INDICATOR RATIOS FOR FOREST PRODUCTS INDUSTRIES

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ABSTRACT

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For several years most facets of the American business community have utilized financial ratio analysis as a managerial tool. Even within the forest products industries the larger concerns became acquainted with ratio analysis long ago. Within many of the smaller forest products businesses though, the owners or operators often feel that they cannot use the same type of analysis as the larger corporations.

It is the contention of this thesis that ratio analysis is applicable to every type of forest products business, regardless of size. A method is presented whereby any operator of a small forest products business can evaluate his organization using ratios or proportions. Twenty-one applicable ratios are discussed and averages given for a sample taken from members of the Michigan Forest Products Cooperative, Inc. An extensive example of the application of this type of analysis to a specific company is also developed.

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INTRODUCTION

Historical Background

Prior to the turn of the century financial statements were used primarily to portray the worth and profitability of an organization. Little, if any, use was made of the information contained therein in the everyday management of the business activities.

In the early 1920's a group of consultants (Robert Morris Associates) first conceived the idea that ratios or proportions could be developed from various items found in financial statements and used as tools for management. The pioneering work in this field was done by Alexander Wall (then Secretary-Treasurer of Robert Morris Associates) and R. W. Duning, and presented in their book entitled "Ratio Analysis of Financial Statements".

Since that time much and varied work has been done on the general use of ratio analysis and the specific application of it to various industries and business concerns. Trade and cooperative associations have found it useful as a comparative tool, and it has been widely promoted within retail, wholesale, and manufacturing operations, both large and small.

The most recent work of a detailed nature on ratio analysis per se is that done by Spencer A. Tucker and presented in his text book entitled "Successful Managerial Control by Ratio-Analysis". In this work he gives very detailed discussions of some 429 specific ratios which can be developed from financial information and which have

found application under various circumstances.

Scope and Applicability

It is the purpose of this thesis to present a method whereby any owner or operator of a small forest products business can evaluate his organization using comparative ratio analysis. The owners or operators of these firms far too often feel that, since their operations are relatively small and lack men with a high degree of specialized training, they cannot use the same type of beneficial financial planning and analysis that is used in "big business". This is usually not a valid belief. These businessmen have both the potential capability and the available information to enable them to use the same general techniques used by the financial analysts of the largest corporations; specifically, ratio analysis.

Ratios are simple computations expressing the relationships that exist between sets of figures. The various ratios which are discussed here have been chosen because of their applicability to the smaller forest products industries and are useful in locating present and potential trouble areas within the organization, in testing decisions in advance, and in suggesting ways of remedying negative conditions.

In most instances the calculation of individual ratios for a given company is of little use without some standard or basis for comparison. If there are no applicable synthetic standards or rules of thumb, the first comparison to make is with past ratios of the same company. Trends, or stability, within ratios, over time, are very useful in analyzing and interpreting policies and decisions. This would include annual comparisons over the years plus shorter period

comparisons of a few selected ratios subject to seasonal variations. Within the forest products industries, the ratios which include inventory or accounts receivable are particularly sensitive, and should be analyzed more often than once a year.

A second comparison, which is emphasized here, is one which compares individual company ratios to current industry averages. Each year Dun & Bradstreet publishes a pamphlet of "Fourteen Important Ratios" for a number of different retailing, wholesaling, and manufacturing industries. Included in these industries are lumber yards, lumber and building materials wholesalers, furniture manufacturers, millwork manufacturers, lumber manufacturers, and paper manufacturers. The ratios, developed from samples within these lines, are applicable to the larger forest products industries throughout the United States. Single copies of this yearly publication may be obtained, free of charge, by writing to the Business Publications Division, Dun & Bradstreet, Box 803 Church Street Station, New York, New York 10008.

In order to provide an average or standard for comparison within the smaller forest products industries, particularly in Michigan, twelve members of the Michigan Forest Products Cooperative, Inc. submitted year end operating statements and balance sheets for 1961, 1962 and 1963. These were used to compile an average of each ratio discussed in this paper. These twelve participants are a representative sample of the smaller forest products industries of the state. They ranged in size from the largest, having net sales in 1963 in excess of $500,000, with a total net worth of more than $150,000, to the smallest, having net sales of a little more than $35,000, with a net worth of approximately $3,400. They were located throughout the entire Lower

Peninsula of Michigan, without any tendency to group in a particular section. All derived the major portion of their sales from wooden pallets and boxes, with half of them also engaging in the manufacture of grade hardwood lumber.

