consist of the largest 500 homebuilders in the United States measured by sales in 2000. The source of sample frame information is U.S. census data. The sample set was purchased from Best Lists, a national survey list company.

The method of data collection was a mail survey questionnaire. Mail questionnaires were chosen as the most cost-effective method of data collection. The method affords a high degree of anonymity and is less limited by rigid time constraints that can impede the effectiveness of other survey methods. The questionnaires consisted of fixed response questions, including fixed alternative and multichotomous questions for responding firm demographic profiles, as well as open-ended questions that allow respondents to express thoughts and ideas not covered in the fixed format questions.

Mail survey procedures included a pre-notification letter, a cover letter accompanying the initial questionnaire, a follow-up postcard, a second follow-up letter, and a second copy of the questionnaire.

Pre-addressed, postage-paid envelopes and a signed cover letter were included with the questionnaire. The cover letter also promised summary results of the study for completing and returning the questionnaire, a tactic that has been used successfully by the researcher in many previous studies. Pre-notification and reminder postcards were also sent to all companies. The study results are based on two mailings. All surveys were sent to upper-level marketing or management individuals by name and title in each company.

Non-response is a survey problem that seems to have grown in recent years as the public has become less willing to participate in surveys (Steeh 1981). The cause of concern about non-response is the risk that non-respondents will differ from respondents with regard to the survey variables, in which case the survey estimates based on the respondents alone will be biased estimates of the overall population parameters (Kalton 1983).

Bias due to non-response can be evaluated by comparing those who responded to the initial mailing to those who respond as a result of subsequent mailings and other follow-up efforts, as second mailing respondents can be used as a proxy for non-respondents (Donald 1960, Armstrong and Overton).

Accordingly, non-response bias was measured by using two-tailed t-tests comparing frequency of companies by state and company size, comparing respondents and non-respondents. In addition, t-tests were performed on study variables between early and late responders. Overall, statistically significant differences were not found in 92 percent of the t-tests, resulting in a low level of concern regarding non-response bias.

Results

Response rate and respondent demographics

Of the 500 homebuilders sent surveys, 198 responses (40%) were received and used in the study. Respondents were relatively well dispersed throughout the United States (**Fig. 1**). The highest region of response came from the southern region (39%) and the lowest region of response was the northeast region (14%).

A large majority of respondents (97%) were male and married or lived with a partner (90%). The predominant age group was between 41 and 60 years (70%), with 16 percent falling in the 21 to 40 age group, and 15 percent falling into the 61 to 80 age group (not all percentages add to 100% because of rounding).

All respondents achieved relatively high education levels. At least 20 percent of respondents graduated from high school. Thirty-six percent attended college, while another 33 percent graduated from college. Ten percent of respondents possessed a graduate degree (masters or doctorate). Twenty-eight percent

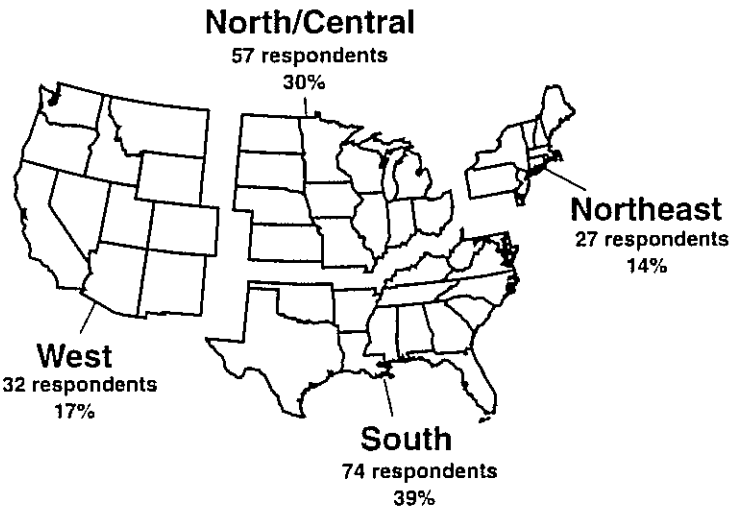

Figure 1. — Respondent geographic distribution (n = 190).

