

Hardwood Sawing Costs: Log Size Differences and Sawing Strategies

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Abstract

Sawmill profitability relies on five primary factors: cost of sawlogs, the lumber grade yield from logs of varying sizes and quality, overrun/underrun, market prices of the lumber products sawn, and the cost of sawing logs. This paper focuses on the cost of sawing logs and the mill strategies that help define the level of cost. Empirical data from several mill studies combined sawline times with the production of lumber and cant products. Cant products included a variety of types, including pallet cants and ties/timbers. By keeping track of the board footage of each product sawn from the sample logs, the footage per foot of sawline was calculated across three cant sizes using cross-sectional areas of the cants (≤ 24 inches; >24 inches and ≤ 40 inches; and >40 inches) and three log sizes based on scaling diameter (≤ 11.5 inches; >11.5 inches and ≤ 15.5 ; and >15.5 inches). Results showed board feet per sawline was maximized when sawing the largest marketable cant regardless of log diameter. Maximizing board feet per foot of sawline effectively minimizes sawing cost, which is illustrated by using a range of sawing costs per minute (\$5, \$20, \$25, and \$20 per minute). A strategy that seeks to saw the largest marketable cant, when economically justified, from logs of varying sizes inevitably leads to lower sawing costs and the ability to saw more volume per unit time. Where larger cant sizes yield higher prices per MBF (e.g., pallet cants versus railroad ties), profitability is further enhanced.

The cost of manufacturing lumber products is one of the five primary factors that defines the profitability of any sawmill. These factors include lumber grade yields, overrun/underrun, sawing costs, log costs, and market prices for lumber and cant products. Except for lumber and cant prices, mill ownership exerts considerable control over the remaining variables. Mill owners have direct control over all aspects of mill costs, including labor, equipment, consumables, inventories, and other cost categories. They also exert clear control over lumber grade yield distributions and overrun/underrun by virtue of log size and log quality they procure.

Any efforts to improve mill efficiency that result in success will lead to improved production and reduced costs, generally producing more profit. And, when discussing costs and cost efficiencies, it is very important to remember that a dollar saved in production costs has the same effect on the bottom line as an additional dollar of revenue from new or existing markets. It is generally recognized that sawing costs per MBF (thousand board feet) ($1 \text{ MBF} = 2.36 \text{ m}^3$) decrease with increasing log diameter.

The basis for this lies in the fact that each log has a fixed cost associated with removing the four slabs necessary to square each log in preparation for sawing boards. In a small log, with proportionately fewer boards than a large log, there is less board volume available to offset the fixed cost of removing slabs.

So, does this line of reasoning consistently lead to the conclusion that small logs always cost more to saw than large logs? Not necessarily, because a very important consideration missing from this description is cant size. In short, the larger the cant size sawn, the fewer the sawlines and the greater the board footage sawn per sawline, leading to reduced cost per MBF of sawn products.

For instance, it is certainly conceivable that in a small log (10 in or 11 in), if the target marketable cant size is the largest possible and in a large log (16 in or up) with a target marketable cant size being as small as possible, the sawing cost per MBF of the smaller log could be less. Therefore, the mill could minimize sawing costs by sawing the largest sized marketable cant, tie, or timber to produce, and in effect eliminating much, if not all, of the perceived disadvantage to sawing smaller logs. So, the efficient allocation of sawlines in maximizing the combination of revenue

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generated and productivity is the pivotal consideration in any discussion of sawing costs. Mills must also recognize that smaller logs will not generate the volume of higher quality boards (No. 1 Common & Better) that the mill might need to remain profitable, so that simply focusing solely on minimizing sawing cost does not consider the quality of logs being sawn and should never be the primary objective of the mill. This study focused on the effects of cant size on the associated sawing cost for logs of varying sizes and species by considering different strategies for dealing with heart-centered cants.

Literature Review

Much of the work produced by the research community regarding sawmill economics has focused on software tools to help sawmills quantify and analyze their cost structures (Palmer et al. 2005; Govett et al. 2005; Mayer and Wiedenbeck 2005). In reviewing the literature, it became obvious that the number of studies simultaneously exploring sawing times, sawing strategies, and footage produced per sawline are essentially non-existent.

