# AN ANALYSIS OF THE CAPITAL BUDGETING SOPHISTICATION OF PRIMARY FOREST PRODUCTS FIRMS IN THE EASTERN UNITED STATES

by

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(ABSTRACT)

The investment decision-making techniques, financing methods and equipment needs of 1,818 sawmills and pallet manufacturers in the Eastern United States were studied. Information was gathered using a mail survey and 581 usable responses were received.

It was found that discounted cash flow techniques have not been extensively adopted by the firms under study as primary methods of investment analysis. Undiscounted payback period was the most extensively used quantitative method. The majority of firms compared the expected return on an investment to a minimum rate of return but this minimum was often determined non-quantitatively. Firms most often accounted for the risk of an investment by subjective means. No statistically significant relationship could be found between investment decision-making technique or risk accounting technique and

firm size, location or type for firms with annual sales of less than $50 million.

During the last five years the majority of firms relied on retained earnings to finance investments involving less than $50,000. The majority of firms financed investments involving more than $50,000 using commercial bank loans. Commercial bank loans are also the financing method the majority of firms plan to use in the near future.

The most common equipment need among responding firms were dry kilns. Resaws, headrigs, edgers and planers were also commonly needed. Equipment was needed most often to increase production capacity or improve yield.

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## PREFACE

This thesis is organized into three sections, each of which represents a different portion of the research project. Since each section is designed to be a complete manuscript, it was necessary to repeat a certain amount of the background material. The reader will also note that the figures concerning the number of surveys mailed and returned differ in the second article as compared to the first and third. This is due to the fact that the second article considered only sawmilling firms while the other articles consider both sawmilling and pallet firms. The author apologies for any confusion this causes the reader.

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## EXECUTIVE SUMMARY

A study was conducted to determine the equipment needs, investment decision-making techniques and financing methods utilized by sawmills and pallet manufacturers in the Eastern United States. Secondary data was reviewed and a mail survey sent to 1,818 firms in 25 states. The survey was mailed during October, 1985. Data tabulation began during January, 1986 and included responses from 581 firms.

Usable surveys were received from every state in the study area. The majority of responding firms operated a sawmill and reported annual sales in the range of $1 million to $9.9 million. Fork trucks, front-end loaders and circular headrigs were the types of equipment most commonly owned by responding firms. The equipment types most commonly needed were dry kilns, resaws, headrigs and edgers. The majority of firms reported needing new equipment in order to increase production capacity or improve yield.

The twelve-month equipment purchase plans of responding firms commonly included fork trucks, carriages and edgers. Five year purchase plans most commonly included trucks, automobiles, dry kilns and fork trucks.

Firms were asked to indicate their anticipated capital expenditures (budgets) for the next twelve months and next five years. The mean twelve month budget, for all respondents, was $400,000 and the mean five year budget was

$1,105,000. The largest budgets were reported by firms in the South-Central and Southeast regions of the study area.

Discounted cash flow techniques of investment analysis have not been extensively adopted by the firms under study. Most firms rely on subjective judgment rather than a formal method of analysis when considering the economics of an investment involving less than $50,000. When the investment involves more than $50,000 firms most commonly used the undiscounted payback period method of analysis. The majority of firms compared the expected rate of return on an investment to a minimum rate of return but this minimum rate was often determined non-quantitatively. Subjective evaluations are the most commonly used method to account for the risk of an investment.

Retained earnings were the most common method firms used to finance investments involving less than $50,000. Investments involving more than $50,000 were most often financed with commercial bank loans. The respondents indicated that commercial bank loans will remain the primary method of financing in the near future.

Equipment leasing was not widely utilized by responding firms. Only 32% have leased equipment in the previous 5 years and 87% indicate that they will not lease equipment in the next 12 months. Rolling stock such as trucks, autos and fork trucks are the most commonly leased types of equipment.

## LITERATURE REVIEW

### Investment Decision-Making Techniques

The process by which long-term investment decisions are made (capital budgeting) has been described as a four phase process (Mintzbert et al. 1976). (1) IDENTIFICATION of areas of opportunities or problems that require a capital expenditure. (2) DEVELOPMENT of various projects and the data required by them. (3) SELECTION of one or more of the projects for implementation. (4) CONTROL or evaluation of the accepted and implemented projects. One aspect of this study was directed toward the selection phase of the capital budgeting process, which is where the investment decision-making takes place.

Many methods have been developed to analyze investment decisions. Runyon (1983) and Petty et al. (1975) found the following methods to be in use:

1. Accounting Rate of Return (ARR)[1]
2. Payback Period
3. Internal Rate of Return (IRR)
4. Net Present Value (NPV)
5. Profitability Index (PI)

Petty et al. (1982) described these methods as follows:

> Accounting Rate of Return is the ratio of average, after-tax, profits to the average dollar size of the investment.
>
> Payback Period is the number of years required to recover the initial cash outlay.
>
> Internal Rate of Return is the discount rate that equates the present value of the project's future net cash flows with the project's initial cash outlay.
>
> Net Present Value is the present value of annual net cash flows, after tax, less the initial investment.
>
> Profitability Index is the ratio of the present value of future net cash flows to the initial investment.

Brealey and Myers (1981) concluded that Net Present Value (NPV) leads to better investment decisions than other criteria. They give the limitations of other popular investment criteria as compared to NPV. Klammer (1972) noted that the Rate of Return and Net Present Value methods were the most sophisticated methods in use. Profitability Index is also considered a sophisticated method of investment decision-making (Gitman and Forrester 1977).

Marty (1970) noted several problems with the Internal Rate of Return (IRR) method. One problem is that when ranking more than one investment, it can give results that are not consistent with rankings based on NPV. In addition, more than one IRR can be generated when cash flows alternate from negative to positive more than once during the investment period.

## Investment Decision-Making in Large Firms

Considerable information is available in the literature documenting the investment decision-making techniques used by major corporations. Studies by Brigham (1975), Petty et al. (1975), Schall et al. (1978), Gitman and Forrester (1977), Gitman and Mercurio (1982), and Williams (1970) are representative of the many available. Brigham (1975) studied 33 major companies and found that the majority used a discounted cash flow method of investment analysis such as Net Present Value. Petty et al. (1975) studied 109 Fortune 500 firms. He found that IRR and Accounting Rate of Return (ARR) were the most commonly used methods of investment analysis. Schall et al. (1978) studied 189 large U.S. firms (net assets greater than $200 million). Schall et al. (1978) concluded that Payback Period was the most commonly used investment analysis method (74% of the firms under study used this method). Very few of the firms, however, used only Payback

Period. The majority of the firms studied reported using at least 3 different investment analysis methods.

Gitman and Forrester (1977) found that the most popular method of accounting for risk in investments was to increase the minimum required rate of return or cost of capital. Gitman and Mercurio (1982) reported on the risk adjustment techniques used by 177 Fortune 1000 companies (annual sales between 79 billion and 118 million dollars). The methods of risk adjustment used most, by the companies that reported that they specifically differentiated project risk, were adjusting the cash flows and adjusting the cost of capital used in analyzing the project. Approximately 33% of the firms in the study reported that they did not specifically differentiate project risk.

**Investment Decision-Making in Small to Medium Sized Firms**

In contrast to the wealth of knowledge concerning large firms, a limited amount of information has been compiled regarding investment decision-making methodology employed by small and medium-sized firms. Studies have been conducted by Scott et al. (1972) and Runyon (1983) which were designed to evaluate capital investment decision-making procedures of smaller companies. The study conducted by Runyon (1983) indicated that most small firms (net worth less than $1,000,000) did not utilize sophisticated capital budgeting techniques, and relied

primarily on Payback Period and Average Rate of Return. Only 14% of the firms under study used capital budgeting methods that accounted for the time value of money (NPV, IRR and PI). Runyon (1983) concluded that when risk was considered it was often subjectively evaluated and based primarily on adjustments in the payback period. Scott's (1972) study also concluded that small and medium sized firms are much less sophisticated in their approach to investment decision-making than large firms.

**Investment Decision-Making in the Forest Products Industry**

Only one published study, Bailes et al. (1978), could be found which documented the investment decision-making practices of forest products firms. Bailes' study predominantly focused on medium to large west coast firms with over 60% of the firms having $50 million or more in assets in fiscal 1975. The study included 108 forest products firms and found that the following investment decision-making techniques were in use:

1. Accounting Rate of Return (ARR)
2. Payback Period
3. Internal Rate of Return (IRR)
4. Net Present Value (NPV)
5. Subjective judgment only

Firms of all sizes (by total annual sales) used all of the methods to different degrees as primary evaluation techniques. However, it was only in the firms with over $500 million in annual sales that IRR and/or NPV were the most frequently used techniques. In firms with less than $100 million in annual sales, payback period was most frequently chosen as the primary evaluation technique.

## Sources of Capital

In addition to investment decision-making and risk adjustment methodology, this study investigated the sources of capital utilized by eastern primary forest products firms. Pease (1982) identified the following sources of capital used within the forest products industry: commercial banks, investment finance companies, dealers, manufacturers, commercial credit companies and leasing companies. Pease (1982) stated that there has recently been a move away from commercial banks but did not report any information concerning the extent to which each source of capital is used within the forest products industry. Morrison (1984) detailed the difficulty that small and medium-sized businesses experience when trying to secure capital for expansion. According to Morrison (1984) small to medium-sized businesses have no access to the bond market or long term loans and only limited access to the stock market or capital from institutional investors.

Gaedeke (1985) divides the financing available to small businesses into two categories: debt financing and equity financing. Debt financing can further be broken down into short-term financing and long-term financing. Short-term financing is used, primarily, as a source of working capital and involves loans that are paid back within one year. Equipment and facilities acquisitions usually involve long-term financing (payback period greater than one year). According to Gaedeke (1985) this type of financing is available to small businesses through commercial banking institutions, commercial finance companies, leasing companies, economic development agencies and the Small Business Administration (SBA). SBA financing may be direct loans to the business or in the form of a guarantee on a loan through a commercial bank (70A loan guarantee program). The importance of SBA direct loans is reduced by the fact that these loans are available only to businesses that are unable to secure a loan from a private financial institution. In addition, the importance of both types of SBA loans may be decreasing due to reduced funding. Heiman (1983) states that the dollar volume of direct and guaranteed loans has been reduced by 50% under the Reagan administration.

Equity financing may be available to small businesses through the sale of common stock, preferred stock, convertible debentures and debts with warrants (Gaedeke

1985). Equity financing may also be available through private investors, private venture capitalists, small business investment companies (SBICs), state business and industrial development corporations (SBIDCs) and local development companies (LDCs).

Because of the tendency for many potential investors to avoid small businesses and the desire on the part of the small business owner to retain ownership of their firms, equity financing is not widely utilized by small businesses (Geadeke 1985).

## Summary

Very little information is available in the literature describing investment decision-making procedures in small to medium-sized firms, and only one regional study is available pertaining to medium to large-sized forest products firms. In addition, discussions of the capital availability problem faced by small to medium-sized businesses can be found but no recent studies can be found in the public domain which examined the most important sources of capital for modernization or expansion of small to medium-sized forest products firms. Nor is any data available describing the capital investment needs of small to medium-sized forest products firms as prioritized by the firms themselves.

## Notes

1 Runyon used the term, Average Rate of Return. This term and Accounting Rate of Return are synonymous (Petty et al. 1975).

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# THE CAPITAL BUDGETING PRACTICES OF SMALL- TO MEDIUM-SIZED SAWMILLS AND PALLET MILLS


## Abstract

Small- and medium-sized sawmills and pallet mills in the East and Southeast U.S. were surveyed to determine their capital budgeting practices. It was found that discounted cash flow techniques have not been extensively adopted as primary methods of investment analysis. The non-discounted cash flow technique of computing payback period was the most extensively used quantitative method. The majority of firms compared the expected return on an investment to a minimum rate of return but this minimum was often determined non-quantitatively. Firms most often account for the risk of an investment by subjective means. Firms with less than $50 million in annual sales were tested for a relationship between investment decision-making or risk accounting technique and firm size, location and type. No statistically significant relationships were found.