An attempt was made to secure data from small forest products industries of the state that were concerned solely with the manufacture of lumber. However, time limitations precluded the accumulation of sufficient information on which to base new standards or determine the applicability of the averages given here or those presented by Dun & Bradstreet. Preliminary results indicate that the Dun & Bradstreet ratios for lumber manufacturing are probably more applicable for strictly sawmill operations, even the small ones.

It should be noted that the averages, as revealed by this study, do not possess any virtue, simply because they are averages. What matters is the variation from the average itself. In order to make a thorough analysis of a business, a study would need to be made of the trend of the various ratios and their deviations from the averages, and then a determination made of the underlying reasons for these variations. This, then, would expose the areas and magnitudes of existing problems.

APPLICATION

The Sales Dollar

The first three ratios are a percentage breakdown of the total sales dollar. They represent that amount of the sales dollar that is used to purchase raw material, meet operating expenses, and provide the net income or profit from operations. Table 1 represents the average percentage breakdown of the sales dollar of members of MFPC in 1961, 1962 and 1963.

TABLE 1.--The sales dollar.

	1961			1962			1963		
Ratio	High	Ave.	Low	High	Ave.	Low	High	Ave.	Low
Cost of goods sold	42.3	32.5	27.2	45.6	35.8	30.3	43.7	37.2	32.0
Operating expenses	70.3	63.5	50.9	69.9	59.4	49.3	65.8	57.5	39.2
Net profit	6.8	4.0	0.1	9.1	4.8	-2.7	17.1	5.3	-4.4

The first of these ratios is the cost of goods sold to sales. This ratio indicates that amount of the sales dollar that is used in the purchase of raw material. It is derived by taking the cost of goods sold figure (actual cost of material f.o.b. the company plant) in the current income statement and dividing this by the total sales for the same period. (The result is multiplied by 100 to convert it to a percentage). The trend of the average cost of goods sold ratio is up from 32.5 in 1961 to 37.2 in 1963, as indicated in Table 1. This trend

would seem to indicate that the cost of raw material is rising faster than the price of the finished product. This might indicate a need to look at pricing or purchasing policies.

The second sales ratio is that of total expenses to sales. This ratio is derived by taking the total expense figure from the operating statement and dividing it by the total sales for the same period. It indicates that portion of the sales dollar used in meeting all operating expenses of a business. It actually depicts the efficiency of an organization more accurately than the net income ratio which will be discussed next. Expenses, if low relative to the volume of business performed, indicate efficient management practices regardless of whether net income is high or low. The trend of the average expense ratio is down from 63.5 in 1961 to 57.5 in 1963, as indicated in Table 1. This reduction more than compensates for the increase in cost of raw materials. This lower expense ratio would seem to indicate an improvement in efficiency over the past year.

The final sales ratio is that of net income to sales. It is derived by dividing the total net income by the total sales for the same period. It simply represents that portion of the sales dollar which remains after all expenses are deducted. It is, perhaps, the most important measure of success. The trend of the average net income ratio is up from 4.0 in 1961 to 5.3 in 1963, as indicated in Table 1. This rise is exactly equal to that reduction of operating expenses not used up in the rise of raw material cost. However, it should be stated at this point that there was a tendency within the single owner firms studied to include a portion of the owner's salary in the net income, resulting in some slight overstatement of the net income ratio for

the business.

Although net profits are the economic end of a business, it cannot operate solely for the maximum of immediate profits, and ignore long range effects. It is necessary to keep all the proportions of the balance sheet in a healthy relationship, one to another, while at the same time attempting to raise the net profit ratio.

Expense Breakdown Ratios

For the purposes of this paper, the total expense section of the operating statement has been broken down into six sub-parts. These are labor, depreciation, repairs, gas and oil, insurance, and other expenses. This breakdown is meant to portray the most common important expense items. In a given operation, however, there may be other expenses that are as important or more important than the ones given here. In this case, these expenses should also be studied in the same manner as the aforementioned six.