The primary obstacle in the development of this type of study was identified by Govett et al. (2006) and relates to the difficulty in conducting individual log studies at mills because of the difficulty in tracking boards and cants from individual logs, which requires personnel stationed throughout the mill to collect the data. This type of study is further complicated by the fact that recording sawing time requires additional personnel and that conducting a mill study may alter normal operations of the mill.

However, a study by Burry et al. (1977) determined lumber recovery at selected sawmills in New York state. This was a continuation of an earlier study that conducted recovery studies at ten (10) New York sawmills. Although some lumber recovery studies have been conducted over the years, it appears that this study is unique in that it also collected data on sawing time and lumber production. Both actual sawing time and delay times were collected, and using that data, the authors determined mill production in board feet per productive hour for each studied mill.

Production ranged from 763 bf per productive hour for a handset, circular sawmill to 5,056 bf per productive hour for a double cut band head-saw with a line bar-band resaw. The authors also investigated downtime among the mills studied, with the downtime per 8-hour shift averaging about 1.64 hours over all mills.

Niskala and Church (1966) investigated opportunities for sawing heart-centered cants versus sawing the entire log into 4/4 lumber. They used a combination of hand drawn diagrams and log conversion studies at local sawmills that included timing of the sawing process for each log to judge the effectiveness of sawing cants v. boards. They concluded that the volume gain from sawing cants should be up to 25 percent, because of the reduction in kerf waste. They further concluded that the reduction in sawing time was the other major benefit. They also cited the improvement in quality and value overall, since less low-grade lumber was being produced. Using contemporary pricing they also found a substantial gain in net revenue from the cant production strategy.

Wiedenbeck and Blackwell (2003) analyzed the downtimes at 22 hardwood sawmills by performing actual time

studies at each mill, averaging 4.5 study hours at each mill. Their primary purpose was to compare the downtime of circle versus band mills and found that circlemills in the study averaged about 17.2 percent downtime, compared to 10.2 percent for band mills.

Hassler et al. (2021), in a survey of Appalachian hardwood sawmills, asked if the mill knew its sawing cost per hour and its sawing cost per MBF, by species. Results showed that 75.2 percent of respondents (n = 110) said they knew the cost per hour to run their mill. In addition, 65 percent indicated they knew the sawing cost per MBF by species. The relationship between knowing the cost per hour to operate the mill and sawing cost per species by MBF was further explored. Of the responding mills, 59.2 percent indicated they knew the cost of both, whereas 18.5 percent did not know the cost of either; 5.8 percent knew only the cost per hour and 16.5 percent knew just the cost per MBF.

Of great concern is that nearly twenty percent of the surveyed mills stated that they did not know either cost (hourly or by MBF) and are presumably not currently tracking those costs, although one must presume that those mills at least know the overall sawing cost per MBF for the mill. This is easily accomplished by simply taking the total cost of the mill for a specified period and dividing it by the total production of lumber and cants for that period. Although this measure of sawing cost is relatively easy to determine, it is not necessarily the best measure of this important variable, since an 'overall' cost does not delineate the cost differences between species, log sizes, or sawing strategies.

A more effective approach is to develop costs on a per unit of time basis, e.g., \$/hour or \$/minute. Because costs are a combination of fixed and variable costs, it is important to standardize costs on a single basis and the best way to handle this is on a scheduled hour basis. So, if the workday is 8 hours and the total number of workdays in a year is 250, scheduled hours are 8 hours/day * 250 days/year = 2,000 hours, defining scheduled hours as those hours that the mill is paying its production crew. So, if a 15-minute break is paid then it becomes a part of scheduled time, whereas unpaid lunch breaks are not part of scheduled time.

Adding up all costs of sawmill operations will translate overall sawmill cost into a cost per scheduled hour. The obvious place to start in determining sawing cost is with the mill's accountant. Without a good accounting system, a reasonable place to start an analysis of sawing costs is to use the US Forest Service's, Cost of Sawing Timber (COST) Module (Palmer et al. 2005). The authors cite operating costs per minute in the range of \$4 to \$25, indicating a considerable range of both costs, and evidently, mill configurations. Once a mill has developed their cost on a per unit time basis, it has a powerful tool with which to analyze mill operations. For the purposes of this study, a range of \$5 to \$20 per minute will be used to illustrate the analysis.

