



Studies in Management and Accounting for the

FOREST PRODUCTS INDUSTRIES

**Capital Budgeting Practices
in
the Forest Products Industry**

by

Jack C. Bailes, Ph.D.
Assistant Professor of Accounting
Oregon State University
Corvallis, Oregon

and

James F. Nielsen, D.B.A.
Associate Professor of Finance
Oregon State University
Corvallis, Oregon

and

Steve Wendell, C.P.A.
Eugene, Oregon

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INTRODUCTION

Companies in the forest products industry are primarily capital intensive. Their long-term assets include timber holdings and substantial plant and equipment. Obviously, the success of a forest products company is strongly influenced by its acquisition and utilization decisions concerning capital resources.

Economic and business researchers have developed an extensive literature describing methods and concepts of capital management. The most commonly recommended capital budgeting techniques involve the discounting of future cash flows to determine either net present value (NPV) or internal rate of return (IRR). On a conceptual basis, these measures have been conclusively demonstrated to be superior to such other frequently encountered capital management criteria as payback and average rate of return. In addition, methodologies have been developed to show how risk can be included in the analysis of capital projects. These methods include certainty equivalents, risk-adjusted discount rates, and sensitivity analyses.

There are no significant reasons why the above capital budgeting evaluations and risk measurement techniques would not be applicable to the forest products industry. However, there have been no empirical studies of the actual capital budgeting practices of forest products firms. This monograph attempts to remedy that situation.

In the first section of the monograph, a case study is presented which describes the development of the capital budgeting process currently being used by a typical, medium-sized forest

products company. The case study shows how one firm has moved away from a completely informal capital budgeting process that did not use any specific measurement criteria to a system eventually developed and formalized in terms of categorization, presentation, and quantitative evaluation. Nevertheless, the company still does not use formal risk-adjustment methods and rarely uses the discounted cash flow capital budgeting technique. In light of general industry surveys, this is surprising because of the high investment rate inherent in the forest products industry; at the same time, it is consistent with previous general survey findings that show the largest industrial firms to be the principal users of conceptually sophisticated capital budgeting techniques.

The second section of this monograph reports the results of a specific survey of current capital budgeting practices in the forest products industry. This survey reviewed the following aspects of capital budgeting:

- Nature of the capital budget
- Project evaluation techniques
- Methods of risk adjustment
- Capital investment post-audit procedures

The final section of this monograph offers some capital budgeting suggestions that individual firms in the forest products industry may find useful. These suggestions reflect conceptual capital budgeting methods that have been adjusted to accommodate the findings of the case study and the survey.

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A CASE STUDY

The study traced the six-year development of a capital budgeting system for a medium-sized forest products company. The company's objective was to develop a straightforward method for internal allocation of capital resources.

THE EARLY HISTORY

In the early history of the case study company, the operating heads simply met and discussed their capital needs, agreed upon priorities, checked with the treasurer about available financing, and, in the absence of restraints, initiated a purchase or construction order. These people constituted an operating committee, the major function of which was to review and process capital requests and to handle other responsibilities primarily concerned with day-to-day operating decisions.

Each member of the committee was either a department or division manager. The committee met twice monthly and reviewed operations in all areas. Requests for capital expenditures were presented orally. Approval was by simple majority vote. The results of the meeting were submitted to the board of directors, with recommendations.

Upon approval by the board of directors, the person submitting the request was authorized to implement the project. This system had many advantages:

- It was simple.
- The time required to respond to a particular need was short.
- The time required to prepare the request was minimal, since detailed financial computations were not required.

On the other hand, the original system also had its shortcomings:

- Long-range capital positioning was being determined on a short-term basis.
- There was nothing to insure or indicate that a project would have a return that exceeded the internal cutoff rate or the cost of capital.
- Good rhetoric could have as much influence on the approval of a project as would the probability of its financial success.
- Those voting on the project were generally less well-informed than the person making

the presentation. Since there was little or no documentation, they could be voting on a project as they perceived it to be rather than as it was actually presented.

- There was no organized or systematic method of feedback to identify overruns or under-runs.
- There were no assurances that good capital projects presented later in the fiscal year would be approved if a heavy load of marginal requests had been approved earlier in the year.

