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Adoption, Diffusion, and Substitution of Structural Wood Panels

Steven R. Shook, William R. Turner and Ivan L. Eastin. 1998

Executive Summary

A sizable literature concerned with technological substitution modeling exists within the domain of forest products. These models have generally been used to develop market share forecasts for various forest products and their substitutes based on relative product prices. Substitution models usually assume that the potential market size is known and that products can freely substitute for one another. A small but growing literature concerned with the diffusion of new innovations also exists within the domain of forest products. This diffusion literature typically focuses on factors affecting consumer acceptance for product innovations and forecasting the level of demand growth without constraining the potential market size. In this paper, we examine the dynamic sales behavior of three and four successive generations of structural wood panel products using varying forms of a multigeneration diffusion model. The multigeneration diffusion model introduced here, which encompasses the elements of diffusion and substitution modeling, assumes that a new structural wood panel product will diffuse through a population of potential consumers over time and that market share competition will be introduced with successive generations of structural wood panels.

Estimation results indicate that market share competition between various structural wood panel products are differentially affected by substitution and diffusion effects. The model results reveal that the aggregate market share growth and decline for southern pine plywood can be attributed mostly to substitution effects (i.e., substitution between western and southern pine plywood), while the aggregate market share growth of oriented strandboard can be attributed to diffusion effects.

The model results also suggest that structural wood panel products act as complements rather than as substitutes to one another. Caution should be used, however, in interpreting these results since we evaluate the structural wood panel market in the aggregate rather than evaluating specific end-use markets. Nevertheless, market aggregate complementarity has been found in other research examining the market share competition between structural wood panel products.

In the near-term, the multigeneration diffusion model suggests that the southern pine plywood market has reached its peak production level over the past five years, with production forecast to decline slowly but steadily over the next decade. Western plywood is forecast to continue its downward production and market share trend. Oriented strandboard is expected to remain entrenched in a growth phase over the next five to ten years.

We explore several managerial implications of the model results and suggest alternative multigeneration diffusion models that could be developed for structural wood panel products.

Keywords: adoption, diffusion, substitution, market share competition, forecasting, technological progress, industry evolution, product life cycle, plywood, oriented strandboard, waferboard

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