Methods

The Appalachian Hardwood Center (AHC) at West Virginia University has conducted in excess of 60 mill studies, resulting in over 4,600 logs with specific data on lumber grade yields and overrun by log grade. These studies generally consisted of up to 100 logs that were categorized by their various characteristics, including diameter, length, clear faces, and scaling defects among others. Each log was

numbered so that the boards and cants sawn from each log were marked with the associated log number and scaled and graded according to National Hardwood Lumber Association (NHLA) grading rules (2019). In this way the total footage sawn in boards and cants for each log was recorded. In a limited number of these mill studies the AHC team was also able to collect the sawing time data on each log allowing a more in-depth analysis of sawing time and costs.

Sawing Time

Analyzing mill performance requires not only a measure of cost per unit time but the actual time it takes to produce a board and the volume associated with that investment in production time. Of particular concern is how to measure time in an appropriate fashion. In any normal production environment, productivity is limited by the weakest component of the production system. The weak link theory says that every system, no matter how well it performs, has at least one constraint that limits its performance, which is the system's weakest link. For instance, in a simple mill setup with a headrig, edger, and trim saw, the headrig is the weak link, so that system productivity is tied to headrig productivity.

However, with resaws and bull edgers/gang saws being prominent in mills, the weak link theory becomes less clear. From experience, the headrig in a resaw/gang saw/bull edger environment can control the production of the resaw/gang saw/bull edger. However, if the headrig attempts to keep a full queue of cants/flitches in front of the resaw/gang saw/bull edger, then the resaw/gang saw/bull edger can become the weak link. Experience also shows that generally, the resaw/gang saw/bull edger does not force the headrig to become the weak link, because headrig production can be adjusted to minimize or eliminate the resaw/gang saw/bull edger becoming the weak link, which is a fundamental reason for adding a resaw/gang saw/bull edger to the mill configuration.

The number of boards and cants produced from a log is defined by the number of sawlines required to produce that result or, in other words, sawlines accurately reflect the work accomplished. So, sawlines and time per sawline become the basic measure in this analysis. Sawlines on a headrig are assumed to be a combination of the time for:

1. Sawlines producing a board plus,
2. Sawlines that do not produce a board (i.e., slab cuts and shim cuts) plus,
3. Turning the log.

The total time on the headrig is apportioned among all sawlines to arrive at an average time per sawline. Of course, this will vary because of log length so that, for purposes of analysis in this study, the operable measure used is time per foot of sawline, which eliminates obvious variation between logs of differing lengths. In practice, the time per foot of sawline is determined by measuring the elapsed time between when a log hits the headrig carriage and the next log hits the carriage, then dividing elapsed time by the total number of feet in the sawlines (i.e., sawlines resulting in a board plus sawlines not resulting in a board). For example, for a 10-foot log with 10 sawlines the total feet of sawlines is 100. If sawing time was 2 minutes then the sawing time per foot of sawline is 1.2 seconds.

Results

Sawline Times

The AHC collected headrig data on two different mills, all with mechanical log turners and pneumatic dogs (except for Mill 1, where the carriage was manually operated to position for the next sawline). Mill 1 sawed all products on the headrig; Mill 2 had a mixed approach where a portion of the logs were sawn entirely on the headrig and the remainder were sawn to a flitch on the headrig and the flitch sawn on a bull edger. Both were grade mills, where the objective was to maximize the production of higher-grade lumber (1 Common and better) and then choose the best strategy for dealing with the remaining heart-centered cant.

Mill 1 data included a combination of soft maple and oak logs; Mill 2 a combination of yellow poplar and oak logs. Table 1 summarizes the average time (in seconds) per foot of sawline.

Cost differences based on species arise because of the different times it takes to complete a sawline. That is, knowing the cost per unit time, combined with the time per sawline, by species, provides cost per sawline for individual species. For instance, the difference in sawline timing between oak and yellow poplar for Mill 2 infers greater cost when sawing oak. Mill 1 times are a bit unexpected, in that one would expect soft maple sawing times to be less than oak. Part of the reason for the greater time per foot of sawline for Mill 1 compared to Mill 2 is the manual operation for that mill to set the next sawline.

The other factor affecting the time per foot of sawline is the number of log turns. For the oak logs, Mill 1 averaged 3.63 turns per log, whereas Mill 2 averaged only 3.06 turns per log. Although not directly comparable, Mill 1 had 3.66 turns per soft maple log and Mill 2 had 2.85 turns per yellow poplar log. For Mills 1 and 2 the differing times per sawline directly impact the number of sawlines that can be completed per unit time, which implies that fewer logs are capable of being sawn per unit time at Mill 1 than at Mill 2, and this would be reflected in the cost per unit volume sawn. Thus, for the same sample of logs, Mill 2 would complete the sawing process much sooner than Mill 1.