In summary, the disadvantages centered around the absence of a long-range planning approach to capital budgeting. Short-range considerations were affecting long-range capital decisions. This procedure promoted suboptimization at the division level, particularly as the firm grew larger and more diverse.

DEVELOPMENT OF THE CURRENT CAPITAL BUDGETING SYSTEM

In developing a more sophisticated capital budgeting system, the company was confronted with a variety of problems. First was the problem of forecasting cash requirements and availability in the highly cyclical forest products industry. Second was the need to find a means of evaluating competing projects to insure effective allocation of the company's resources. Third was the necessity to develop a system for monitoring expenditures against a budgeted or approved amount.

With these problems in mind, the company developed a capital budgeting process consisting of four major elements with an overriding theme of simplicity. Complex and detailed forms and reports were avoided, and this facilitated the transition and acceptance of the new system.

The Cash Forecast

In order to forecast, for investment purposes, the amount of cash available during the forthcoming fiscal year, management developed the following formula:

$$\text{Available cash} = \text{Annual depreciation} + \text{A specified percentage of net income after tax} - \text{Dividends} + \text{Borrowing for specific major projects}$$

A Budget or Listing of Proposed Capital Projects

The second step in the developmental process involved the drafting of a basic budget of the capital needs of each division. This preliminary budget was then reviewed by the operating committee to determine:

- Whether the total requests exceeded the projected cash available.
- Whether any committee member had any serious objections to specific projects being proposed.
- Whether there should be any items added to the budget.
- Whether the budget conformed reasonably well with long-range objectives of the company.

After the first budget review meeting, it became obvious that there was a need to have a system for ranking the projects. One of the easiest methods was for each manager simply to rank his projects in order of his personal preference. Then each manager could eliminate low-priority projects of an approximately equal-dollar amount until the budget fell within the constraints. Such a system had the disadvantage of allowing certain items to remain in the budget that were not financially sound from a total corporate standpoint. Also, no manager wanted to be the only one to eliminate a project if only one elimination was needed to bring the budget in line with the cash forecast.

By the start of the next budget year a classification process had evolved. Projects were categorized into two major groups—*necessary* and *discretionary*. Necessary projects were those required to maintain production at existing levels, or those required by law, such as projects involving pollution control. Discretionary projects were those related to market expansion, new product development, or the addition of sophisticated production machinery that would generate substantial cost savings. All necessary projects were included in the budget. The discretionary projects were then ranked and added to the budget until all projected available cash was committed. Once the total amount of the budget was established, an attempt was made to further refine it by budgeting the expenditures by fiscal quarters. When the total budget was finalized by the operating committee, it was then submitted to the board of directors for final approval.

Further Criteria for Project Evaluation

The third element in the capital budgeting process was the development of criteria to evaluate and authorize individual projects. To avoid burdensome review of numerous small projects, cutoff levels were established. Only capital projects in excess of \$5,000 and repair projects in excess of \$10,000 needed committee approval. Smaller projects could be initiated by department managers.

A simple, single-page capital request form was developed to suit the needs of the company. Such a form is commonly known throughout the business community as an "AFE," or Authorization for Expenditures form. A sample AFE appears on page 5 (Exhibit 1).

The ingredients of this form include:

- A brief description of the project (including whether or not the project is budgeted).
- The project classification (cost saving, replacement, revenue producing, etc.).
- The amount of money requested net of any trade-ins.
- The time frame for cash expenditures.
- The return on investment (if relevant).
- The cash payback period (if relevant).
- The name of the person making the request and committee approval dates.
- The project code number.

The main advantage of using such a form is that all projects are put on an equal footing from the standpoint of presentation. Amounts and assumptions therefore become easier to pin down.

In the case of discretionary projects, two additional forms were provided to show supporting computations. One form projects cash flow over a five-year period and computes the years to payback. The second form projects income over a five-year period plus the average investment in the project; this information is then used in deriving a return on investment (ROI). Those supporting computations are not required for necessary projects.

