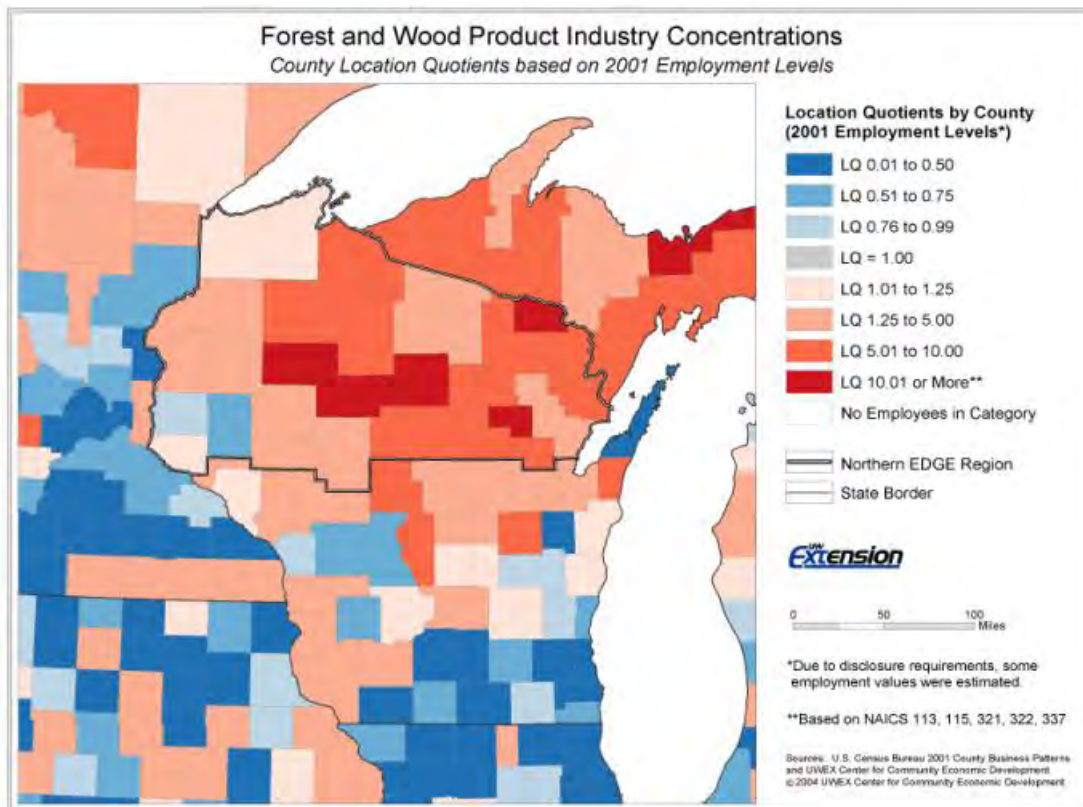


# Evaluation of Forest Products Industry Cluster in Wisconsin And Recommendations for Economic Development Actions



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**Roger M. Nacker**  
**Wisconsin Economic Development Institute, Inc.**





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## Introduction

Analysis and economic development action plans based on industry clusters have become very popular in recent years. However, much of this work has focused on high technology industries. Resource-based clusters, such as what is widely perceived as the paper/forestry cluster in Wisconsin, have not received the same attention. All communities cannot become high tech havens. What then? Resource-based clusters are usually associated with rural economies. Empirical studies of rural industry clusters, when they exist, have shown that they generally contribute positively to regional economic growth, especially in employment and higher wages. This positive growth, however, is not a given and economic development issues must be addressed.

Given the widespread and highly pervasive nature of the paper/forestry cluster in Wisconsin, this report will explore what viability of the cluster means for the economic health of the state, especially the northern half? The goal of this report is to outline the utility of a "cluster" approach for economic developers. Using the Wisconsin Forest Product Industry Cluster as an example, the relative roles of industry and government in fostering business success and in achieving sustainable economic development will be examined. Recommendations will be given to foster positive economic development activity in this cluster

## Defining the Forest Products Industry Cluster in Wisconsin

### What is a Cluster?

Broadly defined, an industry cluster is a **geographic concentration of similar and/or related firms** that together provide competitive advantages for members of the cluster and the area economy. These industry clusters can consist of interconnected companies, specialized suppliers, service providers and associated institutions in a region and are the result of history, natural resource advantages and/or successful entrepreneurial cultures. In recent years, numerous states and regions have adopted clusters as a new strategy for economic development. "**Cluster strategy is first and foremost, an economic development strategy.** It provides a coordinated and efficient way to promote economic growth." (Munnich, *et al*, 1999). One viewpoint, which seems to give extra meaning to the term paper/forest products cluster, at least to natural resource scientists, is conveyed by the quote "**Clusters are economic ecosystems**" (Moore, 1993).

### Cluster Theory History

Economic development interest in clusters began in the early 1990s with the publication of Harvard professor Michael Porter's book *The Competitive Advantage of Nations* (1990). Porter hypothesized that groups of similar, interrelated firms concentrated in a small geographic area gain a competitive edge when they have access to unique regional resources, are driven by demand and have achieved a threshold level of size. Even though competition may be intense, networks of buyers, sellers and service providers

encourage knowledge spillover – a constant churning of ideas that leads to new products and more efficient ways of producing existing products.

While the term “clusters” was new, the theory behind them was not. Spatial definition and analysis of industry complexes goes back to the beginning of the twentieth century. One of the earliest works is that of economist Alfred Marshall who looked at the specialized industrial districts of Europe at the end of the 19<sup>th</sup> century. Walter Isard in his comprehensive book, *Methods of Regional Analysis*, (published in 1960) also cites pioneering work done by Alfred Weber in 1929 and E. M. Hoover in the 1940’s. These works attributed industry location groupings to economic factors such as “transport cost differentials, labor cost differentials and other cost differentials, scale economics and localization and urbanization economies.”

Much of the interest in either industry complexes or clusters remained with regional economists and economic geographers through the ensuing decades except when significant structural changes in the economy resulted from changes in major industry sectors. A prominent historical example is the migration of the textile cluster from the northeastern United States to the Southeast. Precipitated by economic contraction in 1990, several states sought to capitalize on Porter’s research and pioneered using the cluster approach for economic development strategizing. Leaders among them were Arizona and Oregon. The same cluster research boom also occurred in Europe at the same time.

### Identifying a Cluster

In order to develop his theory, Porter had to come up with some techniques for defining and quantifying such “clusters”. Still, there is no one widely accepted way of identifying clusters. Some of the characteristics used to identify clusters are: Products, Processes, Value Chains, Technologies, Skills, and/or Resources.

Obtaining useable data or information, either “hard” or “soft”, to quantify clusters is expensive and time consuming, especially for sub-state regions, particularly counties. Rural counties are a focus of this problem. The data which is often used to measure employment usually comes from state gathered data called the *Quarterly Census of Employment and Wages* (QCEW, also know as ES-202) and/or its federal counterpart *County Business Patterns*. There is, however, a major problem with this data. In order to not divulge proprietary information, data is usually suppressed when less than three employers constitute a sector in a geographic area. For large employers in rural counties, this suppression obscures their important local economic role. Consequently, in order to get usable data either larger geographic areas must be used or data must be estimated.

Once data is obtained, **cluster quantitative techniques** include the calculation of location quotients to measure the presence of clusters and their change over time and input-output models which depict the purchasing patterns between businesses. Performance of the cluster is often then measured by using a technique called shift-share.

*Location Quotient.* A location quotient (LQ) is a calculated ratio between the local economy and the economy and the same activity within a larger (benchmark) region. This ratio is calculated for all industries to determine whether or not the local economy has a greater share of that industry than expected. The location quotient technique measures the relative concentration of the industries. If an industry has a greater share than expected of a given industry, then that “extra” industry employment is assumed to be “basic” because those jobs are above what a local economy should have to serve local needs.

$$\text{Industry Location Quotient} = \frac{\left[ \frac{\text{Industry's Local Employment}}{\text{Total Local Employment}} \right]}{\left[ \frac{\text{Industry's National Employment}}{\text{Total National Employment}} \right]}$$

*Note: In this formula we are comparing the regional economy (often a county) to the national economy. Location quotients may also be calculated to compare the county to a state.*

Basic industries,  $LQ > 1$ , are ones that draw money into an economy. Non-basic,  $LQ < 1$ , refers to industries that serve the needs of the local economy. In *Community Economic Analysis: A How to Manual*, authors Hustedde, Shaffer, and Pulver suggest that a location quotient of at least 1.25 is required to consider classifying a local industry as an exporter. Similarly, they recommend that a location quotient of 0.75 or less is needed to categorize an industry as an importing sector (Table 1). The broader criteria are recommended since a static measure is being applied to a dynamic economy.

Table 1. Location Quotient Categories

Location Quotient	Export/Import Status
$\leq 0.75$	Import Industry
$0.76 \leq LQ \leq 1.24$	Self-Sufficient Industry
$\geq 1.25$	Export Industry

Identifying local export industries ( $LQ \geq 1.25$ ) is useful as it provides a measure of the degree of industry specialization within a community. A community with a high location quotient in a specific industry may mean that the local economy has a competitive advantage in that industry (cluster). There may be economic development opportunities because of existing economies or synergies that make a community more attractive to businesses in related industries. On the other hand, a location quotient much lower than 1.0 may indicate an import substitution opportunity, meaning there is potential to develop local businesses to fill the gap and meet local demand.

*Shift-Share Analysis.* The purpose of this analytic technique is to take the change in employment for an area and break it down into the sources that caused the change:

- National industry growth or decline,
- Industry mix, and
- Local competitive share.

Shift-share analysis is a technique for isolating the effect of economy-wide and sectoral trends on regional industry performance. “Shifts” in the national economy and overall industry are outside the area influences on the regional economy, and must therefore be

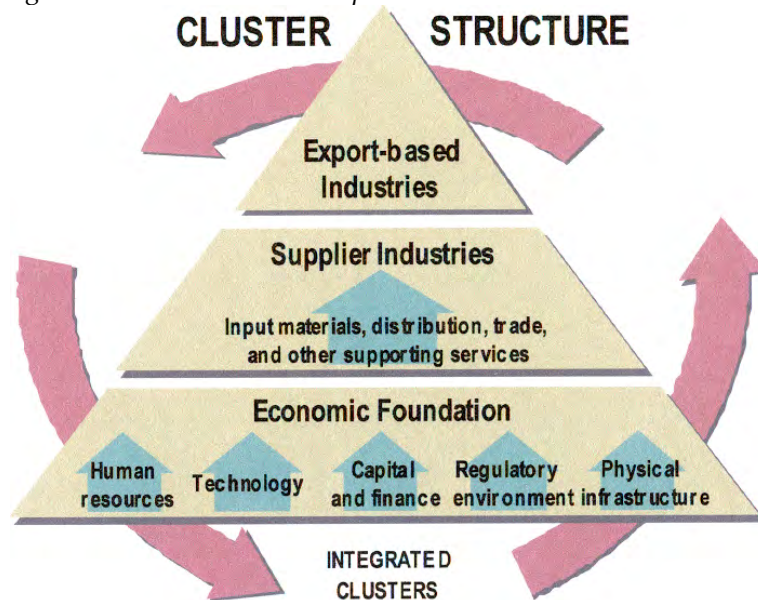
subtracted from the assessment of regional performance. What remains is the region's growth or decline in its "share" of the national industry.