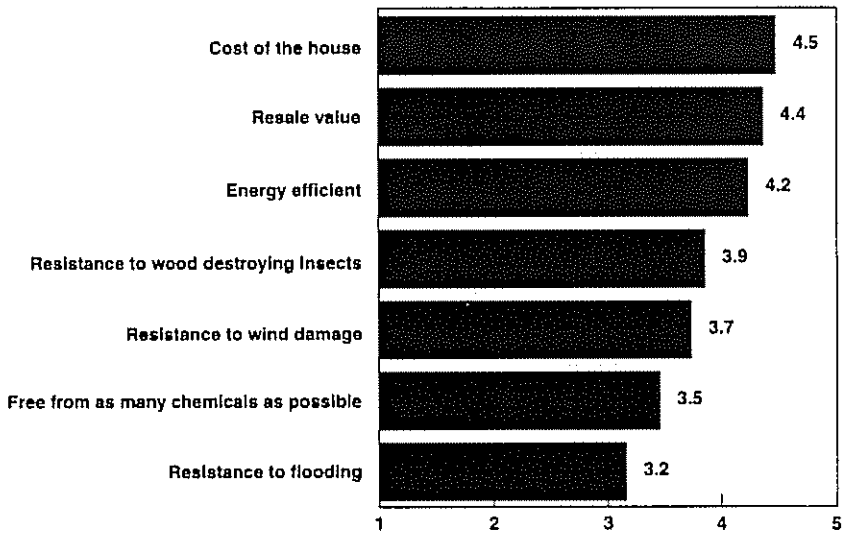

Figure 2. — Criteria used in building a new house (n = 182); 1 = very unimportant; 3 = somewhat important; 5 = very important.

of respondents earned a total household income of greater than $150,000 per year, while 7% earned less than $40,000 per year. The next highest category of total household income was $60,000 to $80,000, with 17 percent of respondents falling into that category.

Only 22 percent of respondents lived in a large or very large city. A "large" city was classified in this survey as one with a population of between 250,000 to 999,999 people. A "very large" city was classified as 1 million people or greater. Forty-two percent of respondents lived in medium (50,000 to 249,999 people) or small (10,000 to 49,999) cities. Another 19 percent stated they lived in very small cities of between 2,500 and 9,999 people. Seventeen percent stated they lived in rural areas (population less than 2,500 people).

Respondents' ranking of criteria used in building new houses

Respondents were asked to rank criteria used in building new houses based on their perceptions of the importance of various items to homebuyers (**Fig. 2**). Respondents ranked each criterion on a scale of one to five; 1 = not important at all and 5 = very important. Respondents ranked all of the seven criteria as above the midpoint (3.0) in level of importance. Of the 182 responses, housing cost (4.5), resale value (4.4), and energy efficiency (4.2) were cited as the most important criteria. Resistance to flooding (3.2) was the least important, followed by absence of chemicals (3.5), wind damage resistance (3.7), and insect damage resistance (3.9).

Respondents' perceptions regarding general wood quality issues

Respondents were asked to rank, on a scale of 1 (not at all) to 5 (significantly), categories of site criteria that might factor into determining wood quality. The categories were soil, rainfall, proximity to municipal landfills, growth rate, tree straightness, and geographic location. The most important criterion was tree straightness (4.2) followed by rainfall (4.1), rate of growth (3.9), soil (3.7), and geographic location (3.6).

In a related question, 72 percent of respondents stated that wide rings negatively affect lumber quality, either somewhat or significantly, while 10 percent thought they had no effect. Another 18 percent did not know whether or not wide rings negatively affect lumber quality. Also, 74 percent of respondents felt that rate of tree growth affects lumber quality, while 10 percent said it did not. Sixteen percent did not know.

Respondents were also asked to rate the importance of species selection in specifying projects. Fully 64 percent of respondents replied that species selection was either somewhat important or very important. Twelve percent replied that this criterion was either somewhat unimportant or extremely unimportant.

Respondents' perceptions regarding SYP

Respondents were queried regarding their perceptions of SYP. Overall, 53 percent of respondents had a somewhat positive (40%) or extremely positive (13%) perception of SYP. Eight percent of respondents expressed a somewhat negative (6%) or extremely negative (2%) perception of SYP. Twenty-eight percent of respondents rated SYP as either somewhat superior (21%) or extremely superior (7%) to other species of lumber, while 15 percent rated SYP as somewhat inferior (11%) or extremely inferior (4%) to other species of lumber. Respondents were further asked