Discounted cash flow analysis is used infrequently. The cash projection (payback) and income projection (ROI) forms are quite adequate for new equipment or mill expansion projects, since they present a five-year summary. Most important, payback and accounting rate of return procedures are easily understood by all com

Authorization for expenditure

LOCATION

A. F. E. NO.

CHECK ONE NON-BUDGETED
 CHECK ONE VOLUME EXPANSION
 COST SAVINGS
 REPLACEMENT
 POLLUTION
 SAFETY
 OTHER

TITLE EXPLAIN OTHER

DESCRIPTION AND SUMMARY OF BENEFITS:

ESTIMATED REQUIREMENTS OF FUNDS	WHOLE U. S. \$
TOTAL FIXED CAPITAL	\$ <input type="text"/>
LESS: TRADE-IN OR INSTALMENT PAYMENTS	<input type="text"/>
FIXED CAPITAL REQUIRED	\$ <input type="text"/>
PLUS: INCREMENTAL WORKING CAPITAL	<input type="text"/>
PLUS: EXPENSIBLE ITEMS	<input type="text"/>
TOTAL NET CASH REQUEST	\$ <input type="text"/>

APPROVALS

SUBMITTED BY: DATE / /

OPERATING COMMITTEE DATE / /

BOARD OF DIRECTORS DATE / /

ESTIMATED USEFUL LIFE (YEARS)

FIVE YEAR AVERAGE RETURN ON INVESTMENT %

CASH PAYBACK PERIOD (YEARS)

PLANNED PROJECT SCHEDULE

STARTING DATE MO YR

MONTHS TO COMPLETION MOS

TIMING OF EXPENDITURES		FIXED CAPITAL	WORKING CAPITAL	TIMING OF PROFIT INCREASES			
1	2	3	4	1	2	3	4
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	QUARTER 19 <input type="text"/>	<input type="text"/>	\$ <input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	QUARTER 19 <input type="text"/>	<input type="text"/>	\$ <input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	QUARTER 19 <input type="text"/>	<input type="text"/>	\$ <input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	QUARTER 19 <input type="text"/>	<input type="text"/>	\$ <input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	QUARTER 19 <input type="text"/>	<input type="text"/>	\$ <input type="text"/>	<input type="text"/>

REMARKS:

mittee members. Projects with economic lives exceeding ten years, such as those involving timberland, are more suitably adapted to discounted cash flow analysis. In these cases, cash flows are discounted at a rate of return that results in a present value equal to the investment outlay. Generally, a member of the accounting staff prepares or assists in the preparation of these analyses. This relieves the person submitting the project from tedious and unfamiliar computation, assures uniformity of presentation, and reduces the likelihood of error.

In a company as small as the one under study, risk becomes an integral part of every committee evaluation of projects simply through discussion. Committee members have a good intuitive feel for the risks involved in any project. Since there is no single hurdle rate against which all projects pass or fail, the discussion and subjective evaluation process allows low-risk projects to be approved, sometimes with returns below the cost of capital. Conversely, high-risk projects may be turned down even if they provide a very high ROI.

Post-Audit Procedures

To provide a means of control over capital projects subsequent to approval, a monthly capital expenditures report was developed. This report summarizes activity by division. It shows the total amount approved to date, the amount budgeted for the year, the amount spent to date, and the net overruns or underruns on completed projects.

This report is reviewed monthly by the operating committee. Division managers comment on the progress of their projects. Projects with impending overruns are examined and resubmitted for approval. The controller comments on any changes in the projected amount of cash available due to deleted projects and budget variances.

The most recent change made in the capital budgeting system was the adoption of a capital budget year that did not coincide with the company's fiscal year. This change was made for two reasons: (1) to allow operating managers to do their planning at the end of the logging season when time is not at such a premium, and (2) to allow sufficient lead time for placement of machinery and equipment orders so that deliveries

can be made prior to the start of the next logging season and during mill vacation shutdown periods.

