UNITED STATES WOOD-BASED INDUSTRY: A REVIEW OF STRUCTURE AND ORGANIZATION

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UNITED STATES WOOD-BASED INDUSTRY: A REVIEW OF STRUCTURE AND ORGANIZATION

INTRODUCTION

The U.S. wood-based industry is an important and dynamic part of the nation's economic and social fabric. The industry's enterprises are mindful of the need to continuously seek innovative and forward-looking responses to rapidly changing domestic and global conditions (Ince and others 2007, Turner and others 2005). In 2007, the industry was responsible for contributing nearly $323 billion in shipment values to the nation's economy and was the workplace for more than 1.4 million persons. Although the industry in general may rely on forests as a common source of raw material, the industry's many segments are extremely diverse in the products they produce and in their often unique need for timber, labor and manufacturing facilities. At the risk of overgeneralizing, suggested here is that the wood-based industry is composed of four major segments or groups, namely the timber growing segment, timber management support segment, timber harvesting and transport segment, and the wood product manufacturing segment. Although important segments of the industry, the wholesale and retail trade sectors of the industry are not considered by this review (Appendix Table 1).

TIMBER GROWING INDUSTRY

General Character of Industry

The timber growing segment of the wood-based industry is engaged in the operation of timber tracts for purposes of growing and selling standing timber harvest which can be subsequently harvested and manufactured into wood products. Although the definition may not be inclusive, timber growing enterprises have been identified collectively as the timber tract operations industry (U. S. Census Bureau 2008a). Included within the latter are private owners of small and medium forest properties, timberland owning manufacturing firms, tax-advantaged entities such as real estate investment trusts (REITs), and institutional timberland investors such as timber investment management organizations (TIMOs). In some manner, forestland owners in all of these categories engage in the sale of timber grown on their property.

In 2007, the timber tracts industry (narrowly defined) was nationally composed of 450 establishments that employed more than 2,600 persons with an annual payroll of about $130 million. Each establishment averaged about 6 employees and an annual payroll of $290,000. As depicted by the following, the industry has experienced a net gain of 32 establishments (8 percent) since 1998

with an especially sharp increase occurring from 2001 to 2002 (increase of 239 establishments). In contrast, employment within the industry gained a respectable 32 percent from 1998 through 2005, only to experience a loss of 1,892 employees (42 percent) from 2005 through 2007 (Appendix Table 2) (U. S. Census Bureau 2009a).

Year	Establishments	Employees	Annual Payroll (million dollars)
2007	450	2,632	130.3
2006	454	2,806	131.5
2005	472	4,524	192.6
2004	521	5,023	210.0
2003	621	5,515	220.6
2002	680	4,203	158.2
2001	441	3,203	123.0
2000	469	3,337	132.0
1999	431	3,258	121.9
1998	418	3,426	132.4

As gauged by the number of employees per establishment, the industry's establishments are quite modest in size. In 2007, 84 percent of them employed one to nine persons while 19 percent employed 10 to 49 persons. Only four establishments reported 100 or more employees in 2007 (one each located in Alabama, California, Florida, and Louisiana). Since 1998, there has been a modest (about 2 percent) decline in the portion of employees in industry establishments with one to nine employees. Forty-two of the industry's 2007 establishments were located (descending order) in Georgia, Oregon, Alabama, Mississippi and Florida. These same states accounted for 45 percent of the employees working in the industry (U. S. Census Bureau 2009a).

Major Segments of Industry

Nonindustrial Private Landowners

Nonindustrial private owners (including family owners) of forest land are very often growers and sellers of timber. Included in this ownership category are individuals, trusts, and certain corporations that do not own or operate timber processing facilities. Most individuals classified as nonindustrial private owners own relatively small parcels of forest land and very often focus their forest management activities on interests other than the production and harvest of timber. In 2006, more than 10 million such landowners owned 260 million acres of forestland (35 of US total forest land) and in 2002 harvested more than 10.6 billion cubic feet of timber (Butler 2008). Many of these landowners are members of the American Tree Farm System (24 million acres of private forestland owned by 90,000 family forest owners) (American Forest Foundation 2008).

