

***Growth in the Value-Added Wood Products
Industry:***

**An Economic Feasibility Study for the Clinch-
Powell Enterprise Community Counties**



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for

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Section I. Overview*

Background and Purpose

This study examines opportunities for development of sustainable value-added wood products industries in the counties that encompass the Clinch-Powell Enterprise Community (Claiborne, Grainger, Hancock, Hawkins, and Union counties). The study focuses on opportunities that may:

- enhance the value-added wood products industry,
- provide employment opportunities for about 30-50 workers, particularly for low income citizens,
- provide returns to the local economy, and
- be environmentally sustainable.

Feasibility of the opportunities examined is based on several criteria. These include production/processing considerations, pricing considerations, financial feasibility, and labor requirements. These criteria are also balanced with concerns for environmental sustainability and capabilities of providing low-income workers with jobs. Feasibility is examined for a:

- Sawmill
- Kiln Drying Operation
- Furniture/Cabinet Blanks Manufacturer, and
- Small Furniture Manufacturer.

*The authors would like to acknowledge the assistance of Dr. Brian Bond, Assistant Professor, Department of Forestry, Wildlife and Fisheries, University of Tennessee, in preparing this study.

Current Wood Products Industry in the Area

The current wood products industry in the area has a wide variety of business types and sizes of firms, from logging to furniture manufacturing. A listing of wood products related firms located in the area, along with their product types, number of employees' category, and sales category for 1999 are displayed in Appendix Table 1. The following provides a description of the current wood products industry in the area.

Primary

Primary wood products producers in the area include 6 logging companies and 26 sawmills and planing mills (Table 1.1). The logging firms generally have 1 to 4 employees. The logging firms appear to have between \$500,000 and \$1 million in sales on average (based on data from Appendix Table 1 and IMPLAN data). The most predominant type of wood product business in the area is sawmills and planing mills. The sawmills and planing mills generally range in size from 5 to 49 employees, with most having between 1 and 4 employees. While value of sales was not available for all firms, around \$1 million in total sales appears to be an average size (based on data from Appendix Table 1 and IMPLAN data).

Secondary

Secondary wood products manufacturers include furniture manufacturers (both non-upholstered and upholstered furniture), flooring mills, kitchen cabinets, wood partitions, wood pallets and skids, millwork, structural wood members, wood preserving, and other wood products (Table 1.1). The size distribution of the furniture manufacturers is very wide in range. England Corsair is the largest, followed by Bush-Line and Oakwood Furniture Manufacturing. These are located in the New Tazewell area. Several moderate and small sized manufacturers are located in the Bean Station area.

Table 1.1. Number and Size Distribution of Wood Products Firms in the CPEC Counties.*

Firm Type	Total Number	Number in Employees Size Category				
		1-4	5-9	10-19	20-49	50 or greater
Carpentry Work	1	1				
Farm Machinery	1			1		
Furniture & Fixtures, NEC	6		1		1	4
Furniture Stores	1	1				
Hardwood Dimension & Flooring Mills	2			1		1
Hardwood Dimension & Furniture Parts	2					2
Hardwood Pulpwood	1	1				
Logging	6	6				
Lumber & Other Bldg. Materials Dealers	3	1	2			
Manufactured Housing	3					3
Millwork	2		1			1
Prefabricated Wood Bldgs. & Components	3	3				
Restaurant Furniture	1		1			
Sawmills & Planing Mills	5	3	2			
Sawmills & Planing Mills, General	21	14	1	3	2	1
Structural Parts, NEC	1			1		
Structural Wood Members, NEC	1		1			
Wood Frames in Household Furniture	1	1				
Wood Household Furniture, Not Uphol.	4		2		1	1
Wood Household Furniture, Uphol.	8		1			7
Wood Kitchen Cabinets	5	4	1			
Wood Office & Store Fixtures	1	1				
Wood Pallets & Skids	3	2	1			
Wood Preserving	1				1	
Wood Products, NEC	1		1			

* Note: Some firms' business activities were in more than one category.

Sources: INFO USA, American Business Lists and Tennessee Wood Using Industries Directory.

Nearby Industry

The surrounding counties (Anderson, Campbell, Greene, Hamblen, Jefferson, Knox, Washington) have a heavy concentration of wood using industries. These industries include hardwood flooring, furniture manufacturing, dimension and furniture stock, lumber and wood products, concentration yards, log homes, pallets, structural members, and kitchen cabinets. A listing of wood products companies or wood using companies is provided in Appendix Table 2. Major employers in these industries in the area include Shelby Williams, Universal, Harris-

Tarkett, Lea, Vaughan, Phillips Consumer Electronics, Woodcraft, Berkline, Cortim Hardwood Parts, Homecrest, Triangle Pacific, and Clayton Homes. A concentration of furniture manufacturing and hardwood dimension and furniture stock manufacturers exists around the Morristown area. Most of the logging companies, pallet and skid companies, and log home companies are fairly small in size (10 employees or less). An exception is Hearthstone in the Dandridge area, which employs between 50 and 99 workers. The furniture, dimension, and kitchen cabinet companies vary in size, from small operations (less than 10 employees) to several hundred employees. The variety of secondary wood products manufacturers in the area, particularly of secondary products, presents opportunities for selling products to be used by these manufacturers.

Wood Resources

The timber resource in the area can be characterized as follows. Removals of sawtimber in the area are greatest in Claiborne County and the lowest in Hawkins County (Table 1.2). Very little softwood removals occur. The hardwood removals are about 19 million board feet per year on average, with just around 66 percent coming from hard hardwood removals (for example, species such as oak and hickory), and 34 percent from soft hardwood removals (for example, species such as yellow poplar).

Table 1.2. 1997 Sawtimber Removals, by County and Type.

County	Million Board Feet (MMBF)			
	All	All Softwood	Soft Hardwood*	Hard Hardwood
Claiborne	8.90	0.0	0.0	8.90
Grainger	4.10	0.6	2.4	1.10
Hancock	2.10	0.0	0.0	2.10
Hawkins	.40	0.4	0.0	0.0
Union	4.80	0.0	4.20	0.60
TOTAL	20.30	1.0	6.60	12.70
EAST TENNESSEE REGION	254.20	148.6	35.40	70.20

*Soft hardwood would include yellow poplar and soft red maple, while hard hardwood would include oak and hickory. Sawtimber includes trees that contain at least one 12 ft saw log or two noncontiguous saw logs 8 ft or longer (the logs must be at least 11 inches in diameter). Source: Schweitzer, C. Forest Statistics for East Tennessee, 1997, USDA, FS, Southern Research Station, Resource Bulletin SRS-44 (in draft).

While information regarding species of sawtimber removals by county was not yet available, the species mix information for the East Tennessee Region was (Anderson, Blount, Bradley, Carter, Claiborne, Cocke, Grainger, Greene, Hamblen, Hamilton, Hancock, Hawkins, Jefferson, Johnson, Knox, Loudon, McMinn, Meigs, Monroe, Polk, Rhea, Roane, Sevier, Sullivan, Unicoi, Union, and Washington Counties). The numbers representing the species mix removals are displayed in Table 1.3. Based on this mix and the information provided in Table 1.4, the predominant hardwood species removals would likely be red oak, white oak, and poplar.

Table 1.3. 1997 Species Mix of Sawtimber Removals, East Tennessee Region.

Species	Annual Removals in MMBF
Virginia Pine	68.7
Other Softwoods	79.9
Select White Oaks	18.4
Select Red Oaks	9.4
Other White Oaks	7.0
Other Red Oaks	27.6
Hickory	3.4
Soft Maple	4.7
Yellow Poplar	24.2
Other Hardwoods	10.9

Source: Schweitzer, C. Forest Statistics for East Tennessee, 1997, USDA, FS, Southern Research Station, Resource Bulletin SRS-44 (in draft).

In general, the removal of sawtimber averages about 14 percent of the net annual growth, with the greatest percent being for hard hardwoods (Table 1.4). The highest percentages of removals compared with net annual growth among the counties were for Claiborne (47%) and Hancock (33%) and the lowest percentage being in Hawkins County.

Table 1.4. Average Net Annual Growth and Average Annual Removals of Sawtimber as a Percent of Average Net Annual Growth, by County and Type.

	MMBF			
	All	Softwood	Soft Hardwood	Hard Hardwood
Claiborne	42.8	5.2	18.8	18.8
Grainger	29.4	2.3	8.0	19.1
Hancock	10.0	0.3	3.4	6.3
Hawkins	35.2	3.1	6.8	25.4
Union	26.3	4.4	11.3	10.6
TOTAL	143.7	15.3	48.3	63.2
Removals as a percent of average net annual growth	14.13%	6.54%	13.66%	20.09%

Source: Schweitzer, C. Forest Statistics for East Tennessee, 1997, USDA, FS, Southern Research Station, Resource Bulletin SRS-44 (in draft).

Of the 19 million board feet in sawtimber removals (from Table 1.2), we have estimated in the CPEC Region that about 10 million board feet are from red oak, white oak, hickory, or yellow poplar logs that are of No.1 or No. 2 grade (based on species removals for East Tennessee, removals of hardwoods for the study area, and volume of sawtimber on timberland by species and tree grade for East Tennessee, see Table 1.5). Of the 111 million board feet in hardwoods net annual growth (from Table 1.4), about 59 million board feet are estimated to be No. 1 or No. 2 logs from the above species. The total volume of sawtimber (growing stock volume in the sawlog portion of sawtimber-size trees) on timberland is 3,465 million board feet. Using the above estimates of species and grades proportions, the total volume of sawtimber in those species and grades would be 1,800 million board feet.

Table 1.5. Percent of Volume of Sawtimber on Timberland in Tree Grades, East Tennessee Region

Species	Percent of Sawtimber in Tree Grade			
	1	2	3	Lower
Select White Oak	33.62	30.74	20.99	14.65
Select Red Oak	44.07	27.69	18.17	10.07
Other White Oaks	29.86	34.48	25.03	10.63
Other Red Oaks	23.45	35.50	28.12	12.93
Hickory	23.96	27.10	20.74	28.20
Yellow Poplar	35.65	21.26	29.09	14.01

Source: Schweitzer, C. Forest Statistics for East Tennessee, 1997, USDA, FS, Southern Research Station, Resource Bulletin SRS-44 (in draft).

Poplar is used for solid and upholstered furniture, molding, trim, millwork, pallets, crates, and skids. Red oak is used for solid furniture, molding, trim, case goods, flooring, upholstered furniture frames, industrial pallets, skids, crates, and tool handles. White oak can be used for the same type products as red oak. The quality of the hardwoods is of utmost consideration in their uses, with higher quality hardwoods going into furniture, trim, and other specialty uses. Lower quality hardwoods may go into products such as pallets, skids, furniture framing, or dimension (such as panels or blanks).

Market Opportunities/Limitations

Fifteen area retail lumber companies, home centers, and hardwood products manufacturers were contacted to inquire if they sold hardwood products, had any perceived shortages of a particular hardwood product, had difficulty in obtaining any particular species of eastern hardwoods, carried locally supplied hardwoods, and the lot size of lumber they normally bought. Lumber companies and home centers were contacted in the Knoxville, Jefferson City, Morristown, and Kingsport areas.

The retail home centers (Lowe's and Home Depot) contacted sold limited amounts of hardwood lumber (oak and poplar planks). The managers at these centers indicated that since their corporate offices dictate what should be sold there is little flexibility in their choosing.

Several of the locally owned lumber and wood products companies in the call areas also sold limited amounts of hardwood lumber. One company did sell small amounts of top-grade hardwoods (lumber) but it was not a large part of their business. Some of the oak and poplar they sold was supplied locally.

A few companies contacted specialized in hardwoods. The contacts indicated that, currently, the overall hardwood market is good with all hardwoods in strong demand. A couple of companies purchased hardwoods both locally and non-locally. One company purchased hardwood lumber from concentration yards in middle Tennessee because of the dependability of deliveries, availability of hardwoods, consistency of materials, and reliability of supply. Another company purchased their hardwoods from a reload or broker rather than directly from sawmills. They purchased from the brokers or concentration yards because of concerns about the volume, reliability, and quality of local supplies. Quality and reliability appear to be stronger considerations to buyers for higher-end products use (such as furniture and architectural woodwork) than obtaining the product at the lowest price.

Several of the potential buyers made suggestions regarding opportunities or indicated the most popular product specifications. Several of the potential buyers suggested that the proper market for hardwoods in this area should be for furniture and millwork. The most prominent locally sourced species were oak and poplar. The most popular sizes were 4 and 8 quarter sawn lumber. One buyer indicated that the furniture, millwork, flooring, and cabinet businesses were doing well and might be likely buyers of hardwood products. Some niche market areas also

suggested were bows and arrows (vertical grain hickory), musical instruments (eastern red spruce), and boat building (locust). Sawmill and kilning opportunities suggested included larger commercial sawmills in the area (15,000 to 20,000 board feet per day sawmill) and 20,000 to 50,000 board foot per charge capacity kilns. In both cases, the contacts believed the area could support 2 to 3 of each. This size of sawmill would saw several times the "average" of sawmills currently in operation. In addition, a smaller custom kilning operation (3,000 to 4,000 board feet capacity) might be an opportunity area.

While the need and potential opportunity for a larger sawmill with kilning capacity in the Clinch-Powell area was expressed by some of hardwood specialty companies, concerns were expressed regarding lack of trained labor to run sawmills and kilns. Additional job skills training are required, including training on how to kiln dry hardwoods. Another concern was the quality of hardwoods. It was suggested that greater sawmill capacity (greater than 45,000 to 60,000 board feet per day total) or kilning capacity (greater than 60,000 to 100,000 board feet per charge) could not be supported due to the lack of sufficient volumes of high quality hardwoods.

Based on needs for larger sawmills and kilning operations, tempered with concerns regarding sufficient volumes of high quality hardwoods, sawmill and kiln feasibilities are examined. However, the sawmill is a 15,000 board foot per day sawmill, and the kiln has 24,000 board foot per charge capacity. Another opportunity examined, with the large number of furniture, dimension, and cabinet makers in the areas and the supply of lower quality hardwoods, is for glue-edged blank manufacturing. These types of blanks are examined because they are used in furniture and cabinet making, and can be made from No. 2 and No. 3 lumber. Finally, with the proximity to a high tourism based region of the state (Sevier County) with a high

number of vacation and second homes, and high visit rates, feasibility of manufacturing of rustic (cabin or outdoor) furniture is examined.