CONCLUDING COMMENTS ON THE CASE STUDY

When the current capital budgeting system was initially introduced, it was not particularly well-received. There were complaints that there was an increase in the amount of paperwork, that complex projects could not be presented adequately, and that there were too many unnecessary constraints. In fact, the new system was not fully appreciated until almost two years after its introduction. At that time, it became necessary to report on the progress of an integrated forest products complex involving several million dollars that had been approved under the old system. The modernization project had originally been approved with only a brief statement of description and a request for the money as a *single* line item. No detailed engineering list of project components was presented to assist purchasing and accounting personnel.

This is not to say that if an AFE form had been prepared at the time the project was presented for approval that all problems would have been avoided. The situation did, however, point out the need for a more sophisticated, more formal, and structured capital budgeting system to monitor the activities of major and complex projects as well as simple, one-time purchases.

The problems encountered with the above-mentioned project accelerated acceptance of the current capital budgeting and project evaluation system. Once the AFE gained some acceptance with the committee, it was not long before most projects were presented in this way. Those not so presented were kicked back to the lower committee for lack of proper identification and description.

Today, all projects are presented on an AFE with attached supporting computations of return on investment and cash payback period. The process retains, however, the benefit of the non-structured element in the old procedure: The person requesting approval can freely describe his project in any manner and at any length he wants, so long as the few standardized items are summarized and presented on the face of the AFE.

THE SURVEY

A capital budgeting survey questionnaire was sent to the controller's office of 231 forest products companies. This group of companies comprised all of the independent firms (i.e., separate divisions of a single parent company were not included) on the forest products companies list compiled by the Oregon State University Forest Products Industries Monograph Program. The survey questionnaire was completed and returned by 108 forest products companies. This represented a 47 percent response, which compares favorably with the response rate for other industry surveys of this type.

The following breakdowns are based on the general financial data reported by the survey respondents. As shown in Table 1, there was nearly equal division between the number of firms with total assets of more than \$100 million and those with total assets of less than \$100 million. Further examination of survey data revealed that nearly

Table 1: *Distribution of Respondent Firms by Size (Fiscal Year 1975)*

Annual Sales (in Millions)	Number of Firms	Total Assets (in Millions)	Number of Firms
Less than \$50	38	Less than \$50	43
\$50 to \$100	13	\$50 to \$100	10
\$101 to \$500	30	\$101 to \$500	32
Over \$500	27	Over \$500	23

half—48 percent—of the companies sold both forest and paper products; another 43 percent sold forest products but not paper products; and only 9 percent sold paper products but not forest products.

Table 2 shows the size of the capital budgets of the companies included in the survey. It was found that the average annual capital budget was approximately 10 percent of a firm's total assets. This rate of annual capital investment is indicative of the previously mentioned capital intensiveness of the forest products industry.

Table 2: *Size of Capital Budgets*

Capital Budgets (in Millions)	Percentage of Firms
Less than \$5	44%
\$5 to \$10	11%
\$11 to \$50	24%
Over \$50	21%

When asked about the percentage of the capital budget required by government regulation each year, most firms indicated a figure in the 0-25 percent range. In other words, 75-100 percent of the annual capital budgets in the forest products industry appear to be discretionary in nature. This does not imply, however, that all discretionary investments are for expansive purposes. The forest products industry requires significant, continuing capital investment to maintain existing facilities at their current level of capacity and efficiency.

EVALUATION METHODS

In order to determine the types of capital budgeting methods employed, the firms were asked to indicate whether various capital budgeting procedures were used as primary or secondary evaluation techniques in judging the acceptability of significant *discretionary* capital expenditures. Table 3 shows the number of firms indicating a specific capital budgeting method as a primary evaluation measure. Since some firms checked more than one method as "primary," the total exceeds the total number of firms.

Table 3: *Primary Evaluation Technique*

Technique	Number of Firms
Accounting Rate of Return	27
Payback	45
Internal Rate of Return	47
Net Present Value	15
Subjective Judgment Only	6
Total	140

Note: The responses total more than 108 because some firms gave multiple responses.

When internal rate of return and net present value are considered together, the survey shows that discounted cash flow procedures are mentioned as being primary 44 percent of the time. The payback method, which is based on cash flows but not discounting, was used as a primary method 32 percent of the time. Accounting rate of return was selected as a primary evaluation method 19 percent of the time. This is the only method that utilizes accounting income in the evaluation process. Only six companies reported that "subjective judgment only" was their primary

evaluation technique. None of these six companies reported an annual capital budget of over \$10 million. The company described in the case study indicated that payback and accounting rate of return were its primary evaluation methods.