A considerable number of forestland owners classified as nonindustrial private forest owners actually each own substantial forest property – but no processing facilities. Examples are Starker Forests, Inc. - - family owned, 60,000 acres of forest land in Oregon; Shasta Forests Company -- family owned, managed by W.M. Beaty and Associates, 280,000 acres of forest land in California; and Port Blakely Tree Farms, LP – family owned, 140,000 acres of forest land in Oregon and Washington; Pingree Associates – family owned, managed by New England Forestry Foundation (762,000acres), 806,500 acres of forest in Maine;H. C. Haynes, Inc – private corporation, 100,000 acres in Maine; St. Joe Company – corporate owned, 199,000 acres of forest in GA and FL; Pope Resources, LP – public corporation, 115,000 acres of forest in OR and WA; J. M. Huber Corporation – private corporation, 500,000 acres of forest in Maine and Southeast United States; Bayroot, LLC – private corporation, 578,000 acres in Maine and New Hampshire (managed by Wagner Forest Management, Ltd.); Baskahegan Company – family owned, 101,000 acres in Maine; Westervelt Company – private corporation, 500,000 acres; Soper-Wheeler Co – family owned, 97,000 acres in CA.

Industrial Fee-Owning Landowners

Wood-based manufacturing companies that grow timber on fee owned land for use by their manufacturing facilities (and not operating as real estate investment trusts) may also sell timber to unaffiliated wood conversion facilities. Operating as such, these companies become part of the industry that grows and sells timber on the open market. Exactly which companies are engaged in such activities and how much timber they grow and sell in total on the open market is not known nor easily ascertained. However, the following examples provide some indication of the nature and extent of these operations (corporate annual reports):

• Weyerhaeuser Company: Forest land ownership – 5.7 million acres. Net sales of logs from company-owned (or leased) land (million dollars): 2006 – $781 (343.6 million cubic feet), 2005 – $761 (355.2 million cubic feet), 2004 – $822 (392.0million cubic feet), 2003 – $730, (412.5 million cubic feet) and 2002 – $657 (360.0 million cubic feet).

• Deltic Timber Corporation: Forest land ownership – 438,200 acres. Net sale of timber from company-owned land (million dollars): 2007 – $10.3(8 percent of net company sales), 2006 – $9.2 (6 percent of net company sales), and 2005 – $10.1 (6 percent of net company sales).

• International Paper Co: Forestland ownership – 300,000 acres. In 2006, saleof 3.4 million tons of wood sold to other users from company forest lands.

Real Estate Investment Trusts

Real estate investment trusts (REITs) are self-standing companies, or subsidiaries of companies, that own or operate income-producing real estate, including timberlands. They can be either publically or privately held, although they are required to have a minimum of at least 100 shareholders (if public), invest at least 75 percent of their total assets in real estate, and derive at least 75 percent of their income from such investments (Mendell 2007). Nationally in 2002 there were more than 2,700 real estate investment trusts engaged in the ownership and management of offices buildings, shopping centers, apartments, resorts, health care centers, and natural resource related enterprises (U.S. Census Bureau 2005). Examples of REITs focused on businesses other than timberland are Simon Property Group (regional malls), Tanger Factory Outlet Centers, Inc. (shopping centers), Host Hotels and Resorts, Inc.(lodging and resorts), National Health Reality, Inc. (Health care), and Entertainment Properties Trust (entertainment).

A real estate investment trust may be formed in any one of the 50 states or District of Columbia as a corporation subject to federal tax laws. The Securities and Exchange Commission requires annual reporting by public (traded on a national stock exchange) and by non-exchange (not traded) REITs, while private REITs are not required to file nor are they publically traded. Real estate investment trusts must be governed by directors or trustees and must annually distribute at least 90 percent of their income to shareholders (shares must be transferable). Corporations or eligible subsidiaries organized as a REIT are not subject to U.S. corporate income taxes on income and gain from investments distributed to stockholders, thereby reducing corporate-level taxes and reducing "double taxation"(non-REIT entities are taxed on corporate income and stockholders are subsequently taxed when distributions are made). Most states honor this federal tax treatment and do not require REITs to pay state income taxes. The tax implications for a C-corporation (corporation liable for federal taxes) versus a publically traded REIT (S-corporation where shareholders are liable for federal taxes) is evident by example for 2006 as follows(Harris 2007).