The derivation of each of the expense ratios is the same. They are gained by dividing the given expense by the total sales for the same period. Again, the resulting figure represents that proportion of the sales dollar used in meeting that particular expense. The sum of all expense ratios should be the same as the ratio of total expenses to sales. The average expense ratios, of the Cooperative members studied, for 1961, 1962, and 1963 are given in Table 2.

A brief description of each average expense ratio is provided. The labor cost ratio, while influenced to some extent by the wage level, is not entirely related to it, but indicates more specifically the effectiveness of management in the use of labor. If the trend of this ratio is downward, the company is in good shape. If it is rising,

it may be caused by several factors, but most likely it is indicative of reduced efficiency in the labor force. If the trend is erratic, as in the case of the averages, interpretation becomes a little more difficult.

TABLE 2.--Average expense breakdown ratios of members of MFPC.

	1961			1962			1963		
Expense Ratio	High	Ave.	Low	High	Ave.	Low	High	Ave.	Low
Labor	43.4	36.2	29.3	41.1	33.8	24.5	41.6	34.7	24.8
Depreciation	11.7	4.4	1.7	8.2	4.9	2.5	6.6	4.0	2.4
Repairs	7.0	3.2	0.3	5.1	2.7	1.0	6.4	2.7	1.8
Gas and oil	10.8	3.9	0.7	11.5	4.8	1.2	10.4	3.9	0.6
Insurance	3.7	2.2	1.7	8.1	3.2	1.3	3.4	2.0	0.6
Other	21.1	13.6	8.7	12.6	10.0	3.1	15.9	10.2	4.3

The depreciation ratio is a little more difficult to interpret, since it reflects policies, such as replacement policy, which may vary between firms. A relatively low ratio might indicate trouble in the days ahead due to high repair bills and down time, since it would seem that equipment would be getting old. A relatively high ratio might indicate an over-extension into equipment purchases, tying up valuable working capital.

The trend of the average repairs to sales ratio is down and this is good. A rising ratio would indicate the need for a closer look at replacement policy and preventative maintenance policies. This ratio should be analyzed in conjunction with the previous one in order to give a clearer picture of the adequacy of a given replacement policy. There should be a semblance of balance between these two ratios. For example, if the depreciation ratio rises along with the repairs ratio,

this should call attention to the fact that, in all probability, investments in fixed assets can be improved. Conversely, a rise in the depreciation ratio, accompanied by a decrease in the repairs ratio, should confirm a belief that wise replacement investments are being made.

A relationship also exists between the labor and depreciation ratios. Automation and mechanization are regarded as progressive moves by a majority of the firms in the forest products industries. A trend toward automation and mechanization should be reflected by a rising depreciation ratio (and probably repairs ratio also), but unless the labor ratio declines by a compensating amount little justification for increased equipment expenditures can be found.

The gas and oil, insurance and other expense ratios will not be discussed here since they should be self explanatory. An attempt should be made to establish a downward trend in all expense ratios, since this indicates efficiency in cost relative to the volume of business done.

Other Important Ratios Involving Sales

There are four other important ratios which involve sales, this time as the numerator of the fraction. They are sales to accounts receivable, sales to inventory, sales to fixed assets, and sales to net worth. The averages for these ratios are given in Table 3.

The sales to accounts receivable ratio is simply an indicator of the status of the credit business. It is gained by dividing net annual sales by the total of trade accounts and bills receivable at the end of the accounting period. The larger sales are in comparison

to receivables, the more nearly a complete collection for the period has been approached and the greater the probable liquidity of the receivables. Conversely, the lower this ratio, the greater the probability of the presence of poor collection methods and stale receivables. Table 3 shows that there is a steady, and rather large, downward trend to this ratio. This would be a favorable indication that the status of extended credit is improving.

TABLE 3.--Averages of other important sales ratios of members of MFPC.