Shift-share analysis identifies leading and lagging industries. It is this information that could help drive business recruitment decisions as well as public investment decisions. Results from this analysis could also help structure economic development policy. A survey conducted by the State of Texas in 2002 of state use of cluster analysis (Akundi, 2003), found that the two most popular measures for analyzing industry growth were shift-share analysis and location quotient analysis. See *Community Economic Analysis: A How to Manual* for how to compute and apply shift-share analysis.

### Clusters as an Economic Development Tool

The term cluster has become a buzzword, frequently used by public officials to describe any industry sector or collection of similar businesses. According to the Texas study, approximately 40 states had some form of cluster strategy. More states have subscribed to the cluster strategy since then. As reported in a recent issue of the Minneapolis Federal Reserve, *Fedgazette* (Davies, 2003), "So often a state will pick a cluster that really isn't one," according to Stuart Rosenfeld, president of Regional Technology Strategies (an economic consulting firm in Carrboro, N.C. which has done a large number of cluster studies for different states). To truly be a cluster, the industry of related firms must represent a **major regional concentration of firms and/or employment that brings wealth to the area by exporting their production** (Figure 1).

Figure 1. Cluster Relationships



Source: SRI International

Taken from the Economic Development Administration's (EDA) website entitled *Cluster-Based Economic Development* some of the more well-known clusters in the US are: North Carolina's Research Triangle; Hartford, Connecticut's insurance and finance markets; Hollywood's film industry; carpets in Dalton, Georgia; tourism in south

Florida; and technology along Route 128 in Massachusetts and in Silicon Valley, California.

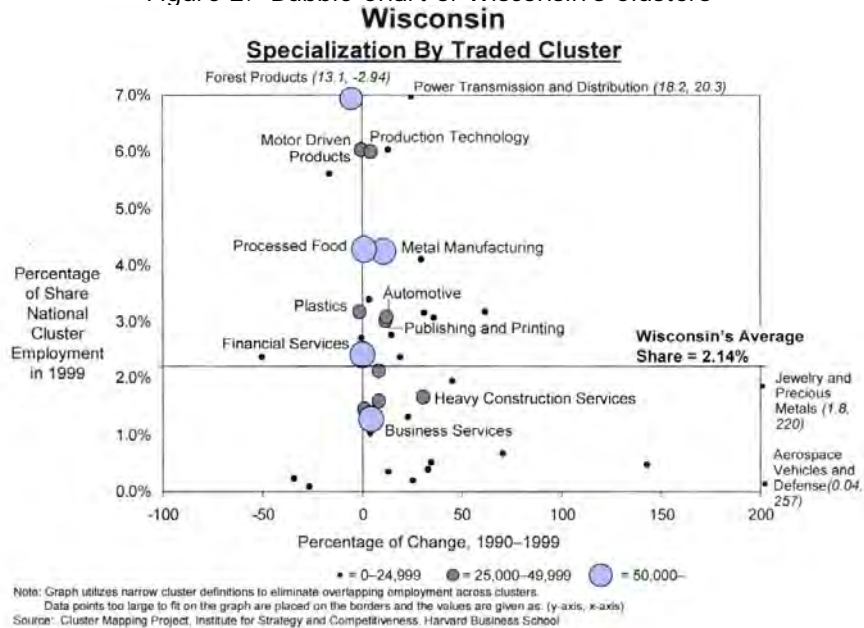
Also, according to the *Fedgazette*, "... the more generic and geographically dispersed a cluster, the less likely it is to confer any economic benefit." Similarly, most cluster experts agree that it is almost impossible to start a cluster from scratch in spite of wishful thinking and economic development initiatives on the part of local officials.

### **Forest Products Industry Clusters**

A relative latecomer to the cluster strategy, the State of Wisconsin has also identified ten clusters for targeting economic development activity (Mone, *et al*, 2000). These industries were chosen because they were large economic sectors and considered to be "**drivers**" of the Wisconsin economy. One of these is a paper/forest products industry cluster. Similarly, another Lake State, Minnesota had identified a Forest Products Cluster in Northeast Minnesota in an oft-cited 1999 study by the Hubert H. Humphrey Institute of Public Affairs at the University of Minnesota (Munnich, *et al*, 1999). The study is widely cited because of its focus on cluster identification techniques. A cursory examination of other areas' economic development policies also indicated that at least 20 states (including the Upper Peninsula of Michigan, the third of the Lake States) have identified some type of paper/forest products cluster, as have most of the countries in Western Europe, Canada and Scandinavia. Because of the rural location of most forest industries, forest product industry clusters are especially important to rural communities.

Michael Porter in work done for the National Governor's Association (NGA) generated a cluster study for each state. This work also identified a very highly concentrated Forest Products Cluster in Wisconsin to which he attributed 13.1% as the share of national cluster employment in 1999 (NGA, 2002). The clusters were then analyzed by plotting them on a "bubble chart." The chart is divided into four quadrants, based on the state's average share of employment, and whether the cluster is growing or losing share. This type of chart allows the depiction of three dimensions of the clusters: percent change on one axis, employment concentration (LQ) on the other and the points are shown as circles with their radii representing size of the cluster. Here, the Forest Products Cluster is shown as being important and highly concentrated in the state but losing market share during the 1990's.

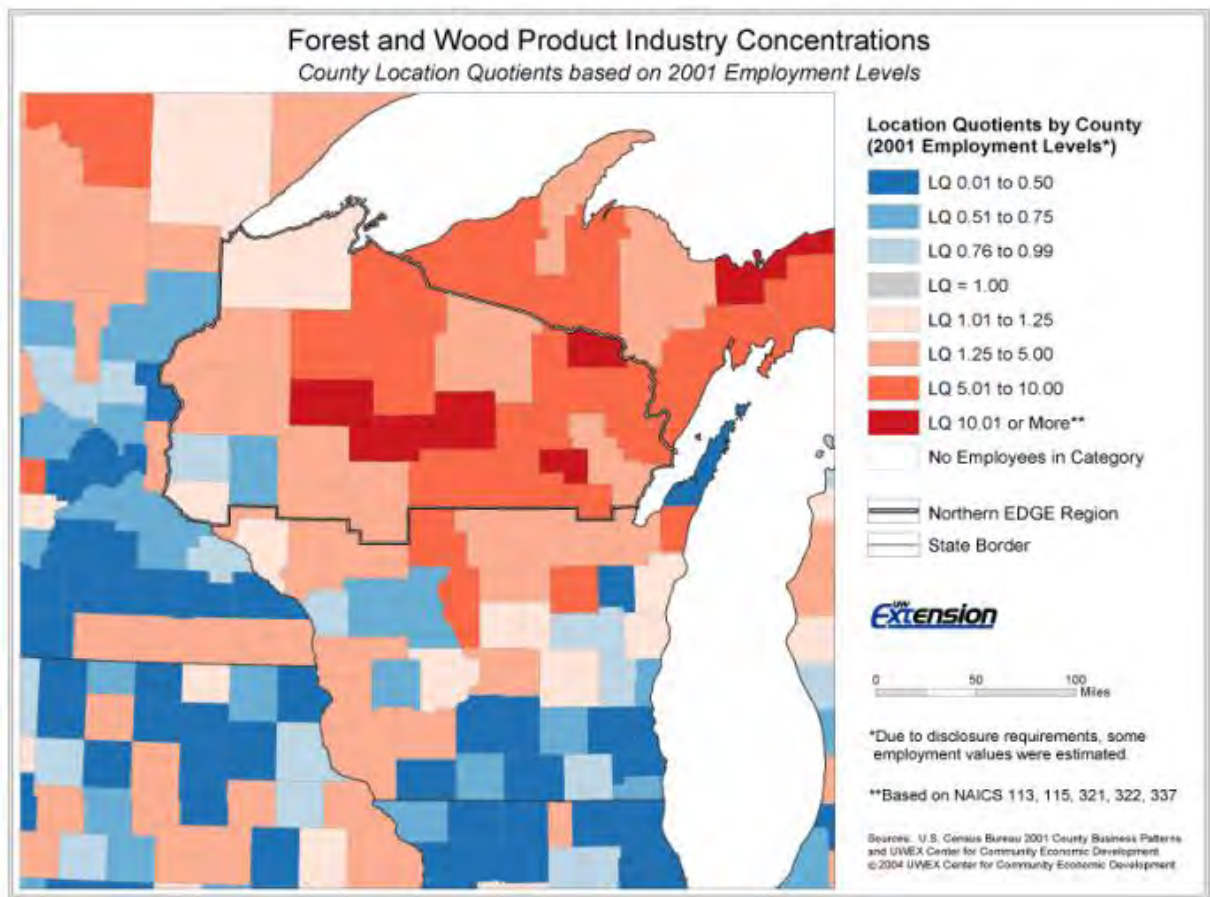
Figure 2. Bubble Chart of Wisconsin's Clusters



Using *County Business Pattern* data and a data estimation algorithm to approximate suppressed data, Kures (2004) also identified forest product industries as "driver" industries in a special study for northern Wisconsin. This data was analyzed using location quotients by three digit North American Industrial Classification System (NAICS) codes for all three digit industries by county which were then mapped using Geographic Information Systems (GIS) techniques to provide a visual analysis. The three digit NAICS level is generally considered to represent **distinct product manufacturing**, i.e., 31 to 33 are the two digit levels for manufacturing, but 337 is Furniture and Related Product Manufacturing. Combined location quotients for the NAICS industry codes of 113 (Forestry and Logging), 115 (Support Activities for Agriculture and Forestry), 321 (Wood Product Manufacturing), 322 (Paper Manufacturing) and 337 (Furniture Manufacturing) show the Forestry and Wood Products Cluster location in Wisconsin.

