1994

Uses of Montana lumber products

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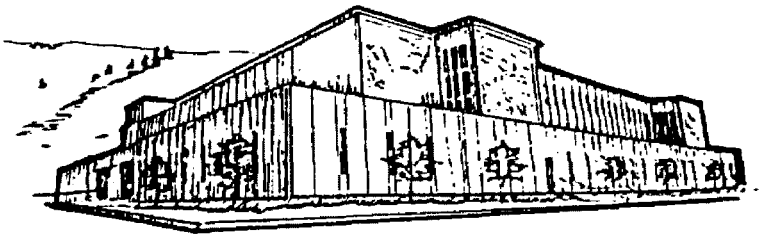

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USES OF MONTANA LUMBER PRODUCTS

by

Paul J. Davis

Presented as partial fulfillment of the requirements

for the degree of

Masters of Business Administration

University of Montana

1994

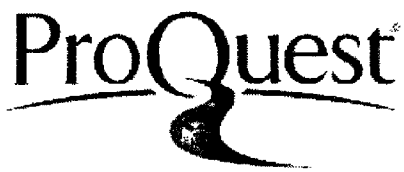
Approved by:

Chairperson

Dean, Graduate School

May 6, 1994

Date



Davis, Paul J. May 1994 Business

Uses of Montana Lumber Products (30 pp.)

Director: Charles E. Keegan, III C K

Information regarding end uses of softwood lumber may be of direct benefit to existing Montana manufacturers as well as potential manufacturers within the state who wish to "add value" to lumber through secondary processing. The objectives of this paper were to: 1. profile Montana's lumber production by logical and consistent categories that indicate potential end use, and 2. analyze the product and geographic end uses of lumber of the type produced in Montana and where possible identify how lumber produced in Montana is used.

Existing data were used to attempt to characterize Montana's lumber production and to examine how lumber of the type (species and grade) produced in Montana is used. Sources included published data, as well as requests for additional information from data sources tracking Montana-produced lumber. Also, experts in the field were interviewed regarding this topic, and they offered their professional knowledge for their respective areas of expertise.

Montana's average annual lumber production was summarized into categories developed by the Western Wood Products Association grading manual. However, no data were found to indicate specifically how Montana lumber is used. Forecasts from a prominent wood products analysis firm were used to project how national wood products consumption may develop over the next five years. In addition, several ideas for developing Montana's end use data were proposed.

Table of Contents

List of Tables

INTRODUCTION

Information regarding end uses of softwood lumber may be of direct benefit to existing Montana manufacturers as well as potential manufacturers within the state who wish to "add value" to the lumber generated from local mills through secondary processing. Softwood lumber is that lumber which is produced from coniferous trees such as pine, fir, and larch (Harlow and Harrar 1969). Virtually all lumber produced in Montana is generated from softwood species (Western Wood Products Association (WWPA) 1992). Currently, over 90 percent of Montana's wood products are shipped out of state in their primary form (Bureau of Business and Economic Research 1989). "End use" data can help manufacturers to exploit potential niche markets by differentiating their products. This strategy of tailoring products to a more specific target market may increase margins and even develop a position as a preferred supplier in less prosperous times (Evans and Berman 1987). Several producers have found success by exploiting niche markets within the lumber arena. An example of this technique is Plum Creek's "Project Plus" where prepackaged bundles of lumber ready for the small scale "do it yourself" purchaser are delivered directly to the retail outlet (Temple 1993). Knowledge of how lumber products are ultimately used

assists mills in optimizing production of niche products such as odd thicknesses for furniture, metric sizes for export, or glue-lam stock.

As timber supply in Montana tightens for a number of reasons, including - appeals of Forest Service sales, concerns for threatened and endangered species, projected declines in industrial harvests, and the failure to resolve the Montana roadless area dispute - mills must target their production to get the most return for their raw material investment. The supply problem is exacerbated by the recent volatility of the markets. There was a rollercoaster ride of prices in 1993 - one thousand board feet of studs sold for $510 in March, for $300 in September, and climbed back to $450 in November (Random Lengths 1993). A marketing approach that emphasizes a closer relationship with customers may reduce this type of volatility by providing more security for each party through increased confidence in supply and/or demand, possibly as a result of longer term contracts and agreements (Temple 1993). In an era of rapidly rising prices and declining timber availability, the lumber markets of the 1990's may very well be "remade" into an entirely new form of manufacture and marketing. What form this will take is uncertain, but it will most likely require a more focused approach to manufacturing and marketing lumber products (Keegan 1993).