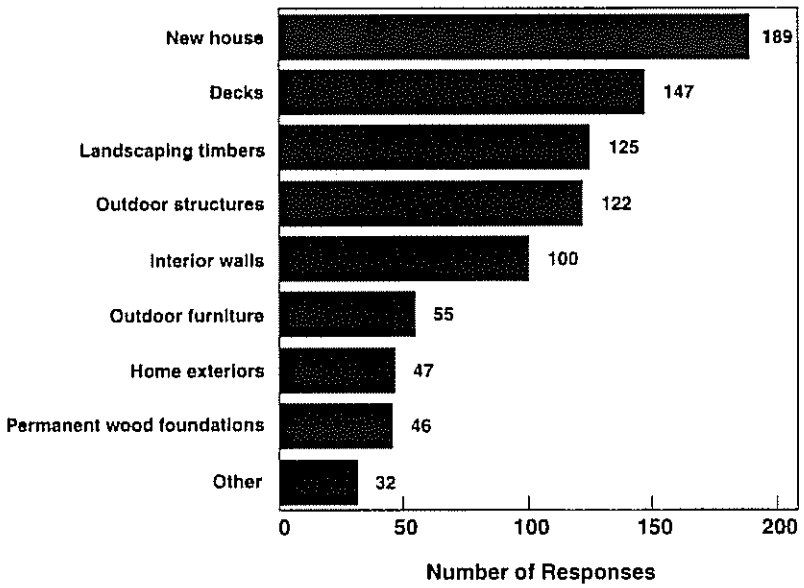

Figure 3. — Applications where southern yellow pine was used by respondents (multiple responses possible).

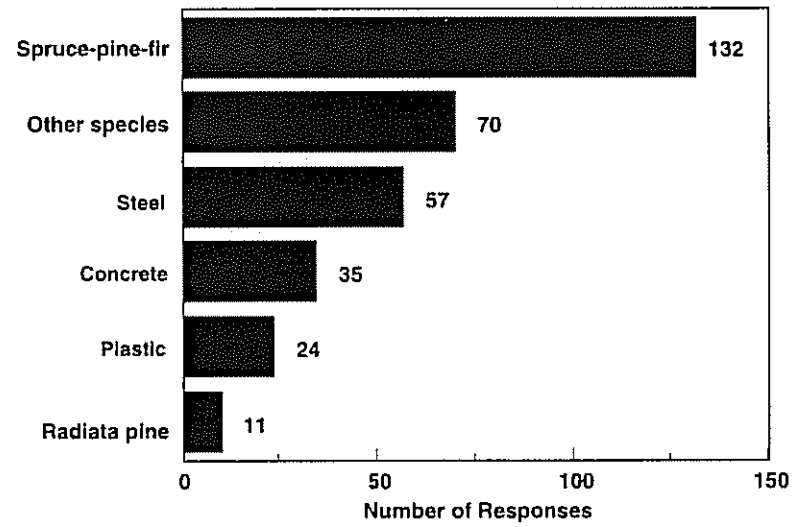

Figure 4. — Perceptions of products that are substitutes for southern yellow pine (multiple responses possible).

about their willingness to build a house using SYP. Eighty-three percent responded that they would be willing to use SYP in housing construction while 17 percent said they would not. Of the 17 percent who responded in the negative about using SYP to build a house, 35 percent stated that the reason was that it is a poor building material, 24 percent stated that its long-term performance is unknown, 20 percent stated cost, and 20 percent stated warp as a factor.

Respondents provided a variety of applications where they use SYP (**Fig. 3**). More respondents (189) use SYP for structural components in the construction of a new house than for any other reason (multiple responses were possible for this survey question). Other popular applications of SYP included decks (147 responses), landscaping timbers (125 responses), outdoor structures (122 responses), and interior walls (100 responses).

Respondents perceived that the quality of SYP has changed over the past 50 years. Forty-eight percent of respondents stated that they believe SYP quality has declined. Another 15 percent stated that quality has stayed the same, while 9 percent stated that quality has improved. Twenty-six percent responded that they didn't know or were unsure. Those that responded that SYP quality had declined over the past 50 years were further asked their opinions regarding why the quality had declined. Sixty-eight respondents stated that SYP warps in service, while another 47 stated that SYP trees are grown too fast. Thirty-five stated that it is kiln-dried too rapidly and 34 stated that SYP has too many knots.

Respondents cited a number of products available as substitutes for SYP (**Fig 4**). Spruce/pine/fir (SPF) was cited the most, with 132 respondents saying that it is a substitute for SYP. Another 70 respondents cited other wood species. Fifty-seven respondents said steel, 35 said concrete, 24 said plastic, and 11 said radiata pine.