The following map shows that the Forest Product Industry Cluster is highly concentrated in north central and northeast Wisconsin. In fact, almost all of the counties in the northern half of Wisconsin have forest product LQ's higher than 1.25 (Figure 3). Consequently, the forest products industries in those areas fit the category of export industries, thus playing a major role in supporting economic vitality. The communities can be assumed to have a competitive advantage in forest products industries and there may be additional economic development opportunities because of that advantage.

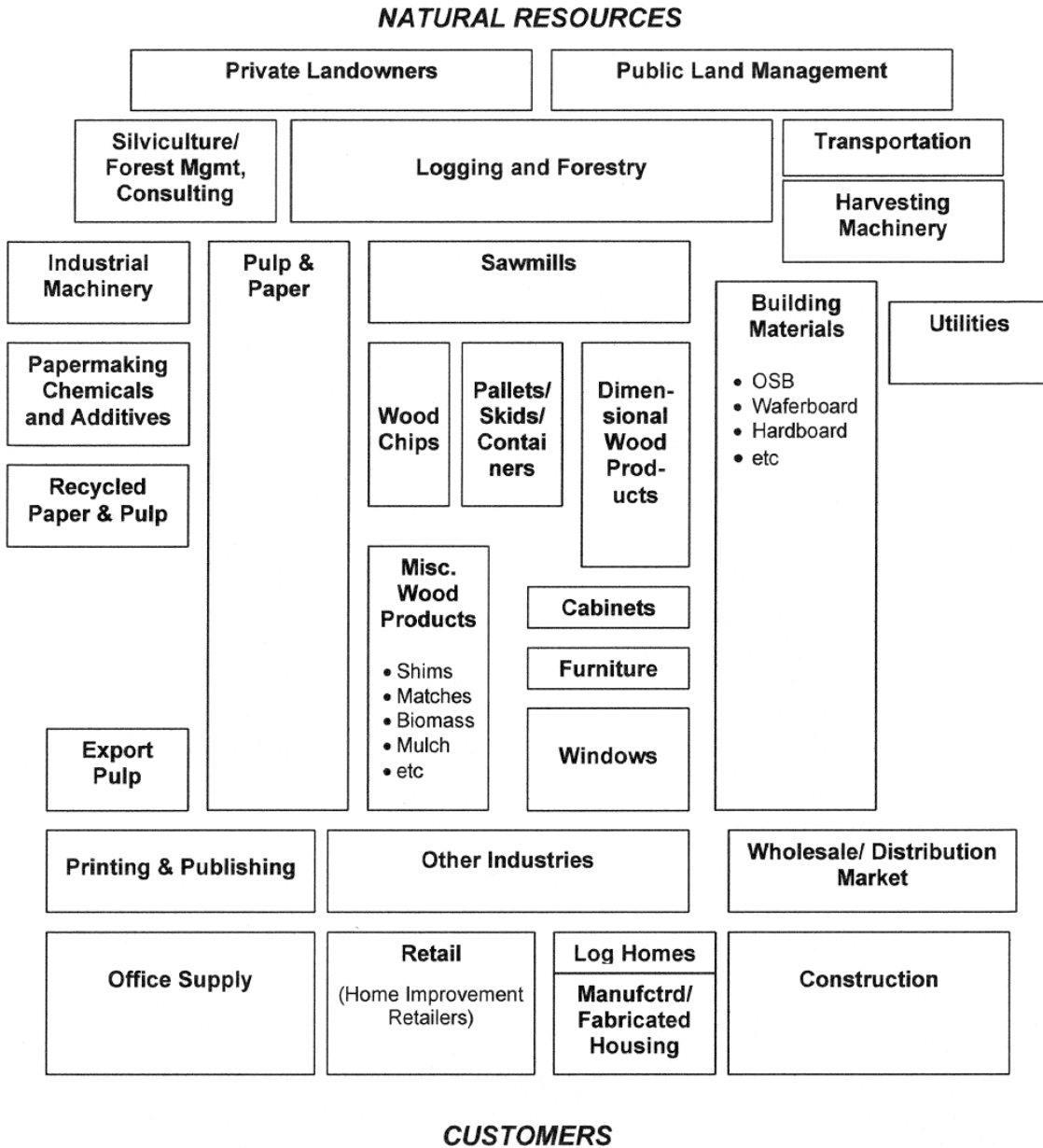
Figure 3. Wood Product and Paper Industry Specialization Counties



Forest Product Industry Cluster Definition

A Forest Products Cluster is comprised of many different members. Visually, a generalized flow chart of the cluster is given in Figure 4, showing process flows from resource to customer.

Figure 4. Generalized Forest Products Industry Cluster Flow Chart



Source: Northeastern Minnesota Industry Cluster Study

Years earlier, using this type of approach, the Wisconsin Department of Transportation (DOT, 1994) in planning Wisconsin's future highways, had also designated a "Forestry Composite" as one of several such economic composites, ranking counties on the basis of the following indicators: pulpwood, number of pulp mills, sawtimber, number of sawmills and wood consumption. Subsequently, a follow-up report in 2000 (*Wisconsin State Highway Plan 2020-Summary Report*) declared that, "The majority of the state's manufacturing jobs (92%) are located within five miles of a Corridors 2020 route." Transportation infrastructure and manufacturing composites are obviously highly related.

### Wisconsin's Forest Products Industry Cluster

Adding definitions and numbers to the components depicted in Figure 4, Wisconsin's Forest Products Industry Cluster is defined as being comprised of firms in the Standard Industrial Classification codes (S.I.C.) 24 - North American Industrial Classification System (NAICS) 321 Wood & Wood Products, that part of (S.I.C.) 25 - (NAICS) 337 - Furniture & Fixtures which manufactures wooden furniture and (S.I.C.) 26 - (NAICS) 322 Paper & Allied Products (Table 3). The "crosswalk" (comparison of the different numbering) between the SIC and NAICS classification systems for forest product firms is given in the Appendix. The NAICS was formally adopted by the federal government in 1997. Prior to that date, the SIC system was used to categorize all forms of economic effort. Since all governmental data series now use NAICS and only go back to 1998, analysis of economic changes is restricted to this period, unless relatively sophisticated estimation techniques are used.

*Table 3. Wisconsin's Forest Products Industry Cluster*

<b>Category</b>	<b>Year</b>	<b>Value</b>	<b>% Of all Mfgs</b>
Number of Companies	2002	1,847	17.5%
Number of Employees	2002	93,177	15.5%
Total Payroll	2002	\$3,591,778,000	16.8%
Value Added	2001	\$8,909,845,452	15.0%
Cost of Materials	2001	\$9,807,953,392	14.7%
Value of Shipments	2001	\$18,719,139,236	14.8%
Capital Expenditures	2001	\$565,046,500	15.2%

Source: Wisconsin DWD, U.S. Census

At approximately 15% or more of all manufacturing measures, the economic viability of this cluster is strategic to many organizations, institutions and local communities in Wisconsin.

## Trends in the Forest Products Industry

### Importance of the Forest Products Industry

Wisconsin's forest products industry has **statewide, national and international prominence**.

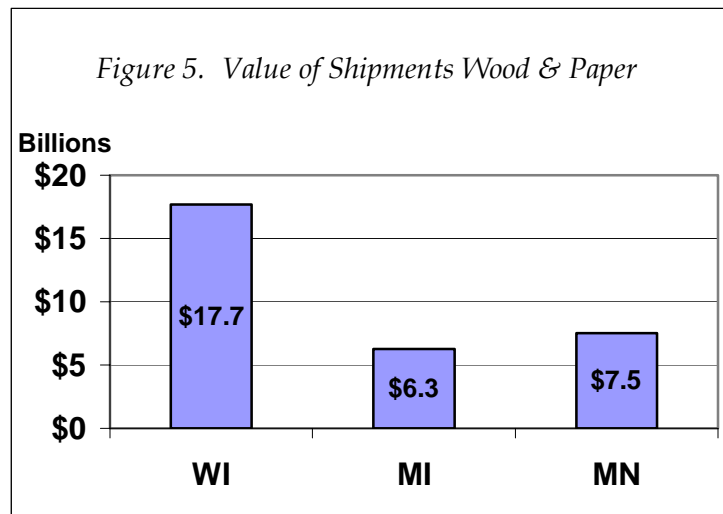
#### National Highlights

Wisconsin is the **#1 paper making state** in the nation and has been for 50 years.

In the United States, Wisconsin forest industry ranks **first in fine papers, first in sanitary paper products, first in high quality juvenile furniture, first in millwork, and third in hardwood veneers**. Wisconsin also leads the nation in forest product manufacturing capital expenditures; second in annual payroll, and second in total forest products employment. In Wisconsin, the wood products industry is the **State's second largest manufacturing employer**.

#### Wisconsin Highlights

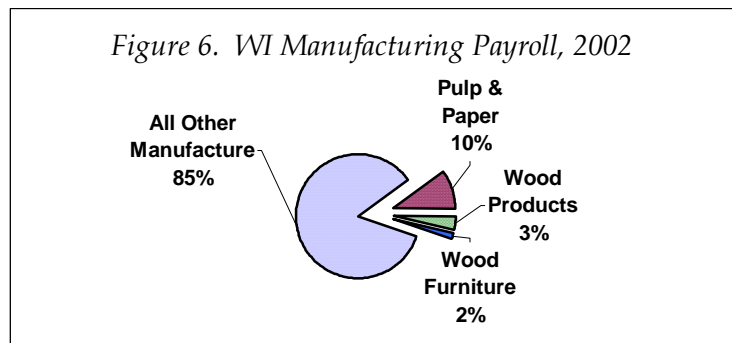
- Wisconsin forests are the state's largest land cover and by far the state's **largest land use**. The 16 million acres of productive forest cover 46% of Wisconsin's land base.
- Wisconsin produces approximately **\$20 billion annually** (when wood furniture is added in) in shipments (analogous to sales) from forest products, which is 2.5 times as much as the neighboring states of Michigan and Minnesota (Figure 5).



Source: U.S. Census

- Wisconsin's forest products industry employs **1 in every 6 manufacturing jobs**. Plus, for every job in the forest products industry, an additional 1.6 jobs are created to support the industry (multiplier effect). Direct employment translates approximately 15% of all the manufacturing wage and salary income generated in the state (Figure 6). Almost \$3.2 billion dollars every year.

