
Forisk Strategy Note, Q2 2019

Substitution in the Forest Industry: Lessons from Plywood and OSB

Brooks Mendell
President & CEO

Summary Messages

- Structural panels, building materials made from layers of veneer (e.g. plywood) or layers of glued wood flakes (e.g. OSB), provide a robust case study for evaluating the strategic threats of substitutes generally and in the forest industry specifically.
- This research highlights three lessons to clarify risks and opportunities to the forest industry from product substitution.
 - 1) **Control costs** to defend against the threat of substitute products. Anything that reduces per unit manufacturing or transportation costs strengthens the relative competitiveness of the firm and industry.
 - 2) **Invest in technology** to sustain margins and continually lower production costs. Technological obsolescence undermines any long-term commitment to a low-cost strategy. In addition, technological advances provide a way for substitute products to “fight back” and regain relevance in the market.
 - 3) **Remain vigilant on standards** to retain market access. Low costs and high quality become irrelevant without a seat at the table.

Introduction

We get introduced to the concept of substitution in elementary school. When Mrs. Schlesinger in third grade is unavailable due to illness or car trouble and a substitute teacher fills in admirably for a day or a week, we learn that everyone, and everything, is replaceable. Yay.

Michael Porter, in a 1979 *Harvard Business Review* article, highlights the threat of substitutes as one of five key forces affecting industrial competitiveness.¹ Substitutes are products or services which offer similar benefits to customers as a company’s own offerings. Viable substitutes constrain the growth and profit potential of a business. As prices for products in one industry or market increase, the substitutes from another become relatively more competitive and attractive to customers. This threat of substitutes exists throughout the forest industry.

Our previous Forisk Strategy Note shared specific learnings related to evaluating risk and capital deployment based on research related to North America’s wood bioenergy sector.² This Note reviews the structural panels sector and analysis from Forisk multi-client studies to address the question, “how and when should substitutes concern executives and investors in the forest industry?”

¹ “How Competitive Forces Shape Strategy” by M.E. Porter. *Harvard Business Review*. March 1979. Available at: <https://hbr.org/1979/03/how-competitive-forces-shape-strategy>

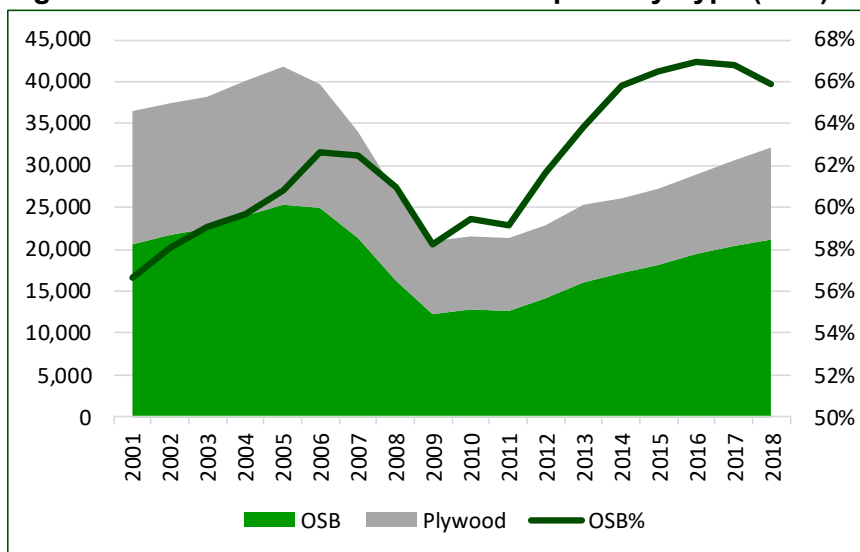
² “Risk and Context in the Forest Industry: Lessons from Wood Pellets and Bioenergy,” *Forisk Strategy Note*, Q1 2019. Available at: <http://forisk.com/resources/white-papers-and-articles/#forisk-strategy>

North American Structural Panels Sector

Structural panels, those building materials made from layers of veneer or layers of glued wood strips, date back to the Portland Manufacturing Company in 1905, when Carlson and Bailey constructed the first piece of structural plywood.³ Early applications included niche markets such as door panels, trunk stock, and furniture drawer bottoms. Real growth, though, waited until after World War II. Since the late 1960s, combined structural panel production for the U.S. and Canada more than doubled from nearly 17 billion square feet (BSF) to over 36 BSF in 2018.