Table 4 shows the number of firms reporting the specific measurement methods used as secondary evaluation techniques. As secondary evaluation techniques, the two discounted cash flow methods received a total of 29 responses. In total, 67 firms mentioned discounted rate of return or net present value as a primary or secondary evaluation technique. This represents 62 percent of the companies responding to the questionnaire. Only 26 companies (24 percent) indicated they never used either of the discounted cash flow methods. Apparently, like the case study example, many of the forest products companies that do not routinely use net present value or internal rate of return as a primary or secondary evaluation technique still use one of these methods for certain types of investments. Unfortunately, the questionnaire did not request any information concerning the relationship between the investment evaluation technique and the type of investment. Based

Table 4: Secondary Evaluation Technique

Technique	Number of Firms
Accounting Rate of Return	24
Payback	41
Internal Rate of Return	13
Net Present Value	16
Other	1
Total	95

on the case study, it is likely that the discounted cash flow methods are used for very long-range decisions such as timberland acquisition.

Table 5 shows how the size of the company (based on sales) is related to the primary invest-

Table 5: Primary Evaluation Technique Based on Size

Firm Size by Annual Sales (in Millions)	Number of Firms Using:			
	ARR	PB	IRR	NPV
Less than \$50 (38 firms)	8	18	9	3
\$50 to \$100 (13 firms)	3	7	5	1
\$101 to \$500 (30 firms)	9	11	12	5
Over \$500 (27 firms)	7	9	21	6

Note: The responses in each sales category may total more than the number of firms in that category because some firms gave multiple responses.

ment evaluation technique reported. Firms of all sizes used all of the methods as primary evaluation techniques. However, it was only in the large sales group that the majority of the respondents used IRR and/or NPV. In the smaller sales groups, payback was most frequently chosen as the primary evaluation technique.

RISK ADJUSTMENT

Risk is caused by uncertainty as to the results of a capital investment. The case study company handled risk subjectively on an informal, project-by-project basis, and it did not use any of the quantitative techniques listed in the capital budgeting survey. However, 44 percent of the responding forest products companies did report using at least one of the following quantitative risk adjustments for those projects that were considered to be riskier than normal: (1) increasing the required cost of capital, (2) reducing the expected life of the project, (3) conducting a sensitivity analysis (i.e., considering alternative investment outcomes). On the other hand, 34 percent of the respondent companies stated that they do not adjust for risk at all in evaluating capital investment projects. The remaining 22 percent of the respondents reported the use of nonquantitative methods to consider the degree of risk in a specific investment project. Only three of the surveyed companies did not respond to the risk section of the questionnaire.

Table 6 shows the number of firms using each of the quantitative risk adjustment methods. Several firms indicated that they used more than one

Table 6: Type of Risk Adjustment Used

Adjustment	Number of Firms
Raise cost of capital	15
Adjust life downward	10
Sensitivity analysis	37

of these methods. Moreover, as shown in Table 7, the size of the firm as measured by annual sales was directly related to the incidence of the company's using at least one of the quantitative risk adjustment techniques. In the two groups of smallest companies (sales less than \$100 million), 47 percent did not make any risk adjustment. In the group of companies with sales between \$101 million and \$500 million, only 31 percent did not make any risk adjustments, and in the group of largest companies (sales greater than \$500 million) only 15 percent did not make any risk adjustment.

Table 7: Risk Adjustment Technique by Size

Firm Size by Annual Sales (in Millions)	Number of Firms Using				
	No Risk Adj	Raise COC	Reduce Life	Sens Analy	Non Quant
Less than \$50 (36 respondent firms)	17	1	2	4	9
\$50 to \$100 (13 respondent firms)	6	1	2	5	5
\$101 to \$500 (29 respondent firms)	9	6	2	11	9
Over \$500 (27 respondent firms)	4	7	4	17	15

POST-AUDIT PROCEDURES

A post audit is a comparison of the actual results of an investment project with the final estimates that were used in approving the project as a part of the capital budget. In this regard, a post audit is very useful in evaluating the planning process. Furthermore, required explanation of post-audit variances increases the motivation for managers to make accurate projections in their original investment proposals.