	1961			1962			1963		
Ratio	High	Ave.	Low	High	Ave.	Low	High	Ave.	Low
Sales to:									
Acc'ts. Receiv.	120.4	37.0	13.6	135.2	35.1	8.8	54.5	24.3	9.7
Inventory	71.4	23.9	11.3	56.7	19.3	5.2	158.1	41.0	7.4
Fixed Assets	11.1	5.3	2.1	11.3	5.2	1.4	74.5	12.7	2.9
Net Worth	4.9	3.7	2.0	5.3	3.9	2.2	8.6	5.9	3.5

In conjunction with the sales to accounts receivable ratio, there is one other analysis of business transactions which can be used to indicate the comparative effectiveness of collections, and should be used whenever the status of extended credit appears to be deteriorating. That analysis gives the guide known as "the average collection period based upon sales".[1] It is obtained by dividing the annual net sales by 365 days to obtain the average sales per day, and then dividing that result into the combined sum of accounts and notes receivable plus any assigned accounts and discounted notes. To be in

[1]Roy A. Foulke, Behind the Scenes of Business (Dun & Bradstreet, 1952)

healthy shape, "the average collection period should be no more than one-third greater than the net selling terms."[1] With selling terms, for example, of two percent discount in ten days, net 30 days, the average collection period should not exceed 40 days.

The sales to inventory ratio is gained by dividing net annual sales by total inventory. This ratio expresses the proportion between sales and inventory which, while not a definite physical turnover indicator, is a comparable measure of turnover from year to year. Marketing effectiveness can be measured, within reasonable bounds, by the sales developed per unit of inventory. The higher the relationship of sales to inventory, the greater is the merchandising capacity and the more probable the freshness, saleability, and liquidating value of the inventory.

The sales to inventory ratio is one of the more erratic ratios which must be considered. Some, and often a great deal, of variation is normal in this ratio, depending on the time of year it is computed, geographic location, and similar interrelated factors which differ between concerns. It is for this reason that, when comparing a given ratio for an individual firm to the average, considerable differences may exist which are not always indicative of poor management policies. Within the firms studied, inventories were almost entirely made up of raw material and in-process goods, and were valued at cost in each instance. If inventories vary a great deal in kind, or if methods of valuation differ, a comparison with the average ratio would not be too meaningful. It would probably be more beneficial to compare the company's own ratios through the years, as they are computed under

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[1]Roy A. Foulke, Behind the Scenes of Business (Dun & Bradstreet, 1952)

essentially the same set of circumstances.

The sales to fixed assets ratio is especially useful for new businesses or those considering expansion. This ratio is derived by dividing the net annual sales by the total amount of fixed assets. It indicates the approximate volume of business that is needed to warrant a given amount of investment in fixed assets. When this ratio is relatively low, it usually means that too great an investment in fixed assets has been made relative to the volume of business for which they are used. If this ratio is high, further analysis would be warranted to determine whether such a ratio resulted from extreme efficiency in the use of fixed assets, or from a policy of letting the fixed assets depreciate without any attempt to rebuild, repair, or keep them in satisfactory condition to provide adequate facilities for doing a good job. It should be further recognized that an organization leasing or renting a large portion of its fixed assets will have a comparatively high figure for this ratio; however, the operating expense ratio would be correspondingly higher since it would reflect rent payments. In many cases careful consideration is given to the purchase or building of facilities solely from the viewpoint of cost and ease of financing. There may not be a sufficient volume of business to warrant a given amount of investment in fixed assets at a given location. Under normal conditions, a rising fixed assets ratio should be established prior to new investment into additional fixed assets.

The sales to net worth ratio reflects the sales activity of invested capital. It is gained by dividing net annual sales by true net worth (total assets minus total liabilities). Capital is invested in any enterprise in the hope of a substantial return. The probability

of such a return is largely dependent upon a reasonable activity of the investment. The proportion borne by sales to net worth establishes a measure of this activity. When the relation of sales to net worth is an increasing one from year to year, it can be reasonably assumed that the invested funds are more actively, and probably more profitably, employed than they could be elsewhere.

Capital Ratios

The next series of important ratios have been termed capital ratios. They are the current ratio, the acid test, inventory to receivables, and net worth to liabilities. The averages are given in Table 4.

TABLE 4.--Average capital ratios of members of MFPC.

	1961			1962			1963		
Ratio	High	Ave.	Low	High	Ave.	Low	High	Ave.	Low
Current Ratio	4.8	2.5	1.2	8.2	3.2	1.5	9.1	3.6	1.3
Acid Test	1.1	0.8	0.6	4.3	1.4	0.5	6.7	2.0	0.4
Inven./Receivables	5.9	2.3	1.0	3.6	2.1	0.6	2.7	1.2	0.1
Net Worth/Liabil.	7.1	4.0	0.9	6.7	3.0	0.3	7.1	2.7	0.4

The current ratio indicates the dollars of current assets on hand to offset the dollars of current debt. It is gained by dividing total current assets by total current liabilities. The higher this ratio runs, the freer current assets are from debt claim by creditors, and the more likely it is that creditors would receive prompt and complete payment on demand. An established guide used in many circles is that this ratio should not be less than 2.0.