When asked about the ability of various building materials to protect against termites, respondents had relatively strong preferences (**Fig. 5**). Specifically, respondents were asked to rate, on a scale from 1 (does not protect at all) to 5 (greatly protects against termites) different building materials and their ability to protect against termites. Respondents rated steel and aluminum the highest at 4.9 and 4.8 out of 5, respectively, but they were closely followed by concrete (4.7) and plastic (4.6). Treated SYP was rated next highest (4.0), followed by radiata pine (*Pinus radiata*) and Douglas-fir (*Pseudotsuga menziesii*) (both at 2.0), and finally by untreated SYP (1.9).

Respondents' perceived that concrete and steel are the most durable building material (**Fig. 6**). When asked to estimate how many years building materials will last in exposed conditions, over 80 percent responded that concrete would last 25 or more years, while slightly more than 60 percent felt that steel would last 25 or more years. Approximately 38 percent of respondents felt that treated SYP would last more than 25 years, which was slightly higher than the response for naturally durable wood species (25%). Less than 5 percent of respondents felt that untreated SYP would last longer than 25 years.

Radiata pine is a species that has some wood properties that are similar to SYP and can, therefore, be thought of as a substitute. Survey participants were

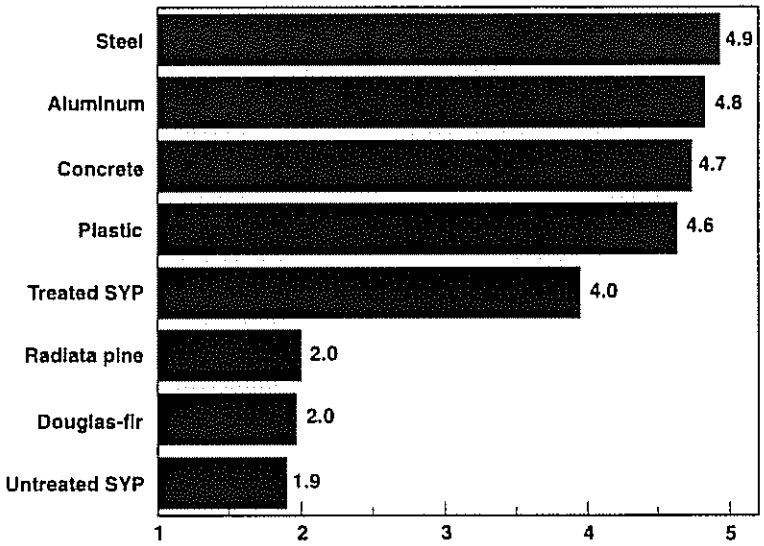

Figure 5. — Perceived termite protection for various building materials (n = 184); 1 = does not protect; 3 = protects somewhat; 5 = greatly protects.

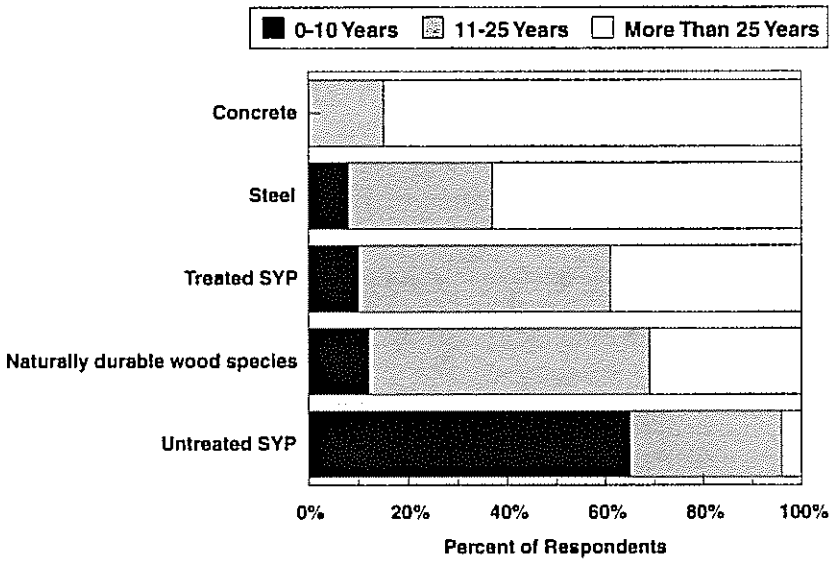

Figure 6. — Perception of how many years building materials last in exposed conditions (n = 183).

queried regarding their exposure to and acceptance of radiata pine. When asked whether or not they had ever heard of radiata pine, 83 percent of respondents said they had never heard of it. Of the 17 percent who responded they had heard of radiata pine, only 10 percent thought that it was superior to SYP.