The case example company did not use a post audit per se. They required a monthly capital expenditures report for each division. This report showed the progress in implementing approved projects and the actual versus budgeted capital costs of completed projects. In this way the company utilized a control procedure to provide planning feedback.

The survey questionnaire asked whether or not the respondent company had a formal procedure for comparing the actual results with the original capital budget. Of the 104 firms answering this question, 66 percent indicated that they did have a formal post-audit procedure. The post audit for 50 of the companies included the initial outlay costs, the operating costs, and the operating revenues. Another 8 companies had a post audit for two of these items, and 11 companies had a post audit for the initial outlay only.

THE TOTAL CAPITAL BUDGET

In theory, a company should undertake any project that meets the specific criteria of that company's evaluation technique. In practice, most companies' total capital budgets are constrained by other factors. Only 12 percent of the forest products companies reported that the most important determinant of the size of the capital budget was "the amount of funds needed to under-

take all acceptable investment proposals." The majority of the companies said that the decision of upper management was the primary determinant of overall capital budget size. Nearly one out of every four companies indicated that internal generation of funds was the primary determinant of their total capital budget.

In the case study example, the total size of the capital budget was determined by a formula prior to the consideration of individual projects. The formula, however, included management discretion as to the specific percentage of after-tax earnings to be included in the capital budget. In addition, the formula allowed for "borrowing for specific major projects." This last factor means that to some extent the existence of approved projects can affect the size of the total capital budget when debt financing is used. Thus, the case study company appears to be typical of the forest products industry in this area.

CONCLUDING COMMENTS ON THE SURVEY

On the basis of the case study and the industry survey, we conclude that the majority of forest products companies have a formal capital budgeting process. This is consistent with the relatively high investment rate for this industry. Furthermore, most forest products companies use, to some extent, the theoretically preferred discounted cash flow capital budgeting methods. A majority of the companies use either net present value or internal rate of return as a primary or secondary evaluation technique. In this regard, the forest products industry, in general, evidences more capital budgeting sophistication than large industrial companies. (See "Empirical Evidence of the Adoption of Sophisticated Capital Budgeting Techniques" by T. Klammer, *Journal of Business*, October 1972.) Further, within the forest products industry the degree of capital budgeting sophistication is directly related to company size.

In the area of risk adjustment, a majority of forest products industry companies do not use quantitative techniques, and a significant number of industry companies make no risk adjustment at all in capital budgeting. Moreover, forest products companies report less use of capital budgeting post-audit procedures than that reported by most other industry groups. We therefore conclude that these latter two areas are the areas in which the forest products firms have fallen slightly behind.

RECOMMENDATIONS

The forest products industry is dominated by operational considerations, because projects are primarily initiated and wholly implemented in the field. For this reason it is important that a company's capital budgeting system not be overly complex. One of the primary considerations of the case study company was that production managers be as comfortable with the capital budgeting process as the company's financial officers. The company believes that their success in achieving this goal was an important reason for the success of their new capital budgeting system. In general, no budget process is going to be successful unless it is first understood and accepted by the operating personnel.

Four key elements of a capital budgeting system were identified by the case study company. Other forest products companies should find it useful to review these elements and to consider incorporating them into their own capital budgeting systems. A good capital budgeting system should include: (1) a cash forecast, (2) a budget of proposed capital projects, (3) project evaluation criteria, and (4) a monitoring and/or post-audit procedure.

In setting up their capital budgeting system, firms with cyclical operations should also consider using a budget period independent of their fiscal year. The case study company found it beneficial to begin the capital budget year at the end of the logging season. This allowed managers to do their capital planning during a slack operating period and facilitated the implementation of capital projects prior to the start of the next busy season.