Although the average current ratio of the firms studied has not been below 2.0, and in fact has risen to a comfortable level of 3.6, this should not be taken as an infallible indication of a very strong current credit position. If the total of cash and receivables is less than the total of current liabilities, then considerable doubt is thrown on the current credit strength regardless of what the current ratio happens to be.

In its briefest form the "acid test" consists of measuring the total of cash and receivables against total current liabilities. To meet the test satisfactorily, this ratio must be equal to or greater than 1.0. If this acid test is applied and a company meets the test, then its current liabilities will not exceed the total of cash and receivables. The whole value, then, of the inventory, whatever it may finally check out to be, becomes available as a buffer against loss.

As was mentioned in the discussion of the current ratio, if the acid test ratio is less than 1.0 then considerable doubt is thrown on the current credit strength regardless of how high the current ratio happens to be. In the case of the averages, however, the trend of this ratio has been upward, and when coupled with the current ratio would seem to indicate a favorable position as far as the ability to secure short term credit is concerned.

The inventory to receivables ratio expresses the relationship between inventory, a cost item, and receivables, a selling price item, which together usually form the predominating factor in the total of current assets. It is derived by dividing inventory by the trade accounts receivable. The fluctuations of this ratio in a

measure check the fluctuations of the current ratio, due to the fact that sale of merchandise and transformation of inventory into receivables adds the equivalent of gross profit on the sale to the asset side of the current ratio without any necessary addition to the liability side. It can also be used to indicate the preponderance of either merchandise or receivables in the current assets which makes a considerable analytical difference in estimating probable losses or profits due to inventory fluctuations in different phases of the business cycle. For most firms, it is desirable to keep this ratio as low as possible.

The net worth to liabilities ratio expresses the proportion existing between the capital owned by an organization and the capital loaned to it by creditors. It is derived by dividing the true net worth by the total liabilities, including both current and long term. The whole capital at use in supporting the operation of a company consists of net worth and that capital loaned to it more or less temporarily by creditors, represented by debts. The proportion existing between owned capital and that borrowed measures and records debt pressure. The higher this ratio, the lighter the debt pressure and the further removed a company is from the criticism of being "topheavy with debt". There has been a sizeable decline in the average ratio since 1961 and, although 2.7 is not considered by many concerns to be "too low", a close watch should be kept on this ratio in order to impede or stop this decline.

Supplementary Ratios

There are four other ratios which are necessary for a complete analysis of the foundation of any forest products business. These are

net worth to fixed assets, funded debt to fixed assets, working capital to inventory and net income to net worth. The averages are given in Table 5.

TABLE 5.--Average supplementary ratios of members of MFPC.

Ratio	1961			1962			1963		
	High	Ave.	Low	High	Ave.	Low	High	Ave.	Low
Net Worth/Fix. Ass.	1.4	1.1	0.6	1.3	1.1	0.4	1.7	1.0	0.4
Fund. Debt/Fix. Ass.	51%	15%	10%	89%	32%	0%	87%	32%	0%
Working Cap./Inven.	1.1	0.8	0.3	1.9	1.1	0.5	5.7	2.1	0.3
Net Income/Net Worth	21%	11%	10%	28%	14%	6%	40%	23%	3%

The net worth to fixed assets ratio expresses the proportion between owned capital and the money not currently invested in fixed assets. It is gained by dividing true net worth by net fixed assets. Plant or other fixed assets should be financed primarily from owned capital by the ordinary forest products industry. The higher this ratio is, the more liquid is the net worth of a company and consequently the more effective it is as a liquidating protection to creditors.