Finally, participants were asked whether or not they objected to purchasing imported lumber. Sixty-eight percent responded they had no objections to purchasing imported lumber, while 32 percent did express objections.

Discussion

Results indicate that homebuilders at a macro level perceive that homebuyers are most influenced by economic factors associated with construction. In all regions of the country, respondents list cost of the house, resale value, and energy efficiency as key factors. Other factors that might be perceived by some to be more important in particular regions (for example, resistance to termite damage in the South or resistance to wind damage in the North/Central region) were not given great importance and they did not replace traditional economic factors as top priorities. This indicates that homebuilders are still very much guided by traditional cost factors in determining the makeup of the constructed unit.

Homebuilders cite species as an important criterion for specific projects. Not only is species important, but perceived quality characteristics such as tree straightness and ring width stand out as important factors as well.

The majority of homebuilders participating in the survey view SYP favorably. Further, a large majority stated that they are willing to use SYP in the construction of houses. However, there are indications that they perceive the quality of SYP products to be declining through time. Indications from respondents are that SYP suffers from some quality problems, perhaps the result of rapidly grown plantation trees or improper kiln-drying techniques. If the perception is that the trend will continue and quality will continue to decline as trees are grown ever faster, there may eventually reach a point at which homebuilders will substitute other products for SYP. As mentioned earlier, however, homebuilders still perceive homebuyers to place a premium on cost considerations. As long as SYP remains price competitive with its substitute products and homebuilders, overall, perceive it to be a quality product, it will likely maintain a strong market share. We can only surmise as to whether or not an erosion of market share would occur through time if perceived quality were to continue to diminish while relative prices of SYP and its substitutes remained constant. To move beyond speculation would place us outside the realm of this study.

On the other hand, producers of SYP products can likely improve market share for SYP if they can develop more consistent dry kiln practices, decrease the speed of growing processes while at the same time recovering the additional costs associated with slower grown SYP (possibly by charging a premium for such a product if the market will bear it), or by convincing homebuilders through marketing or education that these perceived negative practices, in fact, either do not occur or have no impact upon the quality of SYP products. It might also be important for manufacturers to either direct research efforts toward increasing

the durability of SYP products or convince homebuilders that SYP products are already at a comparable level of durability, especially with respect to its efficacy against termites and other natural enemies.

Treated SYP compares favorably with other wood products in terms of homebuilders' perceptions of providing resistance to termites. It is viewed as considerably superior to such substitutes as radiata pine, Douglas-fir, and untreated SYP. However, it is also viewed as considerably inferior to steel, aluminum, concrete, and plastic. Naturally, in areas where termite protection is extremely important, such as in the southeastern United States, SYP is likely to suffer from perceived or actual inadequacies compared to these non-wood substitutes.

Although a majority of respondents have no objections to purchasing imported lumber, the perception of those that have heard of radiata pine is that it is not superior to SYP. Therefore, SYP suffers from no perceived quality deficiencies compared to this substitute product that could be imported and used in its place.

Summary

Southern yellow pine (SYP) is an important wood resource in the U.S. South and has for many years provided the homebuilding industry with abundant, cost-competitive products. However, some studies have reported that different user groups perceive that lumber quality in general has decreased in recent years. This study's objective was to ascertain homebuilders' perceptions of SYP lumber quality. We recognize that the physical attributes of SYP, such as wane, knots, color, and grade, can have a substantial effect on homebuilders' perceptions of quality. However, these factors were not included in this study because the primary objective was to determine overall perceptions and not to ascertain specifically why these perceptions exist as they do.

The method of data collection was a mail survey questionnaire sent to the largest 500 homebuilders in the United States, as measured by sales in 2000. A total of 198 surveys was completed and returned.

In general terms, homebuilders cite as important criteria for wood quality such factors as tree straightness and ring width. They also believe that species selection based on specific job requirements is important.

SYP is still highly regarded by a majority of homebuilders nationwide and is considered a credible resource to use in manufacturing good products. However, a considerable number (though not a majority) of homebuilders do perceive that SYP quality has declined over the past half-century. Generally, those homebuilders who did perceive a decline in SYP quality attributed it to warping problems, perhaps stemming from trees being grown too fast or wood being kiln-dried too rapidly.

Therefore, concerns among the industry regarding substitution of other products for SYP do seem to be grounded in more than mere intuition. In order for SYP to remain a viable and competitive product, research and marketing efforts will have to be conducted to not only develop better and higher quality products at prices competitive with its substitutes, but also to better educate and inform both homebuilders and homebuyers that these efforts are resulting in better, more durable, higher quality products.

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