



The University of Georgia

Center for Agribusiness and Economic Development

College of Agricultural and Environmental Sciences

Feasibility of Small Log Saw Mill in Telfair County, Georgia

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FEASIBILITY OF A SMALL LOG SAWMILL IN TELFAIR COUNTY, GEORGIA

Introduction

The Center for Agribusiness and Economic Development (CAED) was contacted concerning an analysis of the feasibility of a small log saw mill in central Georgia. Mr. Albert Glass of Eastman, GA is interested in retrofitting a now closed saw mill with the aim of using small diameter logs as a source of dimension lumber while also producing wood chips, shavings and bark. Mr. Glass provided significant financial and technical information upon which this study is based. CAED supplemented information where available and appropriate. The results of the analysis are dependent upon the accuracy of the information obtained.

The Company

Telfair Lumber Company (TLC) proposes to construct and operate a saw mill near Lumber City, Georgia, that will specialize in producing graded lumber from small diameter logs. The concept is to purchase relatively low valued small logs in the range of 5 to 8 inch butt diameter and saw out dimension lumber in the range of 1x4 to 6x6 inch sizes. Co-products include bark, most of which will be burned to produce steam for the kilns, chips from the off-fall to be sold to the pulp market, and shavings from the planing process to be sold to the horse bedding market or other available markets.

The facility will be located on the site of a now closed wood products operation. Some of the existing facilities will be used as is, but a major upgrade of facilities will be needed. The proposed saw mill will be a state-of-the-art computer-based facility that uses a scanner system to determine optimum cut-out given the log size, shape, and market price for all possible grades of lumber that can be obtained. This system strives to optimize the lumber income from each individual log while minimizing co-product production.

Company Ownership

Telfair Lumber Company will be organized as a limited liability corporation with investors owning a share of the company equal to their share in the total investment. Governance will be by a board of directors. The organizer intends to solicit ten initial owners each contributing \$100,000. Additional funding will be secured through grants and debt financing.

Company History

Some five years ago a group of investors attempted to build a small log sawmill utilizing small diameter stems to produce lumber to be sold into the wood treating industry. The venture ultimately failed for several reasons, many of which are the standard reasons most start up companies fail: lack of capital, poor business vision, and poor planning. Probably the most important reason for this failure was neglecting to contract with professional mill designers to layout the total mill design.

Telfair Lumber Company will be dedicated to using state- of-the-art mill design and construction. The company will employ small log sawmill design professionals to guide the construction with the goal of maximum production at minimum operating cost. TLC will use proven techniques in the design and operation of the mill and will employ professional mill managers with extensive experience in sawmill operations. Due to downsizing, closings, and acquisitions in the forest industry, TLC feels the professional as well as typical mill employees with experience will be available for employment

Company Facilities

The facility will be located just off Highway 341, a major travel corridor through southeast Georgia. The site once housed a sawmill operation. Existing facilities at the site include about 50 acres of land, a rail spur to the Southern Railroad line, an office, break room/bath room building, a shipping office building, a shop building, six metal bulk storage buildings totaling 90,000 square feet. four kilns of approximately 310,000 board feet, and a water treatment facility. This site will require \$100,000 in investments to update and bring it into useable condition. See Appendix for a layout brochure of the site.

The manufacturing process will use state-of-the-art techniques to achieve very high production rates thereby reducing the per unit manufacturing costs of the lumber. The result will be a facility designed to operate below the average cost of competitors in the industry.

The mill will use the latest technology to achieve its low cost and high yield. The logs will be scanned as they enter the mill. A central computer uses the scan data to control the manufacturing processes. Market data such as demand and price for various products will be input into the system to control production to maximize revenue. Automation reduces labor to a fraction of a traditional sawmill. The operating process will allow faster operating rates than are typically achieved. The logs are separated into batches based on diameter. Logs with size variation of less than one-half inch are processed together. The consistent logs size requires only micro adjustments by the saw heads between logs. This allows closer spacing of logs, with inches instead of feet between the logs, as they travel through the mill. The logs are in effect “ribbon fed” through the mill allowing extremely high production rates using only small logs.

The proposed TLC sawmill can produce graded lumber from this pulpwood. Using technology and equipment developed in Sweden and Canada, the mill can run very efficiently on small diameter logs. The objective is to manufacture lumber at a cost under \$300.00 per thousand board feet (mbf) and be competitive in the industry (see notes at end of Financial Section for details of projected costs). For comparison, typical operating costs at chip-n-saw mills normally run about \$285.00/mbf and some large log mills, because of their inherent inefficiencies, run about \$325.00/mbf or higher.

Feedstock for the Mill

Pine sawmills in the south traditionally run on large logs. Logs with a diameter of 14 to 34 inches are becoming increasingly scarce and competition for them has intensified. The result has been upward pressure on prices. Saw logs are now selling from \$50-\$70 per ton delivered to the mill. Conversely, an abundant supply of pine pulpwood as a result of strong reforestation programs by major paper companies and government incentive programs such as the CRP program has pressured pine pulpwood prices. Pine pulpwood is defined as pine timber with a large end size of 8 inches or less. The price for this pulpwood material is now \$23-\$29 per ton delivered to the mill.

The annual capacity of the mill operating at one shift per day is 330,000 tons of round wood. Most of the round wood purchased would come from thinned pine plantations within a 50 mile radius of the plant. Given a typical thinning of young pine plantations of about 200 stems per acre, the plant would use the product of about 6,550 acres. Operation at two shifts per day would require the product from about 13,100 acres. There is ample acreage of young pine plantation within a 50 mile radius as documented in the Appendix. Available acreage is in excess of 1,000,000 acres.

The pine resource in the mill area is considered to be abundant. Supply studies confirmed this assumption and include four sources of information. First, The Forest Inventory and Analysis program is a coordinated effort in Georgia by the US Forest Service Southern Research Station and the Georgia Forestry Commission. This data is compiled using field measurements of inventory plots within the specific proposed timber procurement zones. The compiled data is from 2003. The second service is the Timber Product Output report, also a coordinated effort on the USFS Southern Research Station and the Georgia Forestry Commission. This data provides estimates of timber removals and production of finished products based on a biennial industry survey. The estimates in this report are for the 2003 calendar year. Also consulted is a report entitled *Analysis of Wood Supply Sustainability, including* at all county locations in Georgia, by Dr. Chris Cieszewski and Shangbin Liu, Warnell School of Forest Resources, University of Georgia, 2005. Finally, the data in "An Estimate of Forest Resources to Supply a Small Log Sawmill in Lumber City, Georgia", by Nathan McClure, Georgia Forestry Commission, January 12, 2006.

The preferred input is southern yellow pine that has reached the age of at least 16 years. The gate specifications for minimum lengths and diameters for log tops and butts is as follows:

- 24 ft. minimum length
- 4 in. minimum top diameter
- 2 in. maximum sweep per 10 ft. length
- no cankers or forked trees

PRODUCT - TLC plans to offer variety of processed wood products.