Weyerhaeuser Company (C-corporation)	Plum Creek Timber Company (REIT)
Revenue: $21,896 million	Revenue: $1,627 million
Income before taxes: $826 million	Income before taxes: $328 million
Corporate income taxes: $471 million	Corporate income taxes: $13 million
Net income (w/adjustments): $453 million	Net income (w/adjustments): $317 million
Effective tax rate: 57 percent	Effective tax rate: 4 percent

Real estate investment trusts in all likelihood own 10 to 15 million acres of forest land, valued at $10 to $12 billion. Nearly all of this property was once owned by vertically integrated forest products companies. Although the factors influencing such firms to restructure their

timberland holdings into a real estate investment trust are complex and driven by corporate overall management strategies, a key motive was the 1997 federal Real Estate Investment Trust Simplification Act. The latter removed major barriers to forming a REIT (for example, forgo timber harvesting for four years after forming a REIT) and allowed large institutional investors to hold shares in a real estate investment trust. The effect was to increase the liquidity of timberland investments for those REITs open to public trading. Also prompting restructuring as a REIT was more favorable tax treatment and enhanced after-tax investment returns, a desire to ensure timberlands are fairly valued in financial markets (recognition of appreciation in the value of timberland assets, not just the profit from harvesting trees from such land), and US Internal Revenue Service ruling allowing certain subsidiaries of taxable corporations to qualify as a REIT (Hickman 2007).

A modest number of wood-based companies have chosen to restructure themselves in such a way that their previous fee-owned timberland to qualify as a REIT (Fernholz and others 2007, Hickman 2007). Examples of such enterprise are as follows (corporate annual reports, 2006 and 2007 filings U. S Securities and Exchange Commission).

• Longview Fibre Company (Brookfield Asset Management, Inc.)(public)(Longview, WA); Forestland ownership – 588,000 acres (OR, WA); sales (timber) 2007 – $193 million. "Our business is organized into two segments: timber (REIT segment) and manufacturing . . . our Longview mill obtained approximately 6 percent of its wood chips from logs harvested from our timberlands . . . our principal REIT qualifying investment is our timberland . . . we own and operate tree farms which produce logs for sale."

• Potlatch Corporation (public) (Spokane, WA); Forestland ownership – 1,700,000 acres; sales (timber) 2007 – $296.8 million. "Our business is organized into five segments: resource, real estate (REIT segments), wood products, pulp and paper board, and consumer products . . . primary business of the resource segment is the management of timberlands to optimize the value of all possible revenue producing opportunities while at the same time adhering to our strict stewardship standards . . . the segment sold wood fiber at market prices to our manufacturing facilities . . . also sold logs and pulpwood to a variety of forest products companies located near our timberlands."

• Plum Creek Timber Company, Inc. (public) (Seattle, WA); Forestland ownership – 8,000,000 acres; sales (timber) 2007 – $782 million. Businesses conducted through nontaxable REIT segments, namely Northern Resource Segment and Southern Resource Segment, and Taxable REIT segments, namely real estate segment, manufacture products segment (lumber, plywood, medium density fiberboard), and natural resources (other) (oil, gas, minerals, coal). "Our objective is to maximize the long-term value of our timberlands located in 18 states . . . we grow the value of our core timber business through intensive management of our timberlands . . . we view our core timber resource base as a renewable asset with substantial inherent value . . . we seek to manage our timberlands in

a manner that optimizes the balance among current cash flows, the biological growth of timber and prudent environmental management."

•Rayonier, Inc. (public)(Jacksonville, FL); Forestland – 2,041,000 acres fee-owned, 285,571 long-term lease; sales (timber) 2007 – $210 million. Businesses conducted through two entities, namely Rayonier Forest Resources, LP (REIT subsidiary) and Rayonier TRS Holdings, Inc. (non-REIT subsidiary). "Company operates in four segments: Timber, Real Estate, Performance Fibers, and Wood Products . . . timber segment owns, leases, or manages timberlands and sells standing timber at auction to third parties, as well as sells delivered logs . . . corporate strategy is to pursue strategic growth opportunities in our timber segment."

