



**Costs & Returns**  
*for hardwood lumber production  
in the Appalachian Region  
of Kentucky and Ohio*

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# **Costs & Returns**

## *for hardwood lumber production in the Appalachian Region of Kentucky and Ohio*



**S**TUDIES made at seven circular sawmills in the Appalachian region of Kentucky and Ohio (fig. 1) show that costs and returns differ among mills because of three major factors: (1) the types of markets for which lumber is produced, (2) the volume sawed annually, and (3) the amount of processing and seasoning done to lumber produced. Classifying sawmills according to these three factors, and examining their annual costs and returns, revealed needed areas of cost control. In addition, comparison of similar costs and returns between mill types indicates what might happen if a small millowner gradually increased production and diversified his operation.

Because knowledge of costs is necessary for controlling them, annual costs and returns were studied at the seven mills, each of which produced  $\frac{1}{2}$  million board feet or more annually. Mills of this size class make up 36 percent of the 360 commercial sawmills



Figure 1. — The Appalachian region of Kentucky and Ohio.

and account for about three-fourths of all lumber produced in the region<sup>1</sup>

Mills selected for study were those that (1) use a circular head-saw for primary log breakdown; (2) have good records of costs, returns, and production; and (3) typify the types of larger scale operations in the study area.

This report summarizes 1 year's costs and returns at each study mill. Operating costs are first considered — what these costs are, and where within the firm they occur. Second, costs are analyzed by volume of lumber and manufactured products containing lumber sold. Finally returns, also analyzed by volume sold, are related to costs to determine net income available for profit and risk.

<sup>1</sup>Sources: Ohio Forestry Association, OHIO FOREST INDUSTRIES DIRECTORY, 1964; and unpublished data of the U. S. Forest Service Central States Forest Experiment Station

## The Study Mills

Two of the seven study mills were classed as small lumber mills. Each produced  $1\frac{1}{2}$  to  $11\frac{1}{2}$  million board feet of lumber annually and sold more than half its production by hardwood lumber grades (fig. 2).

Three study mills were classed as large lumber mills. Each produced more than  $11\frac{1}{2}$  million board feet of lumber annually and sold more than half of it by hardwood lumber grades.

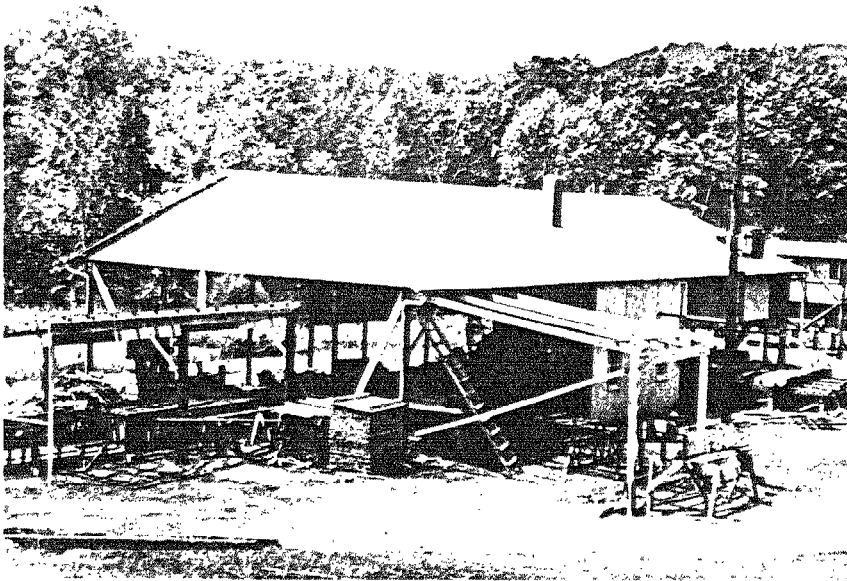


Figure 2. — A typical sawmill of the region.

The two remaining study mills were classed as pallet mills. Each produced 1 million or more board feet of lumber annually and sold more than half of it as pallets or as material for use in pallet manufacture.