## Introduction

The process of capital budgeting (investment decision-making) has been extensively studied. Investment decision-making techniques utilized by major corporations, for instance, have been documented in studies by Brigham (1975), Petty et. al. (1975), Schall et. al. (1978), Gitman and Forrester (1977), Williams (1970), and Klammer (1972). These studies typically conclude that major corporations have adopted relatively sophisticated discounted cash flow (DCF) investment decision-making techniques such as net present value (NPV) and internal rate of return (IRR).

Balies et. al. (1978) and Cubbage and Redmond (1985) have shown that larger forest products firms are similar to larger firms in other industries in their use of DCF investment decision-making techniques. Cubbage and Redmond (1985) documented capital budgeting practices in forest products firms with annual sales greater than $100 million. Balies (1978) studied forest products and paper firms of various sizes but concentrated on larger firms, with over 60% of the firms in his study reporting annual sales in excess of $50 million.

Few studies have been conducted to determine the investment decision-making techniques used by small- to medium-sized firms. Runyon (1983) studied manufacturing firms having a net worth between $500,000 and $1,000,000.

Scott et. al. (1972) studied manufacturing firms with less than $1 million in net assets. Both of these studies concluded that DCF investment decision-making techniques had not been extensively adopted by smaller firms.

There is evidence to suggest that major corporations and large forest products firms utilize relatively sophisticated DCF investment decision-making techniques. There is also more limited evidence suggesting that smaller manufacturing firms utilize less sophisticated techniques. However, the investment decision-making sophistication of small- to medium-sized primary forest products firms is clearly inadequately understood. Yet sound investment decision-making is no less important for these firms than for the more extensively studied firms. Recent business conditions as well as the capital intensity of portions of the industry (Buford et. al. 1975) suggest that investment decisions may be even more critical to these firms than to firms in other industries. This is especially true of the small- to medium-sized firms which lack the resources and timberland holdings of major forest products firms.

Small- to medium-sized primary forest products firms are an important part of the economy of many areas and provide a significant number of jobs. Obviously, the public interest as well as the firms' interest is served if critical investment decisions are made in the best way

possible. Improvements in the investment decision-making process can best be planned by first understanding the level of investment decision-making sophistication of these firms. The primary objective of this study was to provide this information.

## Methodology

### Sample Frame

Sawmills and pallet manufacturers in 25 Eastern and Southeastern states were included in the study (Table 1). Names and addresses of firms in these states came from two sources. First, all 1,733 of the sawmills and pallet manufacturing firms listed in the Directory of the Forest Products Industry (Miller Freeman 1982) and located within the study area were included. It was determined from census data that, within the study area, the ratio of sawmills to pallet mills was approximately 7:1 (USDC-BOC 1980). The Directory of the Forest Products Industry under-represented pallet mills when compared to this ratio. In order to make the sample more representative of the population, all 85 of the firms listed in the National Wooden Pallet and Container Association Member Directory (National Wooden Pallet and Container Association 1985) located within the study area were also included. The sample then consisted of a total of 1,818 firms in 25 states and had a ratio of sawmills to pallet mills of approximately 6:1.

**Data Collection Procedures**

A mail survey was used to contact the selected firms. Prior to administration to the firms included in the sample, the questionnaire was pretested by mailing to 50 randomly chosen sawmills and pallet manufacturing firms within the study area. During October 1985, after minor revisions, the questionnaire was mailed to all 1,818 firms in the sample. Two follow-up mailings were used.

A total of 581 usable questionnaires were returned by the fourth week of January, 1986. The overall response rate (adjusted for undeliverable questionnaires as described by Dillman, 1978 ) was 38%. This rate is comparable to many similar capital budgeting studies (Scott et. al. 1972, Runyon 1983, Petty et. al. 1975, Scott and Johnson 1982, Gitman and Forrester 1977).

Because of the anonymity afforded survey respondents, non-response bias could not be assessed by contacting firms that did not return the questionnaire. It was possible, however, to investigate date-of-return dependent trends within the data. Responses were coded with the date they were received and this data was used to compare the responses on key questions to the month of response. Trends in answers over time could indicate that early respondents differed systematically from later respondents and the groups should be analyzed separately. A non-parametric technique, the Chi-square test, was used to

test for a time dependent relationship since it required a minimum number of assumptions about the nature of the data[1]. Tests were conducted at the .05 level of significance and in no case could the hypothesis of independence be rejected. This result indicates that responses did not systematically vary with date of return and allowed all responses to be combined for the purpose of analysis.

## Respondents

Usable responses were received from every state in the study area. For the purpose of analysis these states were grouped into four regions (Table 1). Fourty-eight of the responses could not be categorized in this manner due to unreadable postmarks.

The majority of responding firms fell into the small- to medium-size range targeted by this study (Figure 1). Over 90% of the responding firms reported total 1984 sales of less than $50 million. Approximately 78% reported 1984 sales of less than $10 million.

An effort was made to ensure the questionnaire was completed by someone within the firm with the knowledge to provide accurate responses. Upper management personnel, in particular, were targeted. The success of this effort is evidenced by the high percentage of questionnaires that were completed by presidents (33%), managers (23%),

vice-presidents (14%) and owners (15%). The titles of other respondents included treasurer and corporate secretary.

### Investment Decision-Making Techniques

Firms were asked to indicate the primary technique they used to evaluate investment decisions. Two levels of investments were investigated, those involving less than $50,000 and those involving more than $50,000. The Chi-square procedure was used to test the hypothesis of independence between investment decision-making methodology and firm type (sawmill or pallet manufacturer) or firm location (by region). Neither hypothesis could be rejected at either level of investment, indicating that investment decision-making technique did not systematically vary with firm type or location. Therefore, all regions and firm types were combined in further analyses of investment decision-making.

The results of the questions concerning investment decision-making (Table 2) suggest that discounted cash flow techniques have not been extensively adopted by small- to medium-sized primary forest products firms as primary methods of investment decision-making. At the less than $50,000 level of investment, the largest number of firms, 247 or 48%, reported that they did not use a quantitative technique and instead relied on qualitative assessments of

investment opportunities. The most often used quantitative technique was undiscounted payback period, a technique that is considered relatively unsophisticated since it does not consider the time value of money (Petty et. al. 1982). A total of 199 firms, 38% of those answering the question, indicated they relied on this method. Profitability index, which is a discounted cash flow technique, was used by 27 firms or 5% of the respondents.

At the over $50,000 level of investment, the largest number of firms, 222 or 43%, reported that their primary method of investment decision-making was undiscounted payback period. The next largest group of firms, 170 (33%), reported using no quantitative technique. As with the under $50,000 case, profitability index was the most often used discounted cash flow technique.

**Influence of Firm Size on Investment Decision-Making Technique**

Firms were separated into four size categories, based on 1984 sales, in order to investigate the relationship of firm size to investment decision-making technique used. These categories were: less than $1 million in sales, $1 million to $9.9 million, $10 million to $49.9 million, and $50 million or more. A Chi-square test at the .05 level of significance was first used to test for this relationship in the three size categories of primary interest in this study, those with less than $50 million in annual sales.

The test was conducted at both levels of investment and in neither case could the hypothesis of independence be rejected. This result suggests that, for firms with less than $50 million in annual sales, investment decision-making technique is not related to firm size.

A similar pair of tests were made with the $50 million or more sales category included. Both of these tests rejected the hypothesis of independence at the .05 level of significance, suggesting the possibility of a size related relationship. Cross tabulations indicated that firms in the $50 million or more sales category relied less on qualitative assessments of investments and more on quantitative, discounted cash flow techniques than firms in the smaller size categories at both levels of investment. The suggested relationship, however, appears to be quite weak. Cramer's V statistics (Watson and McGaw 1980, Norusis 1983) were found to be .153 for the under $50,000 level of investment case and .173 for the greater than $50,000 case. Perfect association in both cases would be a Cramer's V statistic of 1.0.

**Minimum Rate of Return**

Firms were asked if they compared the expected rate of return on an investment with some minimum rate of return. Three hundred and thirty-eight firms, approximately 58% of the respondents, indicated that they made this comparison. Since less than 60 firms indicated they used a rate of

return based investment decision-making method for primary analysis, the large number of firms comparing expected and minimum rates of return suggests that these methods are commonly used in a secondary analysis.

Three hundred and twenty-nine firms indicated how their minimum rate of return was determined (Table 3). The majority (57%) indicated that their minimum rate of return was set by management prerogative and an additional 16% based it on returns from past investments. Approximately 8% of the firms based their minimum rate of return on the cost of capital from one source. A more sophisticated method, the weighted average cost of capital, was used by 16% of those indicating they compared expected and minimum return rates.

## Risk Assessment

Firms were asked to indicate the primary technique they used to account for the risk associated with an investment opportunity (Table 4). Usable responses to this question were received from 516 firms. One hundred and three firms (20%) indicated they made no adjustment for risk in an investment decision. An additional 256 firms (50%) indicated they accounted for risk but only through a subjective evaluation of the investment. The most frequently used quantitative technique of risk adjustment was the use of certainty equivalents in the investment

analysis. Fifty-seven firms (11%) indicated they used this technique. Another 10% of the firms accounted for risk by increasing or decreasing the required payback period and 5% performed a sensitivity analysis to assess risk.

Three seperate Chi-square tests were used to investigate the relationship between firm size (as measured by 1984 sales), firm type (sawmill or pallet/bin manufacturer) and firm location (by region) and the firm's risk adjustment methodology. In every case the hypothesis of independence could not be rejected.

## Summary

Small- to medium-sized primary forest products firms in the Eastern and Southeastern U.S. have not widely adopted discounted cash flow (DCF) methods of investment analysis. They rely primarily on qualitative assessments or on undiscounted payback period when making investment decisions. In this respect they are similar to the small- to medium-sized manufacturing firms studied by Runyon (1983) and Scott et. al. (1972). This finding is also in aggreement with the statement by Dickinson et. al. (1984) that qualitative factors often dominate the capital budgeting decision process.

Small- to medium-sized primary forest products firms differ from larger forest products firms which tend to use DCF methods (Balies et. al. 1978, Cubbage and Redmond

1985). Cubbage and Redmond (1985) found that larger forest products firms most often use the DCF technique of internal rate of return. While the majority of the firms in this study did not use DCF techniques, those that did most often used profitability index. The majority of firms compare the expected rate of return on an investment with a minimum rate of return. Often, however, firms use a minimum rate of return that is based on historical return rates or management prerogative. The more sophisticated weighted average cost of capital approach to minimum rate of return determination was used by only 16% of the firms comparing expected and minimum return rates. In contrast to these findings, Cubbage and Redmond (1985) found that the weighted average cost of capital technique was the most commonly used approach among larger forest products firms.

Sound investment decision-making requires that the risk of an investment be considered. Small- to medium-sized primary forest products firms are relatively unsophisticated in their approach to this risk assessment. Approximately 20% of the firms in this study made no adjustment for risk and 50% relied on a subjective adjustment. This is similar to the findings of Cubbage and Redmond (1985) concerning larger forest products firms and Runyon (1983) for manufacturing firms.

Investment decision-making and risk adjustment techniques do not seem to be related to firm type or

location. In addition, no relationship was found between firm size and risk adjustment technique. A relatively weak relationship was found between investment decision-making technique and firm size when all size categories were included in the test. However, when only the size categories of interest in this study were included, those with less than $50 million in annual sales, firm size and investment decision-making technique could not be shown to be related.

