

WOOD FLOW SYSTEMS IN THE SOUTHERN USA

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HISTORICAL REVIEW

Sawmills moved into the Southern US in the late 1800's, followed by the paper industry in the 1930's. Early mills were located to provide both rail and water transportation, long before an extensive road network was established. Prior to the development of modern, heavy duty trucks in WWII, trucking was limited to short hauls with straight frame trucks, which were hand loaded, cross-hauled, or loaded with simple stiff-leg cranes.

Until the 1950's, all timber products were selected and cut to length at the stump. The concept of byproducts did not exist, except for the occasional burning of slabs and bark to produce heat or steam power. Most of the slabs, edgings, bark, and dust was left to decompose or burned, first in open piles, and later in "teepee" burners.

Timberland was cheap, and "high grading" (cutting only the best and leaving the rest) was common on non-industrial private land, which predominated. A surplus of willing, cheap labor also existed. The surplus of raw material and labor, combined with institutional factors, controlled the evolution of many wood specifications and handling systems. For instance, five-foot shortwood became the standard because it could be hand loaded and discount tariffs were offered by railways in return for profitable paper traffic. To qualify, wood had to be cut too short for lumber production.

Since the days of shortwood and bobtail trucks, changes in wood form and flow have resulted from concerns over resource shortages. People were the first resource to become scarce. In the late 1960's, demographic, social, and legal trends converged to reduce the size and security of the wood production force. Management in the wood-using industries responded by throwing money at R&D, equipment development, and training to improve labor productivity and working conditions.

Every imaginable sort of machine was attempted, as

Industrial foresters were joined by architectural, agricultural, and industrial firms, along with government agencies, associations, and universities. Tree length wood, hydraulic felling shears, rubber-tired skidders, knuckleboom loaders, in-woods slashers, and gate delimiters were the principal developments which survived.

The high level of investment and activity lasted until the mid-1980's. During this period, most of the systems which are now in use were developed and proven. Feller buncher saws and chain fall debarkers are the last two logging equipment developments in this series. Tree length drums and satellite chip mills most recently dominated the field of process development.

Deceptively simple concepts such as tree length handling have come to dominate wood supply systems. Tree length handling was first promoted because of materials handling efficiency: "Keep the piece as big as possible as long as possible". More recently, it is seen as a key to merchandising and processing flexibility. With a minimum of separations, it becomes standard products which can be delivered to a variety of markets, each of which can continuously optimize cut-up and processing to generate the desired product mix.

While many contemporary Southern wood flow systems have become deceptively simple in appearance, administration and control is often intricate. Before we explore some of the unique networking which can be found, I will first review statistics for wood flow in the region in which these systems operate.

REGIONAL TIMBER HARVESTING STATISTICS

The Southern US currently produces approximately 225 million cubic meters of wood per year. 58 percent is destined for solid wood products and 42 percent is pulp and paper mill furnish.

This timber is harvested from lands under the following ownership pattern:

	Percent of Total
Federal and State	10
Non-industrial, Private	66
Forest Industry	24

Stand composition for the forested area includes the following timber types:

	Percent of Total Area
Hardwood	50
Mixed Pine/Hardwood	15
Natural Pine	15
Pine Plantation	10

Independent contractors harvest over 95 percent of the volume, and crews employed by the wood-using mills harvest the remainder.

Transportation is principally by truck, with rail and barge movements beyond economical trucking distances, in the following proportions:

	Percent of Volume
Trucking	75
Rail	22
Barge	3

Harvesting crews average just over 700 cubic meters per week. The average crew has 5 men. Most have three to four markets. The majority are equipped to cut either pine or hardwood. Less than 20% are specialty crews.

Over 50 percent of crews use hydraulic shears for felling. Mechanical saws are rapidly becoming accepted, so the proportion felling with chainsaws is dwindling rapidly.

Skidding and forwarding are found to be:

	Percent of Crews
Cable Skidders	37
Grapple Skidders	48
Forwarders	7
Farm, Misc. Tractors	8

Sorting is done at the stump and at the loader in the approximate proportions:

	Percent of Volume
Sort in woods	<10
Sort at loader	>90

The number of sorts will vary in this range:

Uneven-aged, natural pine-hardwood stands	3 to 7
Pine plantations	1 to 3

Natural stands are clearcut, thinned, or multi-stage logged, depending on stand composition, silvicultural and ownership objectives, and markets. Occasionally, market limitations will require multi-stage logging and delay completion in mixed pine-hardwood stands for as long as two years.

WOOD PROCUREMENT ORGANIZATIONAL STYLES

Two styles of wood procurement are most common, the dealer system, and direct purchase. Wood dealers were the original Southern pulpwood suppliers. They were local businessmen who purchased stumpage and employed independent loggers to cut and haul. They were essential when logging was very labor intensive, and wood flow was maintained by sheer numbers of "producers" and substantial inventories at dealer concentration yards.

As forest products firms vertically integrated in the early 1970's, progressive groups of tree length logging contractors were assembled to supply both building products and paper mills. This direct purchase system removed the middle man, promoting development of a productive, trained supply force with the capability to deal with financial, legal, mechanical, and managerial tasks. To initiate the change, procurement departments began to secure and provide stumpage for all their markets, build roads, provide financial backing, help with equipment selection and systems design, and coordinate training. During the next decade, contractors assumed most of these responsibilities. Dealer wood became less significant, generally limited to low volume or specialty production, and shortwood rail production.