## **Cost Classification**

Sawmill operating costs may be divided into two types: fixed and variable. Fixed or overhead costs include such specific expenses as depreciation, insurance, rents, leases, taxes, and interest. They are called fixed costs because their total amount does not change with the volume of lumber produced in any period of time. Therefore they do not directly affect short-term operating decisions such as size of labor force to hire, volume of raw materials to purchase, and types of products to saw. But they must be considered to measure short-term profitability and will therefore be included in all operating costs presented in this paper.

Variable costs are the direct expenses for operating a sawmill. They tend to vary directly with volume of logs purchased and lumber produced. They include such expenses as labor, repairs, maintenance, gasoline, diesel fuel, oil, grease, electricity, sawlogs, and other supplies. Unlike fixed costs, they affect short-term operating decisions because they usually increase or decrease directly with changes in the volume produced.

## **Results**

### **Types of Costs**

Total fixed costs and total variable costs, as a share of all costs, differed little among mill classes (table 1). Moreover, there were no apparent differences in specific fixed costs. But some specific variable costs differed noticeably among the three mill classes.

An individual sawmill operator is cautioned against comparing his own costs with any but the mill class most similar to his own operation. For example, a pallet-mill operator should not compare his labor cost with that of a large-lumber-mill operator and conclude that he can decrease labor cost at his mill from 29 to 19 percent of total expenditures. Labor accounted for a greater share of all costs at pallet mills than at the other types because more labor than machines and materials is needed to manufacture pallets. Likewise, the small-lumber-mill operator should not think he pays more for sawlogs than a large-lumber- or pallet-mill operator. Other expenses, such as office operation, administration, and prod-

Table 1. — Percentage distribution of total costs, by type of mill

| Costs                                   | Mill class       |                |              |
|-----------------------------------------|------------------|----------------|--------------|
|                                         | Small sawmills   | Large sawmills | Pallet mills |
| Fixed:                                  |                  |                |              |
| Depreciation                            | 4                | 4              | 4            |
| Insurance                               | 2                | 2              | 2            |
| Rents and leases                        | —                | 1              | —            |
| Taxes                                   | .5               | 1              | 1            |
| Interest                                | .5               | 1              | 1            |
| Total fixed costs                       | 7                | 9              | 8            |
| Variable:                               |                  |                |              |
| Labor                                   | 17               | 19             | 29           |
| Repair and maintenance                  | 1                | 2              | 3            |
| Fuels and lubricants                    | 1                | 1              | 1            |
| Utilities                               | 1                | 1              | 2            |
| Sawlogs                                 | 65               | 26             | 37           |
| Office, overhead, and products shipping | 7                | 17             | 18           |
| Lumber purchased for resale             | ( <sup>1</sup> ) | 25             | —            |
| Other                                   | 1                | —              | 2            |
| Total variable costs                    | 93               | 91             | 92           |
| Total fixed and variable costs          | 100              | 100            | 100          |

<sup>1</sup> Less than 0.5 percent.

ucts shipping, played a less prominent role at small lumber mills so sawlog costs constituted a higher portion of all costs at these mills.

Lumber purchased for resale at large lumber mills represented one-fourth of all costs, underlining the importance of wholesaling at such mills. Large mills typically have a large lumberyard and employ one or more lumber inspectors to grade lumber purchased from nearby smaller mills. In some cases, large lumber mills send trucks to pick up this purchased lumber.

### Where Costs Are Incurred

Costs incurred at each sawmill were grouped into one of four major activities: (1) sawmill operation, (2) yard operation, (3) administration and marketing, and (4) secondary manufacturing.

Sawmill operations include those jobs performed from the time sawlogs are placed on the log deck to the time lumber is ready for stacking or further processing.

Yard operations include receiving and handling sawlogs and handling and stacking lumber purchased for resale and received from the sawmill.

Administration and marketing include such things as sawlog purchases, wholesale lumber buying, recordkeeping, advertising, supervision, and all costs associated with products shipment.

Secondary manufacturing operations, although not present at every mill studied, include further processing rough-green or air-dry lumber into such products as pallets, skids, boxes, or prefabricated structures.