## Notes

1 The assumptions required by the Chi-square test are: (1) The samples are random and observations independent and (2) the responses can be placed in mutually exclusive categories (Daniel 1978). The nature of the data satisfies assumption (2). Responses were independent but non-response bias must be considered insignificant in order to satisfy the randomness requirement of assumption (1).

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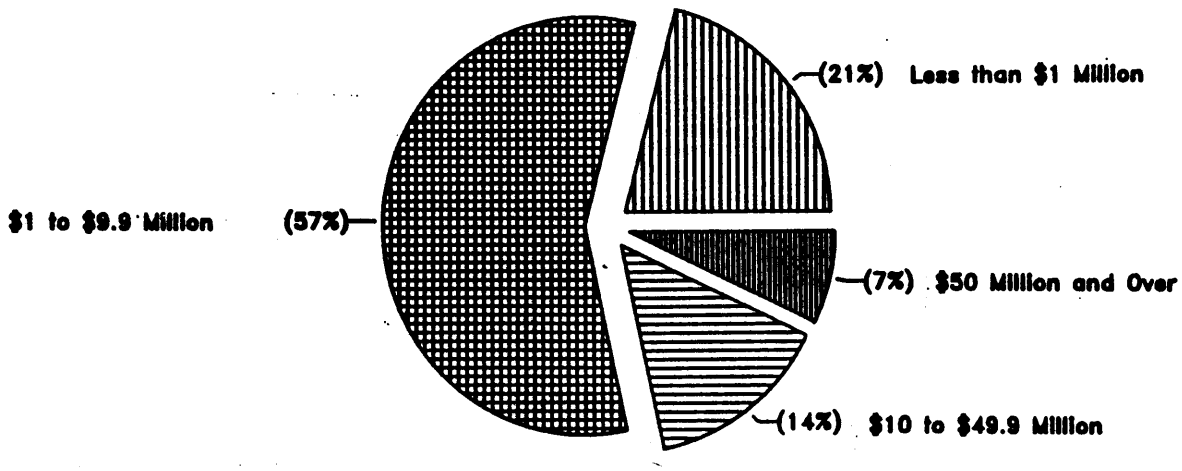


Figure 1. Respondents by 1984 Total Sales

**Table 1. Sample and Response Distribution by Geographic Region**

| Region | | | |
|---|---|---|---|
| **Northeast** | **East-Central** | **Southeast** | **South-Central** |
| Connecticut | Delaware | Alabama | Arkansas |
| Maine | Kentucky | Florida | Louisiana |
| Massachusetts | Maryland | Georgia | Mississippi |
| New Hampshire | North Carolina | S. Carolina | Texas |
| New Jersey | Tennessee | | |
| New York | Virginia | | |
| Ohio | West Virginia | | |
| Pennsylvania | | | |
| Rhode Island | | | |
| Vermont | | | |
| **Sample** | | | |
| 325 (17.9%) | 592 (32.6%) | 524 (28.8%) | 377 (20.7%) |
| **Responses**[1] | | | |
| 167 (28.7%) | 163 (28.1%) | 118 (20.3%) | 85 (14.6%) |

[1] 48 (8.3%) of the 581 responses could not be classified by region

**Table 2. Primary Technique Used to Evaluate Investment Decisions**

| Technique | Responses | |
|---|---|---|
| | Level of Investment | |
| | Less Than $50,000 | More Than $50,000 |
| Undiscounted Payback Period | 199 (38.3%) | 222 (43.4%) |
| Profitability Index | 27 ( 5.2%) | 41 ( 8.0%) |
| Accounting Rate of Return | 15 ( 2.9%) | 32 ( 6.3%) |
| Internal Rate of Return | 14 ( 2.7%) | 27 ( 5.3%) |
| Net Present Value | 9 ( 1.7%) | 13 ( 2.5%) |
| Other | 9 ( 1.7%) | 6 ( 1.2%) |
| No Quantitative Technique Used | 247 (47.5%) | 170 (33.3%) |
| Total | 520 (100.0%) | 511 (100.0%) |

**Table 3. Techniques Used to Determine A Minimum Rate of Return**

| Technique | Responses | |
|---|---|---|
| | Number | Percent |
| Management Prerogative | 188 | 57.1 |
| Based on Historical Rate of Return | 54 | 16.4 |
| Weighted Average Cost of Capital | 53 | 16.1 |
| Cost of Capital From One Source | 26 | 7.9 |
| Other | 8 | 2.4 |
| Total | 329 | 99.9[1] |

[1] Rounding error

**Table 4. Techniques Used to Account for Risk**

| Technique | Responses | |
|---|---|---|
| | Number | Percent |
| Subjective Accounting | 256 | 49.6 |
| Change Minimum Rate of Return | 15 | 2.9 |
| Change Payback Period | 53 | 10.3 |
| Use of Certainty Equivalents | 57 | 11.0 |
| Perform Sensitivity Analysis | 24 | 4.7 |
| Other | 8 | 1.6 |
| No Adjustment for Risk | 103 | 20.0 |
| Total | 516 | 100.1[1] |

[1]Rounding error

# A PROFILE OF THE SAWMILL INDUSTRY IN THE EASTERN AND SOUTHEASTERN UNITED STATES


## Abstract

A mail survey was used to gather information from sawmills in the Eastern and Southeastern United States. A total of 491 usable responses were received. The majority of the sawmills had annual sales of less than $10 million. They averaged 62 full-time production employees and produced an average of 12,660.7 MBf./year. The productivity of those sawmills that did not also produce pallets averaged 295 MBf./employee/year and was highest in the southeast region of the study area. The sawmills were approximately evenly split between those that used both hardwoods and softwoods and those that used only one type of wood. The median mix, for those using both types, was 75% hardwood and 25% softwood. The majority of sawmills marketed at least some of their products through captive distribution systems or direct to the customer. Firms that participated in the export market typically used indirect exporting channels.

## Introduction

The past 10 years have seen significant changes in the sawmill industry. Stumpage prices have fluctuated considerably and in many cases not in step with lumber prices, creating a bind that has undoubtedly contributed to the decrease in the number of sawmills. The number of sawmills and planing mills (SIC 2421) decreased by 1755 establishments between 1972 and 1982 and employment in the industry decreased by 34,700 employees (USDC-BOC 1985). Industry capacity, however, has remained high due to productivity increases (Anonymous 1985).

Other changes have also affected the industry. Deregulation of the transportation industry upset the uniformity of freight rates. Distribution channels are changing and captive distribution systems are becoming increasingly important in the industry (Rich 1981, Barnes and Sinclair 1985).

It is evident that the sawmill industry has undergone a shakeout and it is probable that the sawmill of today is different from the sawmill of 10 years ago. In order to assess these changes a study was undertaken to provide current information about the industry. Specifically, the study's objectives included determining the equipment types most commonly owned by the sawmills in the study area, obtaining a measure of the productivity level of the sawmills, determining the mix of product types (hardwood or

softwood) produced, and investigating the types of marketing channels utilized by the firms.

The study was limited to only a portion of the United States, the Eastern and Southeastern regions, in order to allow a sampling rate sufficient to provide accurate data. These regions, however, represent a significant portion of the sawmill industry. Combined, they accounted for over 66% of the nation's sawmills and over 50% of the industry's employees in 1982 (USDC-BOC 1985). In addition, this area produces the majority of the nation's output of southern yellow pine. This species has become the basis of the treated lumber industry, one of the few segments of the lumber market that has performed well in recent years. (Walsh 1985).

## Methodology

### Sample Frame

Sawmills in 25 Eastern and Southeastern states were included in the study. The names and addresses of the sawmills were obtained from the Directory of the Forest Products Industry (Miller Freeman 1982). A 100% sample of the firms listed in the directory and located in the study area was used, resulting in a sample of 1,560 sawmills.

**Data Collection Procedures**

A mail survey was used to contact the selected firms. Prior to administration to the firms included in the sample, the questionnaire was pretested by mailing to 50 randomly chosen firms within the study area. During October 1985, after minor revisions, the questionnaire was mailed to all 1,560 sawmills in the sample. Two follow-up mailings were used.

A total of 526 questionnaires were returned by the last week of January, 1986. This resulted in an overall response rate (adjusted for undeliverable questionnaires as described by Dillman, 1978) of 40%. This rate is comparable to other mail survey based studies of the forest products industry (Bowyer et. al. 1986, Govett and Sinclair 1984, Sinclair and Govett 1983).

Because of the anonymity afforded survey respondents, non-response bias could not be assessed by contacting firms that did not return the questionnaire. It was possible, however, to investigate date-of-return dependent trends within the data. Responses were coded with the date they were received and this data was used to compare the responses on key questions to the month of response. Trends in answers over time could indicate that early responses differed systematically from later responses and the groups should be analyzed separately. A non-parametric technique, the Chi-square test, was used to test for a time

dependent relationship since it required a minimum number of assumptions about the nature of the data[1]. Tests were conducted at the .05 level of significance and in no case could the hypothesis of independence be rejected. This result indicates that responses did not systematically vary with date of return and allowed all responses to be combined for the purpose of analysis.

## Respondents

Surveys were received from 491 sawmills of whom 96 also produced pallets or bins. An additional 35 surveys were received but were not included in the analysis because firm type could not be determined. Usable responses were received from sawmills in every state within the study area with the exception of Delaware. For the purpose of analysis states were grouped into four regions, Northeast, East-Central, Southeast and South-Central. Table 1 shows the response distribution by region.

An effort was made to ensure the questionnaire was completed by someone within the firm with the knowledge to provide accurate responses. Upper management personnel, in particular, were targeted. The success of this effort is evidenced by the high percentage of questionnaires that were completed by presidents (28%), managers (25%), vice-presidents (14%) and owners (16%). The titles of other respondents included treasurer and corporate

secretary.

As shown in Figure 1, over 90% of the sawmills reported 1984 sales of less than $50 million and approximately 73% reported sales of less than $10 million. The responding sawmills averaged 62 full-time employees and produced an average of 12,660.7 MBf. per year. The median production was 5,000.0 MBf. per year.

A Chi-square test was used to test the hypothesis that firm size and location were independent. This test rejected the null hypothesis of independence at the .05 level of significance, suggesting that a relationship existed. The strength of the relationship was tested using Cramer's V statistic (Watson and McGaw 1980, Norusis 1983). The resulting Cramer's V of .207 indicated a relatively weak relationship. The nature of the relationship was investigatied by examining the Chi-square residual values. These residuals indicated that sawmills in the Northeast and East-Central regions of the study area tended to be smaller than those in the Southeast and South-Central regions.

## Equipment Owned

Firms were asked to indicate the equipment they presently owned in each of several equipment categories (Table 2). This question was completed by all but one of the 491 responding sawmills. One of the categories of

equipment was headrigs. In this category circular headrigs were most common, with sixty-eight percent of the firms owning this type of headrig. Band headrigs were owned by approximately 29% of the sawmills and chipping headrigs by approximately 26%. Obviously, some firms owned more than one type of headrig.

In the materials handling equipment category, the most commonly owned types of equipment were front-end loaders and fork trucks. Each were owned by approximately 84% of the sawmills. In general, mobile log handling equipment was more common than stationary equipment. Mobile log unloaders were owned by approximately 37% of the sawmills while stationary grapple loaders and log cranes were each owned by less than 15%.

In order to assess the extent of computerization within the sawmill industry, sawmills were asked to indicate their ownership of several types of computer controlled equipment (Figure 2). The most commonly owned type of computer controlled equipment was a carriage, with 19% of the respondents owning this type of equipment. Dry kilns, while not the most commonly owned computer controlled equipment, provide an example of the extent of computerization within the industry. While 214 sawmills reported owning a dry kiln only 22 reported owning computer controlled dry kilns, indicating a computerization rate of approximately 10%.