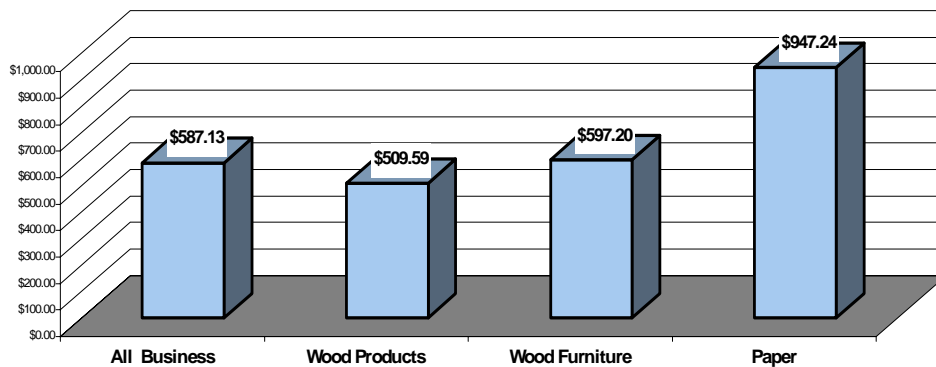
Most importantly, this cluster is the major manufacturing employer in a third of Wisconsin's counties and one of the top three major employers in almost 60% of them. Subsequently, the agendas for a large number of the approximately 800 local economic development organizations in Wisconsin (Anderson & Nacker, 2002) look to this industry cluster for success in achieving their goals. Forward Wisconsin, Inc., the state's economic development marketing organization has also designated this cluster as being of high priority for Wisconsin's future economic success. This is also true for a number of associations specializing in the forest industries, such as the Wisconsin Paper Council, the Woodland Owners Association, the Timber Producer's Association of MI & WI, and the Lake States Lumber Association. And, the Wisconsin Department of Commerce's economic development program, designed to combat the state's current economic malaise, also features a Papermaking/Forest Products Cluster.



Source: U.S. Dept. Commerce, BEA

- Manufacturing, including the forest products industry cluster, is especially important to the state because it is considered an **export-base industry**. That is, products are made here and sold outside the borders of the local and state economy, thus bringing new dollars into those economies. This influx of new dollars replaces the monies spent to buy products made elsewhere, leakage from the local economy, and provides a financial return to capital investment (companies) and labor (jobs).
- Wisconsin's forests support Wisconsin's tourism and recreation economy, creating an additional \$5.5 billion annually in **forest-based recreation**, plus the benefits of clean water and abundant wildlife.
- Wisconsin has over 1,800 forest products companies.
- Wisconsin's forest products industry creates **high paying jobs** - average wages for forest industry jobs are \$38,000 annually, compared to the state average of \$30,000. Notably, paper mill workers earn \$49,000 annually, on average. This differential is often magnified in rural areas (Figure 7).

Figure 7. Wisconsin Average Weekly Wages, 2000



Source: Wisconsin DWD

- Wisconsin manufacturers depend on Wisconsin forestry. Wisconsin manufacturers use over 90% of the state's timber harvested.
- Wisconsin farmers depend on forestry. Wisconsin farmers are often times forest landowners and also often work in the forest products industry.

### Sustainable Forest Resource Highlights

At a time when significant expanses of forestland are being lost in other states, Wisconsin's forestlands actually **gained over 640,000 acres** between 1983 and 1996. The net volume of growing stock increased 12 percent during the same time period.

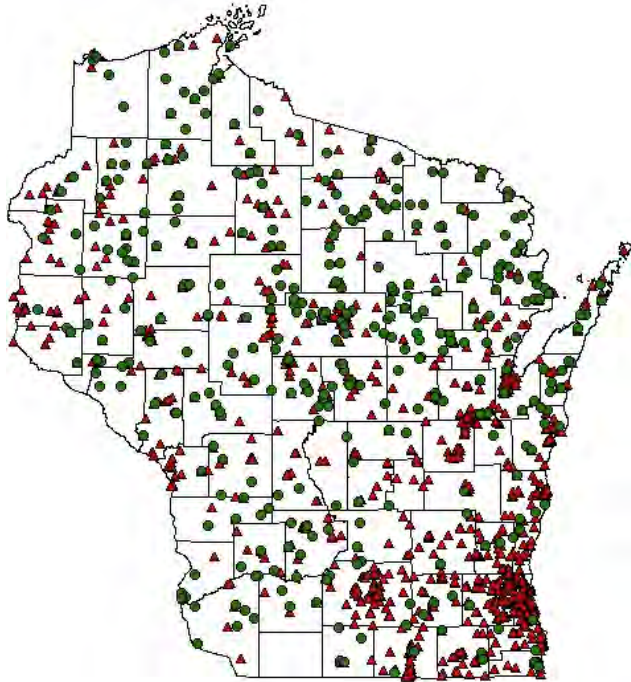
Most commercial forests are **privately owned** in Wisconsin, unlike many southern and western states where commercial forestlands are largely in the hands of the federal government or large forest industries.

- Wisconsin continues to **grow more wood than it removes**. About 490 million cubic feet is grown each year, while only 332 million cubic feet is removed.
- Wisconsin's forests are just meeting the wood needs of Wisconsin residents. It's estimated that Wisconsin residents consume 327 million cubic feet of wood annually, whereas we harvest 332 million cubic feet. Wisconsin is the only Midwest state that harvests the volume equivalent of what it consumes.

Industry Location

Figure 8. Forest Industry Locations

- Primary Industry
- ▲ Secondary Industry



Just as Wisconsin’s forest acreage is distributed over a large portion of the state, the forest products industries are also **located throughout**. Primary forest product industries are those companies converting roundwood (logs) to wood products such as lumber. The secondary industries (those making consumer products) are more concentrated in the southeastern quarter (Figure 8).

Source, WI DNR

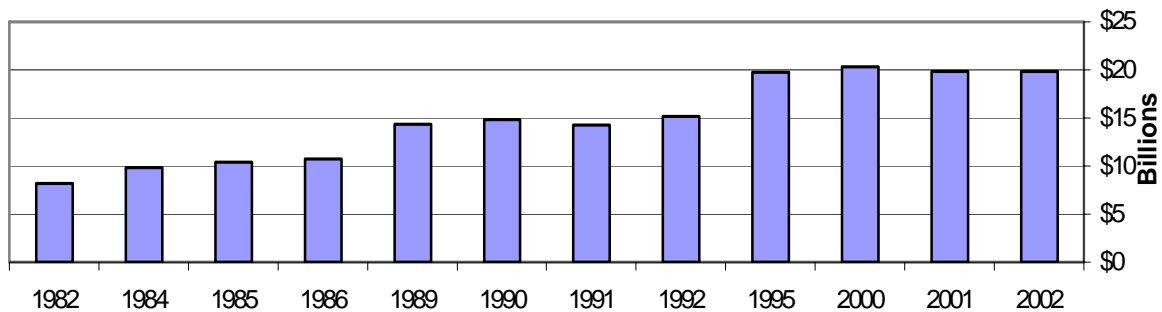
**Recent Forest Products Industry Changes**

Economic Downturn

In the recent recession, the forest industries have declined. The severity of this decline is hard to pinpoint as economic data sources have a significant time lag.

Prior to the recession and despite a slight decline in 1991, the **value of shipments** of the forest industries has actually increased from \$8.1 billion in 1982 to almost \$20 billion in 2002 (Figure 9), which includes the decline since 2000.

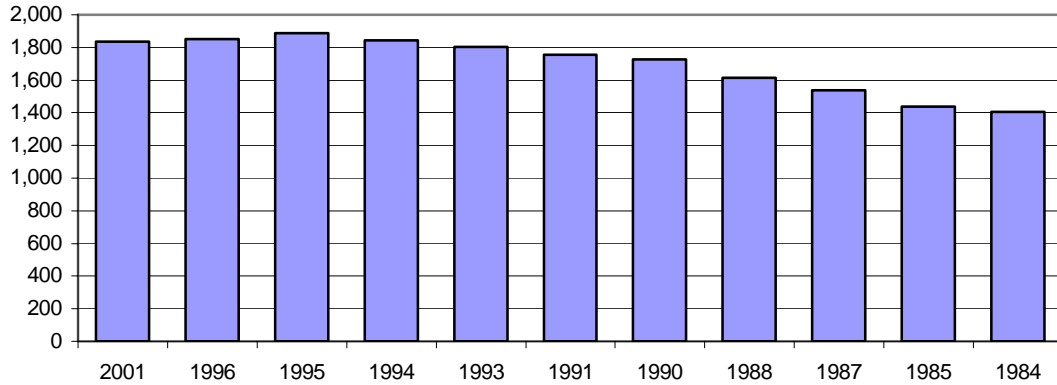
Figure 9. Value of Shipments Wisconsin Forest Industries



Source: U.S. Census, Data not compiled for intervening years.

The **number of firms** has also started to decline due to consolidation and closure (Figure 10). (Many of the medium size firms have closed while the larger firms have continued to grow).

Figure 10. Number of Companies  
Wisconsin Forest Product Industry

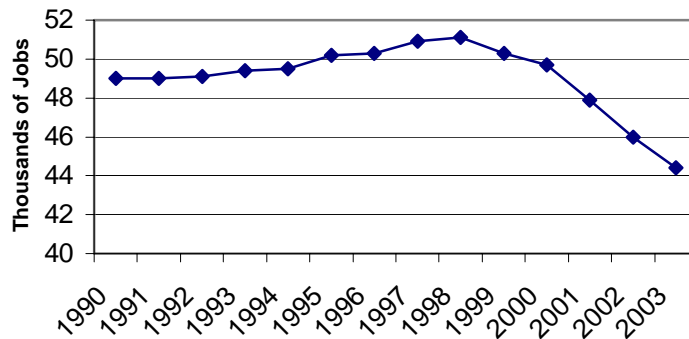


Source: U.S. Census, Data not compiled for intervening years.

### Paper Industry Trends

Approximately **5,000 jobs have been lost** (this translates into approximately \$200 million in lost payroll) in the Wisconsin pulp and paper making industries since 2000 (Figure 11). So far in the first half of 2004, the job losses appear to have stabilized but have not recovered, even though the number of manufacturing jobs has increased.

Figure 11. Wisconsin Pulp & Paper Jobs



Because of the deteriorating economic circumstances of the paper industry, the Wisconsin Paper Council met with statewide stakeholders in October 2002 to discuss the paper industry cluster. This study group generated two reports in 2003, *The State of Wisconsin's Paper Industry, Parts I and II*.

Focusing on the "Big Picture," the study group came up with a list of fundamental economic changes, which they deemed to be responsible for the **industry problems**.

*Overcapacity (nationally)* Since 1999, 21 machines in Wisconsin have been shut down, leaving 137 still operating.

*Consolidation* Paper companies consolidating in order to capture market share and replace older assets.