Board Footage per Sawline

Sawlines alone are not sufficient for decision making; they must be combined with footage sawn, so it is possible to calculate footage per sawline, which better reflects the economic outcomes to be expected. For instance, if Mill 1 is more judicious in maximizing the board footage per sawline than Mill 2, the economics of that may favor Mill 1. That is, if one can generate more volume per unit time (board feet per sawline) then cost per mbf is lower. This is where the necessary data required to make an analysis has

Table 1.—Seconds per foot of sawline for two mills and different species.

Species	Seconds per foot of sawline	
	Mill 1	Mill 2
Oak	2.02	1.11
Yellow Poplar		0.89
Soft Maple	2.14	

Table 2.—A comparison of cant size, log diameter, and board feet per foot of sawline for two sawmills where logs are sawn completely on the headrig.

Cant cross sectional area (in ²)	Log diameter (in)	Mill no. 1 bf/ft. of sawline (no. of logs)	Mill no. 2 bf/ft. of sawline (no. of logs)
≤24	All logs	0.42 (57)	0.63 (107)
>24 and ≤40	All logs	0.49 (155)	0.66 (29)
>40	All logs	0.68 (85)	0.88 (112)
≤24	≤11.5	0.40 (25)	0.64 (10)
>24 and ≤40	≤11.5	0.50 (68)	0.66 (7)
>40	≤11.5	0.70 (7)	0.77 (9)
≤24	>11.5 and ≤15.5	0.43 (28)	0.56 (57)
>24 and ≤40	>11.5 and ≤15.5	0.48 (72)	0.59 (12)
>40	>11.5 and ≤15.5	0.68 (56)	0.86 (64)
≤24	>15.5	0.44 (4)	0.72 (40)
>24 and ≤40	>15.5	0.54 (15)	0.74 (10)
>40	>15.5	0.68 (22)	0.96 (39)

been traditionally lacking. What is required is log size data, combined with sawn footage and the number of sawlines in each log.

The cross-sectional area of produced cants significantly affects the volume (bf) per sawline. The larger the cant size, the greater the volume per sawline and ultimately, the lower the cost. When cutting a wide range of cant sizes, the cross-sectional area of the cant is the variable most correlated to volume per sawline. Log length is the second most correlated variable, whereas diameter is less correlated to volume per sawline (in this analysis log length is not an issue since the operable variable is volume and time per foot of sawline). This is due in part to the more significant effect of cross-sectional cant area on volume per sawline. Again, log diameter becomes less relevant with increasing cant size.

Sawing data from Mills 1 and 2 was collected, in addition to log characteristics and all board and cant data sawn from those logs. The analysis focused on the board foot volume produced per sawline by cant size and log diameter. Cant size was categorized into three classes: ≤24 inches², >24 inches² to ≤40 inches², and >40 inches² of cant cross sectional area. The data was further divided into three log size classes: ≤11.5 inches, >11.5 inches to ≤15.5 inches, and >15.5 inches, representing traditional diameter classes. The board feet per foot of sawline results are presented in Table 2.

Clearly, the logs from which large sized cants are sawn show greater bf per ft of sawline and thereby, higher production over time for both mills. For example, Mill 2 board feet per foot of sawline increases from 0.63 bf for all logs with the smallest size cant to 0.66 bf feet per foot of sawline for medium sized cants, and 0.88 board feet per foot of sawline for the largest cants.

The same progression is evident for Mill 1, with the difference that Mill 1 produced fewer bf per foot of sawline. For logs of the same size, sawing larger sized cants did result in greater production. For Mill 1, medium sized logs produced 0.43, 0.48, and 0.68 board feet per foot of sawline for small, medium, and large size cants, respectively. A similar progression occurs in both small and large diameter logs, as well as the Mill 2 results. These results also confirm the hypothesis that, for a small log, sawing large sized cants (e.g., Mill 1 small diameter log and large size cant yielded 0.70 bf per foot of sawline) can generate greater volume per

sawline than a large log with a small cant being sawn (e.g., Mill 1 large diameter log and small cant producing 0.44 bf per foot of sawline). The same result occurred with Mill 2 where small diameter logs sawing a large cant size yielded more bf per foot of sawline than large diameter logs sawing small sized cants.