Chip mills also eliminated many dealer organizations, when arrays of roundwood concentration yards were phased out. In a few cases, dealer rehaul yards have been retained to supplement tree length inventories at chip mills, which generally maintain less than three days of wood.

Chip mills are expensive, and must be run at continuous, high production rates to compete with

round-the-clock millyard operations. The situation bred a new style of wood dealer, an entrepreneur who contracts with several mills for clean chip production. Company-owned chip mills have also been built when large volumes were required or it was advantageous to isolate competition from the drain area. Others built remote chip facilities because physical space for mill expansion was limited. Over 150 chip mills are now in operation across the South.

Some large dealerships remained, and even expanded; however, by providing a variety of industrial forestry services which landowners and mills now require. They will provide land or stumpage to back up fee land bases, operate woodyards, manage timberland, provide timber appraisals, and carry out site preparation and regeneration. These expanded management services are still sought by many landowners and forest products firms which choose to minimize capital investment and personnel.

Company logging crews are the least common source of wood. Most of these were originally established as pilot operations to develop and prove equipment and systems during the early days of mechanization. Those which continue provide the ultimate in security of supply and controlled surge capability, a form of insurance which permits minimal inventories. For instance, Union Camp's Savannah mill, the world's largest unbleached paper facility, is able to operate with the South's lowest inventory/production ratio, equivalent to about 3-1/2 days supply. Company crews producing over 10 percent of the furnish from controlled land are key to minimizing inventory here.

Another economic justification for company crews is that they can be called on to perform a variety of capital intensive or difficult operations or surge production from company land and "short term leases" without affecting market rates for stumpage or logging. Some procurement organizations use only one method, while others employ a variety, often in a different mix at various locations.

Most procurement organizations concentrate on logging only their company-owned mills. When they purchase and harvest a tract, they will sell only the products which they cannot use. They employ a logging force scaled to meet their own projected consumption, in conjunction with running and seasonal inventories.

In addition to this controlled production, many

procurement organizations buy market wood to supplement their contractor, dealer, or company production. For most loggers, the sale of market wood means incremental production, and for buyers, it is an optional supply, so the price of market wood is generally the lowest of all sources.

An interesting procurement strategy involving market wood is sometimes used when wood markets are in a general slump, to support the production requirements of highly mechanized contract crews. The procurement group will arrange market wood sales agreements with as many competing wood users as possible, and provide plenty of wood for their contractors. Working together, they monitor inventory at all local markets and communicate constantly to coordinate "just in time" deliveries to any location during brief periods when inventories drop enough to accept deliveries.

The concept works, since market wood is the lowest cost furnish, and competitor mills looking at current wood cost are apt to welcome it. The company orchestrating it is able to buy stumpage at low prices while demand is slack and negotiate low logging rates, since his contractors are able to operate at high, efficient levels.

The strategy works in both long and short term for the seller, but only in the short term for the buyer, since he must impose tighter quotas on his own contractors when he substitutes market wood. As a result, the total economic effect of the "wood glut" is concentrated on one group of wood producers, who will be driven into insolvency if the practice is uncontrolled. This is an example of how wood procurement organizations must avoid tunnel vision and balance short term cost with long term risk and economic health of the producer force.

Southern procurement groups are experimenting with another form of just-in-time supply of wood; cut-to-length sawlogs from plantation thinnings using Scandinavian harvesters. In this concept, cutting orders based on lumber price and demand predictions are provided daily to the field operation, rather than to the cut-up system at tree length sawmills.

These just-in-time log production systems reserve mill inventory capacity for conventional production, which varies more due to timber stand conditions and other market swings. This use of Scandinavian harvesters for just-in-time production contrasts with their traditional use, where wood is produced for inventory, well in advance of consumption. The

common threads between the US and Scandinavian applications are dependable markets, access to capital and skilled personnel, and maximization of value. Thus far, these operations have been limited to company crews.

Economics, technology, social, and environmental issues continue to force evolution in the wood supply system. It is debatable whether even the largest mills have exhausted the benefits of scale; incremental processing capacity is nearly always cheaper than greenfield construction. This fact, coupled with capacity expansion during the 1980's forced many procurement groups to over-cut truckwood zones, then look beyond. Union Camp has recently developed a combination tree length/long log rail car which extends the flexibility of trucking into rail zones.

On a corporate level, mergers and takeovers have changed wood supply systems by creating new networks of timberlands and consumption points. As mills and land bases were divided and combined, outlying lands were sold or swapped. Wood producers established new alliances, and incorporated in-woods flail debarkers along with chip mills to supply the rapidly changing market.

Commercial and residential development of land lying close to mills has converted circular procurement zones to irregular rings. As the haul distance, drain, and competition increase on the remaining resource, companies are looking to whole tree chips for greater yield and recycled fiber as a substitute.

I have touched on only some of the changes which have rippled through the wood supply systems of the Southern US recently. From all indications, this system will see new challenges from all sides in the near future; some trying to manage it, some competing with it, and others attempting to discredit it.

I have appreciated the opportunity to explore the subject with this group, and welcome the opportunity for further discussion. Thank you.