- 1980 – 35 paper companies in Wisconsin. Today there are 28.
- 1990 – 13 companies headquartered in Wisconsin. 11 today.
- Five years ago foreign corporations owned no paper mills. Today six are.

*Globalization* Almost overnight paper products have become a global commodity

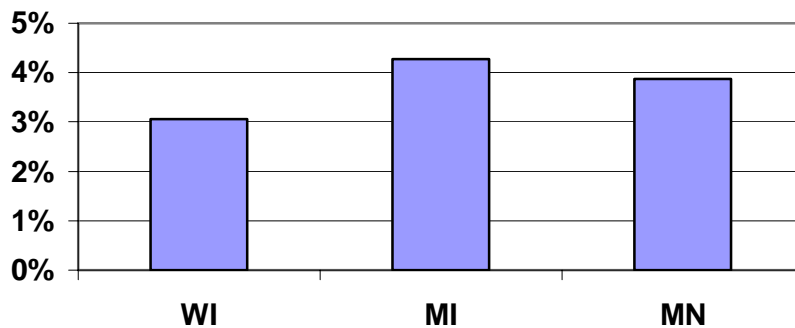
- Foreign competition/consolidation is now very important
- Strength of US dollar affects sales
- Since 1997, 90% of increased US demand was captured by imports

*Capital Spending/Reinvestment* Paper machines are some of the most expensive pieces of equipment with new machines costing between \$300 million - \$500 million

- Upgrades can cost tens of millions of dollars
- Capital spending dropped significantly since 1994
- 2001 to 2003 capital spending in WI was at the lowest level in 30 years
- Wisconsin’s asset base is some of the oldest in the country

Wisconsin is not getting its share of capital investment in the paper industry. This has been well documented in the popular press and by anecdotal response. However, it readily shows up according to data from the *Census of Manufacturers*. And, this mirrors the figures from 2000, as well. Figure 12.

Figure 12. Capital Expenditures as a Percent of Industry Shipments (Production) in Paper Manufacturing - 2001

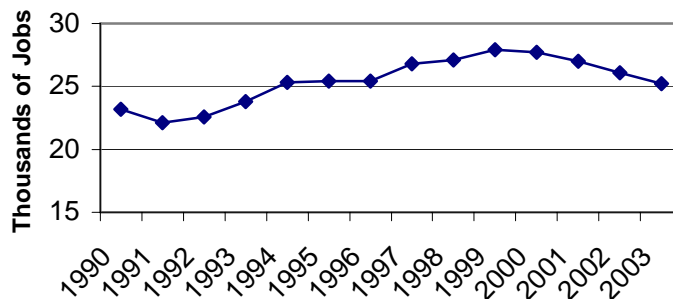


“The bottom line is that the paper industry and its cluster partners, including the state, must **work together** to maintain the positive aspects of Wisconsin’s overall business environment and improve those aspects that hamper the ability of companies to be the low cost producer and attract new investment. This means focusing on key cost drivers – fiber, labor, energy, environmental regulation - and identifying ways to reduce costs and increase investment.” Wisconsin Paper Council, *The State of Wisconsin’s Paper Industry*.

## Wood Product Industry Trends

- For the three-year period 1997 to 2000 the number of **logging contractors decreased** by 418 (a decrease of over 20%).
- Similarly, at least 14 medium to large **sawmills have closed** in the last 5 years.

Figure 13. Wisconsin Wood Products Jobs



Pressure from both a soft domestic economy and fierce foreign competition has played a role in the forest industry decline and associated job losses (Figure 13). The first half of 2004 shows an up-tick in the number of wood product jobs.

### Primary Wood Products

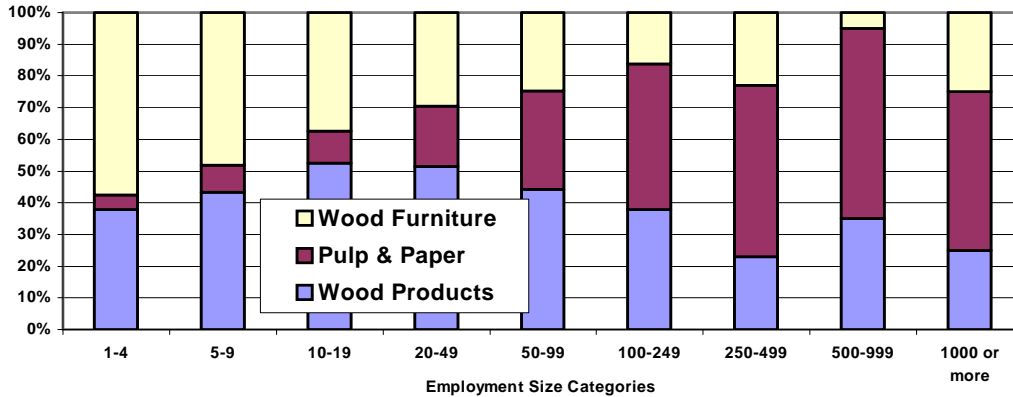
The primary wood products part of the cluster is made up of sawmills, veneer plants, log home manufacturers and loggers. The majority of the firms are sawmills. The majority of the production capacity is concentrated in the northern half of the state where the bulk of the timber is grown. The actual plant locations are fairly evenly distributed throughout rural Wisconsin with the smaller plants located in southern and southwestern Wisconsin. Southeastern Wisconsin has very few primary wood processing plants but has the majority of the secondary wood products plants.

The primary wood products firms have an industrial output of \$2 billion and total employment of 28,000 workers. This industry has been in a **state of change** due to foreign competition and general economic pressures.

Many sawmills have been modernizing to remain competitive. The number of medium size mills has decreased from 106 in 1996 to 73 in 1999. The amount of timber used by this industry has decreased by 6%. Larger mills are installing state of the art equipment while increasing numbers of medium size mills are closing. Figure 14 shows the composition of the forest products industry cluster according to employment size of the firms.

Small sawmills have increased but account for only about 6% of the production. In the last five years, 15 medium to large mills have closed or gone idle. Recently, two of the largest sawmill companies ceased production. Combined these two companies accounted for approximately 100 million board feet of sawn lumber annually, 15% of Wisconsin's lumber production, and employed 180 people.

Figure 14. Forest Product Industry Composition by Employment Size Category, 2001



Source: U.S. Census

The need for skilled labor both in the woods and in the mills has been a problem for these firms. The average age of a logging contractor in Wisconsin is 52 according to the Wisconsin Professional Loggers Association (WPLA). Until the recent recession, sawmills and veneer plants often could not find the workers that they needed.

Secondary Wood Products

The cluster for secondary wood product manufacturers is composed of furniture, fixtures, cabinets, and parts. In 2000, this cluster had a value of shipments that produced \$3.8 billion of output and employed 38,000 people. They provide needed markets for the lumber and veneer produced by Wisconsin’s primary forest industries.

This area of the forest product cluster has been severely **impacted by competition** both from China and Canada. For example, a company in China can purchase US lumber, ship it to China, manufacture furniture, and ship a product back to the United States for 20 to 30% less than it can be manufactured for in the United States (Table 4). In this table it is not known if favorable Chinese exchange rates are included in the computations. The largest component of Chinese-Made Overhead is the transportation costs.

Table 4: Comparison of US and Chinese production costs.

	American-Made	Chinese-Made
Materials	56.6%	53.1%
Labor	17.7%	1.6%
Overhead	25.7%	25.1%
Total	100%	79.8%

(Overhead includes GS&A, Profit & Transportation: Lawser 2003)

As an example, this competition has most recently caused Richardson Brothers Furniture in Sheboygan Falls to move their production to China and Bolivia. In 2001 Richardson Brothers locally employed more than 350 people making fine furniture as

they had done for the last 140 years. When the closure announcement was made they were down to 140 employees. After the change, there will be 40 people making boat interiors. This was done to save the company. The sales and distribution will still continue.

China is not the only source for competition in this sector. Canada with its favorable exchange rate and lower fringe benefit cost has also developed a competitive advantage. The exchange rate and reduced benefits give Canadian firms about a 30% (mostly exchange rate) advantage when compared to similar firms in the United States.

Historically, Canada was the major source for imported furniture to the USA but they have been surpassed by China, which in 2002 shipped over \$4 billion of furniture as compared to about \$2.5 billion of furniture by Canadian firms.

Not all firms have been losing ground. Some of the aggressive, vertically integrated solid wood manufactures have been able to grow their business and capture market share. This would seem to account for the recent slight increase in jobs in this part of the cluster.

### Historical Perspective

The forest products industry cluster in Wisconsin is one of **successful adaptation and evolution**. Prior to 1911, the major paper product in Wisconsin was newsprint. Removal of the tariff on Canadian production at that time forced the industry to move into a diversification of paper products. Similarly, in the 1920's, southern paper mills started to come on line with cheaper resource and production costs and took control of the major markets for coarse papers such as kraft and butcher papers. The industry was again forced to reconfigure, branching into specialty, fine papers and absorbent products production.

As a cluster, the paper industry also evolved institutions to help it deal with industry problems: the Institute of Paper Chemistry, started in Appleton in 1924 (moved to Georgia in the late 1980's), became the world's acknowledged center for paper research; the Sulphite Pulp Manufacturers Research League (1939), one of the country's first anti-pollution organizations, was started to improve Wisconsin air and water quality; Trees for Tomorrow (1944), internationally acclaimed private resources forest education center, was started by a group of paper and power companies; and, in 1950, the paper industry trade association, the Wisconsin Paper Council was founded. Parallel to the development of the resource side of the industry cluster, numerous other Wisconsin companies, associated with the cluster, started producing the highly technical machinery for making paper as well as for generating the power from hydro and other sources required to run the paper mills.

Similar changes took place in the solid wood products side of the cluster. White pine production peaked around 1900 at which time Wisconsin was the world leader in logging. The softwood lumber which was used to provide housing for the Midwest population growth was being depleted. However, this same population had other needs

as they moved from farming to city life. Higher value-added hardwood products such as furniture and millwork were in demand. Just as in the paper industry, Wisconsin's famous metal-working trades started to produce specialized machinery for sawmills and others. And, the U.S. Forest Products Laboratory was established in 1910 to apply science and technology to better the uses of wood.

In fact, the forest products industries have been significant economic contributors for many years in Wisconsin. Over that time, the industry cluster has had to re-invent itself several times so as to remain a national leader. By coping with changing markets, products and species to remain competitive, the cluster managed to increase production and to retain and/or grow market share. The Wisconsin Forest Products Industry now stands at another crossroads and will have to choose a path to reconstitute itself.