Section II. Sawmill Feasibility

Production/Processing Considerations

A larger scale sawmill requires a steady and reliable supply of reasonable (No. 2 grade or better) quality logs. A 15,000 board foot per day sawmill would produce between 3.5 and 4.0 million board feet of lumber per year. The average commercial sawmill in the area appears to currently produce around 1 to 1.5 million board feet per year.

Table 2.1 illustrates estimated log to lumber yields for red and white oak and yellow poplar, predominant species in the area. The estimates are from a forest service study and include all diameters of sawtimber. A weighted average yield in board feet per log across the species would be about 199 for No. 1, 118 for No.2, and 81 for No. 3 logs. Given this information and the percent of logs by grade would suggest that the average yield might be about 130 board feet per tree (7.7 trees per MBF). Hence, the sawmill would require about 115 logs per day for the sawmill's capacity. Also, the estimated yields of the various grades of lumber across species are shown in Table 2.1 (calculated using numbers from the publications for log to lumber yields by grade and the species mix for the Clinch-Powell region).

Given the direct linkage to harvesting and the larger scale of the sawmill operation, environmental considerations are of high concern. One potential sustainably managed source of logs would be from loggers participating in the Tennessee Master Logger Program. The Tennessee Master Logger Program is designed to improve the health and management of forest resources while improving logger safety practices and business management skills (See Labor

Market, Assistance Programs, and Incentives). According to the most recent Master Logger participant list, approximately 28 individuals completed the course in Claiborne County, 5 for Grainger, and 2 for Hancock. Both Hawkins and Union counties had 13 participants each.

Table 2.1. Estimated Log to Lumber Yields by Species, Log Grades 1 to 3.

Log Grade (all diameters)	Overall Estimated Yield Dry Lumber (Board Feet)			
	Yellow Poplar	Red Oak	White Oak	
No. 1	189.1	242.5	203.9	
No. 2	115.4	128.7	121.1	
No. 3	81.3	77.1	87.4	
	Estimated Yield By Grade of Lumber Across Species (Board Feet)			
	FAS	No. 1	No. 2	No. 3
No. 1	61.5	75.6	45.0	17.0
No. 2	14.6	41.3	42.3	19.7
No. 3	3.0	17.6	37.0	23.5

Sources: Hardwood Log Grades and Lumber Grade Yields for Factory Lumber Logs, Forest Service Research Paper NE-468, 1980. Schweitzer, C., Forest Statistics for East Tennessee, 1997. USDA Forest Service, Southern Research Station Resource Bulletin, SRS-44 (in draft).

Pricing Considerations

Hardwood log and green lumber prices for the East Tennessee area are displayed in Tables 2.2 and 2.3. As can be seen, red oak log prices are the highest, while hickory logs bring the lowest prices. This is also true for hardwood lumber prices.

Table 2.2. East Tennessee Log Prices*

Species	Grade 1	Grade 2	Grade 3
		(\$/MBF)	
Red Oak	875	575	250
White Oak	675	400	200
Yellow Poplar	450	300	150
Hickory	250	150	125

* Length 8'-16' and minimum diameter inside bark (DIB) 8" at small end, delivered.

Source: Tennessee Forest Products Bulletin, Volume 24, No. 2, April-June, 2000.

Table 2.3. Green Hardwood Lumber Prices.

Species	Appalachian Regional Average (\$/MBF)		
	<i>Green 4/4 Lumber Prices*</i>		
	FAS	1C	2A
Red Oak	1210	780	500
White Oak	935	535	370
Hickory	855	805	375
Poplar	890	460	300

Source: Hardwood Market Report, May 6, 2000.

*FAS=first and seconds, C=common grades

Using information regarding species and grade removals for hardwood logs, hardwood log to lumber yields in Table 2.1, log prices in Table 2.2, and the green hardwood lumber prices in Table 2.3, estimates of species and quality weighted prices for hardwood logs and green lumber can be calculated. These weighted log price represents a price based on the average proportions of species and grades of sawtimber logs removed and prices for those species and grades of logs. The weighted average price for logs is \$413 (No.1 through No.3). The types of logs being removed and sawn, along with log to lumber yields, are used to estimate the average "mix" of lumber grades and species for the area. The proportions of lumber grades and species and the prices for these types of lumber are then used to calculate a weighted average price. The weighted average price for green lumber is \$511 (including FAS through No. 3 lumber).

Recently, sawmill producers' profit margins have decreased because of the trend of stagnant lumber prices but rising stumpage (value of standing timber) prices. In order to keep a competitive profit margin many sawmill producers have considered investing in new technology to retain a competitive edge. (Source: Gannus, L. and Paul Winistorfer. "The Tennessee Hardwood Sawmill Project," Tennessee Forest Products Center, University of Tennessee (<http://web.utk.edu/~tfpc/research>).

Financial Feasibility

The type of sawmill (circular vs. band), the accompanying machinery, proper sawing methods, whether to invest in “state of the art” machinery to optimize the amount of lumber produced per log are many issues required for consideration by the sawmill operator. Hardwood sawmills require more durable equipment to handle heavier logs compared with softwood mills. Major start-up costs for a hardwood sawmill are the sawmill machinery, auxiliary equipment, buildings, land, and the wood inventory (Table 2.5). Major operating costs are labor associated with the sawmill, the logs, interest on inventory (30 days on logs, 10 days on lumber), and energy costs. For the study area we assumed the use of a used 15,000-board foot per day circular sawmill (Table 2.4). Per industry standards this is a moderately sized sawmill. A typical circle saw technology sawmill consists of a hardwood log yard, a log deck, a debarker, a head saw, an edger, a trimmer, and a “green chain” area where lumber is graded and sorted (see Figure 2.1).

A concern is the quality of the hardwood logs for the study area. A circular headrig or saw was more justifiable for the analysis for cutting logs because of the higher proportions of lower saw log quality and lower initial investment costs. In addition, we chose an inserted tooth circular saw blade for the analysis because this type of blade requires less equipment and time plus the filing skills required are lower. However, according to Dr. Brian Bond, “many of today’s small mills are going out of business because they cannot compete with larger, more efficient sawmills utilizing thin-kerf technology”. Kerf, or the width of the path of the saw teeth as the blade cuts through the log resulting in waste, may be greater for a circular saw blade versus a band saw (thin-kerf technology). However, where log quality is lower, the circular technology may be the more viable choice. (Sources: Steel, Philip, R. Gazo, P. Araman, D. Jackson, J. Beard, “Band vs. Circular Sawmills: Relative Labor and Maintenance Costs”,

thousand board feet was \$501. Estimated profit per thousand board feet is \$10.23. Before-tax profit back to the sawmill operation would be around \$53,700 per year.

Labor Requirements

Approximately 10 employees, plus a manager and secretary, are required to operate the sawmill (Table 2.4), an employee is commonly stationed at the loader operator area, at the debarker, at the head saw, at the edger, and at the trimmer. The green chain area, where the lumber is graded and sorted, four individuals are required. A machinist-filing operator for the sawmill equipment is required including an employee in the management area to oversee the milling operations. In Tennessee, it is not uncommon for sawing machine setters/operators and woodworking machine setters/operators to earn \$8 to \$9 dollars per hour plus benefits. (Sources: Dr. Brian Bond, Assistant Professor, The University of Tennessee's Institute of Agriculture, Forestry, Wildlife, and Fisheries Department; Eastern Tennessee '96 and '97 Occupational Wage Tables, Department of Labor and Workforce Development (<http://www.state.tn.us/empsec/wages/east/agri.htm>)). We have calculated the wage rate at \$8.50 plus 30% to cover benefits, unemployment taxes (2.7%), and workers compensation premiums (14.21%). The manager is assumed to earn \$30,000 plus benefits, while the secretarial salary is assumed to be \$12,000 plus benefits.

Table 2.4. Financial Feasibility Analysis: 15,000 Board Feet per Day Hardwood Sawmill.

Operating Cost Estimates for Sawmill		
	Total \$	\$/MBF
Amortization of Direct Investment (1)		
Sawmill Building	\$4,000.00	\$0.76
Storage-Sawn Lumber	\$1,500.00	\$0.29
Sawmill & Auxiliary	\$30,000.00	\$5.71
Sawblades	\$5,000.00	\$0.95
Filing Room Equipment	\$2,250.00	\$0.43
Log Loader	\$8,000.00	\$1.52
Log Loader	\$8,000.00	\$1.52
Interest on Direct Investment (2)		
	\$29,812.50	\$5.68
Maintenance and Repairs (3)		
	\$5,962.50	\$1.14
Land Interest (4)		
	\$1,000.00	\$0.19
Taxes (5)		
	\$4,683.50	\$0.89
Insurance (6)		
	\$8,587.50	\$1.64
Labor Costs		
	\$249,748.00	\$47.57
Office Overhead (7)		
	\$54,600.00	\$10.40
Energy (8)		
	\$7,704.00	\$1.47
Interest on Inventory (9)		
	\$13,125.00	\$2.50
Total	\$433,973.00	\$82.66
Profitability Analysis		
Weighted Selling Price (\$/MBF)		\$511.00
TOTAL (MBF)		5,250.00
REVENUES (\$)		\$2,682,750.00
Log Prices (\$/MBF)		\$413.00
Log Costs (\$)		\$2,168,250.00
Marketing Costs (\$)		\$26,827.50
Log, Sawmilling, and Marketing Costs (\$)		\$2,629,050.50
Costs/MBF (\$/MBF)		\$501.00
Profit (\$)		\$53,699.50
Profit/MBF (\$/MBF)		\$10.23
Jobs		
Sawmilling (See Figure 2.1)		9.00
Filing		1.00
Management		1.00
Clerical		1.00
TOTAL JOBS		12.00

Notes: (1) Amortization of buildings and equipment = \$ investment/years in economic life, (2) Interest on direct investment = \$ investment * interest rate, (3) Maintenance and repairs = .01* \$ direct investment, (4) Land interest = land value * interest rate, (5) Taxes = effective property tax rate * property value, (6) Insurance=.01* (\$ direct investment + average value of inventory on hand) (The average value of inventory is the average daily volume * price of product), (7) Office overhead= sawmill manager + clerical, (8) Energy=kWh electricity used * electricity price, (9) Interest on inventory=interest rate * average value of inventory on hand, (10) Marketing costs are calculated at 1% of the value of sales.

Table 2.5. Information Used in Sawmill Financial Feasibility Analysis

Direct Investment (\$):	
Buildings	
Sawmill Bldg	\$80,000.00
Storage	\$30,000.00
Circular Sawmill	
Sawmill & Auxiliary Equip.	\$300,000.00
Sawblades	\$15,000.00
Filing Room Equipment	\$11,250.00
Log Loader	\$80,000.00
Log Loader	\$80,000.00
Total Direct Investment	\$596,250.00
Amortization Period (Years):	
Buildings	
Sawmill Bldg	20
Storage-Sawn Lumber	20
Circular Sawmill	
Sawmill & Auxiliary Equip.	10
Sawblades	3
Filing Room Equipment	5
Log Loader	10
Log Loader	10
Quantity of Wood Sawn Annually (MBF)	3,750
Interest Rate (decimal %)	0.05
Land Area (Acres)	8
Land Value (\$/Acre)	\$2,500.00
Taxable Values (\$)	
Land	\$20,000.00
Buildings	\$110,000.00
Equipment	\$486,250.00
Property Tax Rate (effective rate in decimal)	0.0076
Insurable Values (\$)	
Direct Investments	\$596,250.00
Lumber and Logs	\$295,950.00
Insurance Rate (decimal %)	0.01
Labor	
Filing Room Employees (number of employees)	1.00
Employees (number-See Figure 2.1)	9.00
Wage Rate (\$/hour)	\$12.49
TOTAL Labor Costs	\$249,747.00
Energy	
Electrical Use (kWh)	240,000
Electricity Price (\$/kWh)	\$0.03
Weighted Average Price of Lumber (\$/MBF)	515
Weighted Average Price of Logs (\$/MBF)	486
Average Daily Volume of Lumber (MBF)	150
Average Daily Volume Logs (MBF)	450
Total Daily Capacity of Sawmill (MBF)	15

Sources: Electricity rates (Powell Valley Electric Cooperative), Land Prices (Based on industrial property prices, Tennessee Community Data, Tennessee Department of Economic and Community Development), Sawmill/Machinery Prices (TMS Machinery Sales, Sawmill Exchange, Ben Jones Machinery, Inc.), Wages

(based on Tennessee Labor and Workforce Development Estimates) with 30% added for benefits, 2.7% unemployment compensation taxes, and 14.21% for workers compensation premiums, Interest Rates (based on current lending and borrowing rates), Lumber prices (Hardwood Market Report), Log prices (Tennessee Forest Products Bulletin, Volume 24, No. 2, April-June, 2000), Log to lumber yields (University of Wisconsin Cooperative Extension Forestry Fact Sheet No. 74, February 1994).

Section III. Kiln Drying Feasibility

Production/Processing Considerations

In general, a kilning operation will only kiln higher quality woods, for example lumber graded 2A or better (FAS, 1C, or 2A). Lower graded hardwoods will generally not be kiln dried. A larger kiln than is typically being operated in the area (4,000 board feet per year or less) would require sufficient volumes of higher graded lumber for the kiln. Based on a sawmill of 1 million board feet per year, and using the estimate of logs by grade and the sample yields from a No. 1 or No. 2 log, a sawmill of 1 million board feet per year might have about 40 to 50 percent of the lumber of kilning quality (400,000 to 500,000 board feet).

Kiln drying of wood adds value to hardwoods and can serve as an input for secondary wood manufacturers, such as millwork or furniture manufacturing. Kiln drying cuts down on the amount of land area needed to dry woods compared with air drying and also makes woods more suitable for use in today's air conditioned indoor environments. Kiln drying of wood can add up to \$300 per 1000 board feet to the price of green lumber and opens up market possibilities compared with selling only air dried wood. Contract kilning of lumber ranges from about \$.20 per board foot for large lots up to about \$.60 per board foot for small lot custom kilning.