The objectives of this paper were to - 1. Profile Montana's lumber production by logical and consistent categories that indicate potential end use, and 2. Analyze the product and geographic end uses of lumber of the type produced in Montana and where possible identify how lumber produced in Montana is used.

BACKGROUND

The forest products industry is one of the most important industries in Montana, ranked only behind the United States Government and Agriculture in labor income (Keegan, et.al. 1990). In the seven Western Montana counties of Flathead, Lake, Lincoln, Mineral, Missoula, Ravalli, and Sanders, forest products accounts for about 40% of the counties' economic base (Keegan, Bergmeier, Moore 1989). With 1993 sales of $1.4 billion dollars and employment of over 11,000 workers, the success of this industry is important to the economic health of Montana (Keegan 1994).

The forest products industry can be broken down into a myriad of components. Among these are lumber, plywood, pulp and paper, fiberboard and particleboard, house logs, post and poles, and cedar products. Of these, lumber and plywood make up 55% of sales, while the residue-related products of pulp, paper, fiberboard and particleboard contribute an additional 41% of the sales total (Keegan, et.al. 1990)

The focus of this study is limited to lumber. Lumber is chosen because it is the cornerstone of the wood products

residues from lumber mills are essential in supporting wood residue related plants. Despite its importance, very little is currently known about how Montana's lumber is used once it leaves the sawmill (Reseburg 1992).

METHODS OF STUDY

Profile of Montana's Lumber Grades

Existing data were used to attempt to characterize Montana's lumber production and to examine how lumber of the type (species and grade) produced in Montana is used. This included published data, as well as requests for additional information from data sources tracking Montana-produced lumber. Also, experts in the field were interviewed regarding this topic, and they offered their professional knowledge for their respective areas of expertise.

Some of the data sources provide specific published information on species and grade produced, as well as market areas served. Most comprehensive among these is the Western Wood Products Association (WWPA) which maintains a data base built on information collected from mill surveys done on a weekly, monthly and annual basis. The other detailed source of information on lumber production in Montana is a data base maintained by the University of Montana's Bureau of Business and Economic Research (BBER). This data base - the Forest

Industry Data Collection System (FIDACS)- reports annual lumber production and periodically develops detail on species, grade characteristics and geographic region to which it is shipped (BBER 1994).

Lumber comes from a variety of species of trees and with a wide range of quality. The species of tree from which lumber is derived, as well as the number and distribution of knots, stains, and splits in the lumber result in different strength and appearance qualities. For example, some species of trees, such as Douglas fir (Pseudotsuga menziesii) and western larch (Larix occidentalis), have high strength characteristics which make them desirable for dimension lumber, but their dark coloration makes them less suitable for appearance uses such as cabinetry. Lodgepole pine (Pinus contorta), the most commonly produced lumber species in Montana, is best suited to light framing and stud uses based upon the small size of the trees and the relative strength characteristics of the wood. Conversely, western white pine (Pinus monticola) is not particularly strong, but its white appearance and easy workability make it ideal for use in cabinets (Dean 1994).

Lumber grades were established by the wood products industry to set uniform appearance and strength standards in both thickness and quality. Since the early 1900's lumber in western North America has been graded to determine its

suitability for various uses. The actual grades are based upon a visual inspection of the wood surfaces as the sawn boards emerge from the processing portion of the mill (WWPA 1988). Given this, grades seem well-suited to the purpose of classifying the results of this report. It seems likely that end uses of wood products would be associated with the size and quality aspects of lumber grading. Lumber graders in Montana are mill employees who are certified by the WWPA to determine the appropriate grades for lumber (Dean 1994).

For the purposes of this report, the Western Lumber Grading Rules 88, published by the Western Wood Products Association, were used as the basis for consolidating lumber grades into production classifications. This publication, and the lumber grades it defines, are used in virtually every mill in Montana (Keegan 1992). The advantage of basing this study on these rules is that the manufacturers will be familiar with the grades, and will more easily use the resulting data.

Montana's lumber output is classified by over one hundred grade and species combinations. Examination of potential end uses must begin with the consolidation of the large number of lumber grades and subgrades by the various species categories into broader categories. Using the detailed lumber production (by grade) information provided by the WWPA, Montana's lumber production was summarized by species under six categories. These categories are the same as the headings used by the WWPA to report lumber production for the

given year. To profile the lumber grades reported in Montana, WWPA's lumber output report was used, which is derived from mill reports. This report is based upon sixty four percent (64%) of Montana's lumber mill production, which is considered to be a good sample (Yuhas 1993).