• Wells Timberland REIT, Inc. (Wells Real Estate Funds, Inc.) (public) (Norcross, GA); Forestland ownership – 322,800 acres (AL, GA, NC, SC); sales (timber) 2007 – $7.7 million. As of December 341, 2007, not yet qualified or elected to be taxed as a REIT; action pending. "Objective is to provide investors with capital appreciation and opportunity for future income through ownership in a diversified portfolio of professionally managed timberland . . . intend to generate revenues primarily from harvesting and selling timber . . . Wells TIMO, and affiliate of Wells Real Estate Funds, Inc., serves as the advisor for Wells Timberland REIT . . . and employs timberland industry veterans to manage day-to-day operations."

•TimberSTAR (iSTAR Financial, Inc.) (public); Forestland ownership – 1,200,000 acres. Strategy is to ". . . provide flexible financial and operational solutions to owners of timberland . . . by acquiring, managing and harvesting timber and timberland . . . and support of long-term ownership of properties with working forest conservation easements." Estimated timberland value $146.9 million.

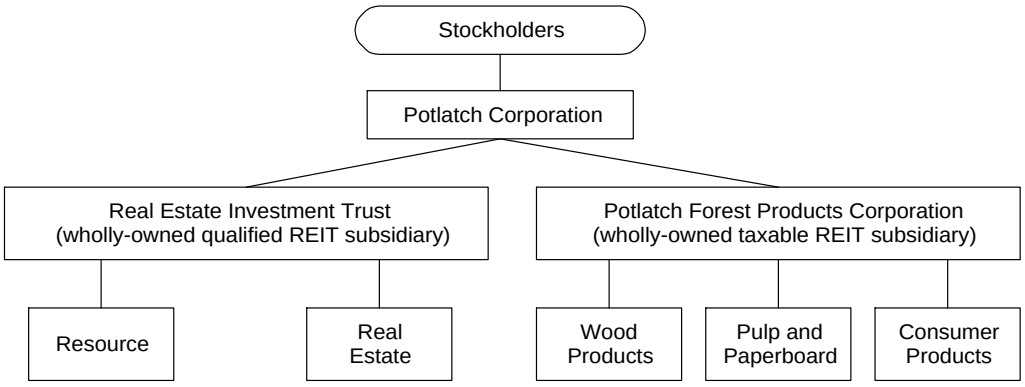
The rationale for and structure of REITs focused on the growing and selling of timber can be best appreciated by review of example companies. What follows is an abbreviated examination of corporations that have chosen a REIT structure for such purposes, namely Potlatch Corporation, Plum Creek Timber Company and Longview Fibre Company (corporate annual reports and 2007 filings U.S. Securities and Exchange Commission).

Potlatch Corporation clearly indicated in 2004-2005 that ". . . because of [its] tax structure as a C corporation, [it] was effectively foreclosed from adding to its [timberland] holdings over the past decade." In order to restore its competitive position in this respect, the company began to seriously consider restructuring as a real estate investment trust (REIT). However, conversion to a REIT was complicated by U.S. Internal Revenue Service (IRS) rules that prohibited certain desired corporate structures (commingling of REITS and certain types of corporate structures), and by the company's inability to meet the income and asset tests required to qualify as a REIT (ratio of timberland assets to manufacturing assets). However, in 2001-2002 opportunity to convert to a REIT structure became more favorable. The IRS amended the tax codes in a way that permitted

REITs to establish taxable REIT subsidiaries, while at the same time the company completed sale of a significant portion of its manufacturing facilities (pulp and coated paper, oriented strand board) – thereby increasing the ratio of REIT-qualifying timberland assets to non-REIT-qualifying assets. Given these events, the company became eligible for conversion to a real estate investment trust.

The officers of Potlatch Corporation fully acknowledged there were advantages that would result from converting to a REIT – and also some risks in doing so. The former included better able to compete for timberland acquisitions with entities that are not taxed as regular C corporations (for example, other REITs and certain partnerships), increased distributions to stockholders and, as a result, expansion of the company's stockholder base (attracted by better yields and asset quality), higher stock values often associated with publically-held REITs (higher multiple cash flows), and a substantial portion of taxable income treated as net capital gains (a lower federal income tax rate). As for drawbacks associated with forming and operating a REIT, the following were identified as especially concerning: challenges in complying with highly complex REIT qualifications, increased distributions that might negatively impact credit ratings, inability to meet minimum distribution requirements because of the cyclical nature of manufacturing operations, management inexperience in operating a REIT, unforseen adverse legislative actions focused on REITS, possible inconsistency in state-federal tax laws involving REITS, fluctuating timber prices harming cash flow from timberland operations, forestry regulations restricting ability to conduct timberland business, and exposure to risk of loss from fire and other natural disasters.