Currently, the most popular kilns used to dry lumber in the U.S. are conventional, vacuum, dehumidification, and solar. Kilns may hold a few hundred board feet of lumber (for example, for craft or woodworking purposes) or up to several thousand board feet of lumber for commercial purposes. Larger commercial dry kilns can range from 20,000 to 100,000 board feet (Source: Dr. Brian Bond). Solar kilns have found hobby use, with 500 to 1,000 board feet

capacity. Conventional kilns that are popular in this part of the state typically have about a 4,000 board feet capacity per charge.

Solar kilns are a viable choice for hobbyists since they require minimum capital investment, have low energy requirements, and are simple to construct and operate. However, solar kilns are more weather dependent. In hot climates they may cause excessive drying of wood products. For colder climates they have a tendency to be unreliable and slow. According to Dr. Bond, solar kilns are not a good choice for a commercial operation due to the lack of kiln control, which can lead to greater inconsistent lumber quality and drying times. In addition, solar kilns may take longer periods to dry lumber to the desired 6-8% moisture content. This longer drying period to reach the desired moisture content adds to the costs associated with holding inventory.

Conventional kilns can be either steam or direct fired and are more appropriate on a large-scale or commercial basis compared to solar. They provide a high quality of lumber if a good method of kiln control is provided. The selection of hardwoods that can be economically dried may be greater with conventional versus solar. Their disadvantage is that they have greater energy requirements since large quantities of air and water require heating and reheating. In addition, the capital and operating costs are greater compared with those of solar kilns.

Vacuum kilns achieve drying times that are usually only a fraction of the time required for conventional or dehumidification kilns. They are useful for drying thick, high value pieces of wood such as large turning stock or dimension parts. This method of drying also works well for dense woods. However, the operating and capital costs are higher when compared to conventional or dehumidification kilns. Consequently, they are normally not used on a larger

commercial basis. In addition, vacuum kilns have small chambers and cannot dry large quantities at any one time, and they require extra material handling.

Dehumidification kilns are typically more energy efficient than conventional or vacuum kilns. This drying system recycles heat continuously instead of venting heated air as a conventional kiln does. Capital and operating costs may be lower too. Drying times are about the same as conventional kilns that operate at comparable temperatures. Environmentally sensitive kiln manufacturers use ozone friendly refrigerants in the drying cycle. However, according to Dr. Bond, “overall, dehumidification kilns do require less energy in the form of heat, but they do use lots of electricity for running the dehumidification unit”. Conventional kilns may burn less expensive fuels (gas or wood) compared to dehumidification kilns.

Hardwoods, such as oak, that are not air dried first may take up to 30 days in a kiln to get the moisture content below 10%. However, the kilning time can be greatly diminished (cut in half) by air drying wood down to 30% moisture content. Hardwoods may be air dried for 30 days prior to kilning. This can cut kilning time down to about 15 to 17 days. However, air drying can greatly increase degrade problems in lumber. Soft hardwoods, such as poplar, take much less time to kiln (less than a week).

Pricing Considerations

Hardwood lumber (4/4) prices for grades 2A or better are presented in Table 3.1. Red oak draws the highest price, while poplar draws the lowest price for 4/4 lumber. Both kiln dried and green lumber prices are shown. As can be seen from Table 9, the highest premiums for kilning are for the higher graded hard hardwoods, such as white oak, red oak, and hickory. Lower kilning premiums are paid for yellow poplar. This may be in part due to supply/demand conditions, but is also a result of the relative kilning costs of hard hardwoods compared with

poplar (see Production/Processing Considerations Section). In general, the premiums paid for kilning averages around \$280 for the hard hardwoods and about \$150 for the soft hardwoods. Kilning would only be feasible from a financial standpoint if the kilning costs per thousand board feet fall below these kilning premiums or the kiln is part of an existing sawmill (*i.e.* market prices are not paid for green lumber).

Table 3.1. Hardwood Lumber Prices: Kiln Dried, Green, and Kilning Premiums. *

Species	Appalachian Regional Average (\$/MBF)		
<i>Kiln Dried 4/4 Lumber Prices</i>			
	FAS	1C	2 A
Red Oak	1,485	1,050	750
White Oak	1,300	800	585
Hickory	1,350	890	535
Poplar	1,080	590	410
<i>Green 4/4 Lumber Prices</i>			
	FAS	1C	2A
Red Oak	1,210	780	500
White Oak	935	535	370
Hickory	855	805	375
Poplar	890	460	300
<i>Premium for Kilning</i>			
	FAS	1C	2A
Red Oak	275	270	250
White Oak	365	265	215
Hickory	495	85	160
Poplar	190	130	110

Source: Hardwood Market Report, May 6, 2000.

*FAS=first and seconds (highest grades), 1 and 2 are common grades.

Financial Feasibility

Larger sawmills with kilning facilities may potentially achieve some cost efficiencies not experienced by smaller kilns. An example of cost efficiencies can come from transportation. For example, a truckload of oak is around 12,000 to 15,000 board feet. The example calculations for financial feasibility for a 24,000 board foot kiln are provided in Table 3.2. The species mix kilned is assumed to follow the major species mix in the area. Kiln times and energy use are

weighted according to the species mix in the area. Table 3.3 provides some of the information/assumptions used in Table 3.2.

As can be seen in Table 3.3, major start-up costs in kilning are the kiln, buildings, land, and wood inventory. Major operating costs for the kiln are labor associated with the kiln, degrade, interest on inventory (3 times kiln capacity assumed to be held), and energy costs. Investment of just over \$100,000 in kiln, machinery, buildings, land, and wood are required. We assumed a used 24,000 board foot capacity dehumidification kiln (new price is \$24,000). We also assumed use of a used 8,000-pound forklift. Major operating costs include green lumber, labor, office overhead, energy, and degrade (Table 3.2). The inventory held was assumed at three times the kiln capacity.

Most estimates we have found suggest total drying costs to be around \$150 per thousand board feet. Our weighted estimate is just over \$157 including marketing costs. Recall that kilning premiums are around \$280 for hard hardwoods and \$150 for poplar. Our estimate was \$224 per MBF. One suggestion was that profitability per thousand board feet from kilning should be around \$30. Our projection is \$35 profit per thousand board feet. Before tax profits back to the kilning operation would be around \$12,742 per year. It is likely that an existing sawmill operation would add a kilning operation rather than a freestanding start-up kiln, therefore the green lumber costs could be lowered. At about \$.16/board foot drying costs, the kiln could potentially do contract kilning (the contract kilning rates we found started at \$.20 per board foot for large lots of lumber).

Table 3.2. Financial Feasibility Analysis: 24,000 Board Feet per Charge Kiln.

Operating Cost Estimates for Kiln Drying		
	<u>Total \$</u>	<u>\$/MBF</u>
Amortization for Direct Investment (1)		
Kiln Bldg	\$1,000.00	\$2.76
Storage-Dried Lumber	\$250.00	\$0.69
Kiln	\$900.00	\$2.49
Fork Lift	\$500.00	\$1.38
Stickers	\$162.65	\$0.45
Interest on Direct Investment (2)	\$2,424.40	\$6.69
Maintenance and Repairs (3)	\$484.88	\$1.34
Land Interest (4)	\$250.00	\$0.69
Property Taxes (5)	\$402.80	\$1.11
Insurance (6)	\$950.48	\$2.62
Stacking Cost	\$1,416.39	\$3.91
Forklift Labor Costs	\$607.02	\$1.68
Kiln Labor	\$21,232.00	\$58.63
Office Overhead (7)	\$10,920.00	\$30.15
Energy (8)	\$4,694.94	\$12.96
Interest on Inventory (9)	\$2,328.00	\$6.43
Degrade (10)	\$6,068.72	\$16.76
Total	\$54,592.28	\$150.75
Profitability Analysis		
Weighted Selling Price (\$/MBF)		\$796.00
TOTAL AMOUNT DRIED (MBF)		381.20
TOTAL AMOUNT w/Shrinkage (MBF) (11)		362.14
REVENUES (\$)		\$288,264.23
Green Lumber Costs (\$/MBF)		\$572.00
Drying Costs (\$/MBF)		\$150.75
Marketing Costs (\$/MBF) (12)		\$7.96
TOTAL COSTS (\$)		\$275,521.92
Total Costs/MBF (\$/MBF)		\$760.81
PROFIT (\$)		\$12,742.31
PROFIT/MBF (\$/MBF)		\$35.19
Jobs		
Kilning		1.00
Handling		0.10
Management/Office		0.40
TOTAL JOBS		1.50

Notes: (1) Amortization of buildings and equipment = \$ investment/years in economic life, (2) Interest on direct investment = \$ investment * interest rate, (3) Maintenance and repairs = .01* \$ direct investment, (4) Land interest = land value * interest rate, (5) Taxes = effective property tax rate * property value, (6) Insurance=.01* (\$ direct investment + average value of inventory on hand) (The average value of inventory is the average daily volume * price of product), (7) Office overhead= 20% of manager + clerical with 30% benefits (8) Energy=kWh electricity used * electricity price, (9) Interest on inventory=interest rate * average value of inventory on hand, (10) degrade=% degrade*dried lumber price*amount lumber dried, (11) amount with shrinkage=5% shrinkage*amount dried (12) Marketing costs are calculated at 1% of the value of sales.

Table 3.3. Information Used in Kiln Financial Feasibility Analysis.

Direct Investments (\$):	
<i>Buildings</i>	
Kiln Bldg	\$20,000.00
Storage-Dried Lumber	\$5,000.00
<i>Kiln and Auxiliary Equipment</i>	
Kiln & Auxiliary	\$18,000.00
Fork Lift	\$5,000.00
Stickers	\$487.94
Total Direct Investment	\$48,487.94
Amortization Period (Years):	
<i>Buildings</i>	
Kiln Bldg	20
Storage-Dried Lumber	20
<i>Kiln and Auxiliary Equipment</i>	
Kiln & Auxiliary	20
Fork Lift	10
Stickers	3
Quantity of Wood Dried Annually (MBF)	381
Interest Rate (decimal %)	0.05
Land Area (Acres)	2
Land Value (\$/Acre)	\$2,500.00
Taxable Values (\$)	
Land	\$5,000.00
Buildings	\$25,000.00
Equipment	\$23,000.00
Insurable Values (\$)	
Direct Investments	\$48,487.94
Wood	\$46,560.00
Property Tax Rate (effective rate decimal %)	0.0076
Insurance Rate (decimal %)	0.01
Labor	
Stacking Time (hours/MBF)	0.4
Hourly Stacking Wage (\$/hour)	\$9.29
Forklift Time (hours/MBF)	0.15
Hourly Forklift Wage (\$/hour)	\$10.62
Kiln Labor Time (Per Year)	2,000
Hourly Kiln Labor Wage Rate (\$/hour)	\$10.62
Energy	
Electrical Use (kWh)	146,260
Electrical Costs (\$/kWh)	\$0.03
Weighted Average Price of Lumber (\$/MBF)	\$796
Average % Drying Degrade (decimal %)	0.02
Average Daily Volume of Lumber (MBF)	72
Total Capacity of Kilns (MBF)	24
Average Length of Kiln Run (days including Load and Unload)	22.98

Sources: Electricity rates (Powell Valley Electric Cooperative), Land Prices (Based on industrial property prices, Tennessee Community Data, Tennessee Department of Economic and Community Development), Kiln capacity, drying times, electricity use (Nyle Company information), Labor use (Kiln drying text), Kiln price (Nyle Company information and TMS Machinery Sales), Forklift price (TMS Machinery Sales), Wages

(based on Tennessee Labor and Workforce Development Estimates), Interest rates (Based on current lending and borrowing rates), Lumber prices (Hardwood Market Report).

Labor Requirements

The kilning operation required would employ between 1 and 2 workers (kiln operator, part of a manager, part of a secretary, and part-time workers for loading/unloading kiln). Kilning of wood requires certain training of the labor involved to diminish losses during the kilning process. Estimates of wage rates were assumed at \$8 and \$9 per hour plus benefits for the kiln labor. Workers compensation premiums were not included because the operation has less than 5 employees. Addition of a larger sized kiln to the area would likely necessitate training of several individuals, especially the manager/owner and the person monitoring the kiln. Local training or scholarships to attend training elsewhere would likely be needed (see Section VI).

Section IV. Hardwood Blanks Manufacturing Feasibility

Production/Processing Considerations

Manufacturing of blanks used by furniture and cabinet makers is one potential low start-up cost type of dimension manufacturing (Source: Araman, P. "Standard Sized Blanks for Furniture and Cabinets", Northeastern Forest Experiment Station, USDA). Blanks are rough dimension parts of specific sizes that can be solid or glued and are used by furniture or cabinet manufacturers. Blanks can be made from lower grade mixes of lumber. A dimension manufacturer, a sawmiller-lumber drier, or a furniture or cabinetmaker may manufacture blanks.

Blanks are manufactured with lumber by crosscutting, ripping and edge-gluing. A low cost blanks operation would likely need to select several standard blank sizes in need by the furniture and cabinet making industries. An example of a recommended blank size for furniture and cabinet makers are 7/8 thickness, Clear quality, 26 inch wide blanks or Sound quality 20

inch wide for upholstered furniture. Most needed parts were less than 36 inches long. (Source: Araman, P., C. Gatchell, and H. Reynolds. "Meeting the Solid Wood Needs of the Furniture and Cabinet Industries: Standard-Size Hardwood Blanks," Northeastern Forest Experiment Station Research Paper NE-494, 1982.)

With a 60% No. 1 Common and 40% No. 2 or No. 2A Common mix of lumber used, the lumber to blanks yield for oak 4/4 lumber is about 60% from oak and 65% from poplar. An example of a layout for a blanks manufacturing facility is shown in Figure 4.1. Companies producing blanks in the area are Besturnings, Inc. in Morristown and Woodcraft in Morristown.

Pricing Considerations

Kiln dried lumber (4/4) is used in manufacturing blanks for furniture and cabinet manufacturing. The weighted price of kiln dried lumber from the area is about \$796. Price information regarding blanks is not readily available, because blanks can come in so many sizes and of varying quality. Based on an inflation adjusted historical estimate (1985), and an industry contact (Phil Araman, Project Leader, Southern Research Station, USDA Forest Service), prices would be around \$2,800 M ft².