## Forest Products Industry Cluster Economic Development Strategies

As an economic development strategy, clusters provide a state or region with a number of benefits. By identifying the prime “drivers” in an area, the cluster approach provides an efficient and focused approach to the application of resources to promote economic growth. In the area of workforce training, this targets training to those labor force needs with a high probability of human capital return. Plus, clusters provide a forum for industries and firms to work together to air their needs. Clusters also provide communities with an opportunity to leverage their initiatives to obtain maximum economic development benefits. For example, lumber and wood product workers in clusters were found in an earlier national study to enjoy a significant wage premium over those not working in cluster firms (Gibbs and Bernat, 1997).

### Requirements

The cluster economic development approach, however, has certain requirements. Among these are **leadership and collaboration** between business, government, education and institutions. Additionally, to be successful, most experts agree that the cluster strategy must be **industry-driven**, must include **both industry and government**

#### Cluster-Based Economic Development: A Four-Stage Process

**Stage I: Mobilization**—Building interest and participation among the different constituencies needed to carry out the initiative.

**Stage II: Diagnosis**—Assessing the industry clusters that comprise the economy and economic infrastructure that supports industry performance.

**Stage III: Collaborative Strategy**—Convening demand-side stakeholders (companies in each cluster) and supply-side stakeholders (public and private supporting economic institutions) in working groups to identify priority challenges and action initiatives to address shared problems.

**Stage IV: Implementation**—Building commitment of cluster working groups participants and regional stakeholders to actions and identifying or creating an organization to sustain implementation.

Source: *Cluster Based Economic Development: A Key to Regional Competitiveness*, EDA, 1997, Prepared by Information Design Associates.

and must be relevant to the **regional economy**. These requirements must be met before communities embark on a Cluster-Based Economic Development Process (see sidebar). Starting the Cluster-Based Economic Development Process assumes that the industry cluster and its members have been identified.

As an aid to working with clusters, Wisconsin’s Department of Commerce has written a detailed and useful “How-to-do it” for selecting an industry “champion” and in structuring the initial cluster meetings (*Cluster Organizing Guide*, 2002). This and other information on some of Wisconsin’s clusters are available on the Department’s website.

### A Cluster Strategy in Action

Recent events in Wisconsin suggest that the cluster theory of economic development is being directly followed.

Because Wisconsin’s economy, especially forest products manufacturing had been buffeted by national (the recession) and international conditions (strength of the dollar, trade relations as well as globalization), which had been exacerbated by a **negative**

**business climate image**, especially concerning taxes and environmental regulations, the different sectors have been stirred to action. This action mirrors the processes recommended for Cluster-Based Economic Development.

### Mobilization

Forest industry-specific problems were initially identified in a series of comprehensive interviews with forest products company senior managers, conducted jointly by the Center for Technology Transfer (CTT) and the U. S. Forest Products Laboratory (FPL) starting in the summer of 2002. Interviews were also conducted with solid-wood companies (Nacker and Koning, 2004).

At roughly the same time, the Wisconsin Paper Council acted in concert with the Department of Commerce's cluster initiative. The first step was a stakeholders' meeting held in Green Bay in October, 2002 that was sponsored by the Department of Commerce, the Green Bay Chamber of Commerce, and U.S. Congressman Mark Green.

### Diagnosis

The second step was development of background data and specific recommendations by the Wisconsin Paper Council. The Paper Council prepared a report on the economic condition of Wisconsin's paper industry entitled *The State of Wisconsin's Paper Industry*, using input from the stakeholders' meeting, which was published in February 2003. This report outlined the recent economic history of the paper industry and identified key factors affecting its economic health. The highlights of this report were summarized in the Paper Industry Trends section of this report.

### Collaborative Strategy

The third step in the process was review and modification of the initial Paper Council recommendations by the industry at a May 2003 meeting in Kimberly, WI. These recommendations were published in June 2003 as: *The State of Wisconsin's Paper Industry: Recommendations for Action*.

The Wisconsin Paper Council study recommended a three-step action plan to strengthen the industry. These recommendations directly addressed the health and competitiveness of the paper industry in Wisconsin. The recommendations were:

1. **Tax Reform** - including a sales tax exemption for fuel and electricity used in manufacturing and converting to a single factor corporate income tax model
2. **Environmental Regulatory Reform** by streamlining the system and providing for regulatory flexibility
3. **Creating a Strong Energy Policy** - by providing for a low-cost, reliable, statewide energy system.

-Because of the capital-intensive nature of the industry, the Paper Council also requested that the state take a look at interstate competition for investment and the role of *incentives*.

### Implementation

These issues and problems identified by the Paper Council were subsequently corroborated by a number of other studies and policy reports, coming from both the private sector and by institutional oversight functions within government. On the government side, Wisconsin Department of natural Resources (DNR) did its part by also

reporting on current industry conditions specific to the forest products industry as an administrative briefing paper (Mace, Bowe, Hubbard and Nacker, 2004). As a result, some major business climate changes have been proposed and adopted in statute and policy:

- Single factor apportionment (Corporate Income Tax)
- Sales and use tax exemption for energy used in manufacturing
- Energy Policy Improvements in the siting of transmission lines, expedited approval of power plants and development of a state energy plan
- Small Business Regulatory Reform requiring the explicit consideration of the impact of regulatory costs on small businesses
- Environmental Regulatory Reform including initiatives to streamline operations and to provide assistance in the face of declining capital resources by encouraging collaborative action.

Although initially recommended by the Paper Council, these changes that took place will also have a positive impact on the other parts of the cluster. These changes are significant. Based on the tax changes shown above, the corporate tax burden for paper companies, as recently calculated by the Wisconsin Department of Revenue (*Corporate Tax Burden: Paper Industry*, 2004), improves significantly.

### **Other State-Level Accomplishments**

Environmental regulatory reform is in the process of being implemented. Administrative (agency operating) rules are being developed to put the statutes into action. Since environmental administrative issues were originally considered to be one of the major obstacles to new capital investment in the state, the administrative rule process is very important. The proposed changes do not modify environmental standards, only the regulatory process.

Enabling legislation was also enacted for something called “Green Tier.” Wisconsin is a national leader in this effort to pursue the development and implementation of “contracts” (individual firms) and “charters” (associations) in order to achieve business operating efficiencies and simultaneously exceed environmental standards. The Forest Products Industry Cluster needs a paradigm shift to this collaborative regulation of the environment, rather than the command-and-control approach so favored today by regulatory bodies. Command-and-control achieves only minimum standards; collaboration can go much farther. Efforts are underway to secure forest products companies willing to be “Green Tier” participants.

Part of the “implementation phase” requires that it be on going and sustained. This has also happened. In 2003, the Governor's Council on Forestry was codified in a Wisconsin statute to provide a public forum for this industry cluster. In 2004, state forestlands were third party certified by both the Sustainable Forestry Initiative as well as the Forest Stewardship Council in order to help secure market share for “green” products. This certification was originally requested by industry and championed by Governor Doyle in his “Grow Wisconsin” plan for economic recovery. As a further step, Time Inc. recently announced that it recognizes the Wisconsin Master Logger Program as a certified source of sustainable wood fiber. This

endorsement by Time Inc. is just the second of its kind in the nation, subsequent only to Maine's Master Logger program, which was recognized in 2003.

During 2003 - 2004, the state of Wisconsin is also celebrating the Year of Wisconsin Forestry, marking 100 years since the founding of the Wisconsin State Forestry Program. Under this umbrella, a concerted effort is being made to publicize the importance of the forest products industry to the state.

In November 2004, the upcoming Governor's Conference on Forestry will explore additional ways to maintain Wisconsin's forestry-based economy. The goal of the conference is to develop a coordinated vision and action plan to work together toward the long-term sustainability of Wisconsin's forests -- maximizing the economic, social and ecological benefits for Wisconsin. Industry "champions" will conduct sessions on a variety of themes addressing the goal. One of these themes is "maintaining Wisconsin's Forest Based Economy." The conference will have a cluster economic development perspective in that it will attempt to bring together nontraditional partners represented by people who can make decisions and take action.

### **Rural Area Economic Development**

The Forest Products Industry Cluster in Wisconsin has obviously been very successful in reaching many of its strategic goals in partnership with the state. Local efforts are necessary to maintain this momentum with other components of this sector, especially the more diverse solid wood firms.

Economic development efforts in rural areas pose special challenges because of geographic isolation and low-density populations. Key to successful economic development efforts is recognizing and using what the local area has to offer and building on it. Wisconsin is fortunate to have such a strong and wide-spread rural Forest Products Cluster.

Also key is a regional approach. By combining in effort, local entities can usually achieve a threshold level of resources necessary for effective action. Creating regional coalitions is often not easy because of historical competitive patterns. However, by using laborshed commuting patterns, these regions can be identified and shown to be interdependent (Nacker, 2004).

According to a recent report by the Pew Partnership for Civic Change (*Viable Economies*, 2002), rural development efforts should include:

- Begin with a rigorous strategic analysis.
- Involve many partners and many local businesses, including government.
- Develop strong local leadership.
- Keep economic development efforts focused and therefore manageable.
- Work for economies of scale in services (such as training).

The study further states that in rural areas there is growing interest in pursuing sectoral (cluster) strategies. Successful sectoral action plans then include:

- Develop strong connections to the industry they work with, which enables staff to establish credibility, respond to industry needs, and influence its future.

- Use a strategic analysis that focuses not only on the region's industries and economic potential, but also on the ways its history, culture, and geography influence the economy.
- Build supportive partnerships with other institutions that can provide expertise, training, or resources such as schools.
- Identify ways to add value to their members' products or services so the member firms can grow and survive. Typical strategies include direct service delivery, strengthening the support infrastructure, and creating new patterns of information flow and learning.
- Hire staff with specialized knowledge and marshal additional expertise through consultants or industry contacts.