The output from this consolidation is a summary of the grouping showing the WWPA grades that fall under each heading, as well as a narrative explaining the rationale for including the various grades under the broader WWPA groupings. The consolidated categories will then be used throughout the rest of the report. The categories are listed below.

1. Selects and Finish
2. Commons
3. Shop
4. Studs and Light Framing
5. Dimension
6. Timbers

End Use of Softwood Lumber

Consumption information by various use classifications was sought. These classifications were New Residential Construction, Non-residential Construction, Repair and Remodeling, and Industrial Use. These are the categories used in most major forecasting organizations such as the USDA, WWPA, and RISI. Shown below is a brief description of each of

these categories, compiled from RISI's October, 1993 Wood Products Review.

New Residential Construction: Construction to provide living areas. These include such construction as single family homes, mobile homes, apartment buildings, condominiums, etc.

Nonresidential Construction: This category includes such structures as office buildings, warehouses, retail centers, bridges, etc.

Industrial: Manufacturing such as furniture, doors, windows, toys, etc.

Repair and Remodel: Work done to add on to, maintain or repair existing residential structures.

In addition, the consumption by classification was sought for each lumber category. These consumption figures by classification were expected to display some relationship to the lumber grade categories.

Data regarding consumption is generated from a variety of sources in the western U.S. Generally speaking, the WWPA, Southern Forest Products Association, and the U.S. Department of Commerce collects the consumption data, while organizations such as the USDA and RISI interpret the data to formulate forecasts. In addition to the WWPA's numbers, RISI takes into account various economic and social factors to project consumption for a variety of time frames. Random Lengths, U.S. Department of Agriculture, the National Association of Home

Builders, and the American Forest Products Association (AFPA) all make forecasts in roughly the same manner.

As part of this study, future use was evaluated by collecting projected consumption information from various forecasting organizations such as RISI, WWPA, Random Lengths, etc., to determine the outlook for future consumption for each usage classification. A synopsis of the future expectations for lumber products was compiled.

RESULTS AND CONCLUSIONS

Lumber output summary - Lumber Categories

When lumber grades were initially developed, there was a closer relationship between grades and end use. Today, grade and species classifications offer by no means a perfect picture of potential end use of lumber. In recent years, as the cost of raw materials has climbed so steeply, there has been a blurring of the expected uses from different grades. For example, where window sash manufacturers once depended upon Shop grade material for its characteristic long, clear surfaces; today they often purchase Common grade (which is more liberal in its allowable number of knots and pitch masses) and remanufacture it into an acceptable form. Even so, while grades may not provide as precise an indicator of end use as they have in the past, they still tend to indicate wood characteristics important to certain, more broadly defined uses - such as home construction as compared to industrial manufacturing (Yuhas 1993). Shown below is a listing of the six major grading classifications accompanied by a brief description of each. The information is drawn from the Western Lumber Grading Book 88 publication (WWPA 1988).

Selects and Finish - These grades represent lumber traditionally used for interior walls, siding, trim, cabinets, moulding and other uses that demand attractive grain pattern, workability, and excellent staining surfaces. Only a very few "pin knots" are acceptable. Some very minor checking and small percentages of stain are allowed. Some of the grades included in this classification are: C and D Selects, Casing and Base, Flooring, Clear Paneling, and Drop Siding.

Shop - Lumber in this category is generally destined for remanufacture into such items as door frames, windows, furniture, frames, moulding, pencils, and boxes. This category is more flexible than Selects with regard to stains, but is more restrictive with the smoothness and completeness of the edges. A few of the grades are: Box Lumber, Mouldings, Shop Lumber, and Cut Sash.

Commons - This incorporates a very broad range of uses such as wall facing, cabinets, shelving, siding, crates and general building and craft uses. More and larger knots are allowed in comparison to Select. In addition, stain and pitch over an entire surface are allowed in some grades. Some of the grades are: Common, Knotty Paneling, and Selected Commons.

Studs and Light Framing - These grades are generally chosen for their strength characteristics, rather than appearance characteristics, and as such are often relegated to construction framing. There are no limits on the amount of staining or quantity of pitch streaks. Characteristics such as splits and shake are not limiting within certain guidelines. Examples of grades are: Construction, Standard, Utility, and Studs.