Financial Feasibility

The upfront investment for a small blanks manufacturing plant would be around \$250,000 (Table 4.2). The major upfront investments for a blanks manufacturing plant are as follows:

- buildings
- land
- forklift
- crosscut saw with table
- rip saw with laser guide light
- abrasive planer (37 inch top machine)
- clamp carrier (8 1/2 feet wide, 20 sections)
- factory trucks (25)

- compressed air unit
- dust system
- office equipment
- lumber.

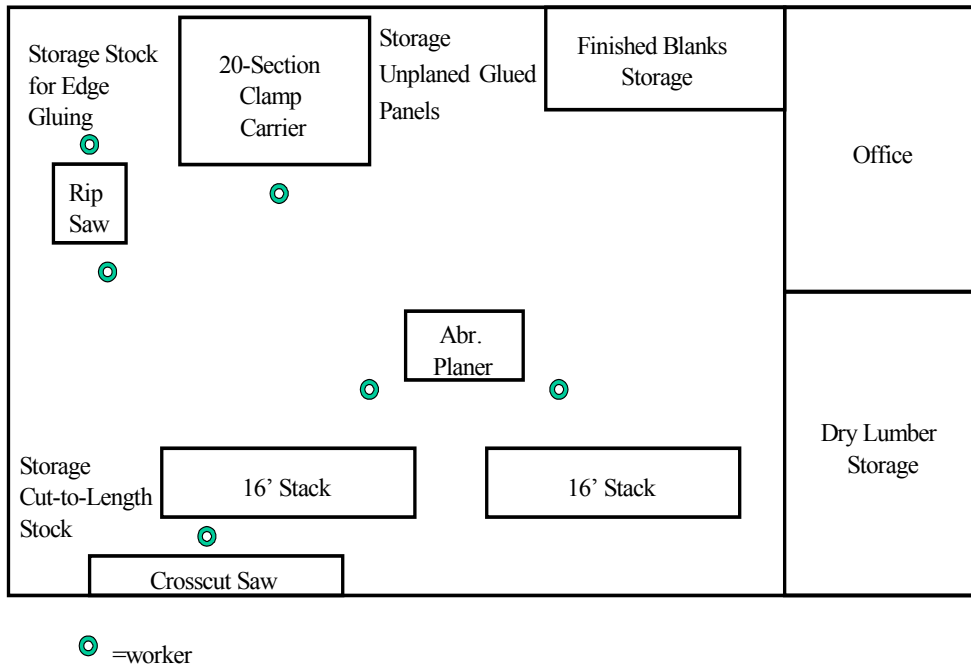


Figure 4.1. Layout of a Blanks Manufacturing Facility.

Source: Hansen, B. and P. Araman. "Low-Cost Opportunity for Small-Scale Manufacture of Hardwood Blanks," USDA Northeastern Forest Experiment Station Research Paper NE-559, 1985.

Inventory of lumber is assumed at 10 days, while finished product inventory is assumed at 25 days. The costs of processing the blanks are about \$969 per thousand square feet while the wood costs are just under \$1,330. The costs per thousand square feet including wood, processing, and marketing are around \$2,295, while the estimate of a weighted price is \$2,800. As can be seen from Table 4.1, the estimates show profitability of \$142,941 before taxes. An additional shift (assuming a 25% increase in buildings investment, increased labor, lumber,

electricity use, maintenance, and shorter amortization schedules) would about double projected profits.

Labor Requirements

A small blank mill would employ about 6 people in manufacturing and two office people, including a manager. The labor use is diagrammed in Figure 4.1. The wage rate is between \$8 and \$9 per hour plus benefits, unemployment compensation taxes, and workers compensation premiums. An additional shift could be run in the manufacturing facility. This would employ an additional 6 people on the line with an additional manager. If a second shift were added the storage facilities portions of the building would need to be expanded.

Table 4.1. Financial Feasibility Analysis: Furniture and Cabinet Blanks Manufacturing.

Operating Cost Estimates for Processing		
	Total \$	<u>\$/M ft²</u>
Amortization for Direct Investment (1)		
Buildings	\$4,000.00	\$13.33
Fork Lift	\$1,000.00	\$3.33
Cross cut saw with table	\$2,400.00	\$8.00
Ripsaw with laser guide light	\$5,000.00	\$16.67
Abrasive Planer (37 inch top machine)	\$8,000.00	\$26.67
Clamp Carrier (8 1/2 feet wide, 20 sections)	\$4,400.00	\$14.67
Glue Pump and Applicator	\$1,400.00	\$4.67
Factory Trucks (25)	\$4,666.67	\$15.56
Compressed Air Unit	\$1,800.00	\$6.00
Dust System	\$2,000.00	\$6.67
Office Equipment	\$1,200.00	\$4.00
Interest on Direct Investment (2)	\$11,750.00	\$39.17
Maintenance and Repairs (3)	\$23,500.00	\$78.33
Land Interest (4)	\$750.00	\$2.50
Taxes (5)	\$1,900.00	\$6.33
Insurance (6)	\$3,349.20	\$11.16
Labor	\$141,106.80	\$470.36
Office Overhead (7)	\$54,600.00	\$182.00
Energy (8)	\$12,840.00	\$42.80
Interest on Inventory (9)	\$4,996.00	\$16.65
Total	\$290,658.67	\$968.86

Profitability Analysis

Amount of Parts Produced (M Ft2)	300
Weighted Price Parts (\$/M Ft2)	\$2,800.00
REVENUES (\$)	\$840,000.00
Amount Lumber Used (MBF)	500
Weighted Price Lumber (\$/MBF)	\$796.00
Lumber Costs (\$)	\$398,000.00
Processing Costs (\$/M ft2)	\$968.86
Lumber Costs (\$/M ft2)	\$1,326.67
Processing Costs	\$290,658.67
Marketing Costs	\$8,400.00
LUMBER, PROCESSING, AND MARKETING COSTS	\$697,058.67
LUMBER & PROCESSING COSTS (\$/M ft2)	\$2,295.53
PROFIT (\$)	\$142,941.33
PROFIT/M ft2	\$476.47

Jobs

Manufacturing (See Figure)	6.00
Management/Office	2.00
TOTAL JOBS	8.00

Notes: (1) Amortization of buildings and equipment = \$ investment/years in economic life, (2) Interest on direct investment = \$ investment * interest rate, (3) Maintenance and repairs = .01* \$ direct investment, (4) Land interest = land value * interest rate, (5) Taxes = effective property tax rate * property value, (6) Insurance=.01* (\$ direct investment + average value of inventory on hand) (The average value of inventory is the average daily volume * price of product), (7) Office overhead=manager + clerical, (8) Energy=kWh electricity used * electricity price, (9) Interest on inventory=interest rate * average value of inventory on hand, (10) Marketing costs are calculated at 1% of the value of sales.

Table 4.2. Information Used in Blanks Manufacturing Financial Feasibility Analysis.

Direct Investments (\$):	
<i>Buildings</i>	
Buildings	\$80,000.00
<i>Equipment</i>	
Fork Lift	\$10,000.00
Cross cut saw with table	\$12,000.00
Ripsaw with laser guide light	\$25,000.00
Abrasive Planer (37 inch top machine)	\$40,000.00
Clamp Carrier (8 1/2 feet wide, 20 sections)	\$22,000.00
Glue Pump and Applicator	\$7,000.00
Factory Trucks (25)	\$14,000.00
Compressed Air Unit	\$9,000.00
Dust System	\$10,000.00
Office Equipment	\$6,000.00
Total Direct Investment	\$235,000.00
Amortization Period (Years):	
<i>Buildings</i>	
	20
<i>Equipment</i>	
Fork Lift	10
Cross cut saw with table	5
Ripsaw with laser guide light	5
Abrasive Planer (37 inch top machine)	5

Clamp Carrier (8 1/2 feet wide, 20 sections)	5
Glue Pump and Applicator	5
Factory Trucks (25)	3
Compressed Air Unit	5
Dust System	5
Office Equipment	5
Interest Rate (decimal %)	0.05
Land Area (Acres)	3
Land Value (\$/Acre)	\$5,000.00
Taxable Values (\$)	
Land	\$15,000.00
Buildings	\$80,000.00
Equipment	\$155,000.00
Insurable Values (\$)	
Direct Investments	\$235,000.00
Wood	\$99,920.00
Property Tax Rate (effective decimal %)	0.0076
Insurance Rate (decimal %)	0.01
Labor	
Number of Employees	6
Wage Rate (\$/hour)	\$11.76
Hours per Worker	2,000
Hours	12,000.00
Energy	
Electrical Use (kWh)	400,000
Electrical Costs (\$/kWh)	\$0.03
Weighted Average Price of Parts (\$/M ft ²)	\$2,800.00
Average Daily Volume of Parts (M ft ²)	30
Average Daily Volume of Lumber (MBF)	20
Plant Capacity per Year (M ft ²)	300

Sources: Electricity rates (Powell Valley Electric Cooperative), Land Prices (Based on industrial property prices, Tennessee Community Data, Tennessee Department of Economic and Community Development), Labor use (Hansen and Araman), Equipment prices (TMS Machinery Sales and Manufacturers web sites), Wages (based on Tennessee Labor and Workforce Development Estimates) with 30% added for benefits, 2.7% unemployment compensation taxes, and 5.64% for workers compensation premiums, Interest rates (Based on current lending and borrowing rates), Lumber prices (Hardwood Market Report), Blanks prices (Hansen and Araman, and Araman), Lumber to blanks conversion (Hansen and Araman).

Section V. Furniture Manufacturing Feasibility

Market Considerations

Tennessee is ranked fourth in the nation in value of furniture sales. The East Tennessee area, especially around Morristown, is known for furniture manufacturing. East Tennessee also has a high rate of tourism, especially in Sevier County and nearby areas. About 10 million

people visit the area each year. Specialty furniture geared toward vacation homes, the tourist market, or outdoor use is a potential niche product.

In addition to the growth in tourism, the area has experienced high growth in retirement and in second/vacation homes construction. The log homes industry in East Tennessee is prominent, with Tennessee being a leading seller of log homes in the U.S. (Source: <http://www.state.tn.us/agriculture/forestry/tdfff.html>). In the East Tennessee region there are over 60 sellers of log homes. In 1990, the Bureau of Census estimated that there were 26,000 second/vacation homes in Tennessee. While more current estimates are difficult to get, reports from counties benefiting from the tourism industries indicate that the state is currently in a strong second/vacation home construction phase.

According to the Log Homes Council (<http://www.loghomes.org/>), the typical log home buyer is a married couple in their mid 40's to early 50's whose children are grown, or almost grown. The average log home has doubled in size in the past ten years, growing from 1,100-sq. ft. to well over 2,000-sq. ft. today. About 25,000 kits are produced annually (6 percent of custom home building market).

Furniture manufactured in a rustic or cabin style could potentially find a niche market with tourism, vacation/second homebuyers, and log homebuyers. Craft specialty shops, furniture retailers, mail order, the Internet, and log home sellers might be potential outlets for this type of product. The product would have potential for building rural heritage tourism within the area.

Web sites of log home companies in the area were checked. Of these, three were found that marketed furniture online with the log homes (Hearthstone (Dandridge), Heritage (Athens), and Rustic Log Homes (Greeneville)). One example was a locally based furnishings company, one linked to a national manufacturer, and the other manufactured rustic furniture along with the

log homes. A number of other log homebuilders had advertising links in their sites to goods or services other than furniture (for example Heritage Log Homes (Sevierville)). In some cases, the log or rustic furniture manufacturers listed log home manufacturers online in their pages.

Comment:

Some examples of rustic furniture manufactures or manufacturers specializing in Appalachian furniture are presented in Table 5.1. Each of the companies has Internet sites and some sell through locations located throughout the United States. Several of these companies produce whole log furniture, some use traditional Appalachian furniture skills, and others contain a variety of furniture styles in their inventory. Appalachian Rustic Furnishings brands (wood burns) a company logo into their furniture. Old Hickory Furniture uses hickory and oak saplings gathered from the Tennessee Valley to manufacture rustic furniture in Indiana.

Table 5.1. Examples of Appalachian or Regional Rustic Furniture Companies.

Company Name	State	Specialty Description	URL
Appalachian Designs	NC	Yellow Pine Log Furniture	www.loghome.net/appdesign.htm
Appalachian Rustic Wood Works	TN	Accessories	www.anglefire.com/tn/farner/appalachian.html
Appalachian White Oak Furniture	NC	Kiln Dried Appalachian White Oak Furniture	www.ac.net/~se
Appalachian Traveler	TN	Home furnishings/accessories	http://Apptrav.com
Appalachian Furniture and Sound	NC	Handcrafted Furniture from Kiln dried Oak	www.dnet.net/~robbins
Appalachian Woods	VA	American Chestnut & Heart Pine furniture	www.organicweb2000.com/appalachianwoods
Falling Spring Furniture Gallery	WV	Rustic solid wood furniture	www.awebresource.com/furniture
Green Mill	AL	Handcrafted white or red cedar furniture	www.greensmill.com
Mountain Country Store	NC	Northern White Cedar furniture	www.mountaincountrystore.com
Sparta Spoke Factory	TN	Furniture crafted from oak, maple, and cherry	http://tennessee-treasures.com/furniture1.html
Appalachian Rustic Furnishings	GA	Family owned--high quality rustic furnishings	www.arfurniture.com

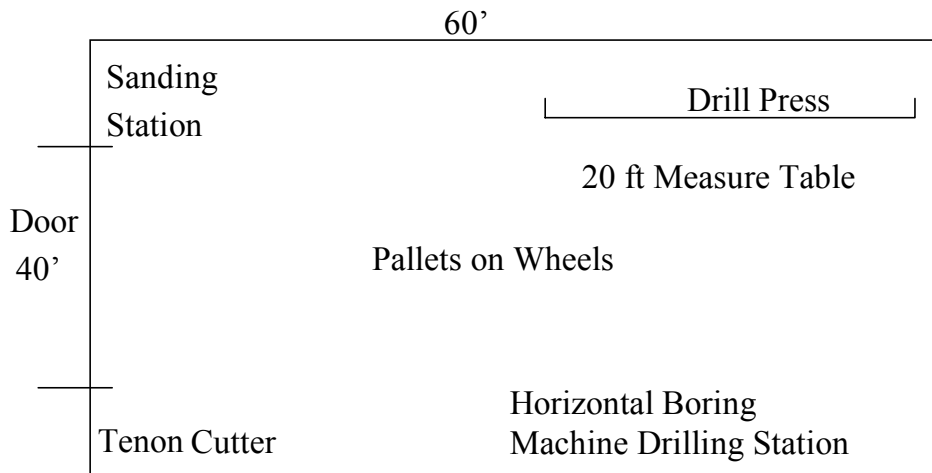
Rustic Rentals and Furnishings	NC	Sells furniture produced elsewhere	www.rusticfurnishings.com
Natural Tree Furniture			www.smithindustries.com
Galey's Log Beds	LA	Handcrafted log furniture	www.microgear.net/galey
Old Hickory Furniture Co., Inc.	IN	Furniture crafted from Hickory and Oak Saplings grown in Tennessee Valley	www.old-hickory.com

Source: Internet company sites.