## **Wisconsin Forest Products Industry Cluster SWOT**

A rigorous strategic analysis of the local area usually includes a SWOT analysis. That is, an identification of industry strengths, weaknesses, opportunities and threats can provide information on the next economic development steps. Applied to the Wisconsin Forest Products Industry Cluster, they are:

### Industry Strengths:

- Wisconsin's forest lands are increasing
- Wisconsin continues to grow more wood than it removes
- An integrated range of wood manufacturing facilities exists to use available timber
- Wisconsin paper and many wood product industries are the leader or among the leaders in the nation
- Forest product industry cluster components have already mobilized to address some current economic and business climate issues

### Industry Weaknesses:

- Recently, there has been a major turnover of large industrial timber ownership
- Shortage of experienced workers – tree harvest/equipment operation/log truck driving etc.
- Cyclical nature of pulp/paper prices, especially current long period at the bottom of the cycle, reduces profitability and investment
- Paper/forest products industry employment suffered during the recession
- Paper production has declined as it has in the rest of the nation
- Wisconsin, forest products industry base, especially in paper-making, is among the oldest in the nation
- Historically, the forest products industry member firms have been fiercely independent, between themselves and especially as it concerns partnering with government

### Industry Opportunities:

- Wood supply is sufficient to support additional manufacturing capacity
- Recent state forest certification for marketing wood as a "green" product, through "sustainable forestry"
- Major business climate improvements recently in taxation, regulatory reform and energy policy

- Wisconsin is also one of the leading states in the remanufacture of recycled paper
- Availability of niche markets for wood products and byproducts
- New production technologies for increased productivity and cost reduction

#### Industry Threats:

- Substitute products for structural wood components (steel, concrete, etc)
- Regulations that reduce the economic viability of forest ownership and forest product production
- Continued price slump for paper
- Foreign competition and ownership, thus taking decision-making out of state
- Capital investment, especially in paper is lagging

#### **Recommendations**

“Clusters have been shown to be a useful tool to engage industry in strategy development and problem solving. On top of helping state business and government leaders to better understand the dynamics of their economies and particular industries, the industry cluster concept has proved to be a powerful framework for companies to organize, work together, and work with government to meet their needs and promote their interests” ( Waits, 2000).

The recent economic downturn has been a wakeup call to the industry in recognition of structural economic changes taking place. Part of the cluster, the paper industry has mobilized and been successful in its initial efforts. Opportunity is still available. Implementation of collaborative regulatory reform represents a significant opportunity to enhance modernization, productivity, energy saving and cost-efficient production.

#### Local Economic Development Effort

Recognizing, defining and empowering a cluster strategy such as for the Forest Products Industry Cluster in Wisconsin, is just part of an overall economic development program. In a general economic development program, a formal, local economic development organization is required. Such an organization will then have the responsibility for ensuring that infrastructure is adequate, business development is a community focus (including retention/expansion, entrepreneurial development and attraction - especially support/supplier industries) and that an adequate, trained workforce is available. Increasingly, these efforts are enabled by engaging in regional collaboration.

#### Research and Development

Industry specifically, research and development is necessary to develop new value-added products. Global competition requires that forest products firms change their focus from least cost production to higher value-added products in order to survive in the world marketplace. Research and development and technology transfer are also products of the state’s institutional framework. University and technical colleges have an important role.

### Center for Sustainable Forestry Business

A Center for Sustainable Forestry Business (CSFB) has also been proposed to partner in solving policy, business, research and development issues that will enable Wisconsin's forest industry, cluster businesses to be sustainable. The primary purpose of the "Center" will be to facilitate solving related problems through interaction between university, government and industry. The center would be an independent resource for policy issue development and would provide direct assistance to university staff and businesses.

### Forest Product Diversification Grant Program

Currently the Wisconsin Department of Agriculture has a very successful program titled "Agricultural Development and Diversification Grant Program." This program offers grants up to \$50,000 to small business for applied projects that will help them diversify or expand their markets. The average grant has been approximately \$12,000.

A similar program would be very beneficial to use to help entrepreneurs in small forest product firms get businesses started or to grow ideas in existing businesses. A small piece of equipment or attending a trade show will often enable a small firm to open up new markets.

### WoodLinks for Wisconsin

Wisconsin has started a program called WoodLinks. The program connects the forest industry to technology education programs in high schools. There is a need for a statewide WoodLinks coordinator to organize the involvement of schools and the forest industry. The program was funded for one year but has not been able to secure continuing funding.

From 1997 to 2000 the number of logging contractors declined by 23% (418 contractors). The average age of the logging contractors in Wisconsin according to the Wisconsin Professional Logger association is 52. The forest industry needs skilled workers now and more so in the future. A program such as WoodLinks can provide needed exposure to forestry in schools. Permanent funding is recommended.

### Finally

Sustainable economic development of this Forest Products Industry Cluster is critical for the economic future of Wisconsin. A final recommendation is simply a call to action. To be successful and sustainable, industry and government must:

- Recognize - define the cluster and its importance
- Organize - bring the cluster stakeholders together
- Mobilize - structure the cluster effort for action
- Strategize - define common cluster goals and needs

Further recommendations will originate with the cluster.




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**APPENDIX - 2002 NAICS Matched to 1987 SIC  
Wood Product, Paper and Furniture Manufacturing,  
part (NAICS 321-323, 337)**






**Comparability Symbols** link to the Bridge Between NAICS and SIC, 1997

 (Bridge complete.)	Comparable	NAICS derivable from SIC data.
 (Drawbridge slightly open.)	Almost comparable	Sales or receipts from SIC are within 3% of NAICS sales or receipts.
 (Drawbridge open.)	Not comparable	NAICS sales or receipts cannot be estimated within 3% from SIC data.

Source: U.S. Census Bureau, NAICS Manual and 1997 Economic Census  
Last revised: April 30 2003
















**321 Wood Product Manufacturing**






<b>2002 NAICS</b>	<b>2002 NAICS U.S. Description (with link to definition)</b>	<b>Com- para- bility</b>	<b>1987 SIC</b>	<b>1987 U.S. SIC Description (with link to definition)</b>
321	<a href="#">Wood Product Manufacturing</a>			
3211	<b><a href="#">Sawmills and Wood Preservation</a></b>			
32111	<a href="#">Sawmills and Wood Preservation</a>			
321113	<a href="#">Sawmills</a>			
			<a href="#">2421</a>	<a href="#">Sawmills and Planing Mills, General</a> (Sawmills)
			<a href="#">2426</a>	<a href="#">Hardwood Dimension and Flooring Mills</a> (Hardwood dimension lumber made from logs or bolts)
			<a href="#">2429</a>	<a href="#">Special Product Sawmills, NEC</a> (Shingle mills, shakes)
321114	<a href="#">Wood Preservation</a>		<a href="#">2491</a>	<a href="#">Wood Preserving</a>
3212	<b><a href="#">Veneer, Plywood, and Engineered Wood Product Manufacturing</a></b>			
32121	<a href="#">Veneer, Plywood, and Engineered Wood Product Manufacturing</a>			
321211	<a href="#">Hardwood Veneer and Plywood Manufacturing</a>		<a href="#">2435</a>	<a href="#">Hardwood Veneer and Plywood</a>
321212	<a href="#">Softwood Veneer and Plywood Manufacturing</a>		<a href="#">2436</a>	<a href="#">Softwood Veneer and Plywood</a>
321213	<a href="#">Engineered Wood Member (except Truss) Manufacturing</a>		<a href="#">2439</a>	<a href="#">Structural Wood Members, NEC</a> (Except trusses)
321214	<a href="#">Truss Manufacturing</a>		<a href="#">2439</a>	<a href="#">Structural Wood Members, NEC</a> (Trusses)
321219	<a href="#">Reconstituted Wood Product Manufacturing</a>		<a href="#">2493</a>	<a href="#">Reconstituted Wood Products</a>
3219	<b><a href="#">Other Wood Product Manufacturing</a></b>			
32191	<a href="#">Millwork</a>			
321911	<a href="#">Wood Window and Door Manufacturing</a>		<a href="#">2431</a>	<a href="#">Millwork</a> (Wood windows and doors)
321912	<a href="#">Cut Stock, Resawing Lumber, and Planing</a>			
			<a href="#">2421</a>	<a href="#">Sawmills and Planing Mills, General</a> (Lumber manufacturing from purchased lumber, softwood

				cut stock, wood lath, fence pickets, and planing mill products)
			<u>2426</u>	<u>Hardwood Dimension and Flooring Mills</u> (Hardwood cut stock, resawing hardwood lumber, and planing purchased hardwood lumber except flooring)
321918	<u>Other Millwork (including Flooring )</u>		<u>2421</u>	<u>Sawmills and Planing Mills, General</u> (Softwood flooring)
			<u>2426</u>	<u>Hardwood Dimension and Flooring Mills</u> (Hardwood flooring)
			<u>2431</u>	<u>Millwork</u> (Except wood doors and windows)
32192	<u>Wood Container and Pallet Manufacturing</u>			
321920	<u>Wood Container and Pallet Manufacturing</u>		<u>2421</u>	<u>Sawmills and Planing Mills, General</u> (Box lumber made from purchased lumber)
			<u>2429</u>	<u>Special Product Sawmills, Not Elsewhere Classified</u> (Cooperage stock)
			<u>2441</u>	<u>Nailed and Lock Corner Wood Boxes and Shook</u>
			<u>2448</u>	<u>Wood Pallets and Skids</u>
			<u>2449</u>	<u>Wood Containers, NEC</u>
			<u>2499</u>	<u>Wood Products, NEC</u> (Wood containers, such as noncoopered vats and reed or straw baskets)
32199	<u>All Other Wood Product Manufacturing</u>			
321991	<u>Manufactured Home (Mobile Home) Manufacturing</u>		<u>2451</u>	<u>Mobile Homes</u>
321992	<u>Prefabricated Wood Building Manufacturing</u>		<u>2452</u>	<u>Prefabricated Wood Buildings and Components</u>
321999	<u>All Other Miscellaneous Wood Product Manufacturing</u>		<u>2421</u>	<u>Sawmills and Planing Mills, General</u> (Kiln drying)
			<u>2429</u>	<u>Special Product Sawmills, NEC</u> (Excelsior)
			<u>2499</u>	<u>Wood Products, NEC</u> (Except wood containers, wood cooling towers, cork life preservers, mirror or picture frames, and laundry hampers of reed, rattan, and willow)
			<u>3131</u>	<u>Boot and Shoe Cut Stock and Findings</u> (Wood heels)
			<u>3999</u>	<u>Manufacturing Industries, NEC</u> (Burnt wood articles)



