

Wood Supply Chain Efficiency and Fiber Cost: What Can We Do Better?

Jacek P. Siry, Assistant Professor
W. Dale Greene, Professor
Thomas G. Harris, Jr., Professor
Robert L. Izlar, Professor & Director

Center for Forest Business
Warnell School of Forestry & Natural Resources
University of Georgia
Athens, GA 30602-2152
jsiry@forestry.uga.edu

Abstract

Fiber is the largest component of cash manufacturing costs. As such, fiber availability and cost have large impacts on industrial profitability. We begin with the examination of wood supply chains across the world's major wood producing regions, including the U.S. South, Western Canada, Brazil, Sweden, and Australia. We evaluate the effectiveness of particular systems based on information about their structure, stumpage costs, and delivered wood costs. Using the linerboard sector as an example, we also examine the impact of using virgin fiber vs. recycled fiber on manufacturing costs. These regional comparisons are used to identify strategies that should be considered by the industry in the U.S. South for improving wood supply chain efficiency. A special emphasis is placed on what wood processing mills can do to improve the wood supply chain efficiency, both in terms of reducing costs and improving fiber availability, including policies associated with truck weight limits, scheduling, equipment, and contracting.

Objectives and Methods

The forest products industry in the U.S. faces increased competition from every corner of the globe. In addition, population pressures and changes in land use in the U.S. South where the industry has traditionally been most competitive are also impacting the industry. For years the industry was a low-cost producer, benefiting from excellent infrastructure, productive forests on low-cost land, innovative logging contractors, and strong product markets. The U.S. South is no longer the lowest cost producer, however, even after discounting the impact of the recent weak dollar (RISI 2004). Recent research supported by the Wood Supply Research Institute identified that unused logging capacity alone cost the wood supply chain nearly \$400 million per year or about \$2 per ton (Greene et al. 2004).

Fiber is the largest component of cash manufacturing costs in forest industries. As such, fiber availability and cost can have a substantial impact on industrial profitability. To successfully compete in a global marketplace, our industry must continually evaluate how it supplies its mills and implements changes to keep it competitive. To address these questions, we assess: (1) the

cost of doing business in the U.S. wood supply chain compared to foreign competitors, and (2) how the wood supply chain can be modified to improve its competitiveness in world markets. The major wood producing regions examined include the U.S. South, Western Canada, Brazil, Sweden and Australia. We evaluate the effectiveness of particular systems based on information about their structure, stumpage costs, and delivered wood costs. The delivery process includes procuring, harvesting, and transporting fiber to the production facility's woodyard and processing there. These regional comparisons are used to identify strategies that should be considered by the industry in the U.S. South for improving wood supply chain efficiency.

Results

In terms of delivered pulpwood prices, the U.S. South is generally competitive with the rest of the world (Figure 1). Delivered softwood prices tend to be higher in Sweden, Western Canada, and Australia. The prices are lower in Brazil, but this gap has been narrowing recently. After accounting for operational conditions, the U.S. South also seems to be competitive on a global scale.