Production/Processing Considerations

The type of equipment needed would depend greatly on the type of furniture being manufactured. For example, if the furniture were a tenon (log or sapling type construction) then tenon cutting and a specialized drill press would be needed. Also, the labor requirements may vary greatly depending on the type of furniture being manufactured and the level of finishing of the furniture. In the following analysis we are assuming a more handcrafted approach, where the stock for the furniture is constructed on-site rather than being purchased from another manufacturer. We are also assuming a rustic log or sapling type construction that would be suitable for vacation homes, cabins, or outdoor use. Estimates are calculated for manufacturing of an armchair and an end table. An example layout for a tenon type construction is shown in Figure 5.1. This layout diagram does not include the finishing, storage, and office areas.

For oak and hickory sapling furniture construction, the saplings are kiln dried, cut for parts, sanded, tenoned, and domed for final assembly. If curved or hooped parts are used, then the wood is soaked in a steam tank and pressure bent into forms, then redried. Joints are glued and double pinned with air driven nails. Table tops may be constructed with veneers or with solid woods. Oak table tops are often used along with hickory sapling legs and framing.



Finishing area, storage, or office space not included

Figure 5.1. Layout for Tenon Furniture Manufacturing.

Source: Tenonizer, Inc.

Pricing Considerations

In general, rustic furniture is constructed from eastern red cedar, oak, hickory, heart pine, or poplar. In some cases, a mix with specialty hardwoods is used (for example black locust). To obtain example of furniture prices, rustic/country furniture Internet sites were searched. Prices for furniture constructed from pine, cedar, oak, and mixed hardwoods were gathered for a 5' swing, a straight back chair, queen bed, 6' bench, garden furniture, which includes a chair, settee, and table, and a dining farm table (Table 5.2). As can be seen from Table 5.2, the prices range widely from under \$200 to over \$1,000 per piece. The value of the product will depend on the marketing skill of the producing firm, the quality of the product, the intrinsic value placed on the product by the customer, and many other factors. In addition, the price received will depend on whether furniture is sold directly as retail or wholesale to furniture or craft retailers.

Table 5.2. Example Furniture Prices

Type of Furniture	Wood used in construction					
	Pine	Cedar	Oak	Mixed Hardwoods	Hickory	Log
	Dollars					
5' Swing	\$199-350	\$289-399		\$255		\$270
Straight Back Chair	\$175	\$110-199	\$160			\$175
Queen Bed	\$1,200 – 1,300	\$329				\$850
6' Bench	\$255	\$750	\$1,000			\$235
Dining Table	\$875-1,370	\$1,029	\$199-750	\$769	\$595	\$650
End Table	\$195	\$269			\$500	\$416
Arm Chair	\$175	\$140				\$430
Garden Furniture:						
Chair	\$164	\$165				\$179
Settee		\$249-350	\$249		\$1,295	

Source: Internet company sites.

Financial Feasibility

The financial feasibility of a small furniture manufacturing is examined in Tables 5.3 and 5.4. A furniture manufacturing facility with 9 employees could be expected to have revenues of around \$900,000 per year. We projected a wholesale price for a chair or end table of \$150 per piece wholesale (or \$250 retail) and about 6,000 pieces manufactured per year. With 7 workers in the manufacturing process (2,000 hours per worker), the labor hours per piece would average around 2.3 per piece, so the labor costs per piece would average around \$27. This would leave a margin of about \$125 per piece to cover other costs. We estimated wood costs at about \$1.85 per board foot with about 28 feet of materials required (based on kiln dried oak and hickory prices). Therefore, the wood costs per piece were estimated to average around \$52. Other materials costs (hardware and coatings) are estimated at \$5 per piece. Marketing costs was assumed at 3% of total sales. Inventory period on supplies and product is assumed at 10 days. The average cost per piece is estimated at about \$108 including wood, processing, and marketing costs.

Table 5.3. Financial Feasibility Analysis: Furniture Manufacturing.

Operating Cost Estimates for Processing		
	<u>Total \$</u>	<u>\$ Per Piece</u>
Amortization for Direct Investment (1)		
Building	\$7,500	\$1.25
Truck	\$3,000	\$0.50
Fork Lift	\$1,000	\$0.17
Office Equipment	\$1,000	\$0.17
Tenon Cutters	\$680	\$0.11
High Pressure Sprayer	\$330	\$0.06
Drill Press	\$330	\$0.06
Sander	\$425	\$0.07
Finishing Equipment	\$230	\$0.04
Bandsaw	\$1,000	\$0.17
Planer	\$1,600	\$0.27
Jointer	\$600	\$0.10
Router	\$600	\$0.10
Handtools	\$667	\$0.11
Interest on Direct Investment (2)	\$11,001	\$1.83
Maintenance and Repairs (3)	\$11,001	\$1.83
Land Interest (4)	\$500	\$0.08
Taxes (5)	\$1,589	\$0.26
Insurance (6)	\$2,560	\$0.43
Labor	\$164,624	\$27.44
Office Overhead (7)	\$54,600	\$9.10
Energy (8)	\$12,840	\$2.14
Interest on Inventory (9)	\$1,800	\$0.30
Total	\$279,478	\$46.58
Profitability Analysis		
Amount of Product (pieces)		6,000
Product Price (\$/piece)		\$150
Revenues (\$)		\$900,000
Amount Wood Used (board feet)		168,000
Price (\$/BF)		\$1.85
Wood Costs and Materials Costs (\$)		\$340,800
Processing Costs (\$)		\$279,478
Processing, Wood, and Materials Costs (\$)		\$620,278
Marketing Costs (\$) (10)		\$27,000
Total Costs (\$)		\$647,278
Wood Costs and Materials Costs (\$/piece)		\$56.80
Processing Costs (\$/piece)		\$46.58
Wood and Processing Costs (\$/piece)		\$103.38
Costs per Piece (Including Marketing) (\$/piece)		\$107.88
PROFIT (\$)		\$252,722
PROFIT/piece (\$/piece)		\$42.12

Jobs

Manufacturing	7.00
Management/Office	2.00
Total Jobs	9.00

Notes: (1) Amortization of buildings and equipment = \$ investment/years in economic life, (2) Interest on direct investment = \$ investment * interest rate, (3) Maintenance and repairs = .01* \$ direct investment, (4) Land interest = land value * interest rate, (5) Taxes = effective property tax rate * property value, (6) Insurance=.01* (\$ direct investment + average value of inventory on hand) (The average value of inventory is the average daily volume * price of product), (7) Office overhead=manager + clerical, (8) Energy=kWh electricity used * electricity price, (9) Interest on inventory=interest rate * average value of inventory on hand, (10) Marketing costs are calculated at 3% of the value of sales.

Table 5.4. Information Used in Furniture Manufacturing Financial Feasibility Analysis.

Direct Investment (\$):	
Building	\$150,000.00
Equipment	
Truck	\$30,000.00
Fork Lift	\$5,000.00
Office Equipment	\$5,000.00
High Pressure Sprayer	\$700.00
Tenon Cutter	\$3,400.00
Drill Press	\$1,650.00
Sander	\$2,125.00
Finishing Equipment (High Volume Low Pressure Sprayer)	\$1,150.00
Bandsaw	\$5,000.00
Planer	\$8,000.00
Jointer	\$3,000.00
Router	\$3,000.00
Handtools	\$2,000.00
Total Direct Investment	\$220,025.00
Amortization Period (Years):	
Building	20
Truck	10
Fork Lift	5
Office Equipment	5
Tenon Cutters	5
High Pressure Sprayer	5
Drill Press	5
Sander	5
Finishing Equipment	5
Bandsaw	5
Planer	5
Jointer	5
Router	5
Handtools	3
Interest Rate (decimal %)	0.05
Land Area (Acres)	2
Land Value (\$/Acre)	\$5,000.00

Taxable Values (\$)	
Land	\$10,000.00
Buildings	\$150,000.00
Equipment	\$49,025.00
Insurable Values (\$)	
Direct Investments	\$220,025.00
Wood	\$36,000.00
Property Tax Rate (effective rate decimal %)	0.0076
Insurance Rate (decimal %)	0.01
Labor	
Number of Employees	7
Wage Rate (\$/hour)	\$11.76
Hours per Worker	2,000
Hours	14,000.00
Energy	
Electrical Use (kWh)	400,000
Electrical Costs (\$/kWh)	\$0.03
Product Price (\$)	\$150.00
Wood Price (\$/BF)	\$1.85
Average Daily Product Volume on Hand (pieces)	240
Avg. Daily Volume of Wood Parts (BF)	6,720
Plant Capacity per Year (Pieces)	6,000

Sources: Electricity rates (Powell Valley Electric Cooperative), Land Prices (Based on industrial property prices, Tennessee Community Data, Tennessee Department of Economic and Community Development), Labor use (estimated based on industry data -sales and employees size categories), Equipment prices (Tenonizer, Inc., TMS Machinery Sales, and Manufacturers web sites, Wages (based on Tennessee Labor and Workforce Development Estimates) with 30% added for benefits, 2.7% unemployment compensation taxes, and 5.64% for workers compensation premiums, Interest rates (Based on current lending and borrowing rates), Wood prices (Hardwood Market Report), Furniture prices (company web sites selling furniture), Wood use (company web sites selling furniture and forest industry web sites for conversion charts).

Major upfront investments would be for the building, machinery (including a tenon cutter, sander, drill press, spraying equipment, planer, bandsaw, and joiner), and wood materials and supplies. In addition, depending on the construction of the furniture, a steamer might be needed (for bending wood). The total direct investment is estimated at \$220,000 for buildings and equipment. The profits are estimated at \$252,722 or \$42 per piece before taxes.

Labor Requirements

Two management/office personnel would be needed to deal with production management, marketing, and purchasing. Another worker would be needed for loading/unloading, inventory, and transportation. The rest of the workers would be used in assembling

and finishing the furniture. This would likely require around 6 employees. Wage rates are about \$8.50 for furniture manufacturing workers (without benefits) or \$11.76 with benefits, unemployment compensation taxes, and workers compensation premiums.

Workers would either need to be trained in furniture making or solicited from local area crafts people who may already be making furniture. There are several organizational and training considerations that surfaced as research was conducted on the rustic furniture feasibility. These included the possible formation of a furniture making guild, the development of a cooperative, and offering furniture making courses.

The development of a guild would promote the exchange of woodworking information and to increase regional expertise in the production of quality furniture. The guild becomes a means to further knowledge and expertise, create an opportunity for people with similar interests to meet and discuss issues and problems, and develop a way to learn new skills. Woodworking guilds and craft guilds with woodworkers can be found throughout the United States. Some examples of these guilds include the following:

Minnesota Woodworkers Guild	www.visi.com/~jzinsli/
The Lee's Summit Guild	home.att.net/~lswoodguild
The Furniture Society	www.furnitureociety.org
East Tennessee Woodworkers Guild	www.kornnet.org/etwg/
Foothills Craft Guild	www.kornnet.org/foothill/

A second option might be a cooperative that operates a furniture making shop. Here, members would sign up for time to use the equipment. To cover expenses, a portion of the product's value produced in the facility would be paid to the cooperative. The cooperative could assist in marketing, developing a website listing available products, developing woodworking courses, etc. If the furniture were of consistent specifications and quality, it could be branded. Developing product specifications and marketing those specifications would be the functions of

the cooperative. An example of a woodworking cooperative can be found in Washington state, Fine Woodworking NW (www.nwfinewoodworking.com).

Finally, furniture making courses are a way to increase the skill level and potentially the craftsmanship value of the finished product. Perhaps a subsidized woodworking or hand-crafted furniture making course offered would be beneficial in the development of a rustic furniture industry in the Clinch-Powell Enterprise Community Counties. Another option would be to offer scholarships to training courses or workshops in the Appalachian and Southeast region (see Section VI).

Section VI. Labor Market, Assistance Programs, and Incentives

Labor Force and Low Income Workers

Labor force estimates and unemployment rates are shown for each county in Table 6.1. Hawkins and Claiborne counties have the largest labor force followed by Grainger, Union and Hancock. The unemployment rate ranges from 3.2 to 4.5 percent for all counties. The lowest unemployment rates are in Union and Grainger at 3.2 and 3.3 percent, respectively. The counties with the highest unemployment rates include Claiborne at 4.5 percent followed by Hawkins at 3.9 percent and Hancock at 3.7 percent. The counties with the largest number of individuals unemployed are Hawkins and Claiborne followed by Grainger, Union, and Hancock.

Table 6.1. Labor Force and Unemployment Rates, April 2000

County Name	Labor Force	Unemployment	Unemployment (%)
Claiborne	13,180	590	4.5
Grainger	9,950	330	3.3
Hancock	2,680	100	3.7
Hawkins	23,370	920	3.9
Union	7,760	250	3.2

Source: Tennessee Department of Labor and Workforce Development, Public Information Office (http://www.state.tn.us/labor_figures/c.htm)

U.S. poverty guidelines for 1999 are presented in Table 6.2. If the size of the household is one individual and household income is \$8,240 or less the poverty criteria guideline is met. An additional \$2,820 should be factored for each additional member added to the household. Thus, a family of four with an income of \$16,700 or less meets the poverty criteria.