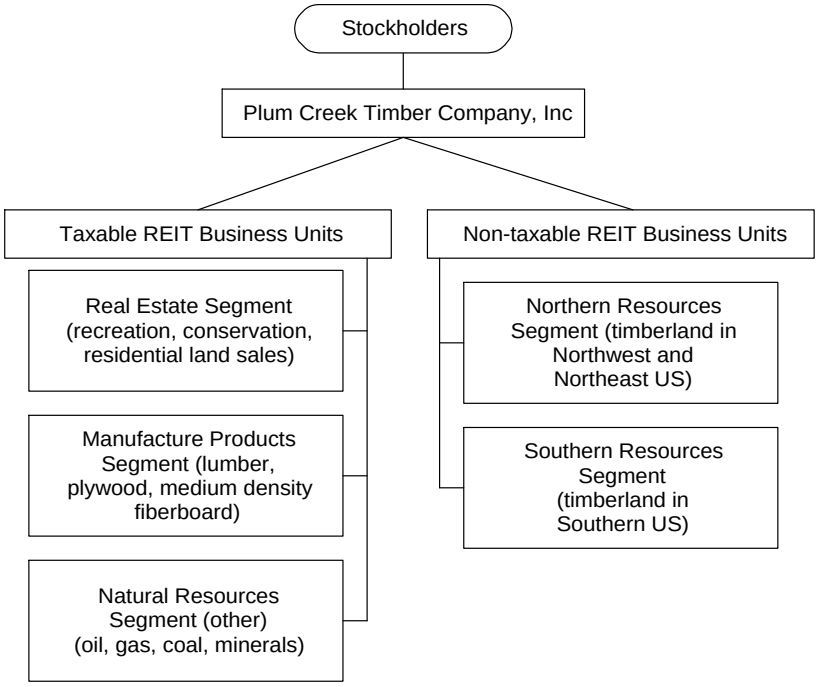
In January 2006, Potlatch Corporation formally reconstituted itself into two subsidiaries (five operating segments) – one a taxable REIT, the other a non-taxable REIT (Potlatch Forest Products Corporation) as follows. The subsidiary which owns and manages timberland is a fully-qualified non-taxable REIT and is bound by formal agreement to sell standing timber to the company's taxable manufacturing subsidiary (Potlatch Forest Products Corporation).



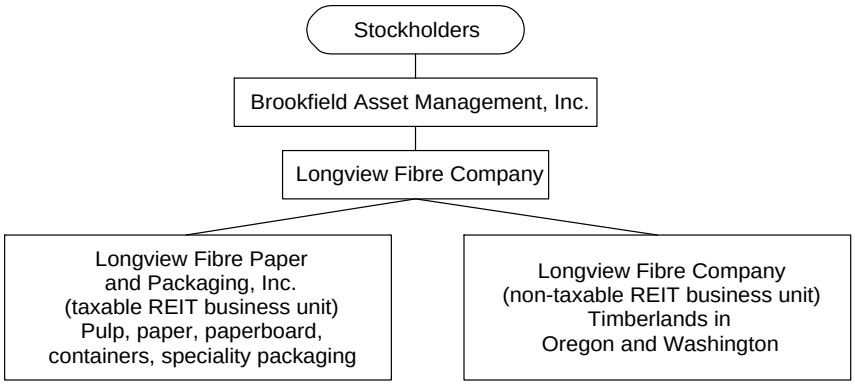
Plum Creek Timber Company, Inc. also operates as a real estate investment trust. Operating in 1998 as a master limited partnership, the officers of the company indicated that conversion to a REIT would be beneficial to the company and its investors for reasons such as ". . . REIT is a superior structure for growth, as it will expand access to equity and debt capital markets . . . permit a broader base of investors by allowing institutions, such as mutual finds, to invest in the company [thereby] enhancing investor value . . . [better] alignment of shareholder interests and a significant lowering of the cost of capital [which] will make future acquisitions more accretive to cash flow and more beneficial to investors than can occur under current company structure . . . investor favorable tax treatment [including] benefit of capital gains treatment and a significant portion of [dividends] for the next several years [will be] a non-taxable return on capital, and . . . both institutional and individual investors can participate directly in the growing value of timberlands without the management fees and liquidity constraints of a TIMO (timber investment management organization)." Company officers indicated that the conversion transaction [to a REIT] would not ". . . change who we are or how we conduct our business . . . we will continue to have the same management, assets, and focus on growth and value." The investors in the company agreed to the proposed conversion, and on July 1, 1999 the company was restructured as Plum Creek Timber Company, Inc., portions of which became qualified as a REIT.