It was also possible to compare the impact of sawing the log completely on the headrig or sending a flitch to the bull edger at Mill 2. Table 3 illustrates the result of that comparison. Results provided in Table 3 confirm that board feet per foot of sawline increases with increasing cant size, with and without using a bull edger (0.88 bf and 1.07 bf per sawline, respectively for the largest sized cants). The other interesting result is that the volume (bf) per sawline increased for medium and large cant sizes when the bull edger was incorporated into the sawing process. The data indicates that fewer sawlines and log turns are needed on the headrig when incorporating the bull-edger (i.e., 6.7 vs. 11.4 sawlines and 2.1 vs. 3.5 log turns) to complete the processing of the log.

From a general cost perspective for these two sawing options, less time on the headrig combined with more board feet per sawline is a win-win for the mill. Using a second saw to complete the processing conserves headrig time and reduces sawing cost, which is the primary reason that a mill chooses to incorporate a resaw option in the mill.

Table 3.—A comparison of results for Mill 2 where the log was either completely sawn on the headrig or partially sawn on the headrig and then moved to a bull edger to complete the sawing of the log.

Item	Mill 2 with no bull edger	Mill 2 with bull edger
Total no. logs	248	133
Bf/Sawline		
Cant cross-section area ≤24" (No. Logs)	0.63 (107)	0.63 (9)
Cant cross-section area >24" & ≤40" (No. Logs)	0.66 (29)	0.79 (55)
Cant cross-section area >40" (No. Logs)	0.88 (112)	1.07 (69)
Avg. no. of log turns on headrig	3.5	2.1
Avg. no. of sawlines on headrig ¹	11.4	6.7

¹ Includes sawlines in which a board was sawn plus sawlines that included a slab or shim cut.

Table 4.—Cost per MBF for Mill 2 with no bull-edger sawing red oak, where SLt = 1.11 seconds and BFsl = 0.63, 0.66, and 0.88 bf over all logs sawn and yellow poplar, where SLt = 0.89 seconds and BFsl = 0.63, 0.66, and 0.88 bf over all logs sawn.

Cant cross-section area (in2)	Board feet per sawline	Species	Sawing cost per minute			
			\$5	\$10	\$15	\$20
<24 in.	0.63	Red Oak	\$147	\$294	\$440	\$587
		Yellow Poplar	\$118	\$235	\$353	\$471
>24 in. & <40 in.	0.66	Red Oak	\$140	\$280	\$420	\$561
		Yellow Poplar	\$112	\$225	\$337	\$449
>40 in.	0.88	Red Oak	\$105	\$210	\$315	\$420
		Yellow Poplar	\$84	\$169	\$253	\$337

Sawing Cost

With accurate sawing time and board feet per foot of sawline estimates, accurate sawing cost estimates can be developed for a range of costs per unit time using equation (1):

$$\text{CMBF} = \text{SLt} * 1/\text{BFsl} \text{ Cmin} * 1000/60 \quad (1)$$

Where:

CMBF = sawing cost per MBF,

SLt = seconds per foot of sawline,

BFsl = board feet per foot of sawline,

Cmin = cost per minute to operate the mill

Table 4 illustrates the cost per MBF of both red oak and yellow poplar for Mill 2 with no bull edger using a range of \$5 to \$20 for Cmin. Tables 4 vividly illustrates the impact of the decreased number of sawlines as cant size increases. For red oak, moving from a small cant size to the largest cant size can decrease cost per MBF by \$42 (\$147 – \$105) when sawing cost is \$5 per minute to operate the mill, to \$167 (\$587 – \$420) when sawing cost is at \$20 per minute to operate the mill. Similarly, for yellow poplar the decrease in cost per MBF was \$34 (\$118 – \$84) when sawing cost is set at \$5 per minute to \$134 (\$471 – \$337) when sawing cost increases to \$20 per minute.

The impact of adding the bull-edger/gangsaw to the mix is illustrated in Table 5. Although the results for sawing the smallest sized cant, over all logs sawn, remain the same, the impact of the bull-edger is obvious in the other cant size categories. For both red oak and yellow poplar the addition of the bull-edger, across all cost categories per minute to operate the mill, showed substantial reductions in cost per mbf. For instance, the >24 in. & ≤40 in. category of cants showed a reduction of \$46 per mbf (\$280 – \$234) for red oak and \$37 per mbf (\$225 – \$188) for yellow poplar at \$10 per minute to operate the mill. Similarly, for >40 in. category of cants, the addition of the bull-edger showed a \$37 (\$210 – \$173) reduction in cost for red oak at \$10 per minute and \$30 per mbf (\$169 – \$139) for yellow poplar at \$10 per minute.