Lumber: Lumber is the main value product from operations at TLC. The dimensions will consist of 1x4, 2x4, 3x4, 4x4, 6x6, 1x6, 4x6, in lengths of 8 to 12 feet. The optimum grade will be #2 and better, with some #3 and #4 downfall. Estimates for yields would be 85% #2 or better and 15% for grades 3 and 4. It is assumed that the lower grades will sell at a discount of 60% of the value of the higher grades.

Bark: Bark is the second largest co-product in a sawmill operation. Bark is a much sought after product in the fuel and landscaping business. Prices for bark FOB mill are about \$16 to \$18/ton. Telfair Lumber Co. will use approximately 80% of the bark generated to produce steam for drying lumber in the kilns.

Chips: Chips are the largest by-product in a sawmill operation. Presently the main market for chips is the pulp and paper manufactures. Telfair Lumber Co. will be working diligently to create additional markets for its chips. Some emerging markets might include, B to G (Biomass to Gas), conversion, cellulose to ethanol, torrefication, wood floor manufacturing, and the composite lumber manufacturing, where siding or molding and furniture is manufactured using wood and polypropylene. Telfair Lumber Company's business plan is based on chips sold in today's market to the pulp and paper manufactures.

Shavings: Shavings produced from lumber planning have a good market for horse bedding in the Central Florida area. The shavings market is presently at \$27/ton FOB mill. Shavings, as with chips, can also be used in the manufacturing process of several secondary products including artificial fire logs, bagged animal litter, and medium density fiber board.

Markets

The US market for lumber is approximately 70 billion board feet per year. This market operates as a commodity market. There are many buyers and sellers. The US lumber market will continue to grow according to industry and government reports. The demand for wood in construction for single family homes will rise at 3% per year through 2010. The US lumber market will grow at a faster pace in the US south than any other region. The popular use of southern yellow pine in treated products will increase the demand. Also, lumber cost as a percentage of the cost of a new home has decreased. In 1978, the lumber component of a new home cost 4.92% of the home's value. By the year 2000, the relative cost had decreased to only 2.3% of the home's value. Thus, it is anticipated lumber's lower relative cost will increase its use in future home construction.

Generally, lumber is sold according to its dimension and grade, and is price-tracked by organizations such as Random Lengths, Global Wood, Wood Web, et al. Potential buyers of lumber manufactured at Telfair Lumber Company would include remanufacturers, truss companies, exporters, pressure treaters, and lumber wholesalers among others. Manufactured lumber is often sold using a lumber broker firm or an in-house company sales team. A brokerage firm will charge in the range of 2% to 3% to handle sales and will offer to settle accounts in less than 30 days. Some brokerage firms also offer insurance on sales in order to guarantee payment. Initially, Telfair Lumber Company will use a lumber broker but will also train a lumber sales team for use by the second year of operation.

The wood chips, shavings, and sawdust generated by TLC can be marketed to generate revenue. Pine chips, shavings, and sawdust can be used as animal bedding and or litter products in both the pet and livestock markets. There are a number of potential uses in the pet industry as litter products for birds, cats, dogs, small animals (mice, hamsters, gerbils), reptiles, and amphibians.

The livestock market offers significant potential as well as bedding materials for stalled horses and cows as well as for many commercial poultry operations. Bulk sales to large buyers of material might include owners, breeders, or producers of livestock such as poultry, goats, swine, horses, or cattle. The potential for bedding material in the large animal market rivals that of the pet market but requires less handling and further processing to access and does not have to be packaged. For example, horse stalls are cleaned on a regular basis and poultry houses are turned every 8 weeks, requiring large quantities of shavings.

A second market for the TLC's chips, shavings, and related wood residues might be in the secondary wood products market. These products could be used to make products such as particleboard, fireplace logs made of sawdust and wax or starch, fuel pellets, and molded products. Wood shavings can also be used as packing material and in gift packaging where "all natural" products are being marketed.

Marketing Channels

Lumber is typically sold FOB mill with trucking paid by the purchaser. Bark and shavings will be sold FOB mill or if a better price is available, TLC will haul to the buyer's location. This business plan will assume all bark not burned on site is sold FOB mill at \$16/ton and all shavings will be sold at \$27/ton.

Chips that are sold to paper manufacturing plants will incur a freight cost of \$0.11 per ton per mile. It is unknown what percent of chip production will be sold to any one paper manufacturing facility. For this exercise, an average truck haul of 80 miles with the production of chips at 207,900 tons will be used. Estimated cost of trucking chips is approximately \$1.5 million per year. TLC will use hired trucking to move its product to buyers.

Strategic Alliances

INCOMPLETE

Pricing Strategies

TLC will compete in a commodity business in that their products will be undifferentiated from competing products. TLC will be providing a line of products (lumber, wood chips, pine bark, and shavings) with a market-determined value. These products will meet uniform product standards, specifically in the case of lumber. TLC's products will have to adhere to market requirements of uniform quality similar to that produced in large quantities by many different producers. As a result, TLC's products will be perceived as being identical to the products being produced by competing businesses.

As a result of operating in a commodity market, TLC will have to rely on market forces to determine product pricing. These prices will be variable and may fluctuate often. Sawmills report prices on a daily basis and these reports are what determine the price of sawn lumber products. As a result, TLC is ultimately a price taker unless it can develop strategic relationships with buyers and develop a client-specific pricing strategy.

Prices reflect the supply and demand for dimension lumber and co-products of chips, shavings, and bark. Price levels within the industry are typically based upon prices cited by industry agencies such as Random Lengths, a price collection and dissemination service. Sales are quoted from the prices reported. TLC will also maintain steady contact with buyers and aggressively seek new buyers.

Marketing Plans

Manufactured lumber is either sold using an outside lumber brokerage firm or in-house by a company sales team. Brokerage firms typically charge 2% to 3% of sales to handle transactions and usually settle accounts in less than 30 days. Some brokerage firms also offer insurance on sales in order to guarantee payment. Telfair Lumber Company will ultimately hire or train a lumber sales team and acquire the insurance to cover losses associated with selling. However, initially TLC will contract with a lumber broker to handle sales, provide sale insurance, and collect receivables.

Product quality will be assured by regular inspections conducted by regulatory agencies including the Timber Product Inspection Bureau and the Southern Pine Inspection Bureau.

Competition and Industry Analysis

The global lumber industry is in transition. There is a definite shift to higher mechanization to achieve lower unit cost. The availability of premium saw logs is diminishing. Competition is keen from several areas of the world. The harvest of pine plantations is increasing and will double during the next ten years. The log size from these plantations is smaller on average than logs from natural grown forests.

