

OPRE 6398.001 Prescriptive Analytics

Reading 4*

The U.S. cabinet industry was growing and profitable in the 1980s due to an expanding new housing market and an active replacement market. Encouraged by the trend, manufacturers offered more contemporary product lines not only for the kitchen and the dining room, but for other rooms in the house as well. However, there was constant pressure on them to provide quality cabinets at competitive prices. Since cabinet making is basically an assembly operation in which parts are made of timber from different suppliers, a rational procurement strategy was necessary to control the wood quality and cost.

Wellborn Cabinet, Inc., owned a manufacturing facility in central Alabama that included a sawmill, four dry kilns, and a wood cabinet assembly plant. The company was primarily concerned with the relatively expensive logs, which made up about 45 percent of the total material costs. Two researchers at Auburn University developed a linear programming (LP) model to help management determine the most economical combination of raw materials for processing blanks into cabinets during a typical five-day week of operation.

The input data included (1) the diameter and length measurements of logs randomly selected, (2) a tally of the green lumber from each individual log sample, (3) a tally of the blanks produced from dry lumber of a given grade and source, (4) the maximum weekly throughput, (5) the aggregate capacity of the dry kilns as well as the drying rate, (6) the delivered cost of logs and lumber, (7) the cost of converting logs into lumber, (8) the cost of drying lumber, (9) the cost of converting dry lumber into blanks, and (10) the weekly requirements of blanks by size classification. On the other hand, the constraints in the LP included the capacities of the sawmill and dry kilns, the required output of blanks at the production plant, and the available supply of raw materials. The optimal solution generated by computer showed that Wellborn should buy #2 grade hardwood logs and #2 common green lumber directly from outside suppliers to minimize the raw material costs.

Shadow prices of the various types of logs were also examined to explain why sawmill operators at the manufacturing facility preferred to use the Doyle rule as the basis for buying relatively small-sized logs. Through additional sensitivity analyses, management at Wellborn was able to establish the price ranges for lumber and logs in which the optimal solution remained the same. In all, the recommended wood procurement policy was expected to yield approximately 32 percent savings in total material costs for the company.

Carino, H. F., & LeNoir, C. H. Optimizing wood procurement in cabinet manufacturing. *Interfaces*, 1988, March-April, 10-19.