The share of total costs incurred for sawmilling was about equal for the three mill types (fig. 3). Yard operating and administra-

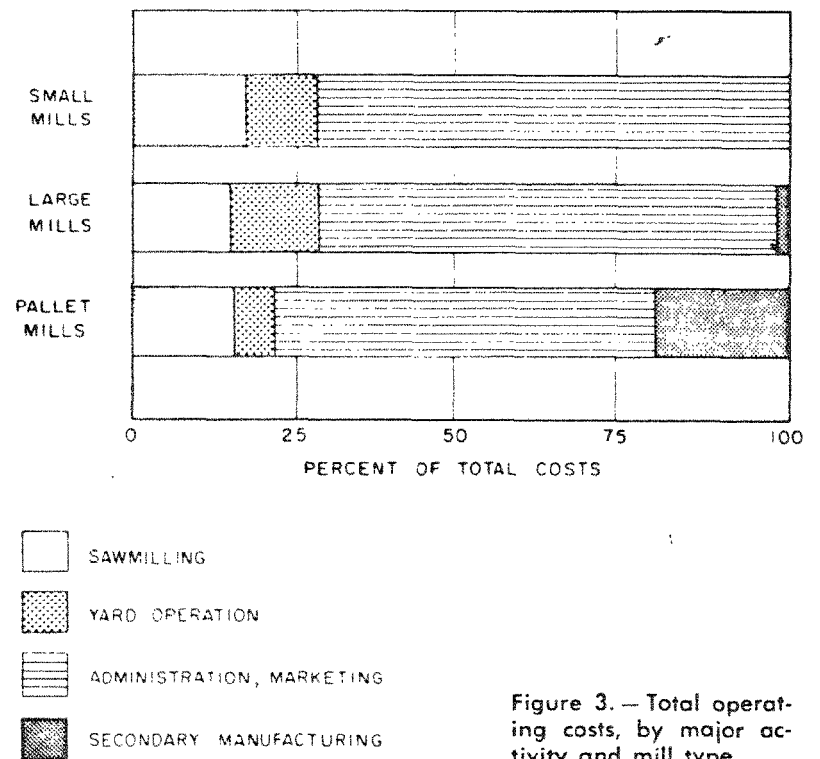


Figure 3. — Total operating costs, by major activity and mill type.

tion and marketing costs represented about the same proportion of total costs at the small lumber and large lumber mills. However, both yard operating and administration and marketing costs occupied a smaller proportion of total costs at pallet mills. This was mainly because pallet and other product-manufacturing costs comprised about 20 percent of their total costs, compared to less than 1 percent at other mills.

### Unit Costs

To compare total operating costs for each major activity among the study mills, costs were determined per thousand board feet of lumber sold, either as lumber or in manufactured products. With costs standardized in this manner, three differences became apparent for the mill types studied: (1) sawmilling costs for pallet mills were about \$5.50 per thousand higher than for small or large lumber mills; (2) yard operating costs were about \$5.00 per thousand higher for large lumber mills than for the other two types; and (3) administration and marketing costs tended to increase with increases in output and the amount of processing (table 2).

Sawmilling costs were higher at pallet mills because such mills generally processed smaller logs and produced mostly 4/4 lumber

Table 2. — Costs per thousand board feet of lumber sold by the study mills<sup>1</sup>

| Business activity                       | Mill class     |                |              |
|-----------------------------------------|----------------|----------------|--------------|
|                                         | Small sawmills | Large sawmills | Pallet mills |
| Sawmilling                              | \$12.91        | \$12.70        | \$ 18.35     |
| Yard operations                         | 6.90           | 11.62          | 6.23         |
| Administrative and marketing activities | 54.26          | 64.26          | 68.69        |
| Subtotal                                | 74.07          | 88.58          | 93.27        |
| Secondary manufacturing                 | —              | .56            | 25.84        |
| Total                                   | \$74.07        | \$89.14        | \$119.11     |

<sup>1</sup>Lumber used in pallet manufacture was included in the volume used to determine board-foot costs.

rather than thicker boards. Both practices tended to increase sawing costs per thousand.