## 322 Paper Manufacturing










2002 NAICS	2002 NAICS U.S. Description (with link to definition)	<u>Com- para-</u>	1987 SIC	1987 U.S. SIC Description (with link to definition)
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		<u>bility</u>		
322	<u>Paper Manufacturing</u>			
3221	<b><u>Pulp, Paper, and Paperboard Mills</u></b>			
32211	<u>Pulp Mills</u>			
322110	<u>Pulp Mills</u>		<u>2611</u>	<u>Pulp Mills</u> (Pulp producing mills only)
32212	<u>Paper Mills</u>			
322121	<u>Paper (except Newsprint) Mills</u>		<u>2611</u>	<u>Pulp Mills</u> (Pulp mills producing paper except newsprint)
			<u>2621</u>	<u>Paper Mills</u> (Except newsprint mills)
322122	<u>Newsprint Mills</u>		<u>2611</u>	<u>Pulp Mills</u> (Pulp mills producing newsprint)
			<u>2621</u>	<u>Paper Mills</u> (Newsprint mills)
32213	<u>Paperboard Mills</u>			
322130	<u>Paperboard Mills</u>		<u>2611</u>	<u>Pulp Mills</u> (Pulp mills producing paperboard)
			<u>2631</u>	<u>Paperboard Mills</u>
3222	<b><u>Converted Paper Product Manufacturing</u></b>			
32221	<u>Paperboard Container Manufacturing</u>			
322211	<u>Corrugated and Solid Fiber Box Manufacturing</u>		<u>2653</u>	<u>Corrugated and Solid Fiber Boxes</u>
			<u>2679</u>	<u>Converted Paper and Paperboard Products, NEC</u> (Corrugated paper)
322212	<u>Folding Paperboard Box Manufacturing</u>		<u>2657</u>	<u>Folding Paperboard Boxes, Including Sanitary</u>
322213	<u>Setup Paperboard Box Manufacturing</u>		<u>2652</u>	<u>Setup Paperboard Boxes</u>
322214	<u>Fiber Can, Tube, Drum, and Similar Products Manufacturing</u>		<u>2655</u>	<u>Fiber Cans, Tubes, Drums, and Similar Products</u>
322215	<u>Nonfolding Sanitary Food Container Manufacturing</u>		<u>2656</u>	<u>Sanitary Food Containers, Except Folding</u>
32222	<u>Paper Bag and Coated and Treated Paper Manufacturing</u>			
322221	<u>Coated and Laminated Packaging Paper and Plastics Film Manufacturing</u>		<u>2671</u>	<u>Packaging Paper and Plastics Film, Coated and Laminated</u> (Except single-web and multi-web plastics packaging film and sheet)
322222	<u>Coated and Laminated Paper Manufacturing</u>		<u>2672</u>	<u>Coated and Laminated Paper, NEC</u>
			<u>2679</u>	<u>Converted Paper and Paperboard Products, NEC</u> (Wallpaper and gift wrap paper)
322223	<u>Plastics, Foil, and Coated Paper Bag Manufacturing</u>		<u>2673</u>	<u>Plastics, Foil, and Coated Paper Bags</u> (Except single web or multi-web plastic bags)
322224	<u>Uncoated Paper and Multiwall Bag Manufacturing</u>		<u>2674</u>	<u>Uncoated Paper and Multiwall Bags</u>
322225	<u>Laminated Aluminum Foil Manufacturing for Flexible Packaging Uses</u>		<u>3497</u>	<u>Metal Foil and Leaf</u> (Laminated aluminum foil rolls and sheets for flexible packaging uses)
322226	<u>Surface-Coated Paperboard Manufacturing</u>		<u>2675</u>	<u>Die-Cut Paper and Paperboard and Cardboard</u> (Pasted, lined, laminated, or surface-coated paperboard)

32223	<a href="#"><u>Stationery Product Manufacturing</u></a>			
322231	<a href="#"><u>Die-Cut Paper and Paperboard Office Supplies Manufacturing</u></a>			
			<a href="#"><u>2675</u></a>	<a href="#"><u>Die-Cut Paper and Paperboard and Cardboard</u></a> (Die-cut paper and paperboard office supplies, such as file folders, tabulating cards, and report covers)
			<a href="#"><u>2679</u></a>	<a href="#"><u>Converted Paper and Paperboard Products, NEC</u></a> (Paper supplies for business machines, such as adding machine tape, and other paper office supplies)
322232	<a href="#"><u>Envelope Manufacturing</u></a>		<a href="#"><u>2677</u></a>	<a href="#"><u>Envelopes</u></a>
322233	<a href="#"><u>Stationery, Tablet, and Related Product Manufacturing</u></a>		<a href="#"><u>2678</u></a>	<a href="#"><u>Stationery, Tablets, and Related Products</u></a>
32229	<a href="#"><u>Other Converted Paper Product Manufacturing</u></a>			
322291	<a href="#"><u>Sanitary Paper Product Manufacturing</u></a>			
			<a href="#"><u>2676</u></a>	<a href="#"><u>Sanitary Paper Products</u></a>
			<a href="#"><u>3842</u></a>	<a href="#"><u>Orthopedic, Prosthetic, and Surgical Appliances and Supplies</u></a> (Incontinent pads and bed pads)
322299	<a href="#"><u>All Other Converted Paper Product Manufacturing</u></a>			
			<a href="#"><u>2675</u></a>	<a href="#"><u>Die-Cut Paper and Paperboard and Cardboard</u></a> (Except pasted, lined, laminated, or surface coated paperboard and die-cut paper and paperboard office supplies)
			<a href="#"><u>2679</u></a>	<a href="#"><u>Converted Paper and Paperboard Products, NEC</u></a> (except corrugated paper, wall paper, gift wrap paper, paper supplies for business machines, and other paper office supplies)

**337 Furniture and Related Product Manufacturing**

<b>2002 NAICS</b>	<b>2002 NAICS U.S. Description (with link to definition)</b>	<b>Com-para-bility</b>	<b>1987 SIC</b>	<b>1987 U.S. SIC Description (with link to definition)</b>
337	<a href="#"><u>Furniture and Related Product Manufacturing</u></a>			
3371	<a href="#"><u>Household and Institutional Furniture and Kitchen Cabinet Manufacturing</u></a>			
33711	<a href="#"><u>Wood Kitchen Cabinet and Countertop Manufacturing</u></a>			
337110	<a href="#"><u>Wood Kitchen Cabinet and Countertop Manufacturing</u></a>			
			<a href="#"><u>2434</u></a>	<a href="#"><u>Wood Kitchen Cabinets</u></a>
			<a href="#"><u>2541</u></a>	<a href="#"><u>Wood Office and Store Fixtures, Partitions, Shelving, and Lockers</u></a> (Counter tops)
			<a href="#"><u>5712</u></a>	<a href="#"><u>Furniture Stores</u></a> (Custom wood cabinets)
33712	<a href="#"><u>Household and Institutional Furniture Manufacturing</u></a>			
337121	<a href="#"><u>Upholstered Household Furniture Manufacturing</u></a>			

			<u>2512</u>	<u>Wood Household Furniture, Upholstered</u>
			<u>2514</u>	<u>Metal Household Furniture (Upholstered)</u>
			<u>2515</u>	<u>Mattresses, Foundations, and Convertible Beds (Convertible beds)</u>
			<u>5712</u>	<u>Furniture Stores (Custom made upholstered household furniture)</u>
337122	<u>Nonupholstered Wood Household Furniture Manufacturing</u>			
			<u>2511</u>	<u>Wood Household Furniture, Except Upholstered (Except wood box spring frames)</u>
			<u>5712</u>	<u>Furniture Stores (Custom made nonupholstered wood household furniture except cabinets)</u>
337124	<u>Metal Household Furniture Manufacturing</u>		<u>2514</u>	<u>Metal Household Furniture (Except upholstered metal furniture and metal box spring frames)</u>
337125	<u>Household Furniture (except Wood and Metal) Manufacturing</u>			
			<u>2499</u>	<u>Wood Products, NEC (Laundry hampers of reed, rattan, and willow)</u>
			<u>2519</u>	<u>Household Furniture, NEC</u>
337127	<u>Institutional Furniture Manufacturing</u>			
			<u>2531</u>	<u>Public Building and Related Furniture (Except motor vehicle seats and blackboards)</u>
			<u>2541</u>	<u>Wood Office and Store Fixtures, Partitions, Shelving, and Lockers (Wood lunchroom tables and chairs)</u>
			<u>2542</u>	<u>Office and Store Fixtures, Partitions, Shelving, and Lockers, Except Wood (Lunchroom tables and chairs)</u>
			<u>2599</u>	<u>Furniture and Fixtures, NEC (Except hospital beds)</u>
			<u>3952</u>	<u>Lead Pencils, Crayons, and Artists' Materials (Drafting tables and boards)</u>
			<u>3999</u>	<u>Manufacturing Industries, NEC (Beauty and barber chairs)</u>
337129	<u>Wood Television, Radio, and Sewing Machine Cabinet Manufacturing</u>		<u>2517</u>	<u>Wood Television, Radio, Phonograph, and Sewing Machine Cabinets</u>
3372	<b><u>Office Furniture (including Fixtures) Manufacturing</u></b>			
33721	<u>Office Furniture (including Fixtures) Manufacturing</u>			
337211	<u>Wood Office Furniture Manufacturing</u>		<u>2521</u>	<u>Wood Office Furniture</u>
337212	<u>Custom Architectural Woodwork and Millwork Manufacturing</u>		<u>2541</u>	<u>Wood Office and Store Fixtures, Partitions, Shelving, and Lockers ( custom architectural millwork)</u>
337214	<u>Office Furniture (except Wood) Manufacturing</u>		<u>2522</u>	<u>Office Furniture, Except Wood</u>
337215	<u>Showcase, Partition, Shelving, and Locker Manufacturing</u>			
			<u>2426</u>	<u>Hardwood Dimension and Flooring Mills (Wood furniture frames and finished furniture parts)</u>
			<u>2511</u>	<u>Wood Household Furniture, Except Upholstered (Wood box spring frames(parts))</u>
			<u>2514</u>	<u>Metal Household Furniture (Metal box spring frames)</u>

		<u>2541</u>	<u>Wood Office and Store Fixtures, Partitions, Shelving, and Lockers</u> (Except custom architectural millwork, counter tops, and lunchroom tables and chairs)
		<u>2542</u>	<u>Office and Store Fixtures, Partitions, Shelving, and Lockers, Except Wood</u> (Except lunchroom tables and chairs)
		<u>3089</u>	<u>Plastics Products, NEC</u> (Finished plastic furniture parts)
		<u>3429</u>	<u>Hardware, NEC</u> (Sleep sofa mechanisms and chair glides)
		<u>3499</u>	<u>Fabricated Metal Products, NEC</u> (Metal furniture frames)
3379	<b><u>Other Furniture Related Product Manufacturing</u></b>		
33791	<u>Mattress Manufacturing</u>		
337910	<u>Mattress Manufacturing</u>		<u>2515</u> <u>Mattresses, Foundations, and Convertible Beds</u> (Mattresses and foundations)
33792	<u>Blind and Shade Manufacturing</u>		
337920	<u>Blind and Shade Manufacturing</u>		<u>2591</u> <u>Drapery Hardware and Window Blinds and Shades</u>



**Wisconsin Economic Development Institute, Inc.  
10 East Doty Street, Suite 500  
Madison, WI 53703-3397  
[www.wi-edi.org](http://www.wi-edi.org)**