A shakeout is occurring in the old line large log mills. Many of the mills that have not upgraded their equipment to run a smaller log efficiently will not be competitive. Competitive pressures are coming from all over the globe including South America and southeast Asia. However, Canada will play a less important role in future production than in the past. In the last five years, over 50% of the closures of North American softwood sawmills have occurred in British Columbia. Since 1995, the North American softwood lumber industry has experienced a net loss of 39 mills.

To date, softwood sawmills have been increasing lumber production primarily by mill upgrades. In the future, new mills will be constructed using improved utilization technology to increase production and lower cost.

TLC is operating in a very competitive industry. This is evident by the number of sawmills across Georgia making products that will directly compete with TLC. Using information obtained from the 2006 Georgia Wood-Using Industries and Forest Products Marketing Directory, it is possible to estimate the number of competing companies. However, this number does not include competitors in South Carolina and Florida. These figures are estimates since TLC's product line spans a number of different industry codes. Not all of the companies in each of the three categories will be competing with TLC.

Three main categories are:

- Cut Stock, Resawing Lumber, and Planing (NAICA 321912) - 39 companies
- Logging, including Chipmills (NAICS 113310) - 98 companies
- Sawmills, including Pole Mills - (NAICS 321113) - 149 companies

In the southeast Georgia area, there are 18 softwood sawmills. The following counties have at least one softwood sawmill. Given this level of competition, TLC will have to compete on price to enter the market.

Table 1. Competing Facilities	
County	Number of Softwood Mills
Appling	2
Bacon	1
Ben Hill	1
Bullock	2
Clinch	3
Crisp	1
Emanuel	1
Evans	1
Houston	1
Irwin	1
Jefferson	1
Laurens	1
Montgomery	1
Pierce	1
Total	18
Source: Georgia Wood-Using Industries and Forest Products Marketing Directory, 2006.	

Strengths

INCOMPLETE

Weaknesses

INCOMPLETE

Keys to Success

The keys to success in this business are:

1. Procure pulpwood logs on a best cost basis.
2. Produce a quality lumber product with minimum waste and loss.
3. Reach and maintain high volume levels through mill at all times.
4. Ship all lumber orders on time.

Long -Term Plans

It is the intent and desire to develop a **forest products incubator center** at the mill location. Telfair Lumber Company would like to attract other forest product companies that can utilize co-products created at TLC. Adjacent to the mill location is the former Americord Plant, which closed several years ago. The buildings, measuring approximately 200,000 sq. ft. of space, and more than 200 acres of land were left to the town of Lumber City. The Lumber City Industrial Park also has three industrial spec buildings on a 300 acre industrial park. Telfair Lumber Company has planned to add co-generation of electricity to supply not only electricity for its own use but to offer electricity to companies interested in moving to Lumber City. The forest products industry is changing rapidly and TLC will be in a position to capitalize on new market trends by having a large unused facility adjacent to its operation and by-products that can be utilized to make higher value products. TLC is looking forward to possible vertical integration into new products as research and development progress.

Future potential plans could involve attracting businesses that could use the by-products of the saw mill. Two examples of operations that would be complementary to the saw mill would be an operation to convert sawdust, chips, and shavings into ethanol. Cellulosic ethanol conversion is a technology cited by President George W. Bush as one of the resources the US could tap to create energy to run our economy.

A second example is using waste wood as a feedstock for the production of artificial petrified wood. Researchers have developed a process to create two new ceramic materials that are laboratory versions of petrified wood. These materials combine the hardness of metal with the high surface area of carbon to form metal carbides that are stronger than steel and can withstand temperatures to 1,400 degrees Celsius. The original cellulose structure of the wood acts as a template. This product is used for advanced catalyst technologies, as well as for cutting tools, abrasives, and coatings.

Detailed Cost and Description of Needed Capital Improvement

The proposed site for the facility is approximately 50 acres in size located on a rail spur and Hwy 341, a major route through south central Georgia. There is considerable infrastructure on the site readily adaptable to the proposed venture since it was the location of a now closed saw mill.

The appendix contains a brochure detailing the facility. In short, it contains several buildings, kilns, and utilities needed for the venture.

In addition to the existing facilities, TLC projects a need for the following items to begin processing:

Table 2. Facility Assets	
Physical Plant Assets	Cost
Truck Scales	\$ 170,000
Unloading crane	\$ 205,000
Infeed log deck	\$ 80,000
Stem singulator	\$ 145,000
Log trough	\$ 480,500
310 knuckleboom log handler	\$ 85,000
Cut-up saw x4	\$ 60,000
Log singulator x2	\$ 157,000
Log decks x5 for computered logs	\$ 325,000
Belt feed trough 100 ft	\$ 25,000
In-feed to sawmill	\$ 30,000
Stem/Log handler contingency	\$ 500,000
Dust bins	\$ 200,000
Bark bins	\$ 300,000
Chip bins	\$ 300,000
Cambio ring debarker x2	\$ 500,000
Log kickers and transfer decks	\$ 60,000
Scanners x3	\$ 80,000
Saw mill	\$ 1,200,000
Lumber transfer decks	\$ 350,000
Drop-out conveyors	\$ 50,000
Lumber stackers	\$ 225,000
Miscellaneous	\$ 360,000
Roll-out package deck	\$ 60,000
Bark hog	\$ 20,000
Rail spur	\$ 280,000
Buildings	\$ 300,000
Boiler upgrade	\$ 1,000,000
Generator	\$ 1,000,000
sub total	\$ 8,547,500
Contingency @ 15%	\$ 1,282,125
sub total	\$ 9,829,625
Land purchase	\$ 1,000,000
Consulting/engineering	\$ 400,000
Construction cost	\$ 2,500,000
Total Capital Outlay	\$ 13,729,625

Financial Analysis

Pro forma financial statements were prepared for this project based on the following assumptions.

General Assumptions:

Several general assumptions were made in modeling this proposed venture. For the plant to run one shift at full capacity, 330,000 tons of green round wood would be required per year. One of the first assumptions is the turnout of dry lumber board feet (bf) from green round wood. It is assumed that each ton of green round wood results in 120 bf of dry lumber. However, some waste or loss is to be expected from the purchased round wood. Assuming a 5% loss this plant would produce 37,620 mbf of dry lumber per year running at full capacity.

It is assumed that over the first few months, operation will gradually increase and peak at 95% by the sixth month of operation. It is expected that in the first month operations are at 50% capacity, 75% by month two, and gradually increasing thereafter. Given this gradual start-up expected in year one, the overall operating capacity for the year is 87% for a total of 32,761 mbf of lumber. Considering the potential of unexpected downtime, the plant is expected to operate at a maximum of 95% capacity for years two through five. It is also assumed that a second shift will be added after year one, effectively doubling production operations.