## Product Mix

Information concerning the relative use of softwoods and hardwoods was provided by 479 of the 491 responding sawmills. Approximately equal numbers of firms produced only softwood or only hardwood products. Firms producing only softwood products numbered 127 and represented approximately 27% of the respondents. Firms producing only hardwood products numbered 133 or approximately 28%. The remaining 219 firms produced both types of products and reported hardwood usage ranging from 2% to 98% of total production. The median level of hardwood usage was 75% of total production and the median softwood usage was 25%.

## Productivity

The sawmills[2] in this study reported 1984 production figures that averaged to 14,364.0 MBf. (median value of 6,000.0 MBf.). Also reported were the number of full-time production employees and the total number of full-time employees (all types). These figures averaged to 65 and 77 employees, respectively. From this data productivity on a bd.ft. per production employee per year basis was computed. The average productivity was 295.3 MBf./employee/year and the median level of productivity was 211.5 MBf./employee/year. A non-parametric procedure, the Kruskal-Wallis one-way analysis of variance[3], was used to test the hypothesis that none of the firm size

classifications (based on annual sales) differed from the others with respect to productivity. This hypothesis could not be rejected at the .05 level of significance, suggesting that the classifications did not differ in terms of productivity.

**Productivity by Region**

The mean and median productivity level was computed for each of the four study regions (Table 3). The highest mean productivity level, 474.6 MBf./employee/year, was found in the Southeast region of the study area and the lowest productivity, 215.1 MBf./emp./yr., in the Northeast region. As with firm size classifications, differences in productivity between regions were tested using the Kruskal-Wallis one-way analysis of variance. Specifically, the hypothesis that none of the regions differed from the others with respect to productivity was tested. At the .05 level of significance the test rejected this hypothesis, indicating that at least one of the regions differed from the others in terms of productivity.

Possible differences in productivity between regions were investigated further by employing a multiple comparison technique based on the Kruskal-Wallis procedure and suggested by Gibbons (1976). The comparisons were made such that the testwise level of significance was held to 0.10. The only pair of regions that were found to differ significantly were the Northeast and Southeast (Table 4).

**Productivity by Product Type**

Responses were placed into two categories, hardwood mills and softwood mills, in order to investigate possible differences in productivity based on product type. Hardwood mills were defined as those sawmills producing 90% or more hardwood products and softwood mills were defined as those sawmills producing 90% or more softwood products. Sawmills not falling into one of these two categories were not included in this analysis.

The mean production per firm for the softwood mills was considerably higher than the mean production of the hardwood mills (Table 5). Softwood mills also had a higher mean productivity (321.8 MBf./employee/year) than the hardwood mills (297.9 MBf./employee/year).

The hypothesis that the two categories of sawmills did not differ in terms of productivity was tested using the Mann-Whitney procedure[4]. This test is similar to the Kruskal-Wallis procedure but more appropriate for a two-sample problem (Gibbons 1976). The test was conducted at the .05 level of significance and the results suggested that the two categories of sawmills did differ in terms of productivity.

## Marketing Channels

The majority of lumber and building products have historically been distributed through independent

wholesalers. In 1982, for example, three-quarters of the total sales of these products were handled through independent wholesalers (Barnes and Sinclair 1985). There has been a trend, however, toward increasing use of captive distribution systems (Rich 1981, Barnes and Sinclair 1985). In addition, sawmills might utilize indirect export channels, independent brokers or sell directly to retail operations such as retail lumber yards and home centers.

The sawmills included in this study were asked to report the channels they used to distribute their products. Since the 481 responding firms often utilized more than one distribution channel multiple responses were common. The responses are summarized in Table 6.

A large number of respondents, 80%, indicated they sold directly to the customer or through a captive distribution system, bypassing independent middlemen when marketing at least some of their products. For the small sawmill, a captive distribution system may mean owning a retail lumber yard. Selling directly to the customer may mean selling directly to the public at the mill. Approximately 67% of the sawmills reported utilizing channel intermediaries such as brokers or wholesalers to distribute their products. Slightly over a quarter of the sawmills (25.8%) utilized indirect export channels by selling their products to companies such as export buyers,

export trading companies or other companies which purchase goods for export.

## Summary

The responses to this survey suggest that the sawmill industry in the Eastern and Southeastern United States consists predominantly of firms with annual sales of less than $50 million. The responses also suggest that firms in the Southeast and South-Central regions tend to be larger than those in the Northeast and East-Central regions of the study area.

Sawmills typically own a circular headrig and rely on mobile rather than stationary log handling equipment. Computer controlled equipment is not extensively owned within the industry. No type of computer controlled equipment was owned by more than 20% of the sawmills.

Hardwood only and softwood only mills are found in approximately equal numbers within the study area. Together these firms account for slightly over 50% of the total number of sawmills. The remaining sawmills produce both hardwood and softwood products in varying proportions.

Sawmills[2] in the study area produce an average of 14,364.0 MBf. per year and employ an average of 65 full-time production people. The average productivity of these sawmills was 295.3 MBf./employee/year. A statistically significant difference was found when firms

in the Northeast and Southeast regions of the study area were compared on the basis of productivity. Hardwood sawmills were found to differ from softwood sawmills in terms of productivity. However, no statistically significant difference in productivity could be found between firms when grouped by size (as measured by annual sales).

The number of multiple responses to a question concerning marketing channels indicates that many firms use a mix of methods. The traditional channel intermediaries such as brokers and wholesalers are utilized by the majority of sawmills but an even larger percentage utilize captive distribution systems or direct marketing. This finding tends to support the assertions of Rich (1981) and Barnes and Sinclair (1985) that captive distribution systems are becoming increasingly important channels for the distribution of lumber and building products.

## Notes

1. The assumptions required by the Chi-square test are: (1) The samples are random and observations independent and (2) the responses can be placed in mutually exclusive categories (Daniel 1978). The nature of the data satisfies assumption (2). Responses were independent but non-response bias must be considered insignificant in order to satisfy the randomness requirement of assumption (1).

2. To maintain relevance to the sawmill industry, sawmills that also produced pallets were not included in the analysis of productivity.

3. The Kruskal-Wallis procedure is based on the following assumptions: (1) Observations are independent and samples random. (2) The variable of interest is continuous and the measurement scale at least ordinal. (3) The populations are identical except for possible differences in location for at least one population (Daniel 1978). Additional information concerning this test can be found in Norusis (1983) and Watson and McGaw (1980).

4. The Mann-Whitney procedure is based on the following assumptions: (1) Observations are independent and samples random. (2) The variable of interest is continuous and the measurement scale at least ordinal. (3) The distribution functions of the two populations differ only with respect to location, if they differ at all (Daniel 1978). Additional information concerning this test can be found in Norusis (1983) and Watson and McGaw (1980).

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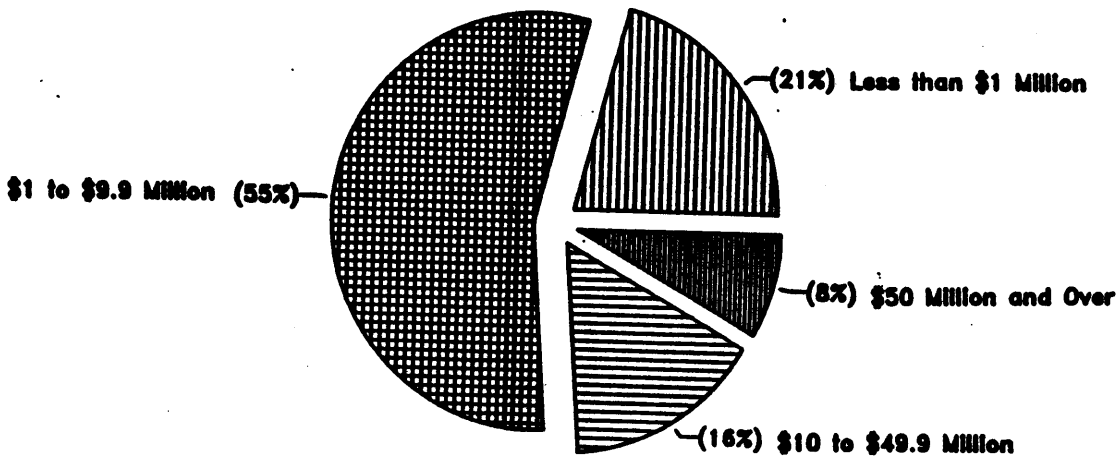


Figure 1. Respondents by 1984 Total Sales.

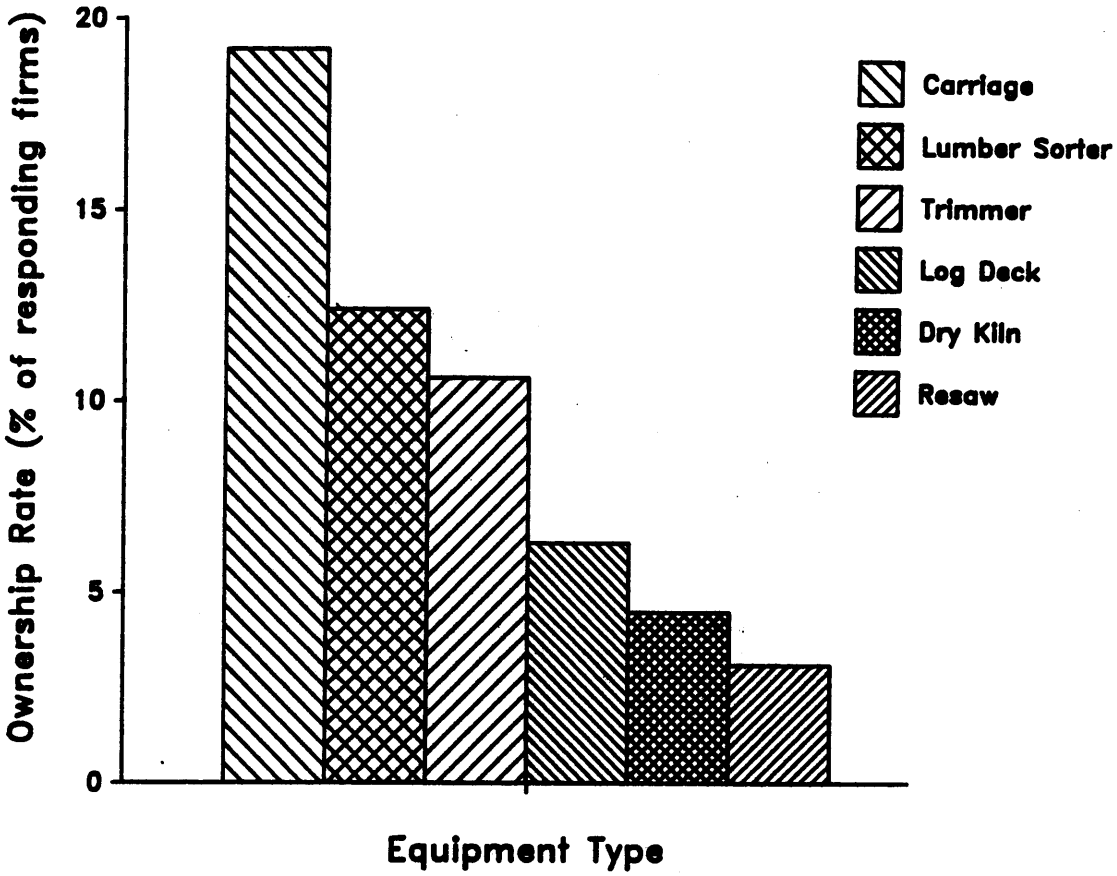


Figure 2. Ownership Rates of Selected Types of Computer Controlled Equipment

**Table 1. Sample and Response Distribution by Geographic Region**

| Region | | | |
|---|---|---|---|
| Northeast | East-Central | Southeast | South-Central |
| Connecticut | Delaware | Alabama | Arkansas |
| Maine | Kentucky | Florida | Louisiana |
| Massachusetts | Maryland | Georgia | Mississippi |
| New Hampshire | North Carolina | S. Carolina | Texas |
| New Jersey | Tennessee | | |
| New York | Virginia | | |
| Ohio | West Virginia | | |
| Pennsylvania | | | |
| Rhode Island | | | |
| Vermont | | | |
| Sample | | | |
| 240 (15.4%) | 530 (34.0%) | 469 (30.1%) | 321 (20.6%) |
| Responses[1] | | | |
| 138 (28.1%) | 135 (27.5%) | 103 (21.0%) | 73 (14.9%) |