Table 6.2. Year 1999 Poverty Guidelines

Size of Family Unit	United States
1	\$8,240
2	11,060
3	13,880
4	16,700
5	19,520

Source: U.S. Department of Health and Human Services (<http://aspe.hhs.gov/poverty/figures-fed-reg.htm>)

The most recent estimates for people of all ages in poverty for the Clinch-Powell counties are presented in Table 6.3. Hawkins and Claiborne have the largest number of individuals in poverty followed by Grainger, Union, and Hancock. Likewise, on a percentage basis, the counties with largest individuals in poverty are Hancock at 32.9 percent followed by Claiborne at 22.6 percent. The poverty rates for Grainger, Union, and Hawkins are 18.4, 17.9, and 15.8 percent, respectively.

Table 6.3. County Estimates for People of All Ages in Poverty: 1995

County	Number	Percent
Claiborne	6,472	22.6
Grainger	3,526	18.4
Hancock	2,236	32.9
Hawkins	7,726	15.8
Union	2,814	17.9

Source: U.S. Census, County Estimates for People of All Ages in Poverty for Tennessee: 1995 (<http://www.census.gov/cgi-bin/hhes/saipe/gettable.pl>)

Information was difficult to find concerning the number of workers and non-workers in each county that fall below the poverty line. Based on labor force statistics in Table 6.1 and poverty rate percentages in Table 6.3 we can try to determine some general information in this

area. Multiplying the labor force values and the poverty rate percentages for each county gives the results in Table 6.4. Labor force statistics presented in Table 6.1 also account for those individuals' unemployed. One may assume of those individuals unemployed a large percentage meet the poverty criteria.

Table 6.4. Estimate of Labor Force Classified in Poverty

County	Labor Force
Claiborne	2,978
Grainger	1,831
Hancock	882
Hawkins	3,692
Union	1,389

A three-year history of per capita personal income by county is presented in Table 6.5. Among the study area counties, Hancock and Claiborne have shown the highest growth rates in per capita income at 4.3 and 3.5 percent, respectively. Grainger, Hawkins, and Union per capita income growth rates are 2.8, 2.8, and 1.4 percent, respectively. Based on a total of 95 counties in the state, county rankings based on 1997 per capita income figures are also presented.

Table 6.5. Per Capita Personal Income for Clinch-Powell Counties

County	1995	1996	1997	Rank
Claiborne	\$14,547	\$14,815	\$15,587	74
Grainger	14,128	14,375	14,941	83
Hancock	11,562	11,584	12,563	93
Hawkins	16,276	16,726	17,210	53
Union	13,066	13,181	13,436	91

Source: Fax from Tennessee Department of Labor and Workforce Development and Tennessee Department of Economic and Community Development (http://208.220.192.127/domains/tennessee_ws/cprofile/action.lasso)

To summarize the potential labor force statistics, Hawkins and Claiborne counties have the largest labor forces and numbers of unemployed individuals of the five counties studied. Based on the procedure to derive values in Table 6.4, projections suggest that these same counties would have the largest numbers of individuals in the labor force classified as in poverty. From 1995 county estimates for people of all ages in poverty (Table 6.3), Hawkins and

Claiborne counties also have the greatest number of people in poverty. These counties, would therefore, likely be those where the largest numbers of the labor force who are in poverty would reside. This might be a consideration in locating the enterprises examined in this study.

Assistance Programs

Tennessee provides numerous programs to help individuals move into productive jobs. In addition to job service and veterans' assistance, the state also offers adult basic education and programs to assist individuals to work toward a lifestyle without welfare. Available state sponsored assistance programs are listed below.

- Job Service Employer Committees – statewide network of local business representatives that provide input on employee and employer needs. The organization provides educational opportunities on employment related issues.
- Families First Program (Welfare to Work) – builds partnerships that move people from public assistance into productive jobs. The program assists in the teaching of interviewing skills, how to fill out applications and how to look for work. Cash grants, education, job training, childcare, employment assistance, and transitional benefits to poor or low-income individuals working toward a lifestyle without welfare are also provided.
- Veterans' Assistance – serves as an outreach to veterans and ensures veterans' preference in referral to jobs. Employment-related testing, training information, skills assessment, referral, and job counseling are among the services provided.
- Adult Basic Education – assists business and industry by ensuring employees have basic educational skills.

- Food Stamps (Employment and Training) – provides a bridge from dependency to self-sufficiency through life-skills training and career preparation assistance.
- Child Care Services – assists in finding child care for the parent and their child.
- U.S. Department of Health and Human Service’s Social Services Block Grant – provides program funds for states for social services directed toward achieving economic self-support or self-sufficiency, preventing or remedying neglect, abuse, or the exploitation of children and adults.

Source: Tennessee Department of Labor and Workforce Development (<http://www.state.tn.us/labor-wfd>) and U.S. Department of Health and Human Services (<http://www.acf.dhhs.gov/programs/ocs/ssbg>)

Local county officials were also contacted to inquire of the availability of low-income assistance programs. Information was requested in the areas of training, transportation, and day care. Labor force information, if available, was also requested. Listed by county are programs that local representatives indicated were available.

Claiborne

- Families First – provides cash grants, education, job training, child care, employment assistance, and transitional benefits to poor or low income individuals;
- Clinch-Powell Head Start – pre-school education;
- Adult Basic Education – provided by local school system;
- Walters State Community College/East Tennessee State University – provides job search program and post employment assistance;
- Walters State – provides child care assistance;
- Department of Education – provides child care;
- Family Service – provides child and family counseling;

- East Tennessee Human Resources Agency – provides transportation for those in need.

Source: Suzy Miller, Department of Human Services, (423) 626-7285

Grainger

- Families First – provides cash grants, education, job training, child care, employment assistance, and transitional benefits to poor or low income individuals;
- Adult Basic Education – provided by the local school system;
- Head Start Program – pre-school education;
- Job Training – career center facility in process of being established in Morristown;
- East Tennessee Human Resources Agency – (dial-a-ride) provides transportation for those in need;
- Douglas Cherokee – state funded program to provide childcare.

Source: Martha Cameron, Department of Human Services, (865) 828-5245

Hancock

- Families First – old Human Services Aid to Families with Dependent Children (AFDC) Jobs Work Program and support services (Welfare to Work);
- Hancock County Sunshine Development Center – provides child care (day care);
- Adult Basic Education – provided by the local school system;
- Head Start Program – pre-school education;
- Hancock County Job Skills Training – training slots, on-the-job-training, employment contracts, placement;
- Human Services (state) – AFDC, food stamps, TN care, adult protective services, vocational rehabilitation;

- Department of Children’s Services – foster care, child protective services, residential placement, juvenile justice services including court probation;
- Jubilee project – non-profit organization providing various community development projects and services;
- Public Housing – Sneedville Garden Apartments, Turner Homes (MHA), Tremont Apartments, Mountain View Apartments, Sneedville Manor Apartments;
- Clinch-Powell Education Coop – provides educational opportunities and services;
- Neighborhood Service Center – emergency food and shelter, weatherization, etc.

Source: William T. Seal, Hancock County Chamber of Commerce, (423) 733-2401

Hawkins

- Families First – provides cash grants, education, job training, child care, employment assistance, and transitional benefits to poor or low income individuals;
- Food Stamps – provides financial assistance for purchasing food items;
- TennCare – provides health care for eligible participants including children.

Source: Carolyn Green, Department of Human Services, (423) 272-2606

Union

- Families First – provides cash grants, education, job training, child care, employment assistance, and transitional benefits to poor or low income individuals;
- First Wheels – provides loans to purchase a car; usually a Families First participant;
- Head Start – pre-school education assistance;
- Adult Basic Education – provided by the local school system;
- East Tennessee Human Resources Agency – provides transportation for those in need.

Source: Kim Stooksbury, Department of Human Services (865/992-5802) and Marie Rhyne, Union County Business & Professional Association, (865/992-0787).

Training

The forest products industry is a competitive business. Attention and knowledge to proper sawing methods, equipment, lumber drying, and furniture construction are important to maximize profits which, in turn, leads to a profitable business and stable employment. In addition, the industry requires knowledge of best management practices of timber resources to ensure an adequate supply for future use. Listed below are available training courses, both in state and out-of-state, that wood processors may take advantage of.

In-State Training

The Tennessee Master Logger Program seeks to enhance the professionalism of loggers through continuing education in safety, environmental stewardship and business management. The Tennessee Forestry Association, Tennessee Division of Forestry, University of Tennessee, Agricultural Extension Service, Tennessee Wildlife Resources Agency, and the U.S. Forest Services are sponsors. There are five sessions at \$20 per session or \$100 for the entire course. The session's topics are logger safety, forest ecology/best management practices, forestry and wildlife management, first aid, and business management. Completing all five sessions earns the participant the title of Tennessee Master Logger. For more information contact Tennessee Forestry Association via telephone at 615/883-3832 or e-mail at <http://www.tenfor.org/logger.html>.

The University of Tennessee's Forest Product Center offers various forest industry training programs. Training is offered for hardwoods in the areas of lumber grading, lumber drying, lumber manufacturing. Dr. Brian Bond, Assistant Professor, Forestry, Wildlife, and

Fisheries is the contact person. Dr. Bond's phone number is 865/974-7991. The URL address is <http://web.utk.edu/~tfpc/>.

The Joe L. Evins Appalachian Center for Crafts in Smithville, Tennessee offers courses in furniture making, chair caning, spindle turning plus other wood craftsman needs. The Center, a division of Tennessee Technological University, is a nationally renowned facility dedicated to expanding the influence of crafts and preserving craft traditions. The telephone number is 615/597-6801. The URL address is <http://plato.ess.tntech.edu/acc/workshops/Default.htm>.

The Arrowmont School of Arts & Crafts in Gatlinburg, Tennessee offers one to two week courses in the woodcrafts area. Men and women of all ability levels, ages, practical backgrounds, and educational levels attend. In addition, the school offers special conferences, seminars, and community classes. One upcoming conference in August 2000 will focus on wood turning. The telephone number is 865/436-5860. The URL address is <http://www.arrowmont.org>.

Out-of-State Training

Haywood Community College in Clyde, North Carolina offers hands-on technical training in all sawmill trades. The curriculum is designed to provide attendees with the technical and practical knowledge, understanding, and skills for lumber specialists (log grading and kilning), saw filers, sawyers (both circle and band sawing), and wood products technology (planing, grading, sawing, filing, and kilning) areas. The contact person is Debbie Carver at 828/627-4590. The URL address is <http://www.haywood.cc.nc.us/WoodProdMenu.html>.

Appalachian State in Boone, North Carolina offers a furniture-manufacturing program. Classes include general woodworking, finishing, production control, planning, CAD, safety,

materials, and manufacturing. The phone number is 828/262-2000. The URL address is <http://www.acs.appstate.edu/dept/tech/Furniture.htm>.

The Furniture Manufacturing & Management Center in Raleigh, North Carolina also offers courses in furniture manufacturing. Classes are offered in the areas of furniture product engineering, manufacturing processes, wood products, and facilities design. The contact person is C. Thomas Culbreth at 919/515-3335. The URL address is <http://www.fmmcenter.ncsu.edu/education/fmmccourse.html>.

Country Workshops in Asheville, North Carolina offers courses in a variety of country and traditional woodcrafts. Workshops include ladder-back chair making, Windsor chair making, carving, hand tool techniques, and rush seating weaving. The telephone number is 704/656-2280. The URL address is <http://www.woodworking.com/magazine/mar96/cw/cw.html>.

The Center for Furniture Craftsmanship in Rockport, Maine offers furniture making workshops in the areas of basic woodworking, furniture making, chair design, veneering and bending, design and craftsmanship, and rustic furniture making. The telephone number is 207/594-5611. The URL address is <http://www.woodschooll.com/calendar.html>.

Incentives

Tennessee provides pre-employment training assistance to targeted incoming industry along with infrastructure and training grants. No state sales tax is required for raw materials, manufacturing equipment for qualified manufacturers, and pollution control equipment. Other tax incentives include a no state property tax, no property tax on work in progress or finished product inventories, and no personal income tax on wages. For energy consumption, the state provides a reduced sales tax for qualified manufacturers' use of energy fuel and water at

manufacturing sites. The state supports numerous financing incentives to help attract prospective employers. Financing can be provided through securities or obligations used by local governments on behalf of business, community development block grants, small business administration “504 Loan Programs”, and economic assistance to local governments to develop infrastructure. In addition, the state allows an accelerated depreciation schedule for machinery and equipment. The Tennessee Valley Authority (TVA), in cooperation with other public and private economic development organizations, also provides a loan program to help assure the infrastructure and equipment needed for economic growth can be available throughout the state. Available incentives are categorized below.

Labor

- Infrastructure and training grants up to \$750,000;
- Pre-employment training assistance free of charge to incoming industry;
- Manufacturing Means Jobs program provides training and technical assistance to manufacturers from a coalition of educational/research institutions and organizations;

Sales Tax

- No sales tax on raw material, on manufacturing equipment for qualified manufacturers, and on pollution control equipment;
- Reduced sales tax for qualified manufacturers’ use of energy fuel and water at manufacturing sites; tax-exempt if they have direct contact with product during manufacturing process;

Tax Credits

- Manufacturers are allowed a tax credit of 1% of the cost of industrial machinery;

- A franchise tax jobs credit allows a \$2,000 or \$3,000 tax credit against franchise tax liability for each new full-time employee of a qualified business that increased employment by 25 or more and meets required capital investment;
- Work Opportunity Tax Credit and Welfare-to-Work tax credit programs complement the welfare reform effort and can be used as incentives for employers to hire regular as well as long term welfare recipients. The program is designed to appeal to a wide range of employers, to impose a minimal burden upon participating employers, and promotes the hiring of target group individuals;
- Day Care Incentive Act allows companies to receive a credit against corporate franchise and excise taxes for establishing a day care center for children of employees;

Other Tax Incentives

- No state property tax, and no property tax on work in progress or finished product inventories;
- No personal income tax on wages;
- “Double Weighting” of Tennessee sales for franchise and excise taxes;

Financing

- Accelerated depreciation of machinery and equipment;
- Securities or obligations issued by local governments on behalf of businesses. Projects may be 100% financed, using proceeds for land, building construction, equipment and fixtures and bond issuance costs;
- Community development block grants designed to provide communities (below 50,000 population) with a basic level of assured, ongoing financial support for fundamental

community and economic development activities. Grants are approved to communities to loan to industries for fixed assets;

- Small business administration “504 Loan Program” enables small business to borrow funds for an expansion project that otherwise would be unattractive. The program gives the business the ability to expand with only ten percent of total project cost coming from equity financing. The program provides long-term, fixed asset financing (land, building, machinery, and equipment);
- Tennessee Industrial Infrastructure Program assists local governments in providing infrastructure support. Funds are restricted to where there is a commitment by private sector businesses to create jobs;
- Tennessee Small Business Energy Loan Program is available to existing businesses for identifying, installing, and incorporating approved energy efficient measures;
- TVA Economic Development Loan Fund program is designed to stimulate capital investment and job creation in the TVA region. Loans can be used for fixed assets, such as plant expansions and the construction of new industrial facilities or for infrastructure projects;
- TVA Business Incubators are facilities designed to help new business by providing affordable rental space, onsite support services, and technical assistance (financial and legal).