Revenue:

Revenue sources include pine lumber, pine bark, pine chips, and pine shavings. It is expected that each ton of green pine round wood will turn out 30% green lumber, 5% bark, 2% shavings, and about 60% chips. As stated above, the 30% green lumber from each ton of round wood is estimated to result in 120 bf of dry lumber. By-products for each ton of pine round wood processed include 100 lbs. of bark, 40 lbs. of shavings, and 1200 lbs. of chips.

Lumber sales are expected to comprise about three-quarters of the total revenue generated. The lumber is projected to be 85% grade #2 or better and 15% grade #3 & 4, which would be discounted by 40% off grade #2 prices. Given these assumptions, a composite price was calculated for various southern yellow pine kiln-dried lumber products based on April 2006 Random Lengths Price Guide as detailed in the table below. The composite price for all projected lumber products was \$374.73 per thousand board feet.

The table also shows the projected distribution of the lumber produced by dimension. Sixty-four percent of the lumber produced is expected to be 4x4s and sold at \$415 per thousand board feet. The second highest source of revenue within the lumber sales is from 2x4s which comprise 16% of the production at a price of \$354 per thousand board feet. Fourteen percent of the lumber produced is expected to be 1x4s at a price of \$210 (sold wet), and three percent each of 4x6s and 6x6s at a price of \$355 and \$420 per thousand board feet respectively. Given these prices and production distribution, the

overall composite price for lumber is \$375 per thousand board feet in year one. Prices for the various lumber dimensions sold are expected to increase by about 1.6% per year. In year one, the estimated revenue from pine lumber sales is expected to be \$12.28 million dollars operating at 87% capacity. At full capacity, the expected revenue would be \$14.1 million.

Table 3. Composite Lumber Price by Dimension for Southern Yellow Pine Kiln Dried Lumber based on April 2006 Random Lengths Price Guide

Lumber Dimension	Dollars per Thousand Board Feet	<i>Production Distribution by Dimension</i>
6 x 6	\$420	3%
4 x 6	\$355	3%
4 x 4	\$415	64%
2 x 4	\$354	16%
1 x 4	\$210	14%

About one-fourth of total revenue will be generated from by-products of the lumber process. Pine bark will be a source of revenue as well as a source of energy. Twenty percent of the bark will be sold at a cost of \$18 per ton. The other 80% of bark generated will be burned on site to produce energy. Pine chips are to be sold at \$20 per ton in the first year and prices are expected to increase by \$2 per ton in years 2 and 3 and then remain constant over the forecasted period. The final source of revenue is pine shavings which will be sold at \$27 per ton in the first year and then increase to \$29 per ton for the remainder of the forecasted period. Total revenue from these by-products is \$4.03 million at an estimated capacity of 87% in year one and \$4.62 million at full capacity for one shift.

Revenue is expected to be collected within one week for pine bark, shavings, and chips. Terms for lumber sales are net in 30 days. This one month lag for lumber payment is reflected in the cash flow statement.

Expenses:

Expenses for this venture include variable costs for green pine round wood, labor, freight, supplies, equipment rental, repairs and maintenance, insurance, utilities, telephone, internet, office expense, interest on operating capital, and other miscellaneous variable costs. Fixed costs include ad valorem taxes, depreciation, and interest on investment.

Pine pulpwood or green pine round wood will be purchased to produce lumber. It is estimated that this will cost \$28.50 per ton in the first year and increase by \$3 per ton every year thereafter. Expected cost in year one is \$8.19 million at 87% capacity and \$9.41 million at full capacity.

Labor costs consist of salaried and hourly employees. Seven salaried employees will be employed at a cost of \$450,000 in year one. Twenty-five hourly employees are assumed to be employed at an average wage rate of \$15.00 per hour. A payroll expense of 30% of total labor costs has been included to account for payroll taxes, workman's compensation, group insurance, uniforms, 401K contribution and other payroll related costs. Total labor cost for year one is \$1.599 million. After year one, annual increases of 4% have been applied to labor costs. The total number of hourly employees is assumed to double in year two when the plant adds a second shift.

Freight expense is assumed to remain constant at \$7 per ton for chips and bark sold. Total tons of chips and bark for year one is expected to be 183,920 with gradual start-up and 211,200 at full capacity for a cost of \$1.29 to \$1.48 million for freight. The tonnage would increase to 401,280 after year one with the addition of a second shift and 95% overall operating capacity.

Supply expense remains constant across all years at \$30,000. Equipment rent is expected to be \$240,000 in year one and will increase to \$276,000 for years two through five to cover the expense of an additional fork lift needed for the second shift.

Repairs are assumed to be 10% of the purchase value of equipment, \$854,750, in the first year and 15% or \$1.28 million for year two and beyond due to the additional wear and tear from the additional shift of operation. Utilities are expected to double from \$22,000 to \$44,000 in year two with the additional shift.

Insurance, telephone, internet, office expense and other miscellaneous variable costs are assumed to remain constant throughout the forecasted period. The total of these costs is \$172,000 per year. Line item amounts for these costs are included in the detailed pro forma income statement.

Given expected lag time in collecting revenue from lumber sales, it is assumed that in year one operating capital of \$1.28 million will be borrowed to cover one month of operating expenses. Interest expense of \$63,420 will be paid as well as repayment of principal in year one. Analysis shows that an operating loan will not be necessary after year one.

Fixed costs for all years include ad valorem taxes of \$15,000 per year, depreciation expense of 20% of the total value of machinery and equipment, or \$1,709,500 per year, and interest on investment. It is assumed that 75% of the total investment will be financed at 9% interest for 10 years. Total interest on investment for year one is \$899,740 and declines gradually each year as the principal balance declines.

Analysis:

A summary of total revenue, expense, and resulting net income is shown in the table below. Total revenue forecasted for year one at 87% operating capacity is \$16,302,768. Total expenses are \$15,083,038 for a net income of \$1,219,730. In year two when operating at 95% capacity with two shifts, net income is forecasted to be \$7.21 million. In years three through five, round wood and labor expenses increase at a greater percentage than the increase in unit value of goods sold. The resulting net income for those years is \$6.51 million, \$5.02 million, and \$3.53 million respectively.

Table 4. Summary Profit & Loss Statement

	1	2	3	4	5
Total Revenue	\$16,302,768	\$36,848,888	\$38,070,919	\$38,502,929	\$38,934,940
Total Expense	\$15,083,038	\$29,642,912	\$31,564,323	\$33,483,676	\$35,400,544
Net Income	\$1,219,730	\$7,205,976	\$6,506,596	\$5,019,253	\$3,534,396

A detailed income statement for the first year of operation assuming one shift at 100% capacity is included on the following page.