[1] 42 (8.6%) of the 491 responses could not be classified by region

**Table 2. Equipment Ownership Rates of Responding Sawmills**

| Equipment | Responses Number | Responses Frequency (%) |
|---|---|---|
| Headrigs: | | |
| Circular | 333 | 68.0 |
| Band | 143 | 29.2 |
| Chipping | 125 | 25.5 |
| Scragg | 37 | 7.6 |
| Multi-band | 24 | 4.9 |
| Other | 21 | 4.3 |
| Materials Handling: | | |
| Fork Truck | 411 | 83.9 |
| Front-end Loader | 411 | 83.9 |
| Mobile Log Truck Unloader | 182 | 37.1 |
| Stationary Grapple Loader | 70 | 14.3 |
| Log Crane | 55 | 11.2 |
| Other Equipment: | | |
| Planner/Matcher | 268 | 54.7 |
| Guideline Light | 254 | 51.8 |
| Dry Kiln | 214 | 43.7 |
| Gang Resaw | 198 | 40.4 |
| Band Resaw | 163 | 33.3 |
| Scanner/Optimizer | 59 | 12.0 |
| Finger Jointer | 9 | 1.8 |
| Total | 2977 | 607.6[2] |

[1] 490 responses
[2] Multiple responses

Table 3. Sawmill[1] Productivity by Geographic Region

| Region | Responses[2] | Mean Number Production Employees | Mean (median) Production (MBf./Yr.) | Mean (median) Productivity (MBf./Emp./Yr.) |
|---|---|---|---|---|
| Northeast | 98 | 39.3 | 7235.5 (3000.0) | 215.1 (187.5) |
| East-Central | 106 | 36.8 | 7073.1 (4448.0) | 251.2 (222.2) |
| Southeast | 90 | 75.7 | 24343.4 (13000.0) | 474.6 (250.0) |
| South-Central | 65 | 129.3 | 21331.0 (10400.0) | 215.3 (187.5) |
| All Regions | 395 | 64.8 | 14364.0 (6000.0) | 295.3 (211.5) |

[1] Does not include sawmills that also produce pallets and/or bins.

[2] Thirty-six firms could not be classified by region.

**Table 4. Statistical Comparison of Productivity by Region[1]**

| Region | Mean Rank($R_i$) | NE ($R_i$-133.3) | E-C ($R_i$-149.7) | SE ($R_i$-168.5) | S-C ($R_i$-135.5) |
|---|---|---|---|---|---|
| NE[2] | 133.3 | 0 | | | |
| E-C | 149.7 | 16.4 | 0 | | |
| SE | 168.5 | 35.2* | 18.8 | 0 | |
| S-C | 135.5 | 2.2 | 14.2 | 33.0 | 0 |

* Indicates statistically significant difference at a overall significance level of .10

[1] Multiple comparison technique described by Gibbons (1976)

[2] NE = Northeast E-C = East-Central SE = Southeast S-C = South-Central

Table 5. Sawmill[1] Productivity by Product Type

| Product Type[2] | Responses | Mean Number Production Employees | Mean (median) Production (MBf./Yr.) | Mean (median) Productivity (MBf./Emp./Yr.) |
|---|---|---|---|---|
| Hardwood | 136 | 45.1 | 6129.5 (3971.0) | 297.9 (175.0) |
| Softwood | 127 | 96.6 | 27604.2 (15000.0) | 321.8 (244.7) |

1 Does not include sawmills that also produce pallets and/or bins.

2 Hardwood sawmills were defined as those mills producing 90% or more hardwood products. Softwood mills were those mills producing 90% or more softwood products.

**Table 6. Distribution Channels Used by Responding Sawmills**

| Channel | Responses | |
|---|---|---|
| | Number | Frequency (%) |
| Direct to Consumer or to Captive Distribution System | 385 | 80.0 |
| Broker or Wholesaler | 322 | 66.9 |
| Sold to a Retail Lumber Yard or Homecenter | 143 | 29.7 |
| Sold to an Export Company | 124 | 25.8 |
| Sold to Another Sawmill | 70 | 14.6 |
| Other | 48 | 10.0 |
| Total | 1092 | 227.0[2] |

[1] 481 respondents
[2] Multiple answers

# EQUIPMENT AND CAPITAL NEEDS OF EASTERN SAWMILLS AND PALLET MANUFACTURERS


## Abstract

A mail survey was used to gather information from sawmills and pallet manufacturers in the Eastern and Southeastern United States. A total of 581 usable responses were received. The majority of the firms were sawmills with annual sales of less than $10 million. The most common equipment need among responding firms was a dry kiln. Equipment was needed most often to increase production capacity or improve yield. Rolling stock equipment such as fork trucks, automobiles, trucks and front-end loaders were most commonly included in equipment purchase plans. Capital expenditure plans averaged $400,000 per firm for the next twelve months and $1,105,000 per firm for the next five years. Planned expenditures were shown to vary by region within the study area. Commercial banks were the primary non-internal source of capital for most firms in the last five years and firms plan to continue utilizing this source in the next twelve months. Approximately one third of the firms have leased equipment in the last five years and 13% of the respondents plan to lease in the next twelve months.

## Introduction

Significant changes occurred in the sawmill and pallet industries between 1972 and 1982. During this period the number of sawmills and planing mills (SIC 2421) decreased by 1755 establishments and employment decreased by 34,700 employees (USDC-BOC 1985). In contrast to the sawmill industry, the pallet industry (SIC 2448) experienced growth between 1972 and 1982. Employment increased by 54% and the number of establishments increased by 1220 (USDC-BOC 1984).

These changes combined with the capital intensity of portions of the industry (Buford et. al. 1975), make it imperative to assess the future equipment and capital needs of these firms. Information of this type is not readily available. A study commissioned by the Wood Machinery Manufacturers of America (Anonymous 1984) provides some information concerning the equipment purchasing intentions of sawmills. The study, however, did not address the needs of pallet mills and is somewhat out of date since buying intentions were documented only through 1986. Pease (1982) identified the sources of capital used within the forest products industry. No information, however, could be found concerning the relative use of these sources of capital.

The objective of this study was to provide information on equipment and capital needs of sawmills and pallet manufacturers. Specifically, the study's objectives included developing a profile of currently owned equipment,

determining equipment needs and purchase plans and investigating trends in capital source usage by sawmills and pallet manufacturers.

The study was limited to only a portion of the United States, the Eastern and Southeastern regions, in order to allow a sampling rate sufficient to provide accurate data. These regions, however, represent a significant portion of the sawmill industry. Combined, they accounted for over 66% of the nation's sawmills and over 50% of the industry's employees in 1982. (USDC-BOC 1985). In addition, the regions included in this study are an important part of the pallet industry. They account for over 50% of the nation's pallet firms (USDC-BOC 1980) and contain all but one of the "Pallet Belt" states as described by Brindley (1984).

## Methodology

### Sample Frame

Sawmills and pallet manufacturers in 25 Eastern and Southeastern states were included in the study (Table 1). Names and addresses of firms in these states came from two sources. First, all 1,733 of the sawmills and pallet manufacturing firms listed in the Directory of the Forest Products Industry (Miller Freeman 1982)[1] and located within the study area were included. It was determined from census data that, within the study area, the ratio of sawmills to pallet mills was approximately 7:1 (USDC-BOC

1980). The Directory of the Forest Products Industry under-represented pallet mills when compared to this ratio. In order to make the sample more representative of the population, all 85 of the firms listed in the National Wooden Pallet and Container Association Member Directory (National Wooden Pallet and Container Association 1985) located within the study area were also included. This resulted in a sample that consisted of 1,818 firms in 25 states and a ratio of sawmills to pallet mills of approximately 6:1.

**Data Collection Procedures**

A mail survey was used to contact the selected firms. Prior to administration to the firms included in the sample, the questionnaire was pretested by mailing to 50 randomly chosen sawmills and pallet mills within the study area. During October 1985, after minor revisions, the questionnaire was mailed to all 1,818 firms in the sample. Two follow-up mailings were used.

**Response Rate**

A total of 581 usable questionnaires were returned by the fourth week of January, 1986. This resulted in an overall response rate (adjusted for undeliverable questionnaires as suggested by Dillman, 1978) of approximately 38%, comparable to other mail survey based studies of the forest products industry (Bowyer et. al. 1986, Govett and Sinclair 1984, Sinclair and Govett 1983).

Because of the anonymity afforded survey respondents, non-response bias could not be assessed by contacting firms that did not return the questionnaire. It was possible, however, to investigate date-of-return dependent trends within the data. Responses were coded with the date they were received and this data was used to compare the responses on key questions to the month of response. Trends in answers over time could indicate that early responses differed systematically from later responses and the groups should be analyzed separately. A non-parametric technique, the Chi-square test, was used to test for a time dependent relationship since it required a minimum number of assumptions about the nature of the data[2]. Tests were conducted at the .05 level of significance and in no case could the hypothesis of independence be rejected. This result indicates that responses did not systematically vary with date of return and allowed all responses to be combined for the purpose of analysis.

## Respondents

Usable responses were received from every state in the study area. For the purpose of analysis these states were grouped into four regions (Table 1). Fourty-eight of the responses could not be categorized in this manner due to unreadable postmarks.

The majority of responding firms fell into the small-

to medium-size range (Figure 1). Over 90% of the responding firms reported total 1984 sales of less than $50 million and approximately 78% reported 1984 sales of less than $10 million.

An effort was made to ensure the questionnaire was completed by someone within the firm with the knowledge to provide accurate responses. Upper management personnel, in particular, were targeted. The success of this effort is evidenced by the high percentage of questionnaires that were completed by presidents (33%), managers (23%), vice-presidents (14%) and owners (15%). The titles of other respondents included treasurer and corporate secretary.

Responding firms were also grouped into three categories based on the products they produced (Table 2). These categories were: firms that operated a sawmill and did not produce wooden pallets or bins, firms that operated a sawmill and also produced pallets or bins, and firms that produced pallets or bins but did not operate a sawmill. Fourty two firms could not be categorized in this manner due to incomplete responses. The majority of responding firms (68%) reported operating a sawmill only. These firms averaged 65 full-time production employees and 77 full-time employees (all types). They reported 1984 production figures that averaged 14,364 MBf and had a median value of 6,000 MBf.

## Equipment Owned

Firms were asked to indicate the equipment they presently owned in each of several equipment categories (Table 3). This question was completed by 572 firms. Two types of materials handling equipment, front-end loaders and fork trucks, were the most common types of equipment owned by these firms. Fork trucks were owned by 481 (84.1%) of the firms and front-end loaders were owned by 426 (74.5%) of the firms. In general, mobile log handling equipment was more common than stationary equipment. Mobile log unloaders were owned by approximately 32% of the firms while stationary grapple loaders and log cranes combined were owned by approximately 22%.

In order to assess the extent of computer usage within the industry, firms were asked to indicate whether or not they owned each of several types of computer controlled equipment (Figure 2). The most commonly owned computer controlled equipment was a carriage. Approximately 17% of the firms owned computer controlled carriages. Computer controlled lumber sorters were owned by approximately 11% of the firms and computer controlled trimmers by approximately 9%. All of the remaining types of computer controlled equipment were owned by less than 6% of the firms.