Dimension - These grades reflect uses that require high strength and a high degree of stiffness. Limiting characteristics are those which affect the strength of the wood, but not necessarily the appearance. Some of the grades are: Select Structural, No. 1, and Economy.

Timbers - Lumber manufactured under this grade is utilized in jobs requiring larger material such as bridges and auditoriums. The constraints for this grade are for characteristics of strength, such as number and placement of knots, slope of grain, and decay. In the higher grades appearance factors are important as well. The available grades are: Select Structural, No. 1, No. 2, and No. 3.

Table 1 contains an estimate of the average annual volume of lumber by species produced in Montana for each lumber

category for the period of 1988 to 1992. Quantities are shown in thousand board feet (MBF).

TABLE 1

Average Annual Montana Lumber Output - 1988 to 1992

Lumber Tally (MBF), by Species and Grade

SPECIES\GRADE	SELECTS	COMMONS	SHOP	STUDS	DIMENSION	TIMBERS	TOTAL
FIR/LARCH	10061	48413		182837	346794	1402	589507
WH. PINE	845	9	275				1129
P.PINE	10187	57306	46140	1236	25432		140301
LP. PINE		7694		211	537		8442
WHITE WOOD*	11207	211564		243187	141102	180	607240
CEDAR	302	11182		1713	859		14056
SPRUCE	3668	71670		33364	2663		111365
MIXED		5047			2170		7217
TOTAL	36270	412885	46415	462548	519557	1582	1479257

* - Lodgepole pine makes up the majority of the white woods category.

The data show that virtually all of the lumber produced in Montana is derived from softwoods. In addition, the predominant species is the white woods group, which is almost wholly composed of lodgepole pine . This is followed by the Douglas-fir and western larch group, which is made up primarily of Douglas-fir (FIDACS 1993). The lumber

characteristics of these species lend themselves to use in construction as dimension and stud lumber (Dean 1994).

End Use by Category

Review of published data, requests to various entities monitoring lumber production and use, and discussions with numerous analysts led to the following conclusions:

1. There is general information available regarding how softwood lumber in the United States is used within broad categories.

2. Information is not readily available on the proportion of lumber by specific grades and species that is utilized in specific end-uses in the United States.

3. Information is not readily available on the specific end-uses of Montana lumber. Also, if buyers are purchasing Montana lumber because of any perceived application advantages, the sources interviewed for this paper were not aware of them. These sources universally agreed that there was no definitive system in place to track Montana lumber to end use. It is known in general how lumber is used, but not specifically how Montana lumber is used.

Use of Lumber in the United States: Shown below are end use consumption figures for the national consumption of softwood lumber for several broad market categories which were described earlier. The data shown below, by percent, are an estimate for 1993 (RISI 1993).

END USE	PERCENT
Residential construction	42
Non-residential construction	6
Industrial	25
Repair and Remodel	27

End Use Montana Lumber: The availability of data on the actual end use of Montana lumber proved to be disappointing. Information on how much of a particular grade of lumber is actually produced by lumber mills can be obtained from WWPA reports; and information on where it is shipped can be provided by WWPA or BBER. Given the current data it is not possible to determine how much of Montana's lumber production is ultimately used in any single use. The lumber production from Montana is dumped into a figurative "lumber pot" with the rest of the nation's lumber production, and then distributed to the various uses.

One example of this gap in information is seen in the WWPA's geographic shipping report (WWPA 1992). While this report summarizes Montana's annual lumber production by the state of destination, it is not possible to trace Montana's production further than to the state to which lumber is shipped. Also, because of the established distribution system

for lumber, tracing is difficult because of the system itself.

Lumber disribution is handled in a number of ways. Some is sent directly to retail outlets such as Payless Cashways or Ernst. Other lumber deliveries are coordinated through lumber warehouses and lumber brokers in a variety of locations throughout the nation. Once under the control of a warehouse operation, the lumber may be sent to a retailer or directly to an end user (Kent 1993). In any event, given the number of lumber brokers and warehouse operations, it is extraordinarily difficult to track the ultimate destination of the lumber. Furthermore, the trail of the lumber remains clouded after the lumber leaves the hands of the retailer, as there are a tremendous number and variety of retail purchasers. In addition, given current data, there is no definitive way to determine the intended use the end user has for the purchased lumber (Fuller 1993).