The resulting return on total investment for year one is 9% with the plant operating at 87% capacity. When 100% capacity is assumed, the return on investment increases to 16%, *ceteris paribus*. It is assumed that the owners contribute 25% of the projected total investment or about \$3.43 million. The return on owner's equity (ROE) results in a higher ratio since the effects of debt financing are taken into account. At the estimated actual operating capacity of 87%, the ROE is estimated to be 36% and increases to 65% when full capacity is considered in year one.

The debt to equity ratio for end of year one is 238% which indicates the company's intent to use a high percentage of borrowed funds to finance its activities. The ratio indicates that for each \$1 invested by owners, \$2.38 was be raised from creditors. In years 2 through 5, this ratio declines considerably to 136%, 108%, 94%, and 88% respectively. As the debt to equity ratio declines, so does the potential for financial distress if earnings do not exceed the cost of borrowed funds.

Balance Sheet and Statement of Owner Equity:

A balance sheet is also presented to show the company's financial position at the end of each year of the forecasted period. Assets include cash, accounts receivable, property, plant, and equipment less accumulated depreciation. Accounts receivable represent one month of lumber sales since lumber revenue is due within 30 days of delivery. Liabilities include long-term financing of the capital investment. Owner equity includes the capital contributions from potential owners and retained earnings. The potential owners plan to invest 25% of the total investment cost, or \$3,432,406. Retained earnings include net income less any dividends paid. It is assumed that one half of the net income will be declared as dividends each year and the remainder will be added to the retained earnings. A summary of the balance sheet for years 1 to 5 is shown below.

Table 5. Summary Balance Sheet for Forecasted Period Year End

Year	1	2	3	4	5
Total Assets	\$13,673,940	\$15,432,919	\$15,621,889	\$14,956,491	\$13,430,960
Total Liabilities	\$9,631,669	\$8,903,686	\$8,107,414	\$7,236,445	\$6,283,774
Owner Equity	\$4,042,271	\$6,529,233	\$7,514,475	\$7,720,046	\$7,147,186
<u>PRO FORMA INCOME STATEMENT for Telfair Lumber Company, LLC.</u>					
Operating Capacity:	<u>100%</u>				
				<u>Annual</u>	
<u>Revenue</u>		<u>Unit</u>	<u>Unit Value</u>	<u>Volume</u>	<u>Value</u>
Pine Lumber		MBF		37,620	\$14,097,186
6x6	3%	MBF	\$419.95	1,129	\$473,950
4x6	3%	MBF	\$354.94	1,129	\$400,590
4x4	64%	MBF	\$414.63	24,077	\$9,983,060
2x4	16%	MBF	\$354.38	6,019	\$2,133,084
1x4	14%	MBF	\$210.09	5,267	\$1,106,502
Pine Bark for Sale	20%	Tons	\$18.00	3,300	\$59,400
Pine Chips (Includes % Non-Lumber Grade)		Tons	\$20.00	207,900	\$4,158,000
Pine Shavings		Tons	\$27.00	15,048	\$406,296
Value of Bark and waste burned	80%	Tons	\$18.00	13,200	\$237,600
Total Revenue					\$18,720,882
<u>Expenses</u>					
Green Pine Round wood		Tons	\$28.50	330,000	\$9,405,000
Labor					\$1,599,000
Salaried Labor		7			\$450,000
Payroll Labor		25	\$15.00		\$780,000
Payroll Expense		30%			\$369,000
Freight - chips and bark		Tons	\$7.00	211,200	\$1,478,400
Supplies					\$30,000
Equipment Rent					\$240,000
Repairs - 10% of purchase value		10%	\$8,547,500		\$854,750
Insurance					\$80,000
Utilities					\$22,000
Telephone					\$20,000
Internet					\$20,000
Office Expense					\$12,000
Interest on Operating Capital		9%	\$1,283,346		\$63,420
Other					\$40,000
Taxes - Ad Valorem					\$15,000
Depreciation – 20% of value		20%	\$8,547,500		\$1,709,500
Interest - 75% of investment	120	9%	\$13,729,625		\$899,740
Total Expenses					\$16,488,810
Net Income					\$2,232,072

Statement of Cash Flow:

A statement of cash flow was included in the analysis to provide information about cash receipts and disbursements as they relate to operating, investing, and financing activities of the business. A monthly cash flow statement was prepared for year one. Annual cash flow statements were prepared for the remainder of the forecasted period.

For the first month of operation, cash receipts include capital contributions from owners, proceeds from loans (operating and long-term) for capital investments, and revenue from sale of by-products including pine bark, chips and shavings. Revenue generated from the sale of lumber is not reflected in the cash flow statement until one month after the sale since buyers are given thirty days to pay.

Cash outflows including variable and fixed costs, as well as dividends declared and paid are accounted for in the statement of cash flow. These costs are represented on a monthly basis for year one and annually thereafter. Given the operating capital borrowed to cover one month of operating expenses at full capacity, the cash on hand remains positive throughout year one even though months two and three result in a deficit when considering total cash in and out for the month.

Annual cash flow statements show the change in cash resulting from operations, investment, and financing as detailed in the table below. At the end of year one, total cash on hand is estimated to be \$537,788. For years two through five, the cash on hand is expected to increase to \$2.85 million, \$4.72 million, \$5.72 million, and \$5.87 million, respectively.