Source: Tennessee Department of Economic & Community Development (<http://www.state.tn.us/e.cd>), Tennessee Department of Labor & Workforce Development (<http://www.state.tn.us/labor-wfd>), and Tennessee Valley Authority Economic Development (<http://www.tva.gov/econdev>).

Section VII. Projected Economic Impacts of Various Wood Products Industries

The following multipliers illustrate the response of the area's economy to activity in each of the wood products industries under consideration. Economic impacts result because the wood products industry purchases goods and services from other industries. In turn, those industries would need to purchase goods and services from other industries (indirect impacts). In addition, household and institutional spending would increase due to the added industry activity (induced impacts). The Total Industry Output (value of production by industry) multiplier measures responsiveness of overall industry activity in dollars to a dollar of wood products industry activity, while the Value-Added multiplier measures responsiveness of overall value-added (income to workers paid by employees; self-employed income; interests, rents, royalties, dividends, and profits; and excise/sales taxes) to a dollar of wood products industry activity. The Employment multiplier measures the responsiveness in jobs to \$1 million in wood products industry activity.

As can be seen in Table 7.1, the largest TIO, Employment, and Value-Added multipliers are for Wood Preserving. The smallest TIO and Value-Added multipliers are for logging, while the smallest Employment multiplier is for Wood Partitions and Fixtures. Among the prevalent types of operations in the area, Sawmills and Planing mills, the TIO multiplier is around 1.53, the Employment multiplier is 1.86, and the Value-Added multiplier is around 2.02. The furniture industry multipliers are around 1.3 for TIO, 1.4 for Employment, and 1.5 for Value-Added.

Table 7.1. Estimated Multipliers for Wood Products Industries in the CPEC Counties.

Industry	TIO*	Employment	Value-Added
Logging	1.19	1.43	1.26
Sawmills & Planing Mills	1.53	1.86	2.02
Hardwood Dimension & Flooring Mills	1.53	1.45	1.46
Millwork	1.56	1.60	1.61
Wood Kitchen Cabinets	1.44	1.33	1.48

Structural Wood Members, NEC	1.64	1.68	1.96
Wood Pallets & Skids	1.62	1.40	1.68
Wood Preserving	1.70	2.88	2.73
Wood Products, NEC	1.55	1.36	1.73
Wood Household Furniture	1.38	1.43	1.48
Household Furniture-Upholstered	1.34	1.48	1.50
Wood Partitions & Fixtures	1.30	1.30	1.40

*TIO - Total Industry Output

Tables 7.2, 7.3, and 7.4 gives projected impacts for TIO, Employment, and Value-Added for industries analyzed in the study. For the industries examined and assuming an average of 10 employees, sawmills and planing mills add an additional 19 jobs, dimension mills add 15 jobs, and furniture adds 15 jobs outside the industries in addition to those directly employed in the industries. Total impacts for TIO are \$2.1 million for sawmills and planing mills and roughly \$1.0 million for both dimension mills and furniture. Likewise, for Value-Added, the total impacts are \$.63, \$.48, and \$.45 million for sawmills and planing mills, dimension mills, and furniture, respectively.

Table 7.2. Projected Employment Impacts-10 Employees in the CPEC Counties

	Employment			Total
	Direct	Indirect	Induced	
Sawmills & Planing Mills	10	5.8	2.8	18.6
Hardwood Dimension/Flooring Mills	10	2.3	2.3	14.6
Wood Household Furniture	10	2.2	2.2	14.4

Table 7.3. Projected Total Industry Output Impacts-10 Employees in the CPEC Counties

	Total Industry Output			Total
	Direct	Indirect	Induced	
Sawmills & Planing Mills	\$1,417,782	\$612,578	\$143,338	\$2,173,698
Hardwood Dimension/Flooring Mills	669,075	238,254	116,048	1,023,377
Wood Household Furniture	815,351	195,340	111,536	1,122,227

Table 7.4. Projected Value-Added Impacts-10 Employees in the CPEC Counties

	Total Value Added			Total
	Direct	Indirect	Induced	
Sawmills & Planing Mills	\$312,395	\$232,651	\$84,712	\$629,758
Hardwood Dimension/Flooring Mills	331,214	84,594	68,870	484,678
Wood Household Furniture	308,276	81,999	66,592	456,867

Section VII. Summary

The study area could support two or three larger sawmills. A combination sawmill/kiln operation may offer advantages, both from an economic and quality standpoint, than if constructed individually. Investment costs are relatively high for sawmills and the potential for competing with existing sawmill operations needs to be considered. Proper training of operators is crucial to realize the maximum benefit for this investment.

Hardwood kilns offer additional value for the hardwoods in the area and they provide a service either through contracting and/or buying for wood users. Initial investments costs are not large compared to other enterprises examined. The kiln would require a good, reliable supply of quality hardwoods to be economically justifiable. Kilns, however, would employ a small number of individuals compared to other enterprises examined.

The hardwood blanks manufacturing plant fits well with the furniture industry and the availability of quality hardwoods in the Clinch-Powell and surrounding areas. The required technology is not high, plus it would employ more individuals compared to a kilning operation, especially if more than one shift was implemented.

The rustic furniture enterprise focuses on the rural heritage of the area. The potential for promoting a guild concept for the area warrants further exploration. Employment requirements are both similar to the needs of a sawmill or hardwood blank manufacturing facility if not more depending on the type of furniture being manufactured. However, more marketing of the finished product would be required.

Developing a rustic furniture workshop that would allow members of a guild or coop to share the facility and sign up for production time to produce furniture might be an idea worth exploring. It would be expected that this enterprise would have an Internet outlet maintained by

someone employed by the cooperative or guild. If the quality of furniture produced met certain standards then the coop could brand the furniture. For example, the standards could include the following:

- wood used was grown in Tennessee;
- wood used was harvested by Master Loggers in a sustainable manner; and
- furniture produced was handcrafted in the Clinch-Powell area by artisans trained in furniture making.

No matter which enterprise is evaluated or adopted, each would require additional training/education of workers to capture the value-added of the available natural resources in the area. Additional training would help to insure maximum benefits to the enterprise owner(s), workers and the community.

APPENDIX

Appendix Table 1: Product-Related Companies in the CPEC Counties

Company Name	City	Primary SIC Description	Other SIC Description	Number of Employees	Sales Category
Claiborne County					
Brooks Furniture Mfg Inc	Tazewell	Wood Household Furniture, Upholstered		100 to 249	\$20 million to \$50 million
Brooks Sawmill	Tazewell	Sawmills & Planing Mills, General		10 to 19	not available
Bushline Inc	New Tazewell	Wood Household Furniture, Upholstered		100 to 249	\$10 million to \$20 million
Claiborne Cabinet Co	Tazewell	Carpentry Work	Wood Kitchen Cabinets	1 to 4	Less than \$500,000
Claiborne Hardwoods	New Tazewell	Sawmills & Planing Mills, General		10 to 19	\$2.5 million to \$5 million
Cumberland Gap Log Homes	Cumberland Gap	Prefabricated Wood Bldgs & Components		1 to 4	Less than \$500,000
Duncan Lumber Inc	New Tazewell	Lumber & Other Bldg. Materials Dealers	Structural Wood Members, NEC	5 to 9	\$10 million to \$20 million
Dunn's Woodworking Shop	Harrogate	Furniture Stores	Wood Office & Store Fixtures	1 to 4	\$500,000 to \$1 million
England Corsair Furniture Mfg	New Tazewell	Upholstered Furniture		1,000 to 4,999	not available
Giles Industries-Tazewell	New Tazewell	Mobile Homes		100 to 249	\$20 million to \$50 million
Graves Sawmill	Speedwell	Sawmills & Planing Mills, General		1 to 4	not available
Hopper Lumber & Sawmill	Speedwell	Sawmills & Planing Mills, General	Logging	1 to 4	\$1 million to \$2.5 million
J H Bolden Lumber Co	Tazewell	Sawmills & Planing Mills, General		10 to 19	\$2.5 million to \$5 million
Jim Welch Logging	Speedwell	Logging		1 to 4	\$500,000 to \$1 million
JJ Cabinets	New Tazewell	Wood Kitchen Cabinets		1 to 4	not available

Appendix Table 1. Continued.

Company Name	City	Primary SIC Description	Other SIC Description	Number of Employees	Sales Category
Oakwood Furniture Mfg	New Tazewell	Wood Household Furniture, Except Upholstered		100 to 249	\$20 million to \$50 million
Youngs Wood Products	Tazewell	Wood Pallets and Skids		1 to 4	not available
Grainger County					
All Wood Products	Bean Station	Kitchen Cabinets		5 to 9	not available
American Heirloom Woodworks Inc	Bean Station	Wood Products, NEC (Dimension and Furniture Parts)		10 to 19	\$1 million to \$2.5 million
Bean Station Cabinet Company	Bean Station	Kitchen Cabinets	Restaurant Furniture	5 to 9	not available
Bean Station Furniture Factory	Bean Station	Furniture & Fixtures, NEC	Wood Household Furniture, Upholstered	100 to 249	\$20 million to \$50 million
C & M Cabinet Co	Washburn	Wood Household Furniture, Except Upholstered		20 to 49	\$5 million to \$10 million
Clayton Homes	Rutledge	Manufactured Housing		100 to 249	not available
Fennell Sawmill and Harvesting	Rutledge	Sawmills & Planing Mills		1 to 4	not available
Futuristic Inc	Bean Station	Furniture & Fixtures, NEC	Wood Household Furniture, Upholstered	50 to 99	\$10 million to \$20 million
Grainger Door	Bean Station	Kitchen Cabinets		1 to 4	not available
Hank Rasnic Lumber	Rutledge	Lumber & Other Bldg. Materials Dealers	Sawmills & Planing Mills, General	1 to 4	\$1 million to \$2.5 million
Holt's Cabinet Shop	Bean Station	Sawmills & Planing Mills, General		20 to 49	not available
Holt's Frame Shop	Thorn Hill	Wood Frames used in Household Furniture		1 to 4	not available
Holt Logging	Thorn Hill	Logging		1 to 4	Less than \$500,000
Hurst Trailers	Washburn	Farm Machinery/Equip		10 to 19	not available
JT Coffey Sawmill	Thorn Hill	Sawmills & Planing Mills, General		not available	available

Appendix Table 1. Continued.

Company Name	City	Primary SIC Description	Other SIC Description	Number of Employees	Sales Category
Oakwood Manufacturing	Thorn Hill	Furniture & Fixtures, NEC	Wood Household Furniture, Except Upholstered	5 to 9	\$1 million to \$2.5 million
Sexton's Furniture Mfg	Bean Station	Furniture & Fixtures, NEC		20 to 49	\$5 million to \$10 million
Smoky Mountain Log Homes	Bean Station	Prefabricated Wood Bldgs & Components		1 to 4	Less than \$500,000
T & D Furniture	Thorn Hill	Wood Household Furniture, Except Upholstered		5 to 9	\$1 million to \$2.5 million
Tennessee Furniture	Bean Station	Wood Household Furniture, Upholstered		5 to 9	not available
Volunteer Fabricators	Bean Station	Hardwood Dimension and Furniture Parts		50 to 99	\$20 million to \$50 million
Young's Frame Shop	Washburn	Hardwood Dimension & Flooring Mills		10 to 19	\$1 million to \$2.5 million
Hancock County					
Cawood Manufacturing Corp	Sneedville	Furniture & Fixtures, NEC	Wood Household Furniture, Upholstered	50 to 99	\$5 million to \$10 million
Copper Ridge Wood Products	Treadway	Structural Parts, NEC		10 to 19	not available
Hensley Lumber Company	Sneedville	Sawmills & Planing Mills		5 to 9	not available
Ken Mabe Sawmill	Sneedville	Sawmills & Planing Mills		1 to 4	not available
Lyde Ramsey Sawmill	Sneedville	Wood Pallets & Skids		1 to 4	not available
Mills Lumber Company	Sneedville	Sawmills & Planing Mills		1 to 4	not available
Oscar Jones Sawmill	Sneedville	Sawmills & Planing Mills		not available	not available
Sam Stewart Sawmill	Sneedville	Sawmills & Planing Mills		5 to 9	not available
Seals Woodyard	Sneedville	Hardwood Pulpwood		1 to 4	not available
Volunteer Fabricators	Sneedville	Hardwood Dimension and Furniture Parts		100 to 199 employees	not available

Appendix Table 1. Continued

Company Name	City	Primary SIC Description	Other SIC Description	Number of Employees	Sales Category
Hawkins County					
Affordable Living	Rogersville	Prefabricated Wood Bldgs & Components		1 to 4	Less than \$500,000
Barrett's Tree Experts	Church Hill	Logging	Logging	1 to 4	\$1 million to \$2.5 million
Bulls Gap Forest Products Inc	Bulls Gap	Wood Preserving		20 to 49	\$20 million to \$50 million
Davis Sawmill	Rogersville	Sawmills & Planing Mills, General		1 to 4	not available
English Lumber	Mooreburg	Sawmills & Planing Mills, General		20 to 49	\$5 million to \$10 million
Erwin Forest Products Inc	Bulls Gap	Hardwood Dimension & Flooring Mills	Sawmills & Planing Mills, General	100 to 249	\$20 million to \$50 million
Full Cycle Woodworks Inc	Rogersville	Lumber & Other Bldg. Materials Dealers	Millwork	5 to 9	\$1 million to \$2.5 million
Helton Sawmill	Rogersville	Sawmills & Planing Mills, General		1 to 4	not available
Henard Sawmill	Rogersville	Sawmills & Planing Mills, General		1 to 4	not available
Mc Lain Sawmill	Rogersville	Sawmills & Planing Mills, General		5 to 9	\$1 million to \$2.5 million
Pinkston Pallet Shop	Rogersville	Wood Pallets & Skids		5 to 9	\$500,000 to \$1 million
Wallen Sawmill	Rogersville	Sawmills & Planing Mills, General		1 to 4	not available
Union County					
Burnette's Sawmill & Logging	Luttrell	Logging	Sawmills & Planing Mills, General	1 to 4	\$500,000 to \$1 million
Clayton Homes	Maynardville	Manufactured Housing		100 to 249	not available

Appendix Table 1. Continued.