Dry kilns, while not the most commonly owned computer controlled equipment, provide an example of the extent of

computer control usage within the industry. While 232 firms reported owning a dry kiln only 22 reported owning computer controlled dry kilns, indicating a computerization rate of approximately 9%.

## Equipment Needs

Firms were asked to indicate the equipment that they presently needed and the reason they needed the equipment (Table 4). The most commonly reported equipment need was a dry kiln (listed by 47 firms). Resaws were listed by 40 firms (8.8%) and headrigs of various types were listed by 39 firms (8.6%). Edgers, planers, trimmers and carriages were also commonly mentioned types of equipment.

A total of 435 firms that reported equipment needs also indicated the reason for this need. The most common reason, indicated by approximately 69% of the firms, was to increase production capacity or improve yield. To replace worn out equipment was listed by 53% of the firms. Most firms did not need new equipment to produce new products. Only 16.5% of the firms indicated that they needed equipment to produce a new product for either the domestic or export market. In addition, government regulations were not resulting in a great need for new equipment within the firms studied. Only 2.1% of the firms indicated they needed equipment for this reason.

## Equipment Purchase Plans

Firms were asked to indicate their equipment purchase plans for the next twelve months and next five years (Table 6). Fork trucks were one of the most commonly owned types of equipment as reported by the firms responding to this survey. Fork trucks were also the most common type of equipment these firms plan to purchase within the next twelve months. Approximately 16% of the responding firms indicated they will purchase a fork truck within the next twelve months. Twenty-one firms (8.4%) indicated they would purchase carriages and an additional 21 firms (8.4%) indicated they would purchase edgers in the next 12 months.

Five-year purchase plans tended to be weighted toward rolling stock items such as trucks, automobiles, front-end loaders and fork trucks. Trucks and automobiles were listed by a combined total of 46 firms (12.1%). Front-end loaders and fork trucks were each listed in the purchase plans of 39 firms (10.3%). The non-rolling stock equipment firms most commonly planned to purchase was a dry kiln.

## Capital Expenditure Budgets

In addition to purchase plans, firms were asked to indicate the amount of money they planned to spend on new equipment and other major purchases during the next twelve months and during the next five years[3]. In order to assure

that responses were based on similar assumptions firms were asked to assume that business conditions during these time periods remain the same as in 1985. Because of this assumption the reported capital expenditure plans (budgets) might be considered as conservative or low estimates if economic conditions improve and high estimates if economic conditions worsen as compared to 1985.

**Twelve-Month Budgets**

Twelve-month budgets were provided by 451 firms. The remaining 130 firms either did not respond to the question or indicated they were unsure of the amount they would spend. If ranges were provided instead of point estimates the average value of the range was used. The average twelve-month budget was $400,000. Reported budgets had a median value of $60,000 and ranged from $0 to $50 million. If the assumption is made that the reported budgets represent a simple random sample from the population of all sawmill and pallet manufacturer budgets in the study area, the standard error of the mean becomes relevant. A 95% confidence interval for the mean twelve-month budget based on this standard error is $164,000 to $636,000. Similarly, a point estimate and 95% confidence interval can be calculated for the total twelve-month budget of all sawmills and pallet manufacturers in the study area (Freese 1982). This total budget was calculated as $2845 million and a 95% confidence interval for this total includes the

range from $1150 million to $4542 million.

**Five-Year Budgets**

Five-year budgets were reported by 396 firms and averaged $1,105,000 per firm. Reported budgets in this time period ranged from $0 to $48 million and had a median value of $250,000. As with twelve-month budgets, a 95% confidence interval for the mean five-year budget can be computed. This interval was $740,000 to $1,469,000. The total five-year budget for all sawmills and pallet manufacturing firms in the study area was computed to be $7,859 million with a 95% confidence interval for the total that covered the range from $5,236 million to $10,482 million.

**Budgets by Region**

Mean twelve-month and five-year budgets were computed for each of the four regions of the study area (Table 7). The largest mean twelve month budget was found in the South-Central region of the study area and the largest five-year budget in the Southeast region. A non-parametric procedure, the Kruskal-Wallis one-way analysis of variance[4], was used to test the hypothesis that none of the regions differed from the others with respect to twelve-month budgets. At the .05 level of significance, the test rejected this hypothesis. The same test was used to test the hypothesis that none of the regions differed from the others with respect to five-year budgets. This

hypothesis was also rejected at the .05 level. The results of these tests suggest that, for both time periods, at least one of the regions differs from the others with respect to capital expenditure budgets.

Possible differences in budgets between regions were investigated further by employing a multiple comparison technique based on the Kruskal-Wallis procedure and suggested by Gibbons (1976). The comparisons were made such that the testwise level of significance was held to 0.10. In both cases (twelve-months and five-years) only two comparisons, the Northeast to East-Central regions and the South-Central to Southeast regions, showed insignificant differences (Tables 8 and 9). This result suggests that, with the exceptions listed above, budgets (both twelve-month and five-year) do vary by region within the study area.

## Sources of Capital

In order to investigate trends in the use of various sources of capital, firms were asked three questions concerning possible sources of capital. The first question requested the primary source of capital the firm had used in the past five years to finance investments involving less than $50,000. Since it was thought that the use of capital sources might vary with the amount of the investment a similar question was asked for investments

involving more than $50,000. The third question asked the firms to indicate the source of capital they would most likely utilize if making a major purchase within the next twelve months.

The question concerning sources of capital for investments under $50,000 was completed by 540 firms, 514 of which indicated they had made such an investment in the last five years. Over half of these firms (53%) indicated that their primary method of financing was the use of the firm's retained earnings. Firms that indicated they used an outside source of capital were most likely to use commercial banks. This source was the primary method of financing for 41% of the responding firms. Very little use was made of other sources such as dealer financing, Small Business Administration guaranteed or direct loans and finance company loans. These sources combined were used by only 5% of the responding firms.

When firms were asked about the primary source of capital for investments involving more than $50,000 retained earnings and commercial banks were again the two most used sources. Retained earnings were the primary source of capital for 32% of the firms that indicated they had made such an investment in the last five years and commercial banks were the source of capital for 53% of the firms. Industrial revenue or development bonds were used by approximately 5% of the firms and equipment dealer

financing was used by approximately 3% of the firms.

Responding firms indicated that commercial banks will be their primary source of capital in the next twelve months. This source was listed by 55% of the 536 responding firms (Table 10). Retained earnings were the next most commonly indicated source followed by equipment dealer financing and industrial development or revenue bonds.

## Leasing

Equipment leasing does not appear to be common practice among sawmills and pallet manufacturers within the study area. When asked if they had leased equipment in the last five years, 68% of the 572 responding firms indicated they had not. When asked if they planned to lease equipment within the next twelve months, 87% of the firms indicated that they would not. This result may indicate a dissatisfaction with current leasing arrangements or tax advantages of ownership.

Firms that had leased equipment utilized leasing arrangements primarily for rolling stock items such as front-end loaders, trucks and fork trucks. Over-the-road trucks were listed by 49% of the firms that reported utilizing leasing arrangements. Fork trucks and front-end loaders accounted for an additional 33% of the responses. Plans for equipment leasing in the next 12 months were

similar to the leasing trends of the last 5 years; rolling stock items, principally trucks, were the most common type of equipment firms plan to lease.

## Summary

The majority of firms in the study were sawmills with annual sales between $1 and $10 million in 1984. The equipment types most commonly owned by these firms were fork trucks, front-end loaders and circular headrigs. Computer controlled equipment ownership rates are relatively low among these firms. The most common type of computer controlled equipment, carriages, were owned by approximately 17% of the firms.

Equipment needs of the sawmills and pallet manufacturers in the study include dry kilns, resaws, headrigs and edgers. Equipment was needed most often in order to increase production capacity or improve yield. The need to meet government regulations is resulting in a relatively small demand for equipment as is the desire to expand into new products for the domestic or export markets.

Firms typically plan to purchase fork trucks and/or carriages in the next twelve months and trucks/automobiles, fork trucks and dry kilns in the next five years. The differences between reported equipment needs and equipment purchase plans suggest that while firms feel the need for

equipment that could increase the value of their products, maintaining their rolling stock is their immediate priority.

Anticipated capital expenditures (budgets) for the next twelve months were found to average $400,000 per firm and five year expenditures averaged $1,105,000. Mean budgets were computed for each region in the study area and the largest were found in the Southeast and South-Central regions. Statistically significant differences in budgets were found between all regions except the Northeast/East-Central and the Southeast/South-Central pairs.

The most common source of capital firms utilized in the last five years for investments involving less than $50,000 was retained earnings. Firms typically obtained capital from commercial banks for investments involving more than $50,000. The results of a question concerning future use of capital sources indicate that firms will continue to use commercial banks as their primary source of capital.

## Notes

1. The 1982 Directory of the Forest Products Industry was the most recent edition available at the time the survey was conducted.

2. The assumptions required by the Chi-square test are: (1) The samples are random and observations independent and (2) the responses can be placed in mutually exclusive categories (Daniel 1978). The nature of the data satisfies assumption (2). Responses were independent but non-response bias must be considered insignificant in order to satisfy the randomness requirement of assumption (1).

3. Time periods are in relation to October 1985.

4. The Kruskal-Wallis procedure is based on the following assumptions: (1) Observations are independent and samples random (2) The variable of interest is continuous and the measurement scale at least ordinal (3) The populations are identical except for possible differences in location for at least one population (Danial 1978). Additional information concerning this test can be found in Norusis (1983) and Watson and McGaw (1980).

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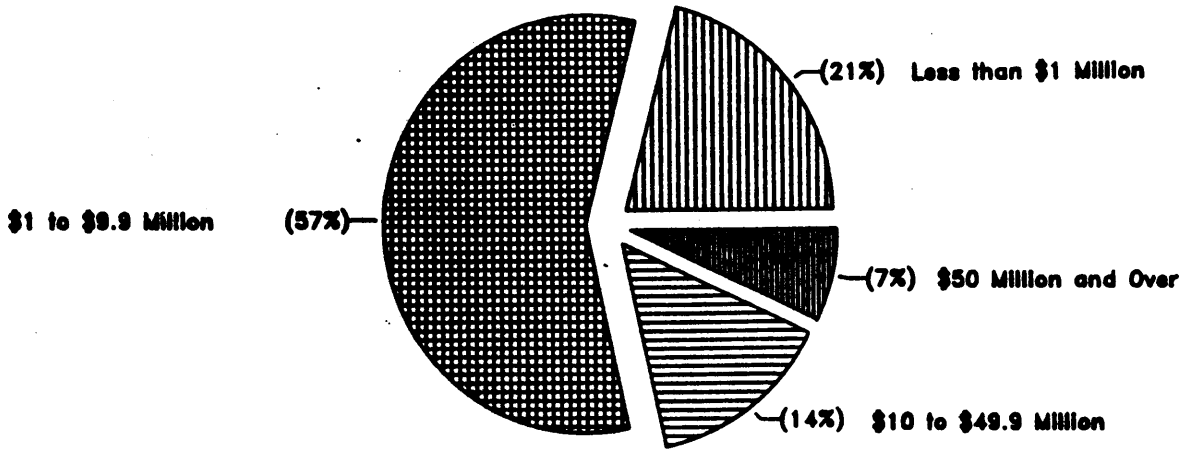