MONTHLY CASH FLOW PROJECTION for YEAR 1

<u>Cash Receipts</u>	<u>1st Month</u>	<u>2nd Month</u>	<u>3rd Month</u>	<u>4th Month</u>	<u>5th Month</u>	<u>6th Month</u>	<u>7th Month</u>	<u>8th Month</u>	<u>9th Month</u>	<u>10th Month</u>	<u>11th Month</u>	<u>12th Month</u>	<u>Annual</u>
Beginning Cash Balance	0	535,458	244,542	221,235	230,585	272,590	347,252	480,652	614,053	747,453	880,853	1,014,253	
Capital Contributions	3,432,406												3,432,406
Proceeds from Loans	11,580,565												11,580,565
Pine Lumber		587,383	881,074	939,812	998,551	1,057,289	1,116,027	1,116,027	1,116,027	1,116,027	1,116,027	1,116,027	11,160,272
Pine Bark	2,475	3,713	3,960	4,208	4,455	4,703	4,703	4,703	4,703	4,703	4,703	4,703	47,025
Pine Chips	173,250	259,875	277,200	294,525	311,850	329,175	329,175	329,175	329,175	329,175	329,175	329,175	3,291,750
Pine Shaving	16,929	25,394	27,086	28,779	30,472	32,165	32,165	32,165	32,165	32,165	32,165	32,165	321,651
<u>Total Cash In</u>	\$15,205,625	\$876,364	\$1,189,321	\$1,267,324	\$1,345,328	\$1,423,332	\$1,482,070	\$1,482,070	\$1,482,070	\$1,482,070	\$1,482,070	\$1,482,070	\$29,833,669
<u>Cash Outflow</u>													
<u>Variable Expenses</u>													
<u>Green Pine Roundwood</u>	391,875	587,813	627,000	666,188	705,375	744,563	744,563	744,563	744,563	744,563	744,563	744,563	8,190,188
Labor	133,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	1,599,000
Freight - chips and bark	61,600	92,400	98,560	104,720	110,880	117,040	117,040	117,040	117,040	117,040	117,040	117,040	1,287,440
Supplies	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	30,000
Equipment Rent	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	240,000
Repairs - 10% of new value	71,229	71,229	71,229	71,229	71,229	71,229	71,229	71,229	71,229	71,229	71,229	71,229	854,750
Insurance	6,667	6,667	6,667	6,667	6,667	6,667	6,667	6,667	6,667	6,667	6,667	6,667	80,000
Utilities	1,833	1,833	1,833	1,833	1,833	1,833	1,833	1,833	1,833	1,833	1,833	1,833	22,000
Telephone	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	20,000
Internet	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	20,000
Office Expense	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
Interest on Operating Capital	9,625	8,856	8,080	7,299	6,512	5,719	4,920	4,116	3,305	2,488	1,665	835	63,420
Other	3,333	3,333	3,333	3,333	3,333	3,333	3,333	3,333	3,333	3,333	3,333	3,333	40,000
Taxes	1250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	15,000
Interest - 75% of investment	77,229	76,830	76,428	76,023	75,615	75,204	74,789	74,372	73,951	73,528	73,101	72,671	899,740
Total Variable	784,725	1,010,294	1,054,464	1,098,625	1,142,778	1,186,921	1,185,708	1,184,486	1,183,254	1,182,014	1,180,764	1,179,505	13,373,538
<u>Fixed Expenses (Financing)</u>													
Operating Loan Principal Pmt	102,605	103,375	104,150	104,931	105,718	106,511	107,310	108,115	108,926	109,743	110,566	111,395	1,283,346
Loan Principal Payment (9%, 10 yrs)	53,212	53,611	54,013	54,418	54,826	55,237	55,652	56,069	56,489	56,913	57,340	57,770	665,550
Facility Construction	13,729,625												13,729,625
Total Fixed Expense	13,885,442	156,986	158,163	159,349	160,544	161,749	162,962	164,184	165,415	166,656	167,906	169,165	15,678,520
<u>Total Cash Out</u>	\$14,670,167	\$1,167,280	\$1,212,627	\$1,257,975	\$1,303,322	\$1,348,670	\$1,348,670	\$1,348,670	\$1,348,670	\$1,348,670	\$1,348,670	\$1,348,670	\$29,052,058
<u>Surplus/Deficit</u>	535,458	-290,916	-23,307	\$9,350	\$42,006	\$74,662	\$133,400	\$133,400	\$133,400	\$133,400	\$133,400	\$133,400	\$781,611
Dividends Declared & Paid												\$609,865	
<u>Cash on Hand</u>	\$535,458	\$244,542	\$221,235	\$230,585	\$272,590	\$347,252	\$480,652	\$614,053	\$747,453	\$880,853	\$1,014,253	\$537,788	

Pro Forma Statement of Cash Flows for Telfair Lumber Co., LLC.

Operations:	<i>Begin Year 1</i>	<i>Year End 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5</i>
Net Income		\$ 1,219,730	\$ 7,205,976	\$ 6,506,596	\$ 5,019,253	\$ 3,534,396
Depreciation		\$ 1,709,500	\$ 1,709,500	\$ 1,709,500	\$ 1,709,500	\$ 1,709,500
(Increase) Decrease in Accounts Receivable		\$ (1,116,027)	\$ (2,268,055)	\$ (2,304,056)	\$ (2,340,057)	\$ (2,376,058)
(Increase) Decrease in Inventories						
(Increase) Decrease in Other Current Assets						
Increase (Decrease) in Accounts Payable						
Increase (Decrease) in Other Current Liabilities						
Increase (Decrease) in Other Non Current Liabilities						
<i>Cash Flow from Operations</i>	<u>\$ -</u>	<u>\$ 1,813,203</u>	<u>\$ 6,647,421</u>	<u>\$ 5,912,040</u>	<u>\$ 4,388,696</u>	<u>\$ 2,867,838</u>
Investing:						
(Acquisition) of Property, Plant & Equipment		\$ (13,729,625)				
Other Assets						
<i>Cash Flow from Investing</i>	<u>\$ -</u>	<u>\$ (13,729,625)</u>	<u>\$ -</u>	<u>\$ -</u>	<u>\$ -</u>	<u>\$ -</u>
Financing:						
Increase (Decrease) in Short-term Borrowing	\$ 1,283,346	\$ (1,283,346)				
Increase (Decrease) in Long-term Debt	\$ 10,297,219	\$ (665,550)	\$ (727,983)	\$ (796,273)	\$ (870,968)	\$ (952,671)
Increase (Decrease) in Contributed Capital	\$ 3,432,406					
Dividends		\$ (609,865)	\$ (3,602,988)	\$ (3,253,298)	\$ (2,509,627)	\$ (1,767,198)
<i>Cash Flow from Financing</i>	<u>\$ 15,012,971</u>	<u>\$ (2,558,761)</u>	<u>\$ (4,330,971)</u>	<u>\$ (4,049,570)</u>	<u>\$ (3,380,595)</u>	<u>\$ (2,719,869)</u>
Net Change in Cash		\$ (14,475,183)	\$ 2,316,450	\$ 1,862,469	\$ 1,008,101	\$ 147,969
Cash--Beginning of Year		\$ 15,012,971	\$ 537,788	\$ 2,854,238	\$ 4,716,707	\$ 5,724,809
Cash--End of Year		<u>\$ 537,788</u>	<u>\$ 2,854,238</u>	<u>\$ 4,716,707</u>	<u>\$ 5,724,809</u>	<u>\$ 5,872,777</u>