Yard operating costs at large lumber mills probably exceeded those at the other mills because each thousand board feet of lumber sold by a large mill spends more time in the yard and is handled more often than it would be at either a small lumber mill or a pallet mill. At large mills, more rough lumber is air-dried and returned to the mill for resawing and surfacing than at the other types of mills.

Administration and marketing costs tended to be greater per thousand board feet at large mills and pallet mills because: (1) larger office staffs were used; (2) more marketing services were provided (grade-sorting lumber, banding and covering lumber packages, stenciling buyers' names on pallets, and giving discounts for prompt payment of accounts); (3) more supervision was used; and (4) larger depreciation costs were incurred for processing and distributing equipment (especially trucks to move products to markets).

## **Returns**

Gross receipts per thousand board feet of products sold ranged from \$79.86 at small lumber mills to \$136.54 at pallet mills — a difference of \$56.68 (table 3). As volume sold and processing increased, gross receipts per thousand board feet increased both for all products combined and for specific products. Though increased processing probably contributed much to the higher gross receipts at large lumber mills and pallet mills, ability to supply greater volume must have also been important. Generally, when two or more types of mills marketed the same product, the higher gross receipts per thousand board feet went to the type supplying the greater volume.

Although each mill tended to concentrate on sawing one specific product (for example, graded lumber), most mills supplemented production with several other products. Consequently, the average return from all products for any type of mill was influenced by the return on each product sold. This was most evident at pallet mills where the return on all products per thousand board feet

Table 3. — Gross receipts per thousand board feet of lumber by type of product and mill type

| Type of product                        | Mill type      |                |                     |
|----------------------------------------|----------------|----------------|---------------------|
|                                        | Small sawmills | Large sawmills | Pallet mills        |
| Graded lumber                          | \$80.25        | \$106.09       | \$ 90.57            |
| Flooring                               | —              | 74.13          | —                   |
| Construction and local-use lumber      | 61.36          | 81.56          | 58.71               |
| Pallets, boxing, crating, and blocking | 65.00          | 73.99          | 131.11              |
| Ties and timbers                       | —              | 81.76          | 139.07 <sup>1</sup> |
| Miscellaneous products <sup>2</sup>    | 90.20          | 109.96         | 163.72              |
| All products (weighted average)        | \$79.86        | \$ 97.02       | \$136.54            |

<sup>1</sup>Includes special orders of large timbers.

<sup>2</sup>Includes veneer logs, cooperage logs, fenceposts, retail sales, and stacking sticks.

exceeded the return on pallets, boxing, crating, and blocking.

Subtracting average total cost (table 2) from the all-products average return (table 3) gives a net income before taxes (return to management, plus margin for risk) of \$5.79, \$7.88, and \$17.43 per thousand board feet at small lumber, large lumber, and pallet mills, respectively. These amounts approximate 7 percent, 8 percent, and 13 percent of their respective weighted average prices.

## Conclusions

We believe the sawmill operations studied typify those in the Appalachian region of Kentucky and Ohio. To the extent that they do, costs, returns, and net incomes at other sawmills in the region may approximate those reported for the study mills.

Small-lumber-mill operators, for example, may expect sawlog expenditures to account for almost two-thirds of their total annual costs. They may also expect each major activity at their firm to contribute approximately the same share to total annual costs as those observed at the study mills. Likewise, large-lumber-mill and pallet-mill operators may expect their expenditures for major activities to comprise nearly the same shares of total costs as those observed at the study mills.

Although all operating costs are important, this study, by identifying the largest costs, may have identified the costs that deserve the most managerial attention. Among fixed costs, for example, mill managers should closely examine depreciation and insurance costs before spending much time on others. The greatest variable costs are for stumpage and sawlogs, purchase of lumber for resale, labor and office operation, products distribution, and administration. These large costs are the ones that managerial cost-control efforts are most likely to reduce significantly. They should therefore be considered first when trying to increase operating profits.