The structural panel industry aggregates a set of competing products and geographies. Consider the U.S., where oriented strand board (OSB) continues to erode market share from plywood following the recession. Figure 1 summarizes how OSB went from 57% of U.S. structural consumption to 66% over the past two decades.

Figure 1. U.S. Structural Panel Consumption by Type (BSF) and OSB Market Share (%)



Data source: APA

The history of structural panels in North America includes a range of substitutes, from western plywood to waferboard to southern plywood to OSB.

Why Substitute?

Why and when do consumers replace one product with another? The primary reasons are straightforward. A consumer considers substituting one product or service for another if it (1) is cheaper; (2) has higher quality; or (3) offers more features or performance, while also having (4) sufficiently low “switching costs” (it’s easy to make the change).⁴

Consider examples from home. We substitute our dish detergent for a cheaper one; we sometimes buy a “higher quality” craft beer instead of our normal one; and we trade in flip phones for higher performing iPhones. Meanwhile, it takes effort to switch utilities, schools and home insurance. In sum, cost, quality and performance, along with switching costs, intermingle when considering substitutes for purchases large or small.

³ *Forest Products Marketing* by S.A. Sinclair. 1992. McGraw-Hill. 403 pages.

⁴ The reverse holds, as well. Consumers disregard substitutes when they are (1) more expensive; (2) of poor quality or (3) lower performers, and (4) require significant effort or costs to make the change.

When should substitutes concern executives and investors? In a commodity business, it comes down to whether or not a substitute product gets the job done at a lower net cost. The factors described inform the ultimate tradeoff between price and performance. And for forest products, substitutes can come from within or outside of the industry. In addition, the forest industry has a history of “pushing back” and adjusting to retain market share. Consider these lessons.

Three Lessons from Structural Panels on Substitutes and Substitution

The structural panel industry is heavily consolidated with a small number of key firms in each sector and geographic region. Adding capacity requires significant capital investments and the adoption of new technologies. What do we observe from firms seeking to maximize these investments and protect them from substitutes?

One: Controlling Costs Offers an Explicit First Line of Defense

Direct from the “competitive forces” playbook, low cost structures provide a strategy for repelling substitute commodities. Efficiency, scale and anything that lowers per unit manufacturing or shipping costs strengthen competitiveness. This is why most forest products are consumed near where they are produced.⁵

History supports this. Consider geographic substitutes within the industry. Plywood production from the Pacific Northwest increased following World War II. Then, during the 1960s, Georgia-Pacific and others built facilities that manufactured plywood from southern pine. The growth and acceptance of southern pine plywood, as reflected in the regional capacity investments (Figure 2), benefited from lower rail transportation costs, as these plants were closer to markets in the East and Lake States (Sinclair 1992). In total, the South went from 4.1% of U.S. plywood capacity in 1965 to 49.9% in 1985.

Figure 2. Plywood Capacity by U.S. Region, 1965 vs 1985 (1000m³)⁶

	South		West			South % of U.S. Capacity
	South Total	Western Washington	Western Oregon	Inland West	West Total	
1965	492	2,146	7,053	2,388	11,587	4.1%
1985	9,684	1,259	6,287	2,181	9,727	49.9%
Change (%)	1868.3%	-41.3%	-10.9%	-8.7%	-16.1%	

Data source: USDA Forest Service

On the manufacturing side, best-in-class production costs enhance the ability-to-pay for logs. Firms that can source wood and remain cash positive through the economic cycle have a strategic advantage, and cost control is part of this equation.⁷

Clarity on costs and business tradeoffs also supports effective leadership. Executives and operating managers who demonstrate an intuitive understanding of their firms’ cost structures

⁵ See “Risk and Context in the Forest Industry: Lessons from Wood Pellets, Part III,” Forisk Blog posted March 31, 2019. Available at: <https://forisk.com/blog/2019/03/31/risk-context-forest-industry-lessons-wood-pellets-part-iii/>

⁶ “Review of Wood-based Panel Sector in United States and Canada.” 1997. Gen. Tech. Rep. FPL–GTR–99. U.S. Department of Agriculture, Forest Service, Forest Products Laboratory.