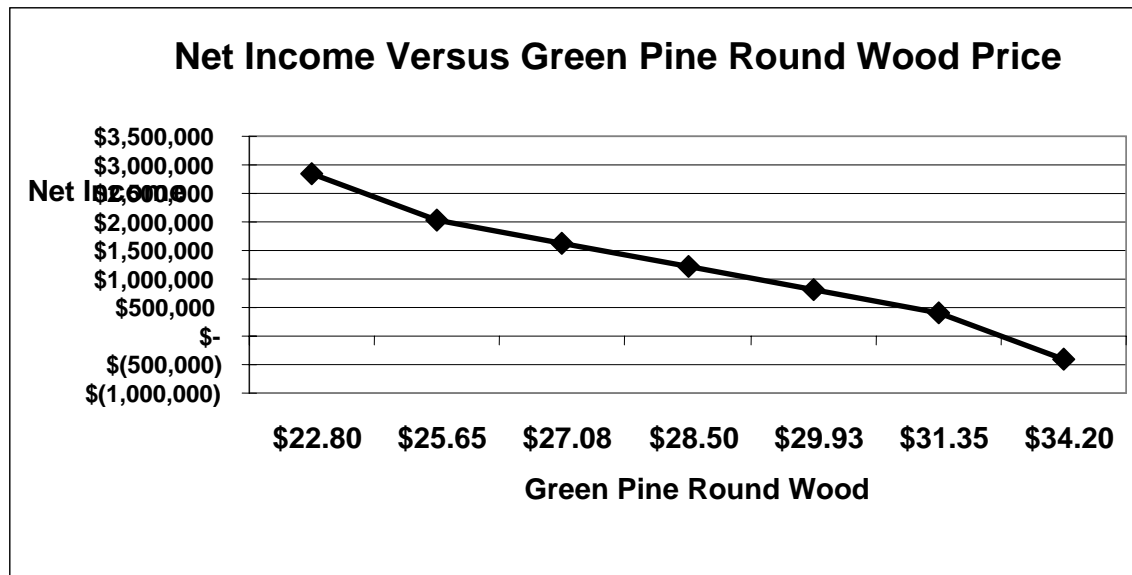
Pro Forma Balance Sheet

	Begin Year 1	Year End 1	Year End 2	Year End 3	Year End 4	Year End 5
Current Assets						
Cash	\$ 1,283,346	\$ 537,788	\$ 2,854,238	\$ 4,716,707	\$ 5,724,809	\$ 5,872,777
Accounts Receivable		\$ 1,116,027	\$ 2,268,055	\$ 2,304,056	\$ 2,340,057	\$ 2,376,058
Inventories						
Other Current Assets						
Property Plant & Equipment	\$ 13,729,625	\$ 13,729,625	\$ 13,729,625	\$ 13,729,625	\$ 13,729,625	\$ 13,729,625
Accumulated Depreciation		\$ (1,709,500)	\$ (3,419,000)	\$ (5,128,500)	\$ (6,838,000)	\$ (8,547,500)
Total Assets	\$ 15,012,971	\$ 13,673,940	\$ 15,432,919	\$ 15,621,889	\$ 14,956,491	\$ 13,430,960
Current Liabilities						
Accounts Payable						
Accrued Expenses						
Line Of Credit	\$ 1,283,346	\$ -				
Long-Term Borrowing	\$ 10,297,219	\$ 10,297,219	\$ 9,631,669	\$ 8,903,686	\$ 8,107,414	\$ 7,236,445
Current Portion of LT Debt		\$ (665,550)	\$ (727,983)	\$ (796,273)	\$ (870,968)	\$ (952,671)
Owner Equity						
Contributed Equity Capital	\$ 3,432,406	\$ 3,432,406	\$ 3,432,406	\$ 3,432,406	\$ 3,432,406	\$ 3,432,406
Retained Earnings		\$ 1,219,730	\$ 6,699,814	\$ 7,335,366	\$ 6,797,266	\$ 5,481,978
Dividends Declared & Paid		\$ (609,865)	\$ (3,602,988)	\$ (3,253,298)	\$ (2,509,627)	\$ (1,767,198)
Total Liabilities & Owner Equity	\$ 15,012,971	\$ 13,673,940	\$ 15,432,919	\$ 15,621,889	\$ 14,956,491	\$ 13,430,960
Debt to Equity Ratio		238%	136%	108%	94%	88%

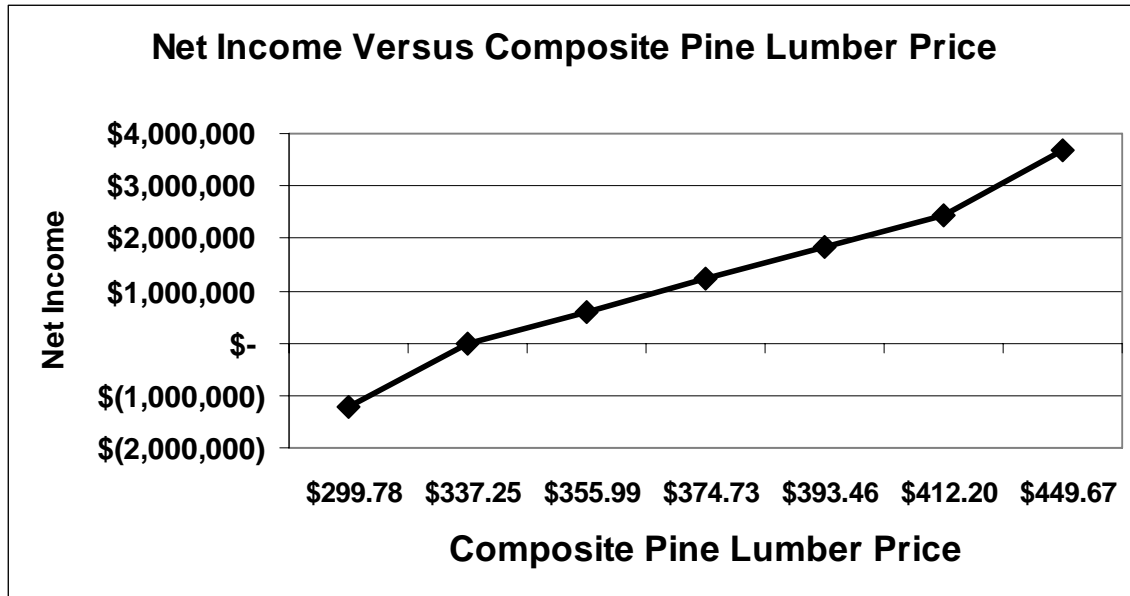
Sensitivity Analysis

The previous section provided an analysis of the proposed venture in static form and with strict assumptions of unchanged parameters. This section explores the impact upon net income when a single parameter is allowed to vary while all others are held constant.