Company Name	City	Primary SIC Description	Other SIC Description	Number of Employees	Sales Category
Cliff Bailey Sawmill	Maynardville	Sawmills & Planing Mills, General		1 to 4	not available
Hodges Manufacturing Co	Maynardville	Furniture & Fixtures, NEC	Wood Household Furniture, Upholstered	50 to 99	\$10 million to \$20 million
Kitts Sawmill	Luttrell	Sawmills & Planing Mills, General		not available	not available
Marlock Inc	Maynardville	Millwork		100 to 249	\$20 million to \$50 million
Maynardville Hardwoods	Maynardville	Sawmills & Planing Mills, General		1 to 4	not available
Rouse Brothers Sawmill	Sharps Chapel	Sawmills & Planing Mills, General		1 to 4	not available
Walter Seymour Sawmill	Maynardville	Sawmills & Planing Mills, General		1 to 4	not available
Wayne Hurst Sawmill	Maynardville	Sawmills & Planing Mills, General		1 to 4	not available
William Loy Sawmill	Sharps Chapel	Sawmills & Planing Mills, General		1 to 4	not available

Sources: INFO USA, American Business Lists and Tennessee Wood Using Industries Directory

Appendix Table 2. Wood Products Companies in Counties Surrounding the CPEC Counties.

County	Company Name	City	Business Type	Number of Employees	Sales
Anderson	Home Crest Corp	Clinton	Kitchen Cabinets	100 to 249	\$20 to 50 Million
	Coal Creek Log Homes	Lake City	Log Homes	1 to 4	<\$500,000
	Jim Barna Log Homes	Clinton	Log Homes	5 to 9	\$ 1 to 2.5 Million
	Jim Barna Log Systems	Clinton	Log Homes	5 to 9	\$ 1 to 2.5 Million
	Clayton Homes Inc	Andersonville	Mobile Homes	100 to 249	\$20 to 50 Million
	Clinton Pallet Co	Clinton	Pallets	10 to 19	\$ 1 to 2.5 Million
	Pallets Plus Inc	Clinton	Pallets	10 to 19	\$ 1 to 2.5 Million
Campbell	Oak Ridge Hardwoods Inc	Oak Ridge	Sawmill	20 to 49	\$10 to 20 Million
	La Follette Cabinet & Millwork	La Follette	Kitchen Cabinets and Millwork	1 to 4	<\$500,000
	Valley Log Homes	La Follette	Log Homes	1 to 4	<\$500,000
Greene	Pallet Express	Pioneer	Pallets	1 to 4	\$500 K to \$ 1 Million
	Hughes Lumber Mills Inc	Chuckey	Hardwood Planing Mill	5 to 9	\$2.5 to 5 Million
	Murray's Custom Cabinets	Afton	Kitchen Cabinets	5 to 9	\$500 K to \$ 1 Million
	New Horizon Log Homes	Chuckey	Log Homes	20 to 49	\$10 to 20 Million
	Cedar Haven Log Homes	Mosheim	Log Homes	1 to 4	<\$500,000
	Hearthstone Log & Timberframe	Greeneville	Log Homes	1 to 4	<\$500,000
	Hillbilly Log Homes	Greeneville	Log Homes	1 to 4	<\$500,000
	Roger's Log Homes & Remodeling	Greeneville	Log Homes	1 to 4	<\$500,000
	Rustic Log Homes Inc	Mosheim	Log Homes	5 to 9	\$ 1 to 2.5 Million
	Cherokee Wood Preservers	Mosheim	Preservative Treating	50 to 99	\$20 to 50 Million
	East Tennessee Forest Products	Greeneville	Preservative Treating (Pressure Treated Lumber)	20 to 49	\$20 to 50 Million
	TMV Lumber Co	Greeneville	Sawmill/Whlsl Lumber	1 to 4	\$ 1 to 2.5 Million
	Cook Lumber Co	Greeneville	Softwood Planing Mill	1 to 4	\$ 1 to 2.5 Million
Weems Roof Truss Co	Mosheim	Structural Parts	10 to 19	\$2.5 to 5 Million	

Appendix Table 2. Continued.

County	Company Name	City	Business Type	Number of Employees	Sales
Hamblen	Stewart Furniture Custom	Morristown	Dining Room and Kitchen Furniture	50 to 99	\$10 to 20 Million
	Sizemore Frame Shop	Morristown	Hardwood Dimension and Furniture Parts	10 to 19	\$ 1 to 2.5 Million
	Besturnings Inc	Morristown	Hardwood Dimension and Furniture Parts	20 to 49	\$5 to 10 Million
	BESTURNINGS Inc	Morristown	Hardwood Dimension and Furniture Parts	10 to 19	\$10 to 20 Million
	Lakeway Wood Products	Morristown	Hardwood Dimension and Furniture Parts	10 to 19	\$2.5 to 5 Million
	Adams Wood Products Ltd	Morristown	Hardwood Dimension and Furniture Parts	50 to 99	\$10 to 20 Million
	Woodcraft Inc	Morristown	Hardwood Dimension Stock	100 to 249	\$20 to 50 Million
	Dalton Wood Inc	Morristown	Hardwood Furniture Dimension Stock	10 to 19	\$2.5 to 5 Million
	Stewart Lumber Co	Morristown	Hardwood Saw and Planing Mill, Kiln	50 to 99	\$20 to 50 Million
	Volunteer Fabricators Inc	Morristown	Hardwood Shelving	10 to 19	
	Triangle Pacific Corp	Morristown	Kitchen Cabinets	100 to 249	\$50 to 100 Million
	Seals Furniture	Whitesburg	Other Furniture	10 to 19	\$2.5 to 5 Million
	Cupp Pallet Co	Russellville	Pallets	5 to 9	\$500 K to \$ 1 Million
	Shelby Williams Co	Morristown	Public Bldg Furniture	1,000 to 4,999	
	Banks Lumber	Morristown	Sawmill	50 to 99	\$10 to 20 Million
	Mc Guffin Truss Inc	Morristown	Structural Parts	50 to 99	\$10 to 20 Million
	Berkline Corp	Morristown	Upholstered Home Furnishings	100 to 249	
	Imperial of Morristown Inc	Morristown	Upholstered Home Furnishings	50 to 99	\$5 to 10 Million
	Village Industries	Morristown	Upholstered Office Furniture	20 to 49	\$5 to 10 Million
	Quality Craft Inc	Morristown	Wood Living Room Furniture	20 to 49	\$5 to 10 Million
Universal Furniture	Morristown	Wood Bedroom Furniture	500 to 999	\$100 to 500 Million	

Appendix Table 2. Continued

County	Company Name	City	Business Type	Number of Employees	Sales
Jefferson	American Bedrails-Finishing Co	Morristown	Wood Bedroom Furniture	20 to 49	\$2.5 to 5 Million
	Lea Industries Inc	Morristown	Wood Bedroom Furniture	250 to 499	\$50 to 100 Million
	Philips Consumer Electronics	Jefferson City	Cabinets	250 to 499	\$20 to 50 Million
	Hearthstone Inc	Dandridge	Log Homes	50 to 99	\$20 to 50 Million
	Accent Mobile Homes	Strawberry Plns	Mobile Homes	5 to 9	\$2.5 to 5 Million
	Clayton Homes Inc	White Pine	Mobile Homes	100 to 249	\$50 to 100 Million
	Rugel Woodworking Co	Jefferson City	Public Bldg Furniture	50 to 99	\$20 to 50 Million
Knox	Cedar Rock Farm Inc	New Market	Sawmill Rough Red Cedar Lumber	5 to 9	\$500 K to \$ 1 Million
	Wheeler-Mull Furniture Inc	Strawberry Plns	Wood Household Furniture	20 to 49	\$2.5 to 5 Million
	Dietz Wood Products	Talbott	Wood Living Room and Other Furniture	5 to 9	\$ 1 to 2.5 Million
	Knoxville Door & Millwork	Knoxville	Doors and Millwork	50 to 99	\$20 to 50 Million
	Witt Building Material Co	Knoxville	Hardwood Planing	5 to 9	\$ 1 to 2.5 Million
	MANCO Manufacturing & Dsgn	Knoxville	Kitchen Cabinets	1 to 4	<\$500,000
	Cabinet Craft	Knoxville	Kitchen Cabinets	20 to 49	\$2.5 to 5 Million
	Ernie Gross Designs Inc	Knoxville	Kitchen Cabinets	10 to 19	\$ 1 to 2.5 Million
	La Montagne Selected Wood	Knoxville	Kitchen Cabinets	5 to 9	\$ 1 to 2.5 Million
	Mason's Cabinet Design	Knoxville	Kitchen Cabinets	1 to 4	<\$500,000
	Top's Inc	Knoxville	Kitchen Cabinets	5 to 9	\$ 1 to 2.5 Million
	Appalachian Log Homes Inc	Concord Farragut	Log Homes	20 to 49	
	Brentwood Log Homes	Knoxville	Log Homes	5 to 9	\$ 1 to 2.5 Million
	Foothills Log & Cedar Homes	Concord Farragut	Log Homes	1 to 4	\$500 K to \$ 1 Million
Stonemill Log Homes	Knoxville	Log Homes	10 to 19	\$2.5 to 5 Million	
S S Wood Products	Knoxville	Logging	1 to 4	\$500 K to \$ 1 Million	
Maddron Woodworks Inc	Knoxville	Millwork	10 to 19	\$2.5 to 5 Million	

Appendix Table 2. Continued

County	Company Name	City	Business Type	Number of Employees	Sales
Sullivan	Simpson Millwork Inc	Knoxville	Millwork	5 to 9	\$ 1 to 2.5 Million
	Witt Building Material Co	Knoxville	Millwork	50 to 99	\$20 to 50 Million
	Clayton Homes Inc	Knoxville	Mobile Homes	100 to 249	\$20 to 50 Million
	Bromley Pallet Recyclers	Knoxville	Pallet Recycling	5 to 9	\$5 to 10 Million
	East Tennessee Pallet Co	Knoxville	Pallets	5 to 9	\$500 K to \$ 1 Million
	G & S Used Pallets	Knoxville	Pallets	1 to 4	<\$500,000
	Pallet Exchange	Knoxville	Pallets	5 to 9	\$5 to 10 Million
	Volunteer Lumber Sales Inc	Knoxville	Sawmill/Whlsl Lumber	5 to 9	\$5 to 10 Million
	Silver Furniture Co	Knoxville	Wood Living Room Furniture	100 to 249	
	Cortrim Hardwood Parts Co	Bristol	Hardwood Furniture Dimension Stock	100 to 249	\$50 to 100 Million
	English Cabinet Shop Inc	Kingsport	Kitchen Cabinets	10 to 19	\$ 1 to 2.5 Million
	Heritage Log Homes-Blountville	Blountville	Log Homes	1 to 4	<\$500,000
	Big Oak Forrest Products	Bristol	Logging	1 to 4	<\$500,000
	Willis Log Yard Inc	Bristol	Logging	1 to 4	<\$500,000
	Washington	Hardwood Mouldings & Millwork	Kingsport	Millwork	5 to 9
Cantley-Ellis Mfg Co		Kingsport	Pallets	20 to 49	\$5 to 10 Million
Bannish-Rickard Lumber Co		Bristol	Sawmill	5 to 9	\$ 1 to 2.5 Million
Mountain City Hardwood Inc		Kingsport	Sawmill	20 to 49	\$5 to 10 Million
Paty Co		Piney Flats	Structural Parts	20 to 49	\$50 to 100 Million
Harris Tarkett Inc		Johnson City	Hardwood Flooring	250 to 499	\$50 to 100 Million
Preston Mc Nees Specialty Inc		Johnson City	Kitchen Cabinets	50 to 99	\$50 to 100 Million
Mountain Craft Log Homes		Jonesborough	Log Homes	1 to 4	<\$500,000
1867 Confederation Log Homes		Gray	Log Homes	1 to 4	<\$500,000
Charles Byrd & Son Logging		Telford	Logging	5 to 9	\$ 1 to 2.5 Million
Gouge Logging Co	Johnson City	Logging	5 to 9	\$ 1 to 2.5 Million	

Appendix Table 2. Continued.

County	Company Name	City	Business Type	Number of Employees	Sales
	Quint-C Pallet	Limestone	Pallets	20 to 49	\$2.5 to 5 Million
	Industrial Wood Products	Telford	Pallets	5 to 9	\$500 K to \$ 1 Million
	Unaka Forestry Products	Jonesborough	Pallets, Skids, Cant	20 to 49	\$2.5 to 5 Million
	Garland Hardwoods Inc	Jonesborough	Sawmill	10 to 19	\$5 to 10 Million
	Automated Building Systems Inc	Johnson City	Trusses/Wood Panels	50 to 99	\$10 to 20 Million
	Kilby Truss Inc	Gray	Trusses/Wood Panels	10 to 19	\$2.5 to 5 Million
	Vaughn Furniture	Johnson City	Wood Household Furniture	250 to 499	\$50 to 100 Million

Sources: INFO USA, American Business Lists and Tennessee Wood Using Industries Directory