The funded debt to fixed assets ratio is gained by dividing long term liabilities by fixed assets. It measures the extent to which fixed assets are mortgaged. It is useful in determining future possible borrowing power through mortgages. When the proportion of funded debt to fixed assets rises abnormally high, there is danger of debt becoming a residuary claim on current assets. The condition of a company having a thin current ratio but a large asset item of effective plant or real estate with no funded debt is quite different from one with both a thin current ratio and a high proportion of mortgages against fixed

assets. Fixed assets can be used as a good secondary defense against a low current ratio position by the amount of their liquidating realizable value.

The average ratio is presently at 32 percent. However, this ratio should be studied with the net worth to fixed assets ratio. In looking at these average ratios together it can be seen that although 32 percent of the fixed assets are presently under mortgage, net worth (or owned capital) will exactly offset the amount invested in fixed assets. This leaves the entire current assets as a buffer against loss of payment on long term debt.

The working capital to inventory ratio is the difference between current assets and current liabilities divided by inventory. This ratio measures the percentage of working capital that depends on inventory as a liquidating element. With the 1963 average at 2.1, this would indicate that less than half the working capital is tied up in inventory. It is desirable to keep this ratio as high as possible in light of inventory policies.

The net income to net worth ratio measures the percentage return on investment. The amount invested in a company, commonly known as capital or net worth, is entitled to a reasonable return. This reasonable return or prospect for such a return is what attracts capital to any enterprise. Again, it is the percentage relationship that profits bear to net worth, rather than the dollar amounts, which measure return. With the trend of the average ratio upward, and with the 1963 average at an almost unbelievable 23 percent, the forest products industry, as represented by members of the cooperative, would appear to be in a strong position to attract additional capital so vitally needed for expansion and improvement.

AN EXAMPLE COMPANY

In order to more concretely demonstrate the use of financial and operating ratios within the smaller forest products industries, an example is included here. This company is actively engaged in operations in Michigan at the present time; however, the name has been changed to conceal its true identity.

Figure 1 portrays the end of year operating statement of Company X for 1963, and Figure 2 the balance sheet compiled at the same time. The figures found on these two statements were used to compute Company X's ratios, shown in Table 6.

Now assume that the owner or operator of Company X has been provided with this current set of ratios (Table 6) along with the averages given in Part II. Using this data he can proceed to make a critical analysis of the financial and operating conditions of the company.

First, a look at the three major subdivisions of the sales dollars. Out of every dollar of sales generated, 39.1 cents goes to pay for raw materials. It is noted that this figure is about 2 cents on the dollar higher than the average. Why? Is raw material more expensive here than elsewhere? Is this lower quality stock thus producing less usable material, while costing the same as the stock others are using? Are operations inefficient in the use of material and perhaps even wasteful? These questions are the ones which must be answered. Then actions must be initiated which will correct the undesirable situation and thereby reduce this ratio.

Sales (less discounts)		$ 365,325
Opening Inventory	51,431	
Purchases	(+) 140,516	
	191,947	
Closing Inventory	(-) 49,218	
Cost of Goods Sold		(-)$ 142,729
Gross Margin		$ 222,596
Operating Expenses:		
Labor	113,308	
Depreciation	(+) 17,150	
Repairs	(+) 6,468	
Gas and Oil	(+) 5,232	
Insurance	(+) 6,814	
Other	(+) 57,051	
Total Expenses		(-)$ 206,023
Net Income (Profit)		$ 16,573

Figure 1.--Operating Statement - Company X

ASSETS		
Current Assets:		
Cash	1,000	
Accounts Receivable	18,287	
Inventory	49,219	
TOTAL		$ 68,506
Fixed Assets (Net):		
Land	35,568	
Buildings	24,448	
Equipment	48,896	
Furniture & Fixtures	12,224	
TOTAL		$ 122,236
TOTAL ASSETS		$ 190,742
LIABILITIES		
Current Liabilities:		
Notes Payable	8,726	
Accounts Payable	26,179	
TOTAL		$ 34,905
Fixed Liabilities (Long Term):		
Mortgages	106,159	
TOTAL		$ 106,159
TOTAL LIABILITIES		$ 141,064
NET WORTH (Assets - Liabilities)		$ 49,678

Figure 2.--Balance Sheet - Company X

TABLE 6.--Company X's ratios - 1963.

