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Material Substitution Trends In Residential Construction, 1995 vs 1998

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Executive Summary

The US residential construction industry, traditionally the largest market for softwood lumber, has undergone a period of uncharacteristically rapid change over the past decade. The effects of timber harvest restrictions in federal and state forests on softwood lumber price, price volatility, and product quality, combined with technological advances by producers of substitute materials, have contributed to increased use of material substitutes in residential construction. The objective of this research was to assess the extent of material substitution in residential construction and provide insight into the factors driving these changes. The results offer convincing evidence that softwood lumber has continued to lose market share in the residential construction industry and that builders remain concerned about its quality and price. The study also shows a shift on the part of builders towards a more favorable impression of the environmental impacts of substitute products, including steel and concrete, relative to softwood lumber.

This study is based on a random sample of 2,400 residential construction firms segmented by geographic region and firm size. The survey was also mailed to the 100 largest home builders, as reported in Builder magazine. The overall response rate was 12.8% (12.1% of the random sample and 37.1% of the 100 largest firms). The results show that residential builders have steadily increased their use of substitute structural materials since 1995. Respondents reported increased use of all of substitute materials included in the survey. Almost all respondents reported using at least one substitute material (compared to 91% in 1995) and over 80% of the respondents reported using glulam beams, wood I-joists, and laminated veneer lumber (LVL). While use of steel, reinforced concrete and plastic-fiber lumber increased, engineered wood products emerged as the clear winners. On a regional basis, builders in the western US reported higher usage of all substitute products. In addition, the survey data suggest that large firms were more likely than small firms to try new substitute products, particularly finger jointed lumber, structural insulated panels, laminated veneer lumber, as well as newer engineered wood products such as parallel strand lumber and laminated strand lumber.

The survey data were analyzed to assess the extent to which various structural products were used in walls, floors, and roofs, the three end-use applications that consume the greatest volume of structural lumber. The most commonly used products were softwood lumber, steel lumber, finger-jointed lumber, wood trusses, LVL, and wood I-joists. While softwood lumber still dominated wall framing in 1998, with an 83% market share, it has lost market share (down from 93% in 1995), particularly among large firms. Softwood lumber's share of the floor framing market declined from 59% in 1995 to 42% in 1998. While it is still the most widely used product, with a 42% market share, the market share of wood I-joists has increased from 23% in 1995 to 39% in 1998. Softwood lumber used to frame roof rafters is no longer the dominant material used in residential roof systems. Survey data show that wood trusses increased slightly from 46% to 48%, while softwood lumber declined from 51% to 40%.

To assess builders' satisfaction with softwood lumber, respondents were asked to rate the level of the importance, and their corresponding level of satisfaction, with 13 softwood lumber attributes. The importance ratings obtained in 1998 were virtually identical to those reported in 1995. Softwood lumber straightness, strength, availability, and lack of defects were rated as the most important attributes. The survey data suggest that price is much more important to large firms than small firms. Builders reported that, while they were more satisfied with the price and price stability of softwood lumber in 1998 relative to 1995, they remained unhappy with softwood lumber quality, particularly with respect to lumber straightness and overall occurrence of defects.

A gap analysis highlighted the difference between the mean importance ratings (where 7 indicates “extremely important” and 1 indicates “not important at all”) and the mean satisfaction ratings for each product attribute (where 7 indicates “extremely satisfied” and 1 indicates “extremely dissatisfied”). Survey findings indicate that while builders are less concerned with price issues than in 1995, they remain very concerned about the perceived decline in softwood lumber quality. The data provide clear evidence that residential home builders are least satisfied with product attributes they rate most important, suggesting that builders are dissatisfied with the value (defined as the ratio of price/quality) of softwood lumber.

To provide a more concise interpretation of the importance and satisfaction of the different softwood lumber attributes, a factor analysis was performed to group together those softwood lumber attributes that are highly correlated to each other. The results of the factor analysis are almost identical with the results obtained from the 1995 survey and suggest that the 13 product attributes used to describe softwood lumber can be summarized into three factors: quality attributes, economic attributes, and technical attributes.

Finally, the survey assessed builders’ perceptions of the environmental impact associated with using substitute products relative to softwood lumber. Although environmental marketing is not prevalent in the US forest products industry, most industry observers believe that it will become more important. While reduced environmental impact had the lowest importance rating of the 13 softwood lumber attributes, survey findings revealed that more builders in 1998 had a favorable perception of the environmental impact of substitute products, including steel and concrete, over softwood lumber than in 1995.

This survey clearly indicates that softwood lumber has continued to be displaced by substitute materials in segments of the residential construction industry that it has traditionally dominated: walls, floors, and roofs. To a large degree, this loss of market share can be attributed to a perception among residential builders that the value of softwood lumber has declined: a direct result of rising prices and a perceived drop in lumber quality. Much of the loss in market share experienced by softwood lumber can be attributed to the increased use of engineered wood products. Many would argue that this is a normal process of product evolution within the forest products industry, attributed to technological advances in manufacturing processes driven by the changing forest resource. However, this study identified two trends that should concern managers in the forest products industry. First, the use of non-wood substitute building materials has increased significantly since 1995. Second, there is a growing perception among home builders that using non-wood building materials (including steel and reinforced concrete) is better for the environment than using softwood lumber. This trend away from wood products is likely to continue unless there is an effective response to the challenge posed by substitute materials.

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