What this information implies is that the acquisition of more specific data regarding Montana lumber usage will require a concerted and probably expensive effort in surveying manufacturers, wholesalers, retailers, and their customers. This is addressed further in the recommendations and conclusions section.

Species and Grade as Indicators of Use: The current lumber production by species and grade category indicated earlier, as well as the inventory of timber in Montana offer some insights into how Montana's lumber production might be used.

Montana's standing softwood timber inventory is made up predominantly of lodgepole pine (32%), Douglas fir (29%), and western larch (8%) (Keegan, et.al. 1989). For lumber produced during the period of 1988 to 1992; the Stud and Dimension grades comprised 66% of the total lumber output in Montana. This figure tracks very closely with what could be expected given the standing timber inventory. Due to the inherent strength characteristics of the wood of these grades, they are most often used for construction purposes. Given this, the expectation is that Montana's lumber demand is more dependent on the construction and repair and remodeling uses (Adams 1994).

Future Trends

Given the lack of data regarding Montana lumber's ultimate end use, it is not possible to project the trends for Montana-produced lumber. However, there are projections regarding the future of lumber consumption in more general terms. The consensus of the various forecasting sources is for the 1990's to see a decrease in overall softwood lumber consumption. Single home construction is expected to decline as the baby-

boom generation ages (RISI 1993, Adams 1994). This decrease will be partially offset by a general strengthening in the repair and remodel and do-it-yourself markets, which have been the most rapidly growing segments of the lumber market (Meyer et al. 1992). This growth will be enhanced as the housing inventory in the U.S. ages, more larger projects will be undertaken to improve and maintain existing houses (RISI 1991). Industrial production, which includes packing materials, home and commercial furniture production, and door and window manufacturing is expected to rise steadily (RISI 1992).

However, more efficient building practices such as truss vs. joist construction; as well as substitution of steel studs, and use of brick and stone patios in place of decking, will serve to dampen lumber demand. In addition, vinyl and metal windows may make inroads into traditional wood products markets (RISI 93).

Product prices are generally expected to rise, caused primarily by reduced availability of the product - lumber. The reduced supply of available timber in particular leads to shortages and subsequently higher prices. Timber availability in North America will probably be limited through the forseeable future for the following reasons (RISI 1992):

- There will a ten to twenty percent decrease in harvest from Canada's provincial forests
- Federal supplies from the western United States will be constrained due to environmental challenges.

The supply from the industrial forests in this region will probably decline to some degree as the large private timberland owners complete harvesting of old- growth stands, and are impacted by additional regulations.

- Increases in log production from non-industrial private forest landowners will not be enough to offset the other declines.

Using the same lumber use categories as discussed above, RISI projects future national consumption of softwood lumber as shown in the table below. Figures are in billion board feet (BBF).

TABLE 2

National End Use Summary
Lumber Tally (BBF)

END USAGE SUMMARY	1993	1994	1995	1996	1997	1998
Residential Constr.	19.15	19.65	18.93	18.71	17.97	16.84
Nonresid. Constr.	2.82	2.54	2.52	2.68	2.79	2.70
Industrial Prod.	11.47	11.15	11.11	11.08	10.94	10.62
Repair and Remodel	12.17	12.72	13.01	13.12	13.51	13.00
TOTAL	45.61	46.06	45.58	45.58	45.21	43.17

Below, the 1993 figures for the various end uses are compared to RISI's expectations for 1998. This shows the shifting demand for wood products within the United States.

END USE	1993	1998
Residential Const.	42%	39%
Non-resid. Const.	6%	6%
Industrial	25%	25%
Repair and Remodel	27%	30%

These figures indicate that softwood lumber use will continue to shift from New Residential Construction to Repair and Remodeling. That shift began in earnest in the late 1970's. In 1972 New Residential Construction composed forty nine percent (49%) of total lumber consumption, while Repair and Remodeling made up only ninteen percent (19%) of the total (RISI 1993). This projected trend is supported by the previously mentioned research that contends that the aging United States existing home inventory will require increased repair and remodeling. New housing starts are expected to remain relatively constant. The entire house inventory is increasing (fewer houses are destroyed than are built). Therefore, new home construction will tend to be a decreasing

percentage component of the market as a whole (Meyer, et al. 1992).