The Sales Dollar:		
1.	Cost of goods sold to sales	39.1
2.	Operating expenses to sales	56.4
3.	Net income to sales	4.5
Expense Breakdown Ratios:		
4.	Labor to sales	31.0
5.	Depreciation to sales	4.7
6.	Repairs to sales	1.8
7.	Gas and oil to sales	1.4
8.	Insurance to sales	1.9
9.	Other expenses to sales	15.6
Other Ratios Involving Sales:		
10.	Sales to accounts receivable	20.0
11.	Sales to inventory	7.4
12.	Sales to fixed assets	3.0
13.	Sales to net worth	7.4
Capital Ratios:		
14.	Current ratio	2.0
15.	Acid test	0.6
16.	Inventory to accounts receivable	2.7
17.	Net worth to liabilities	0.4
Supplementary Ratios:		
18.	Net worth to fixed assets	0.4
19.	Funded debt to fixed assets	87%
20.	Working capital to inventory	0.7
21.	Net income to net worth	3%

Next it is noted that 56.4 cents out of every sales dollar is used to meet operating expenses. This is slightly lower than the average, and therefore the company is probably doing all right in this area. But, to be on the safe side, a look should be taken at each expense ratio separately.

This now leaves 4-1/2 cents out of each sales dollar as profit. It would be desirable to raise this figure, particularly since it is lower than the average by almost a penny on the dollar. This can be accomplished by solving the problem of a high materials expense or by even lowering one of the operating expenses, which will be looked at now.

Looking at the labor ratio, it is seen that this figure of 31 cents on the dollar is quite a bit lower than the average of almost 35. This should be adequate evidence that the company is getting its money's worth for the investment in labor. It is noted that the depreciation ratio is running a little high but appears to be offset by a very low repairs ratio, so this indicates little need of attention in this area. The same is true of the gas and oil and insurance ratios - they are alightly less than average and appear to warrant little effort at reduction.

However, a look at the other expenses ratio which shows that it contains 15.6 cents of every sales dollar, should provide incentive to try and break this account down still further because there is probably an excessive expense buried here that could be reduced if it were located.

A couple of minor trouble spots have already been found in direct expenditures - cost and use of raw material and an excessive

amount of "other expenses". What about the more intangible portions of the sales relationships?

Looking at the sales to accounts receivable ratio, it is found that this 20.0 is slightly less than the average of 24.3, but it is also noted that there is a pretty wide spread in this ratio, from a high of 54.5 all the way down to 9.7. It should not be felt that this level must be maintained or improved. This can only be done by keeping collections current.

The sales to inventory ratio points out a startling fact - only $7.40 in sales was generated for every dollar carried in inventory. This is far below the average of $41.00 of sales per dollar of inventory. It should be realized of course that there is a great deal of variation in this ratio among firms but still the question must persist - is too large an inventory being carried, thus tying up valuable working capital plus risking loss if inventory devalues with time? It is decided to defer answering this question until a further look has been taken into the other ratios.

Focusing attention next on the sales to fixed assets ratio, it is again noted that 3.0 is substantially below the average of 12.7. Normally, this would indicate an over-investment in fixed assets relative to the volume of business done. In other words, there is probably an excess plant capacity which is not being used and sales should be increased, and therefore production, or investments in fixed assets should be cut back. Looking again at the low sales to inventory ratio, though, another thought would come to mind - perhaps the company, in fact, is over-invested in fixed assets which are being utilized to

their fullest, thereby producing an over supply of goods relative to sales. This could certainly be the answer to the large inventory, if it is composed primarily of finished goods, and is a point well worth further investigation.

The sales to net worth ratio is 7.4 compared to an average of 5.9. This data provides reasonable assurance that invested capital is active and should provide a desirable return.

Two more possible trouble spots have now been located - an apparently excessive inventory and perhaps an over investment in fixed assets. Now a look should be taken at the capital situation.

First the current ratio is 2.0. Many credit managers and analysts use this exact figure as a minimum guide line when investigating a company's credit position. However, it is noted that the average is 3.6 and it should be re-emphasized that a very large inventory is being carried. These two facts indicate that maybe the current credit position is not quite as safe as might be thought at first.

The acid test ratio of 0.6 bears out the fact that inventory makes up a large portion of current assets and that cash and receivables alone are not enough to cover current liabilities. This emphasizes the doubts that exist about the current credit position and discredits the current ratio, even though it is at 2.0.