The case study company categorized projects as necessary or discretionary. This approach helps to simplify a capital budgeting system. It is also useful, as shown in the case study example, to set a minimum-dollar cutoff below which projects need not be formally evaluated. Both of these procedures are utilized by many forest products companies, although the number of priority categories and the level of minimum-dollar cutoffs will depend upon individual company circumstances. The advantage of such categorizations and cutoffs is that management time is conserved. For example, it makes little sense to carefully scrutinize a project generally agreed to be "necessary." It should also be obvious that "small" projects

requiring only local management discretion could tie up a capital budgeting system and jeopardize the careful evaluation of "major" discretionary projects.

A modification of the priority category approach is to rank individual projects within categories. This is necessary only for discretionary categories, or where all of the projects within a high-priority category cannot be undertaken because of limited capital.

Project ranking and final approval for discretionary projects should be based on an objective project evaluation method. The survey results showed that the primary capital budgeting methods used by the forest products industry were internal rate of return and payback. Following, therefore, is a brief discussion of the practical and theoretical pros and cons of these two evaluation techniques.

INTERNAL RATE OF RETURN

IRR is a discounted cash flow method. It is defined as the interest rate that discounts the present value of the expected future cash inflows associated with a project to the cost of the investment outlay. Consequently, this method takes into consideration the time value of money. This is an important conceptual benefit.

On the practical side, IRR is a percentage measure. Hence it is consistent with the traditional concept of rate of return and is thus easily understood. In addition, as a percentage figure, IRR is readily comparable to target return rates, market interest rates, or even inflation rates.

One disadvantage of IRR is the relative complexity of its computation. However, the problem of complex computations can be overcome by having the corporate financial staff be responsible for the calculations. Line managers would then be responsible only for providing the raw data projections for their capital proposals.

PAYBACK

For the smaller companies in our survey, payback was the most common primary evaluation technique. This is consistent with the biggest a

vantage of the method, that is, its simplicity. Payback is often used as a first hurdle in capital project screening, because many forest products companies require rapid project payoffs due to the uncertainty of timber supply. This is primarily a problem for those companies that depend on cutting rights for their timber. Companies with a higher percentage of fee timber can much more comfortably undertake longer-term projects. The shorter a project's life, the less the importance of discounting and the greater the appropriateness of the payback method. For this reason we recommend that companies with little fee timber and high concerns about future supply continue to use payback for evaluating short-run projects.

A further recommendation is that for longer-term projects those companies using payback also use the reciprocal of the payback period (the reciprocal of a four-year payback is 25 percent) as an approximation of IRR. In this way the advantages of an IRR measure can be achieved without significantly increasing the complexity of the capital budgeting system. However, there are two conditions which must be met for the payback reciprocal to approximate IRR: the annual expected cash flows must be approximately equal, and the expected life of the project must exceed two times the payback period.

POST AUDITS

Because the survey also showed that the forest products industry reported less use of post-audit procedures than that reported by other industries, our final recommendation is for an increase in the use of post audits. Where capital projects are formally proposed and evaluated, a post audit requires only that actual costs and revenues be classified and recorded consistently with the initial proposal. This greatly increases the control over capital expenditures, and it prevents a manager from using a general project appropriation as a capital slush fund. A post audit also provides feedback on the accuracy of capital proposal projections and the effectiveness of project implementations. This feedback can then be used for manager performance evaluation and therefore can increase manager motivation to make accurate proposals and efficient implementations.

Some companies may be able to increase their use of post audits without adding to their accounting system. The required cost detail may already be available because of the accounting department's needs for tax computations and general financial reporting. On the other hand, if the data is not currently available, the overall accounting system may be improved by the introduction of capital budget post audits.

Monographs published to date:

"The Rush to LIFO: Is it Always Good for Wood Products Firms?" issued in December 1974 and published in condensed form in the April 1975 issue of *Forest Industries*.

(This monograph was revised and reissued in January 1976.)

"Accounting and Financial Management in the Forest Products Industries: A Guide to the Published Literature," issued in June 1975.

(A supplement to this monograph was issued in March 1977.)

"A Decision Framework for Trading Lumber Futures," issued in October 1975.

"Capital Gains Tax Treatment in the Forest Products Industries," issued June 1976.

"Measurement Difficulties in the Log Conversion Process," issued June 1977.

ADVISORY COUNCIL

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