It seems reasonable to assume that the future looks promising to those manufacturers who are not tied solely to the new home construction market and who have access to consistent supplies of timber. However, movement from construction segments of the market may be difficult without a change in the types of timber sawn. Construction grade lumber may not be readily moved from use to use. By its nature, the appearance qualities of this wood often makes it less desirable for other uses (Adams 1994). In any event, product prices are generally expected to rise, and those who can secure consistent access to timber will have a competitive advantage.

DISCUSSION AND RECOMMENDATIONS

Despite the blurring of the connection of lumber grades to end use, Montana lumber manufacturers would benefit to some degree from detailed knowledge of how lumber from the state is used; as would potential users of this lumber. Two key questions are involved in addressing whether or not it is worthwhile to attempt to develop a detailed summary of lumber end use:

1. How could the information be developed?
2. Would potential users benefit enough to justify the effort involved?

After reviewing what information is available, it was determined that tracking Montana lumber production from the sawmill through end use could be accomplished best through surveys of producers, retailers, and end users. At present there is no mechanism in place that could be accessed to follow lumber from mill to end use. As lumber travels through wholesalers and retailers the source of the lumber becomes irrelevant to the seller and purchaser, and is therefore not followed (Reseburg 1992).

What makes accounting for the lumber even more difficult is the elaborate distribution network of wholesalers and

retailers which are utilized to varying degrees by manufacturers. Some manufacturers depend almost solely on wholesalers, while others deal almost exclusively with retailers. Furthermore, lumber is purchased in basically its same form for a vast variety of uses, ranging from construction studs, to furniture, to cabinetry. Determining the ultimate end use for a particular piece of lumber often would require a specific questionnaire because the intent of the buyer would not be readily apparent. Given the vast number of retail centers, and the other distribution options available and utilized by mills, this type of survey falls outside the scope of this project. However, two possible approaches offered by the analysts contacted are described below.

One approach to enhance the data base for Montana's lumber production could be accomplished through a broadly based survey of manufacturers, wholesalers, and retailers (Fuller 1993).

Given the very dispersed nature to the end use market, lumber use will be traced most easily from the mill to the end user, as opposed to initially approaching the final customer. By obtaining a list of purchasers from the mills, a sampling of lumber could be traced to the retail level, where end use customers may be queried regarding their intentions for the lumber they have acquired. By following the path the lumber takes from the mill to the final use, virtually all possible

applications of the lumber would be identified: wood sent directly from the mill to the user, lumber sold by wholesalers, and lumber taken from retail yards by do-it-yourselfers. This could be accomplished through several means. Some manufacturers, such as Plum Creek, apply bar codes to individual pieces of lumber (Temple 1993). These codes could be used in the analysis. Other retail outlets could be surveyed based upon a sampling of orders. The individual lumber orders would then be tracked from the mill to the outlet.

Another approach to collect the necessary information would be to send out survey forms with lumber invoices when the mills send out their billings (Temple 1993). These survey forms would include questions regarding what category of use the purchasers felt their lumber fell under - new home construction, industrial, etc., as well as questions relating to type of lumber ordered, size of order, and questions about the classification of the purchaser's business. The forms would be developed by, and returned to, a credible third party research organization such as the Bureau of Business Research for compilation and interpretation.

Mills would likely be inclined to participate because they could share in the consolidated results. Guaranteed confidentiality for customers would encourage responses for wholesalers as well as retail centers. This alternative has the advantage of lower cost. However, as with any mail

survey, the percentage of valid responses may vary, and more importantly may vary by type of end use - contractors may be less likely than industrial purchasers to respond, do-it-yourselfers may be more likely than industrial, etc.

Henry Spelter, a U.S. Forest Service researcher, offered the question of whether this information was, in fact, critical knowledge to mill operators. Instead, he felt that the marketplace, and more specifically, the market price for individual products would determine optimal mill output. This "market approach" is probably true to a point. However, in a strategic sense, knowledge of individual product demand is important. Mills cannot be easily or cheaply restructured to produce any conceivable lumber product. For example, board mills are not readily converted to stud mills, and it is unreasonable to expect that a mill owner will be able to convert back and forth between two types of mills based on the monthly whims of the market. Perhaps even more importantly, mills are constrained by the species of timber tributary to the facility.

The value of this information is still significant. As manufacturers obtain more knowledge about their customers, they will be better positioned to make more appropriate decisions about their customer's needs and profit from them.

A more realistic question is "at what cost will this information be collected?". Depending on the type of survey used to collect the necessary information, the cost associated with the research could be prohibitive; exceeding the potential benefits that would result.

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