It is important to note that the costs per MBF in this analysis are based on productive time (the time in which the process is performing its specific function) and does not include any downtime estimates. The costs per MBF can be adjusted to reflect costs per scheduled time by dividing the results by the utilization rate, which is productive time (delay free time) divided by scheduled time.

Table 5.—Cost per mbf for Mill 2 with bull-edger sawing red oak, where SLt = 1.11 seconds and BFsl = 0.63, 0.79, and 1.07 over all logs sawn and yellow poplar, where SLt = 0.89 and BFsl = 0.63, 0.79, and 1.07 over all logs sawn.

Cant Cross-Section Area (in2)	Board Feet per Sawline	Species	Sawing Cost per Minute			
			\$5	\$10	\$15	\$20
≤24 in.	0.63	Red Oak	\$147	\$294	\$440	\$587
		Yellow poplar	\$118	\$235	\$353	\$471
>24 in. & ≤40 in.	0.79	Red Oak	\$117	\$234	\$351	\$468
		Yellow poplar	\$94	\$188	\$282	\$376
>40 in.	1.07	Red Oak	\$86	\$173	\$259	\$346
		Yellow poplar	\$69	\$139	\$208	\$277

For example, if the utilization rate is 0.9 then the sawing cost per scheduled hour for \$15 per minute of mill cost for yellow poplar and the smallest cant size for all logs (Table 5) is \$353/0.9 = \$392 per MBF.

Discussion

Although minimizing sawing cost is important, the mill must simultaneously focus on maximizing net revenue from the production of lumber and cants. So, does the strategy of minimizing sawing cost maximize net revenue? Not necessarily. For instance, when sawing logs with only one or no clear faces or sawing small diameter logs, the likelihood of producing a Select & Better board is very low. Even producing a 1 Common board is not a foregone conclusion, since producing a 1 Common board is not always better than leaving the board on the cant. For small diameter logs, the number of boards available is small and, if a Select & Better board is present, it will be sawn from the clear outer portions of the log.

As log quality (two, three, and four clear sides) and diameter increases, however, it becomes incrementally more profitable for the mill, because of the likelihood of producing a Select & Better board is much greater with each sawline. So, when sawing larger diameter, high quality logs, it is critical to determine when to saw one or more additional boards from the cant, rather than leave the cant intact. The factors to consider when taking one or more boards include: a loss of volume because of kerf, oversizing boards to meet target thickness, length differences between the cant and boards, the cost of additional sawlines, the possible reduction in value for the residual cant, and any waste because of unused volume in the process. The revenue potential lies in producing a board or boards with enough value to offset the sum of these losses. Hassler (2024) addresses the economics of sawing a large sized cant/tie into boards and a smaller sized cant and elaborates on these issues and the impact of making the wrong decision.

There is also the possibility of producing unwanted low grade boards when properly sizing a cant following the removal of one or more boards as well as producing a low-grade board even though the visible face is of a higher grade. Also, allocating sawlines to remove boards from a larger cant will effectively reduce the number of sawlines available for additional logs during the production period, reducing the volume potential for the entire production period.

Conclusions

The analysis of sawing costs is a complex issue that is not adequately addressed by simply calculating the overall cost per MBF. The nuances of equipment configurations, sawing strategies, and cost per unit time to operate the mill should be seriously considered in the conduct of mill operations. A key consideration for all grade sawmills is recovering as much high-grade lumber (1 Common & Better lumber) as possible from each log. However, a point is reached in the sawing process when higher grade lumber is not realistically attainable. At this point, the mill has a crucial decision about how to proceed in completing the processing of the log. The key conclusion of this study is at that point the mill needs to consider the various options available to them. . . produce the largest marketable cant or produce a combination of boards and/or boards and a smaller sized cant with the objective of maximizing net revenue.

From an economic perspective, the allocation of sawlines is crucial to achieving the optimum balance between cost minimization and maximization of net revenue, which in its fundamental form is deciding between producing large or small sized cants that are readily marketable.

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