⁷ Clarity in gross margins and the ability-to-pay for wood frames strategic analysis. See Part II on “Pallets and the Forest Industry,” Forisk Blog posted December 6, 2018. Available at: <http://forisk.com/blog/2018/12/06/reinvention-competition-wood-pallets-forest-industry-part-ii/>

and improvement opportunities inspire confidence with investors, customers, and employees. I remember a meeting years ago with a sawmill manager in the Pacific Northwest who fielded questions from employees and union leadership. He addressed tough questions related to profits, wages and benefits by providing transparency into the economics of the business. He went to the chalkboard and said, “Here’s how things work.” He clarified tradeoffs. Did everyone like the answers? No. Did everyone understand how and why decisions were made? Yes.

Two: Competitive Cost Positions Rely on Investments in Technology

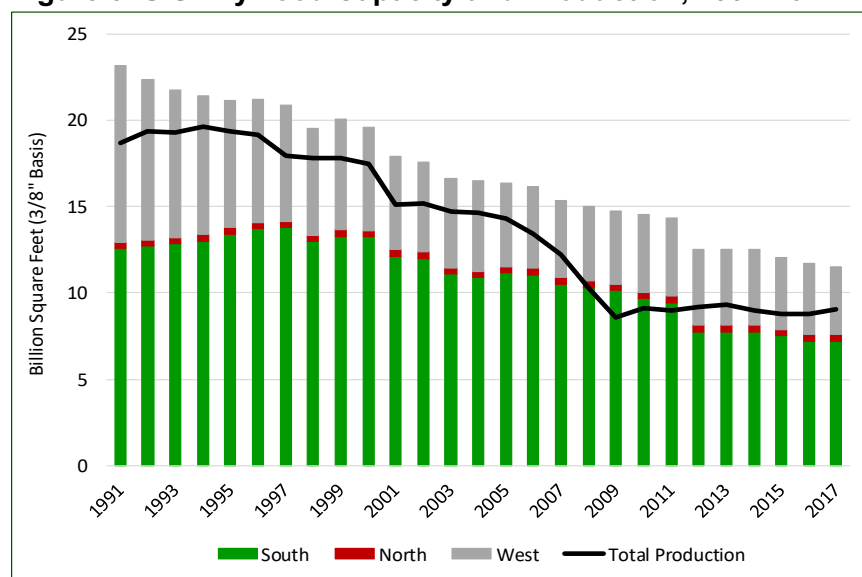
Technological obsolescence undermines the sustainability of a low-cost strategy. Both the development of substitutes and protection from substitution in commodity businesses rely on investments in technology and processes. Generally, we lower costs through improved efficiency or scale, or through lowering energy, labor, or wood costs.

The history of structural panels again provides examples with the introduction of non-veneer panels such as waferboard and oriented strand board (OSB). A precursor to OSB, waferboard bonds layers of rectangular wood flakes in random patterns, which simplified manufacturing and lowered raw material costs. [Wood flakes for waferboard cost less than grade logs for plywood.]

However, waferboard itself lost market share to the structurally superior OSB, which “orients” the wood flakes in layers at 90 degrees to each other. In a simplified summary, waferboard competed with plywood on price, and then OSB competed with waferboard on performance.

Technology also provides threatened products with recourse. While non-veneer panels enjoyed cost advantages of up to 30% in the 1970s, plywood developed its own technologies in the 1980s that reduced production costs.⁸ The plywood industry in North America continued to lose market share, but stabilized its position around 2009 following the Recession (Figure 3), holding production levels as log prices remain low on a historic and real basis. While plywood has some unique applications, low log prices and technological advances sustain its relevance.

Figure 3. U.S. Plywood Capacity and Production, 1991-2017



Sources: Forisk; U.S. Forest Service; APA

⁸ Sinclair (1992) notes technologies such high-moisture content gluing and spindleless lathes.