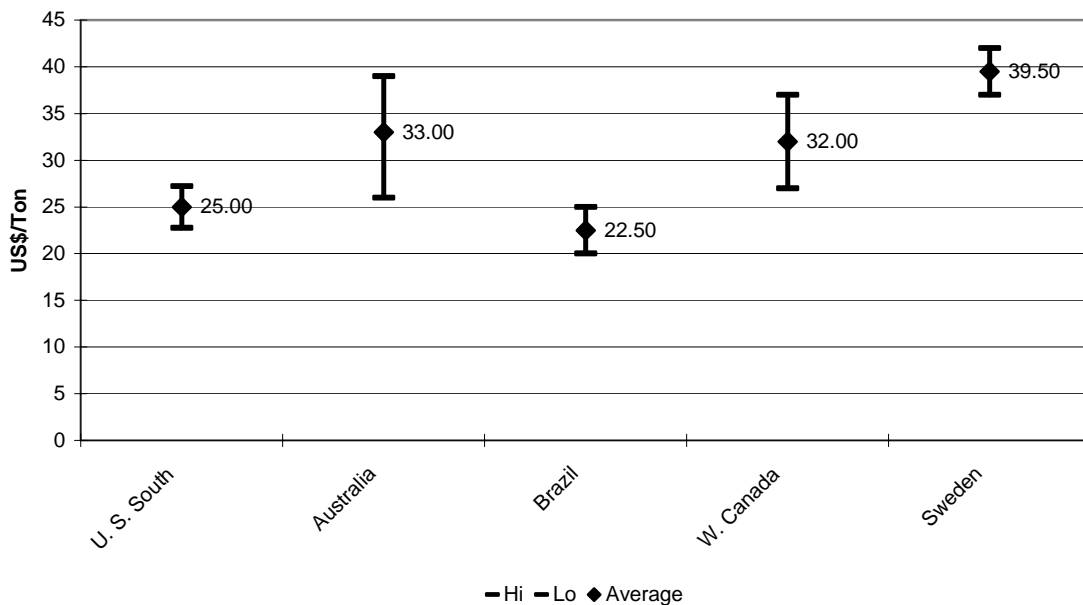


Figure 1. Delivered softwood pulpwood prices, 2005.

Brazil has the lowest wood delivery costs, largely because the wood comes from uniform plantations located close to the mill (Table 1). Furthermore, we find that comparative advantage and the competitive positions of the regions studied have become more changeable and temporal, indicating that global competition is increasingly intense. Exchange rate changes are responsible for a large part of the short-term change. Next come labor costs including benefits that frequently are the deciding factor in a region's ranking.

Table 1. Logging cost estimates, 4th quarter 2005.

	US South	Australia	Brazil	W Canada	Sweden
	\$US/green short ton				
Harvesting/Extraction/Loading	11 - 13	6 - 18	5 - 7	9 - 12	10 - 17
Hauling Rate	4 - 11	4 - 9	2 - 4	9 - 13	4 - 8
Total Cut-n-Haul	15 - 24	10 - 27	7 - 11	18 - 25	14 - 25

Major operational differences between the U.S. South and other major wood supply regions include truck payloads, scheduling and dispatching, contract hauling, cooperative maintenance, and logging contracts. Our competitors operate primarily in the “cut-to-length” system. Trucking in the major competing regions employs larger payloads than that allowed by gross vehicle limits in the U.S. South. Truck payloads reach 55 tons in Brazil on public roads, and as much as 66 tons on private roads. This is more than twice as much as currently allowed in the U.S. South (25-29 tons). On-board scales are uniformly used in Australia to ensure maximum payloads. Our competitors have also better scheduling and dispatching systems that allow eliminating much of truck wait time while loading and unloading. This, in part, is a result of a different approach to wood hauling, which is based on trucking contractors independent from wood harvesting operators. Further, multi-shifting of all logging operations in Brazil and beyond is also common. The enterprises operate the best machinery available, maintain it well, and operate the machinery up to 20,000 h before retiring. Finally, our competitors benefit from longer work contracts that can be used for financing their operations. Last but not least, our competitors devote substantial resources to research, training, safety, and environmental compliance. At least some of these factors should be considered by the southern industry in evaluating approaches to improve their competitive standing.

Further, our competitors benefit from the fact that forest management, logging, and wood manufacturing operations are closely integrated either through ownership or contracts. Integration and the resulting larger scale of operations allows for a number of efficiency gains in planning and scheduling, in addition to other advantages associated with scale economies. In contrast, the U.S. South appears to be heading in the opposite direction.

To assess the prospective efficiency gains of fully loading our trucks more consistently, we analyzed 24 southern mills. The study found that ensuring maximum payloads and reducing load variability positively affects the wood supply system. In essence, more wood is transported in fewer trips. The resulting savings range from 4 to 13 percent, meaning that the southern wood supply system could save as much as \$100 million annually (Hamsley, et al. 2006).

We further evaluated the impact on trucking costs associated with higher payloads in the U.S. South by increasing the gross vehicle weight from 40 to 48 tons, as most highways are constructed to accommodate the increased weights. The potential cost savings reach 18 percent. The combined savings of fully loading trucks more consistently and implementing higher payloads could range from 20 to 30 percent.