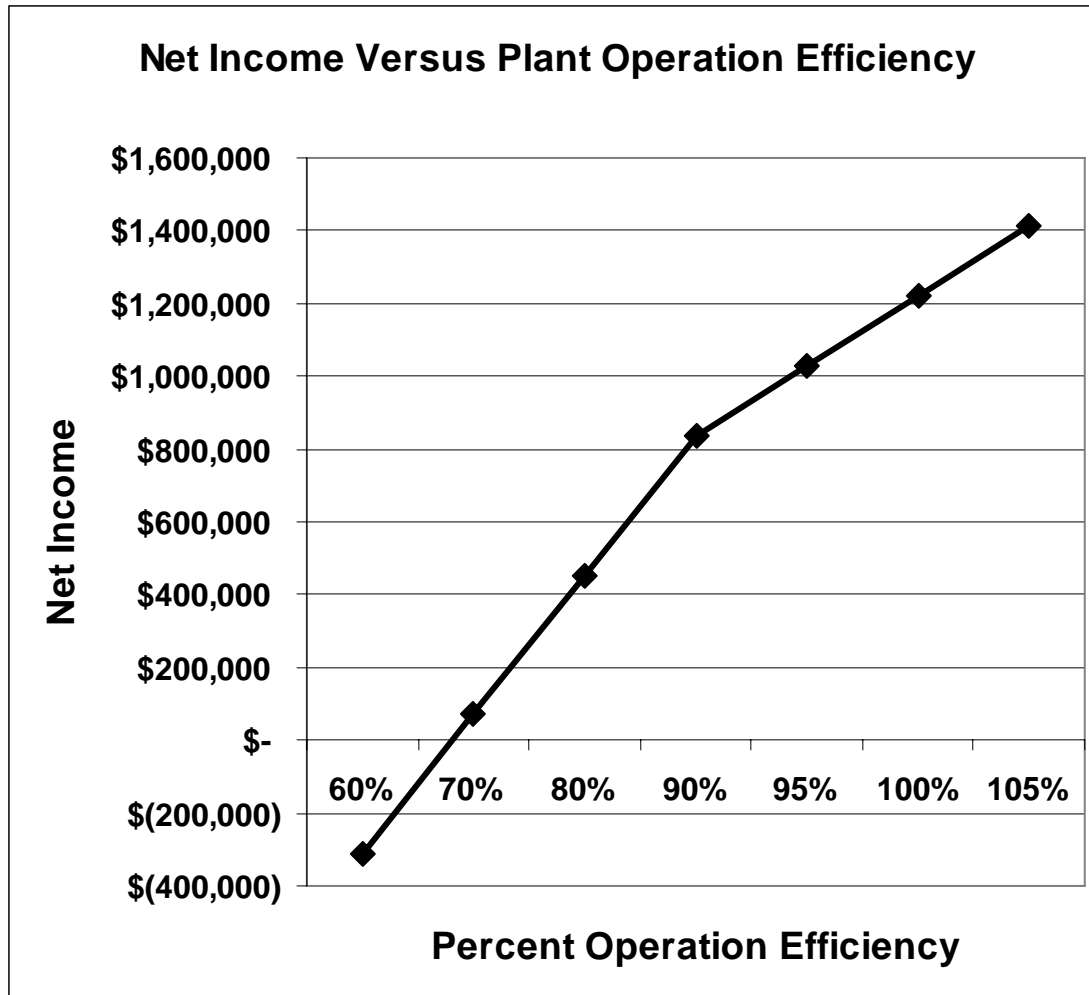
One of the most significant factors impacting net income is the price paid for green round wood. Chart XX demonstrates the relationship between changes in net income and changes in round wood prices. We can observe that net income falls to zero when round wood prices rise to about \$32.80 per ton. This implies that if round wood prices were to rise by about 15%, net income would be zero, illustrating the importance of securing sufficient acceptable round wood without having to pay much above the projected average price.



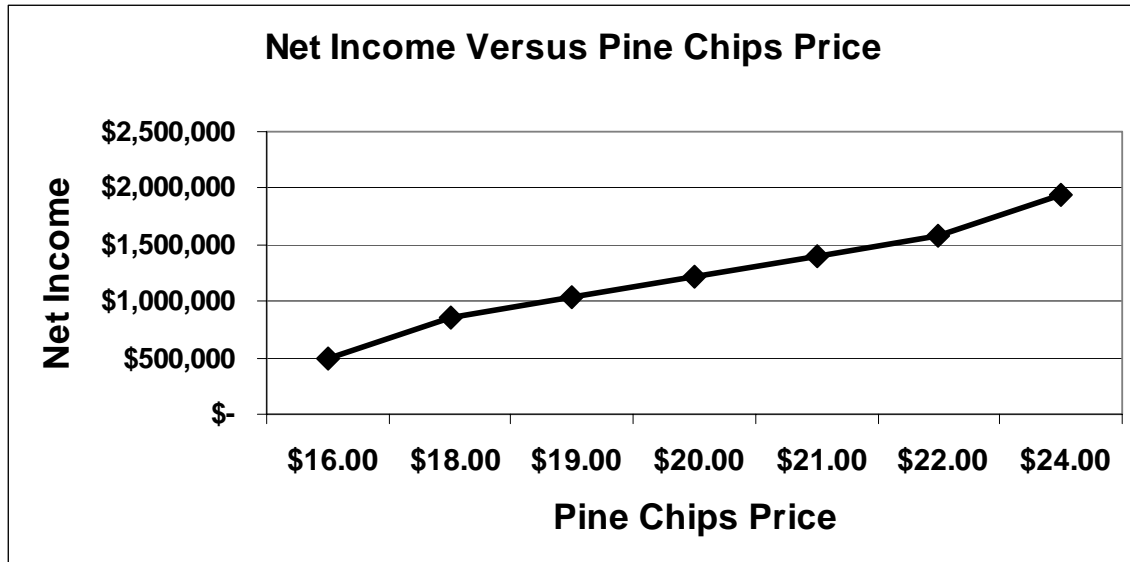
Another very important variable in determining net income is the price of dimension lumber, the primary product of the proposed venture. The following chart demonstrates the relationship between changes in net income and changes in the composite price of dimension lumber. When the composite prices fall to near \$338.00 per thousand board feet, net income falls to zero. This break-even price level is only \$37.00 (or about 10%) below the average composite price, implying that even a modest downturn in market prices would have a significantly adverse impact upon the firm.



A third major factor in determining net income is maintaining operations at projected capacity. Maximizing the through put of product is of utmost importance to generate sufficient revenue to produce net income above costs. The following chart illustrates that relationship. As operation efficiency drops below 70%, net income becomes negative. As a note, the relationship between operation efficiency and net income is direct and proportional even though the chart shows a slight “kink.” The kink is due to a change in the axis measurement increments from 5% to 10%.



The final variable shown is the impact of chip prices on net income. Chip sales are the second largest source of revenue and represent about 22% of total sales income. Thus the price of chips has a large impact on net income.



Concluding Comments

The preceding financial analysis appears to indicate that there is good potential for the proposed venture to generate positive net income. The authors believe there are some unresolved issues that may have negative impacts upon the venture and should be noted.

1. To operate at projected efficiency, the plant would have to handle about 1,825 logs per hour. Two questions are raised: Is there sufficient capital represented to obtain stem and log handling equipment to continuously process at that rate? And, is there sufficient labor projected to handle that volume of product?
2. The calculated cost per thousand board feet of lumber produced is about \$438. The authors feel that this cost estimate is well above the industry average of about \$300 per thousand. This cost disadvantage would place the venture in a precarious position in the event of a down-turn in lumber and/or chip prices.



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J. Scott Angle, Dean and Director