In forestry, the story of substitution features tradeoffs. Persistent gains from manufacturing technology effectively lower the per-unit value of trees destined for commodity forest products. However, the resulting increases in efficiency also reinforce strategic barriers against non-wood substitutes and imported competitors.

Three: Remain Vigilant and Engaged with Product Standards

No matter how low the cost or how high the quality, substituting products or services must have market access to take market share. How can existing industries or professions dull the threat of substitutes in general? One approach includes establishing barriers based on policy, regulations or standards. Examples include certification for sustainability or standards for building products or licensing programs for lawyers and doctors. The threat of a substitute only has teeth if it can access the market.

Product standards and building codes, which act as a form of gatekeeping, comprise blocking-and-tackling qualifications that affect the ability and willingness of consumers to try new products for existing applications. Consider what happened with waferboard and OSB versus plywood in the 1980s. According to Steven Sinclair:

“The strong acceptance of waferboard and [OSB]... was made possible by a shift in the grading standards. [The] structural panel industry went from specification-based standards... to a performance-based system... The standards for panels were based on performance criteria and not the type of manufacturing used to produce the panel.”⁹

The original standards created friction and a barrier to products competing with plywood; the revised standards opened the door and provided opportunities for consumers to try engineered products for structural applications.

Where do standards come from? They come from those willing to engage and secure a seat at the table when and where programs, specifications and enforcement strategies are developed. While the lesson recalls “smoke-filled rooms,” a lot of policies get developed by professionals simply putting in the time to support ad-hoc committees and industry associations.

Conclusion: Strategic Implications

For forest industry executives and investors, the lessons in this Note reinforce classic business strategies for tracking and mitigating the threat of substitutes. Keep costs low. Invest in technology. And engage in policy and trade issues which affect market access.

And substitution cuts both ways. The forest industry has tremendous points of leverage with respect to dealing with threats from outside of the industry. In fact, forest products can tell a growth story. Renewable paper bags for ocean-polluting plastic bags. Wood pellets for coal. CLT and mass timber for energy-intensive steel or concrete. While key threats for substitutes arise within the forest industry, climate change and consumer preferences speak to the advantages and resilience of wood and other “grown” products.

⁹ *Forest Products Marketing* by S.A. Sinclair. 1992. McGraw-Hill. 403 pages.

Appendix A: About Forisk

Our team conducts research to understand how things in the forest industry work. We use this to help clients make better decisions with timber-related investments and wood-using industries. All Forisk researchers have direct forest industry and market analysis experience. This includes work in wood procurement, forest finance, forest operations, and timber market forecasting.

Forisk publishes the *Forisk Research Quarterly (FRQ)*, which includes timber forecasts, forest industry analysis, forest operations research and wood market rankings for North America. In total, Forisk subscribers own or manage over 100 million acres of timberland and use over 200 million tons of wood per year in the U.S. and Canada. This includes firms and organizations based in the U.S., Canada, Europe, Asia and South America.

Our consulting focuses on analyzing the supply and demand characteristics of local wood and timber markets and, from this analysis, developing forecasts and strategic guidance related to investment decisions and the management of assets. To support this research, Forisk maintains the most complete databases of mill level capacity for solid wood-using mills in North America.

Forisk Product and Services

- Products
 - *Forisk Research Quarterly (FRQ)*
 - 2019 North American Forest Market & Industry Rankings
 - North American Timberland Owners & Managers database
 - Silviculture Surveys
 - Forest management benchmarking for the US South and Pacific Northwest
 - Wood Bioenergy US database
- Services
 - Timber market and wood basket screening, ranking and feasibility analysis
 - Property and mill-specific timber price forecasts
 - Stumpage and delivered
 - Forest operations analysis and benchmarking
 - Wood procurement, market infrastructure and logging/hauling capacity
 - Executive education and professional development
- 2019 Events
 - “Applied Forest Finance” short course, February 19, 2019
 - “Timber Market Analysis” short course, June 25, 2019
 - **3rd Annual “Wood Flows & Cash Flows” Conference**
 - **Save the date: December 5th, 2019 in Atlanta**

www.forisk.com