Discussion

The results indicate that the southern industry should consider at least some of the approaches implemented by our competitors to improve its own competitive standing. Clearly, the use of on-board scales to ensure full truck loading and higher payloads has the potential to reduce logging costs in the U.S. South. Some of these changes can be made by individual loggers, encouraged by the mill, while others need state level changes (e.g., a weight law). The mill can play an important role in this process, that of an integrator. Unlike our competitors, our industry is very much disaggregated which makes planning and change implementation a much more challenging task. The mill can and should encourage changes by developing wood delivery policies that encourage full, consistent loading and truck scheduling to minimize down time. This would reduce the number of trucks on the road, yielding numerous benefits to all wood supply chain participants as well as the general public using the same roadways.

Further, we need to recognize that wood supply chain efficiency needs to be studied through to the final product. The U.S. pulp and paper industry is being challenged by competitors, who despite having higher delivered wood costs, are fiercely competitive on the final product basis. This occurs in linerboard production, which is particularly important in the U.S. South. Competitors achieve these results by operating modern machinery, using innovative fiber strategies which include the increased use of recycled fiber, and developing new or modifying existing products (e.g., lighter linerboard grades).

The problem is that U.S. paper mills as a group are no longer world-class (Siry et al. 2005). Paper machines in the U.S. South are by far the largest in the world, reaching capacities of 450 thousand tons on average. They are also old—their technical age is about 21 years. Overall, southern machines are average in terms of asset quality, which in turn suggests that these machines are expensive to operate.

Machines in the U.S. South have fairly high production costs approaching \$270 per ton. It should be noted here that the new machines put into operation across the world are likely the lowest cost producers. As modern capacity grows elsewhere, cost pressures on the southern industry will continue to mount. Wood and personnel costs were the major cost drivers in the U.S. South, while Latin America has the cheapest fiber and personnel. While wood prices in the U.S. South have already receded from 2003 levels, personnel costs are likely to remain high. As the machines continue to age, they will continue to lose competitive position.

The U.S. industry's position is further eroded by changing markets for packaging materials, primarily by the development and widespread use of cheaper alternatives to kraft linerboard by foreign competitors. About two thirds of European capacity is based on recycled fiber, and Asia produces large volumes of kraft-top testliner. Southern kraft linerboard, while a superior quality product based on virgin fiber, is not cost competitive in some applications. Cheaper alternatives appear to do an acceptable job elsewhere, shrinking our market share.

While the consumption of the recycled fiber has grown over time, the U.S. industry should reconsider the strategic use of recycled fiber, primarily of old corrugated containers (OCC), in

the production of linerboard. Recycled linerboard mills represent only 11 percent of the southern linerboard capacity. Our kraft mills also use limited volumes of recycled fiber (normally up to 20 percent). In total, recycled fiber accounts for about a quarter of the linerboard output. While the United States does use recycled fiber, it may have misjudged the competition and does not sufficiently employ a combined product strategy. Our competitors produce and utilize large volumes of cheaper testliner, oftentimes manufactured in smaller and cleaner mills that can be located closer to recycled fiber supplies. In places where kraft linerboard is called for, our competitors commonly use lighter linerboard grades, which are cheaper to produce.

Therefore, while our logging industry certainly can do and should do several things to bring wood costs down, it needs to be recognized that the industry is already fairly competitive and doing a relatively good job, given the operating conditions. This implies that the true competitive position needs to be studied at the final product level as well as the wood cost level.

Conclusions & Recommendations

Comparative advantages of wood producing regions are not static – they change over both the short and long-term. This suggests that the competitive positions of the regions should be monitored on an on-going basis. Global competition is increasingly intense. Exchange rate changes are responsible for a large part of the short-term change.

Wood Sources and Cost

- Wood cost rankings by region can change frequently and cost ranges often overlap.
- Currency exchange rates are often the key factor affecting the cost ranking of regions.
- Our true competitive position needs to be studied at the final product level as well as the wood cost level. Other recent studies indicate that US paper mills as a group are no longer world-class, thus other regions are more competitive on a final product basis even though the US South is competitive at the raw material level.
- Stumpage costs are established by mechanisms other than a free market in some of the studied regions. The US South and Sweden rely heavily on open-market purchases from private landowners. Brazil relies nearly exclusively on wood from plantations of exotic species, often owned by the same company that owns the mills. Western Canada mills rely on Crown timber but pay for silviculture, regeneration, and extensive road building costs.
- Logging contractors in many other regions work under longer-term contracts (1-3 years) than typically seen in the US South. This facilitates greater autonomy on the part of the contractors and allows them greater leverage in negotiating capital financing and other business arrangements to strengthen their business.
- Labor costs (including benefits) frequently are the deciding factor in a region's ranking. The gap between labor costs in Brazil and the other four countries is not as large as is often cited when all labor costs are considered. However, Brazil clearly enjoys a labor cost advantage.
- Cost of environmental compliance (from forest to mill) appears to be fairly comparable in the five regions we examined due to a combination of government regulation and widespread third-party certification of industrial forests. It should be noted that other

countries not in this study have significant issues with illegal logging and with environmental non-compliance. (Russia, almost all of Asia, etc.)