The next ratio, that of inventory to accounts receivable, is another confirmation of the belief that too much inventory is being carried. With inventory being 2.7 times as large as receivables, it is by far the largest part of current assets. This is not particularly desirable since inventory is subject to devaluation with a downward flux

in the market, and since, in most states, inventory is subject to various taxes.

Looking next at the net worth to liabilities ratio, it is found that the company really is in a very poor debt position. This ratio is 0.4. The average is 2.7, and even this would be considered by some to be a fairly low ratio. Serious thought needs to be given to postponing any new purchases or expansion plans until some of the burden of this heavy debt pressure is removed.

In order to fully complete the analysis, the last four supplementary ratios must be studied. Again, the company is found to be in a poor position when net worth to fixed assets ratio is examined. With this ratio being only 0.4 it would be difficult to liquidate a substantial portion of net worth, if the need should arise.

The funded debt to fixed assets ratio measures the amount of fixed assets which are mortgaged, in this case 87 percent. This should be just one more pointed reminder that the company's credit position seems to have been over-extended, particularly in long term mortgages. In fact, the interest charges that are being payed on all this borrowed capital will account for over 10 percent of "other expenses".

A final ratio to emphasize the severity of the credit position is the working capital to inventory ratio. With this ratio at 0.7 it can be seen that besides having all working capital tied up in inventory, there is some borrowed money in inventory too. This goes back to the problem of an excessive inventory stock.

The last ratio to look at is perhaps the one holding the most interest, since it measures the return on invested capital. The net income to net worth ratio is only at three percent, but this is really not too surprising since the only way to improve it is to eliminate or

reduce the problems already discovered.

As a summary of this ratio analysis, a list can now be made of the major problem areas discovered, and an attempt made to find solutions to them in light of company policies.

1. Excessive inventory
2. Over investment in fixed assets
3. Over extension of credit - both short and long term
4. Relative cost of raw material
5. Excessive amount of "other operating expenses", which should prompt the search for an individual expense account which appears to be out of line

No attempt will be made in this example to provide possible solutions to the problems. The alternatives available are many and must be evaluated in the light of company policies and objectives.

LIMITATIONS

Whenever an analysis of this type is being planned the question will always arise as to what ratios are significant. There are a vast number of ratios which can be developed just from the items listed on the balance sheet and the income statement. The twenty-one which have been discussed here seem to be the most significant for the smaller forest products businesses taken as a group. Within a given organization, however, special circumstances may dictate the use of a different set of ratios tailored to meet specific requirements. Additional ratios, which have proven useful under various conditions, are discussed at length in the references given at the end of this paper.

An additional limitation, of this study in particular, was the inadequacy of many of the record keeping systems of the smaller wood using industries. Whenever records are poorly or inaccurately maintained the usefulness of any analysis made of them is subject to question. Also it was found that even in the better systems certain accounts or classifications among various firms did not contain the same elements, thereby reducing the effectiveness of comparing individual ratios with average ratios.

CONCLUSIONS AND RECOMMENDATIONS

Ratio analysis, as presented here, is an applicable managerial tool which can be, and should be, utilized by the owners or operators of all forest products industries. It is useful not only in locating present and potential trouble areas, but also in suggesting courses of action to take in everyday management of operations.

Emphasis in the future should be placed on the installation and maintenance of adequate record keeping practices. In an attempt to assist in reducing or eliminating the limitation to the use of ratio analysis which arises from poor record keeping practices, a Forest Products Business Record Keeping Book has been developed by the Cooperative Extension Service of the Department of Forest Products at Michigan State University. Should this record keeping system prove to be widely accepted, it would not only improve the quality and quantity of information available to the owners or operators, but would also provide a standard set of records which would lend themselves more readily to industry-wide ratio analyses, such as this one. Acceptance of this record keeping system would also further the possibilities of economically securing the benefits available through the group useage of electronic data processing.

As a final conclusion, no statistical study or ratio analysis will ever substitute for management judgement. Ratios will not provide solutions to problems nor dictate successful operating policy. Ratios are helpful in measuring the performance of a business and in locating

potential or present trouble areas. In addition, the knowledge of what others in the same line are doing can be of real assistance in making decisions. This knowledge can be gained by the use of studies, such as this one, which yield averages for a group of comparable businesses. Beyond this, it is up to the individual managers to initiate effective action.

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