Figure 1. Respondents by 1984 Total Sales

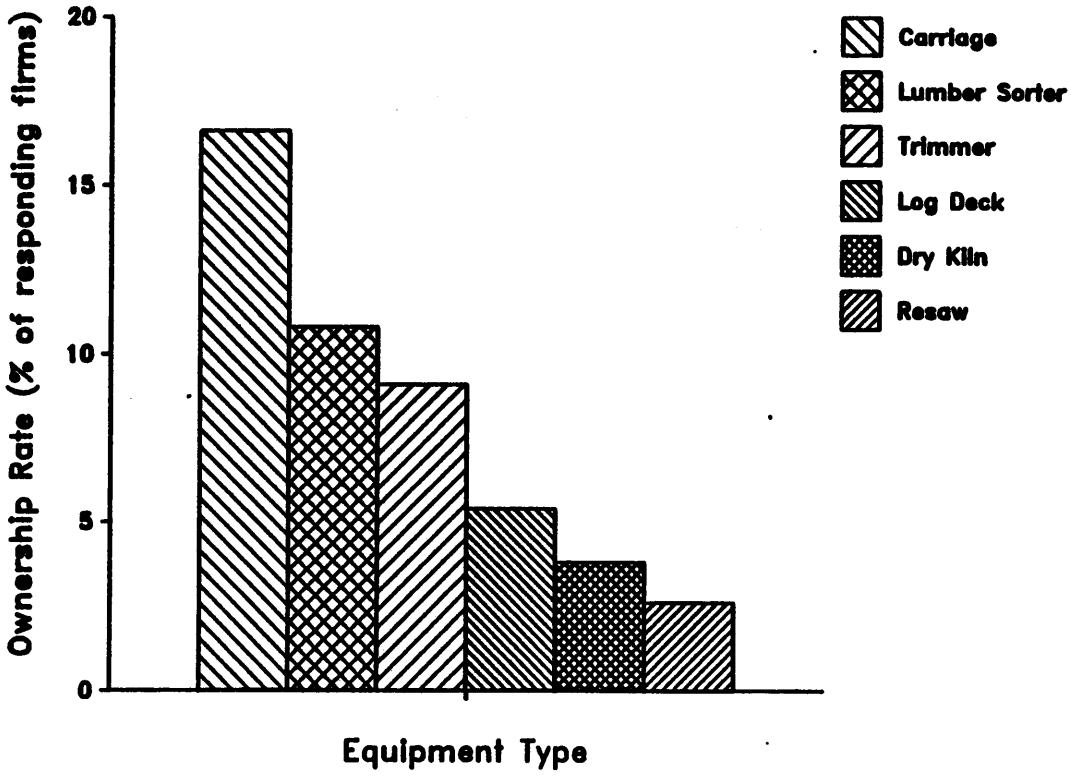


Figure 2. Ownership Rates of Selected Types of Computer Controlled Equipment

**Table 1. Sample and Response Distribution by Geographic Region**

| Region | | | |
|---|---|---|---|
| **Northeast** | **East-Central** | **Southeast** | **South-Central** |
| Connecticut | Delaware | Alabama | Arkansas |
| Maine | Kentucky | Florida | Louisiana |
| Massachusetts | Maryland | Georgia | Mississippi |
| New Hampshire | North Carolina | S. Carolina | Texas |
| New Jersey | Tennessee | | |
| New York | Virginia | | |
| Ohio | West Virginia | | |
| Pennsylvania | | | |
| Rhode Island | | | |
| Vermont | | | |
| **Sample** | | | |
| 325 (17.9%) | 592 (32.6%) | 524 (28.8%) | 377 (20.7%) |
| **Responses**[1] | | | |
| 167 (28.7%) | 163 (28.1%) | 118 (20.3%) | 85 (14.6%) |

[1] 48 (8.3%) of the 581 responses could not be classified by region

Table 2. Key Characteristics of Responding Firms by Firm Type

| Firm Type | Responses[1] | Mean Number of Employees | | Mean (Median) Production Levels | | |
|---|---|---|---|---|---|---|
| | | Production | All Types | Lumber (MBf.) | Pallets (x1000) | Bins (x1000) |
| Sawmill | 393 | 65 | 77 | 14,364.0 (6,000.0) | ____ | ____ |
| Pallet Mill | 57 | 34 | 40 | _____ | 294.6 (285.0) | 41.6 (23.5) |
| Sawmill & pallet mill | 89 | 52 | 61 | 6,215.4 (3,500.0) | 231.0 (200.0) | 17.3 (4.0) |

[1] Of the 581 responding firms, 42 could not be categorized.

**Table 3. Ownership of Selected Types of Equipment by Responding Firms**

| Equipment | Responses | |
|---|---|---|
| | Number | Frequency (%)[1] |
| Headrig: | | |
| Circular | 341 | 59.6 |
| Band | 150 | 26.2 |
| Chipping | 125 | 21.9 |
| Scragg | 39 | 6.8 |
| Multi-Band | 24 | 4.2 |
| Other | 24 | 4.2 |
| Pallet Equipment: | | |
| Trimmer | 136 | 23.8 |
| Notcher/Chamferer | 116 | 20.3 |
| Nailing Machine | 109 | 19.1 |
| Conveyer | 106 | 18.5 |
| End Table | 61 | 10.7 |
| Un-nailer/Stripper | 13 | 2.3 |
| Materials Handling Equipment: | | |
| Fork Truck | 481 | 84.1 |
| Front-End Loader | 426 | 74.5 |
| Mobile Log Truck Un-loader | 184 | 32.2 |
| Stationary Grapple Loader | 70 | 12.2 |
| Log Crane | 55 | 9.6 |
| Other Equipment: | | |
| Planer/Matcher | 301 | 52.6 |
| Guideline Light | 257 | 44.9 |
| Gang Resaw | 233 | 40.7 |
| Dry Kiln | 232 | 40.6 |
| Band Resaw | 201 | 35.1 |
| Scanner/Optimizer | 60 | 10.5 |
| Finger Jointer | 12 | 2.1 |
| Total | 3756[2] | 656.8[2] |

[1] Percent of 572 responses

[2] Multiple responses.

Table 4. Equipment Needs of Responding Firms

| Equipment | Responses | |
|---|---|---|
| | Number | Frequency (%)[1] |
| Dry Kiln | 47 | 10.4 |
| Resaw | 40 | 8.8 |
| Headrig | 39 | 8.6 |
| Edger | 35 | 7.7 |
| Planer | 35 | 7.7 |
| Trimmer | 30 | 6.6 |
| Carriage | 27 | 6.0 |
| Truck/Automobile | 26 | 5.7 |
| Debarker | 24 | 5.3 |
| Chipper | 20 | 4.4 |
| Front-End Loader | 18 | 4.0 |
| Nailing Machine | 18 | 4.0 |
| Lumber Sorter | 17 | 3.7 |
| Rip Saw | 12 | 2.6 |
| Boiler | 11 | 2.4 |
| Stacker | 10 | 2.2 |
| Pre-dryer | 8 | 1.8 |
| Computer | 7 | 1.5 |
| Crane | 6 | 1.3 |
| Scanner | 6 | 1.3 |
| Notcher/Chamferer | 6 | 1.3 |
| Molder | 5 | 1.1 |
| Other | 27 | 5.6 |
| Total | 474[2] | 104.0[2] |

[1]Percent of 454 responses.

[2]Multiple responses.

**Table 5. Reasons for Equipment Needs of Responding Firms**

| Reason | Responses | |
|---|---|---|
| | Number | Frequency (%)[1] |
| Increase Production Capacity or Improve Yield | 301 | 69.2 |
| To Replace Worn-Out Equipment | 229 | 52.6 |
| Improve Quality | 153 | 35.2 |
| To Produce a New Product For Domestic Market | 54 | 12.4 |
| To Produce a New Product For Export | 18 | 4.1 |
| Meet Government Regulations | 9 | 2.1 |
| Other | 63 | 14.5 |
| Total | 827[2] | 190.1[2] |

[1] Percent of 435 responses.

[2] Multiple responses.

**Table 6. Equipment Purchase Plans of Responding Firms**

| Equipment Type | Responses | | | |
|---|---|---|---|---|
| | Plan to Purchase in Next 12 Months[1] | | Plan to Purchase in Next 5 Years | |
| | Number | Percent | Number | Percent |
| Fork Truck | 39 | 15.6 | 39 | 10.3 |
| Carriage | 21 | 8.4 | 22 | 5.8 |
| Edger | 21 | 8.4 | 22 | 5.8 |
| Front-End Loader | 16 | 6.4 | 39 | 10.3 |
| Stacker | 16 | 6.4 | 4 | 1.1 |
| Chipper | 15 | 6.0 | 21 | 5.5 |
| Resaw | 14 | 5.6 | 14 | 3.7 |
| Trimmer | 14 | 5.6 | 22 | 5.8 |
| Dry Kiln | 14 | 5.6 | 38 | 10.0 |
| Planer | 14 | 5.6 | 21 | 5.5 |
| Truck/Automobile | 13 | 5.2 | 46 | 12.1 |
| Debarker | 10 | 4.0 | 14 | 3.7 |
| Computer | 7 | 2.8 | 6 | 1.6 |
| Headrig | 6 | 2.4 | 20 | 5.3 |
| Lumber Sorter | 6 | 2.4 | 15 | 4.0 |
| Conveyer System | 5 | 2.0 | -- | -- |
| Grading Equipment | 4 | 1.6 | -- | -- |
| Rip Saw | 4 | 1.6 | -- | -- |
| Sawmill | -- | -- | 11 | 2.9 |
| Other | 11 | 4.4 | 25 | 6.6 |
| Total | 250 | 100.0 | 379 | 100.0 |

[1] The questionnaire was mailed during October, 1985.

**Table 7. Capital Expenditure Budgets of Responding Firms by Region**

| Region | 12-Month Mean Budget (x $1000) | 5-Year Mean Budget (x $1000) |
|---|---|---|
| Northeast | 198.24 | 398.25 |
| East-Central | 106.02 | 482.65 |
| Southeast | 405.54 | 2375.45 |
| South-Central | 1489.78 | 2056.77 |

Table 8. Statistical Comparison of Twelve-Month Budgets by Region[1]

| Region | Mean Rank($R_i$) | NE ($R_i$-197.5) | E-C ($R_i$-194.1) | SE ($R_i$-221.9) | S-C ($R_i$-243.8) |
|---|---|---|---|---|---|
| NE[2] | 197.5 | 0 | | | |
| E-C | 194.1 | 3.5 | 0 | | |
| SE | 221.9 | 24.4* | 27.9* | 0 | |
| S-C | 243.8 | 46.3* | 49.8* | 21.9 | 0 |

* Indicates statistically significant difference at a overall significance level of .10

[1] Multiple comparison technique described by Gibbons (1976)

[2] NE = Northeast E-C = East-Central SE = Southeast S-C = South-Central

Table 9. Statistical Comparison of Five-Year Budgets by Region[1]

| Region | Mean Rank($R_i$) | NE ($R_i$-154.9) | E-C ($R_i$-164.0) | SE ($R_i$-225.6) | S-C ($R_i$-221.1) |
|---|---|---|---|---|---|
| NE[2] | 154.9 | 0 | | | |
| E-C | 164.0 | 9.1 | 0 | | |
| SE | 225.6 | 70.7* | 61.6* | 0 | |
| S-C | 221.1 | 66.2* | 57.2* | 4.4 | 0 |

* Indicates statistically significant difference at a overall significance level of .10

[1] Multiple comparison technique described by Gibbons (1976)

[2] NE = Northeast E-C = East-Central SE = Southeast S-C = South-Central

**Table 10. Sources of Capital Responding Firms Would Use if Making a Major Purchase in the Next Twelve-Months**

| Source of Capital | Responses | |
|---|---|---|
| | Number | Frequency (%) |
| Commercial Bank Loan | 295 | 55.0 |
| Retained Earnings | 175 | 32.6 |
| Equipment Manufacturer or Dealer Financing | 25 | 4.7 |
| Industrial Revenue or Development Bonds | 11 | 2.1 |
| Finance Company Loan | 10 | 1.9 |
| Government Agency Loan (Other Than SBA) | 3 | .6 |
| Small Business Administration Guaranteed Loan | 3 | .6 |
| Small Business Administration Direct Loan | 2 | .4 |
| Other | 12 | 2.2 |
| Total | 536 | 100.0 |

## RECOMMENDATIONS FOR FURTHER RESEARCH

There are several opportunities for further research based on this study. First, similar studies should be conducted for the North-Central and Western regions of the United States. Comparisons could then be made between all regions of the U.S. and statistics for the entire industry in the U.S. could be tabulated. Since much of the information gathered in this study is time-dependent, a repeat of the study at a latter date would allow changes in equipment needs, investment decision-making techniques and other areas to be assessed. Finally, since this study covered a wide range of topics, opportunities exist for more in-depth research in the areas of capital budgeting, financing and equipment needs. This study could be used as a basis for this work.