- The South is increasingly operating as a non-integrated free market wood economy. Other regions are more integrated and concentrated. Does this put the free-market US South at a disadvantage?

Trucking & Logistics

- Trucking in our competing countries employs larger payloads (up to 100% larger) than that allowed by gross vehicle weight limits in the US. This permits cost-effective trucking over longer distances or provides a significantly lower trucking cost at comparable distances to those seen in the US.
- Truck weights are much more tightly controlled and monitored in other countries with stiff fines beginning when weights exceed limits by as little as 2-5%. Many US states permit 5-10% weight tolerances.
- Loaded truck weights in the US are highly variable causing both significant underloading and overloading of trucks. A minority of US log trucks are weighed before leaving the woods while in many other countries the majority of trucks are weighed, thus permitting greater control of payload.
- Our research indicates that greater control of truck loading (less variable weights) leads to greater payloads. This is an opportunity that can be exploited without regulatory changes and regardless of what happens in competing countries. The research identifying these opportunities has been published for nearly 20 years.
- One approach to capturing some trucking gains would be to make trucking contractors aware of the performance of the best operators at each mill to encourage other contractors to emulate their performance. Many trucking contractors are not aware of the tare weights or average payloads of other producers.
- In most other wood producing regions, some type of effort is made to schedule truck arrivals at mills to attempt to reduce truck waiting times and increase trucking efficiency. Such efforts are rare in the US South, yet we continue to discuss this as an issue. Given our extensive communication systems (cellular phone, Southern Linc, GPS, etc.) we have an opportunity to take action to improve this area.
- Trucking costs are directly and immediately impacted by changes in fuel costs. We found mills and logging contractors buying fuel in bulk through cooperative arrangements in other countries. These efforts not only reduced fuel costs but also often resulted in a fueling station on or immediately adjacent to the mill site thus reducing truck miles driven to find a fuel station.
- Many of our competitors field logging operations for multiple shifts per day and obtain more hours from their equipment prior to replacement.

Other Issues

- The US South does not have access to the well-funded, consistent research efforts that our competitors in Sweden, Western Canada, and Australia enjoy from Skogforsk, FERIC, and CSIRO. WSRI is a noble effort that should be strengthened and continued, but we have a long way to go to become a peer of these research programs. Until then,

we will continue to watch other countries innovate in this area and adopt their technology after they have obtained the early and more profitable returns.

- While the Master Logger programs and other CLE activities have improved training levels in the logger work force, the US South lags other regions in worker training. Most of our productivity gains over the past 30 years have been the result of mechanizing labor-intensive operations (eliminating labor). We may need to rethink our labor training approach if we are to use more advanced equipment in our harvesting force.
- No single study of this duration can do more than take a snapshot of the competitive position of the wood supply system in competing regions. Such comparisons must be performed on a regular basis if their findings are to have the maximum potential value to the industry.

Literature Cited

Greene, W.D., Mayo, J.H, deHoop, C.F., and Egan, A.F. 2004. Causes and costs of unused logging capacity in the southern USA and Maine. *Forest Products Journal* 54(5):29-37.

Hamsley, A.K., W.D. Greene, J.P. Siry, and B. Mendell. 2006. Improving Timber Trucking Performance by Reducing Variability of Log Truck Weights. *Proceedings, Annual Meeting, Council on Forest Engineering.*

RISI. 2004. World timber price historical data. Resource Information Systems, Inc. Lexington, MA. 36 p.

Siry, J.P, Harris, G.T., Jr., Baldwin, S., Null, D., and Gonzalez, J. Southern U.S. Forest Products: How Competitive? *TAPPI Solutions!* May 2005:34-37.