# APPENDIX

## Survey Instrument

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
DEPARTMENT OF FOREST PRODUCTS
FOREST PRODUCTS INDUSTRY SURVEY

1. Please indicate your position/title.

_____

2. Please indicate your company's total sales (from all locations) in 1984.

- ☐ Less than $ 1 million
- ☐ $ 1 million to $ 9.9 million
- ☐ $ 10 million to $ 49.9 million
- ☐ $ 50 million to $ 249.9 million
- ☐ $ 250 million to $ 1 billion
- ☐ Over $ 1 billion

*If your company has facilities at more than one location, please answer the remainder of this survey in terms of the facility at your location only.*

3. What was the average number of people employed by your company at your location during 1984?

Number of full-time production employees _____

Number of full-time employees (all types) _____

4. What equipment does your company have at your location? Please check all that apply.

Headrig:

- ☐ Circular
- ☐ Chipping
- ☐ Multi-band
- ☐ Band
- ☐ Scragg
- ☐ Other

Pallet Equipment:

- ☐ Nailing Machine
- ☐ Un-nailer/Stripper
- ☐ Notcher/Chamferer
- ☐ Conveyor
- ☐ End Table
- ☐ Trimmer

Log Handling Equipment:

- ☐ Mobile Log Truck Un-loader
- ☐ Stationary Grapple Loader
- ☐ Log Crane
- ☐ Front-End Loader

Other:

- ☐ Scanner/Optimizer
- ☐ Planner/Matcher
- ☐ Guideline Light
- ☐ Gang resaw
- ☐ Band resaw
- ☐ Finger Jointer
- ☐ Dry Kiln
- ☐ Fork Truck

Computer Controlled Equipment:

- ☐ Carriage
- ☐ Resaws
- ☐ Trimmers
- ☐ Log deck
- ☐ Lumber sorters
- ☐ Dry Kiln

5. Does your company operate a sawmill at your location?

- ☐ No — If no, please skip to question 9
- ☐ Yes ⟹ What was the production of this sawmill in 1984?

_____ board feet

6. During the next 5 years, what type of equipment do you think your company will use to unload, sort and move logs?

_____

_____

7. In 1984, how did your company sell its' sawmill production? Please check all that apply.

- ☐ Sold through a broker or wholesaler.
- ☐ Sold direct to customer or through your own distribution system.
- ☐ Sold to another sawmill.
- ☐ Sold to a retail lumber yard or home center.
- ☐ Sold to another company for export.
- ☐ Other (Please Specify)_____

_____

8. Please indicate how much of your company's 1984 sawmill production was hardwood and how much was softwood. (Example: 80% hardwood and 20% softwood)

Softwood _____ %

Hardwood _____ %

100%

9. Does your company manufacture wooden pallets, bins or other wooden containers?

- ☐ No
- ☐ Yes ⟹ Please indicate your company's 1984 production of the following products.

| | Number produced in 1984 |
|---|---|
| Pallets | _____ |
| Bins | _____ |
| Other wooden containers | _____ |

10. What equipment purchased during the last 5 years has been the most beneficial to your company?

_____

How has the equipment been beneficial?

_____

_____

11. What pieces of equipment does your company need? Please list the equipment needed the most on the first line.

| Equipment needed | Primary reason equipment is needed | | | | | | |
|---|---|---|---|---|---|---|---|
| | To increase production capacity or improve yield. | To improve product quality. | To meet government regulations. | To produce a new product for export. | To produce a new product (not for export). | To replace worn-out equipment. | Other |
| 1. _____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. _____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. _____ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

*Questions 12 through 14 ask about your company's equipment purchase plans and budgets for equipment, buildings, land and other major purchases. We realize that future purchase plans and budgets may change or may not yet be determined. However, your best estimate of your company's intentions in these areas is very important to the success of this survey.*

12. What are the most important pieces of equipment that your company plans to purchase within the next 12 months? Please write the equipment name or type on the lines below and indicate whether the equipment is likely to be new or used.

| | | |
|---|---|---|
| 1. _____ | New ☐ | Used ☐ |
| 2. _____ | New ☐ | Used ☐ |
| 3. _____ | New ☐ | Used ☐ |

13. What are the most important pieces of equipment that your company plans to purchase within the next 5 years? (Not including equipment listed in question 12.)

| | | |
|---|---|---|
| 1. _____ | New ☐ | Used ☐ |
| 2. _____ | New ☐ | Used ☐ |
| 3. _____ | New ☐ | Used ☐ |

14. How much money do you estimate your company will spend for equipment, buildings, land and other major purchases during the next 12 months and the next 5 years? (Assume that business conditions remain approximately the same as in 1988.)

Next 12 months Approximately $_____

Next 5 years Approximately $_____

15. When deciding on a brand of equipment to purchase, how much importance does your company place on the following factors?

| | Not Important | Low Importance | Moderate Importance | High Importance |
|---|---|---|---|---|
| Price as compared to other brands | ☐ | ☐ | ☐ | ☐ |
| Service after the sale | ☐ | ☐ | ☐ | ☐ |
| Reputation of manufacturer | ☐ | ☐ | ☐ | ☐ |
| Equipment design and construction (ie. Quality) | ☐ | ☐ | ☐ | ☐ |
| Knowledge and helpfulness of sales personnel | ☐ | ☐ | ☐ | ☐ |
| Manufacturer or dealer's ability to provide financing | ☐ | ☐ | ☐ | ☐ |
| Made in USA with American materials and labor | ☐ | ☐ | ☐ | ☐ |
| Manufacturer or dealer's ability to provide an economic analysis of the equipment investment | ☐ | ☐ | ☐ | ☐ |
| Advertising in trade journals and at trade shows | ☐ | ☐ | ☐ | ☐ |
| Availability of a complete equipment system (as opposed to a single piece of equipment) | ☐ | ☐ | ☐ | ☐ |

*Questions 16 through 18 refer to the way your company makes decisions about investments in equipment (fork trucks, hoedrigs, sailing machines, lifts, plapers, etc.), buildings, land and other major purchases.*

As you know there are many ways to analyze an investment and determine if the investment will be profitable. Some companies use a formula method. Many companies use the judgment of experienced management. There is no right or wrong way to make this analysis.

16. What is the primary method your company would use to analyze an investment involving less than $50,000? Please check one.

- ☐ Payback period ——— (The number of years needed to recover the initial cost of the investment)
- ☐ Judgment of experienced management personnel
- ☐ Internal Rate of Return ——— (The discount rate that equates the present value of the investment's future net cash flows with the initial investment cost)
- ☐ Profitability Index ——— (The present value of future net cash flows divided by the initial investment cost)
- ☐ Net Present Value ——— (The present value of annual net cash flows less the investment's initial cost)
- ☐ Accounting Rate of Return ——— (The average profits from an investment divided by the average dollar size of the investment.)
- ☐ Analysis is performed by manufacturer, dealer or organization providing financing.
- ☐ Other (please specify) _____

17. What is the primary method your company would use to analyze an investment involving more than $50,000? Please check one.

- ☐ Payback period ——— (The number of years needed to recover the initial cost of the investment)
- ☐ Judgment of experienced management personnel
- ☐ Internal Rate of Return ——— (The discount rate that equates the present value of the investment's future net cash flows with the initial investment cost)
- ☐ Profitability Index ——— (The present value of future net cash flows divided by the initial investment cost)
- ☐ Net Present Value ——— (The present value of annual net cash flows less the investment's initial cost)
- ☐ Accounting Rate of Return ——— (The average profits from an investment divided by the average dollar size of the investment.)
- ☐ Analysis is performed by manufacturer, dealer or organization providing financing.
- ☐ Other (please specify) _____

18. When analyzing an investment, does your company compare the expected rate of return on the investment with a minimum rate of return or cost of capital?

- ☐ No
- ☐ Yes ⟹ How is this minimum rate or cost of capital determined?
  - ☐ It is based on the returns from past investments.
  - ☐ It is based on a weighted average cost of capital.
  - ☐ It is based on the cost of capital from one source.
  - ☐ It is based on judgment and experience.
  - ☐ Other (Please Specify) _____

*Predictions about future costs and profits from an investment always involve some degree of uncertainty (risk). Question 19 asks how your company accounts for the uncertainty (risk) of an investment.*

19. Please indicate the primary method your company would use to adjust for uncertainty (risk) when analyzing potential investments. Check one.

- ☐ No adjustment
- ☐ Use expected values (certainty equivalents) of the cash flows
- ☐ Change required rate of return or discount rate
- ☐ Change required payback period
- ☐ Adjustment based on experience of management
- ☐ Perform a sensitivity analysis
- ☐ Other (please specify) _____

*Questions 20 through 24 refer to the sources of financing your company uses when investing in equipment (fork trucks, hoedrigs, sailing machines lifts, plapers, etc.) buildings, land and other major purchases.*

20. Please indicate the primary source of capital your company used in the last five years to finance purchases involving less than $50,000. Check one.

- ☐ None - Have not made such a purchase
- ☐ Paid cash
- ☐ Equipment manufacturer or dealer financing
- ☐ Small Business Administration guaranteed loan
- ☐ Small Business Administration direct loan
- ☐ Commercial bank loan
- ☐ Finance company
- ☐ State, local, or federal agency loan (Please specify agency) _____
- ☐ Other (Please Specify) _____

21. Please indicate the primary source of capital your company used in the last five years to finance purchases involving $50,000 or more? Check one.

- ☐ None - Have not made such a purchase
- ☐ Paid cash
- ☐ Equipment manufacturer or dealer financing
- ☐ Small Business Administration direct loan
- ☐ Small Business Administration guaranteed loan
- ☐ Commercial bank loan
- ☐ Industrial revenue or development bonds
- ☐ Finance Company
- ☐ State, local, or federal agency loan (Please specify agency) _____
  _____
- ☐ Other (please specify)_____
  _____
  _____

22. Has your company leased equipment in the last 5 years?

- ☐ No
- ☐ Yes ⟹ What equipment was leased?
  _____
  _____
  _____

23. If your company made a major purchase in the next 12 months, which source of capital would it be most likely to use?

- ☐ Equipment manufacturer or dealer financing
- ☐ Small Business Administration direct loan
- ☐ Small Business Administration guaranteed loan
- ☐ Industrial revenue or development bonds
- ☐ Commercial bank loan
- ☐ Finance company
- ☐ Cash
- ☐ State, local,or federal agency loan (Please specify agency) _____
  _____
- ☐ Other (please specify)_____
  _____
  _____

24. Does your company plan to lease equipment within the next 12 months?

- ☐ No
- ☐ Yes ⟹ What equipment does your company plan to lease?
  _____
  _____
  _____

*Thank you for your cooperation. Please return the survey in the postpaid envelope.*

*If you would like a copy of the results of this study, when published, please fill in your company's name and address below. This will also allow us to avoid sending you additional letters concerning this survey. All replies are strictly confidential.*

Company name: _____

Company address: _____
_____
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