The importance of being structured in such a way so as to include a REIT-qualified segment is acknowledged by the officers of Plum Creek Timber Company, Inc. Failure to qualify as a REIT in any taxable year would mean ". . . being subject to federal and state tax on taxable income at regular corporate rates of approximately 39 percent . . . not allowed to deduct dividends to stockholders in computing taxable income . . . be disqualified from treatment as a REIT for four taxable years following the year disqualified, and . . . borrowing funds or liquidate some investments to pay additional tax liability." The company has no assurance of remaining qualified as a REIT. Adverse legislative, judicial or administration interpretations of highly complex tax provisions focused on REITs could pose major difficulties for the company's REIT structure and could pose serious problems for the investment interests of company stockholders.

Since 1999, Plum Creek Timber Company, Inc. have evolved into five business units, each with a separate management team that directs different production processes and marketing strategies As indicated by the following, these units have been grouped within the company according to the manner in which they are treated for tax purposes. For the calendar year 2007 (as of December 31st), revenue from the company's non-taxable REIT units was $782 million and from taxable units $893 million. The organizational structure of Plum Creek Timber Company, Inc. is as follows:



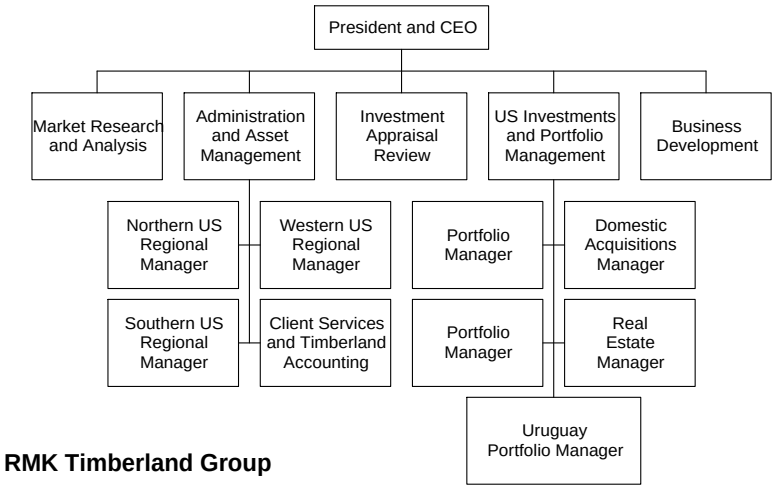
Longview Fibre Company has also organized its operating structure in such a way as to include a REIT. In 2005, the company's board of directors authorized actions required to meet REIT qualifications for federal income tax purposes, pointing to the following advantages of such a structure ". . . reduction in income taxes . . . increase in number of shares of common stock, and . . . increase in dividends paid on common stock." The company proposed that its principle REIT qualifying segment would be its investment in timberlands, with income from non-real-estate investments, principally manufacturing operations, being taxed at federal corporate income tax rates. On January 1, 2006, the company officially reorganized into two segments, namely Longview Fibre Paper and Packaging, Inc. and Longview Fibre Company as follows. For the calendar year 2006, net sales for the former were $757.6 million, while net sales for the company's timberland REIT were $193 million. In 2006, the company established a five-year agreement to supply a specific volume of logs to a previously owned sawmill. The organizational structure of Longview Fibre Company, Inc. is as follows:

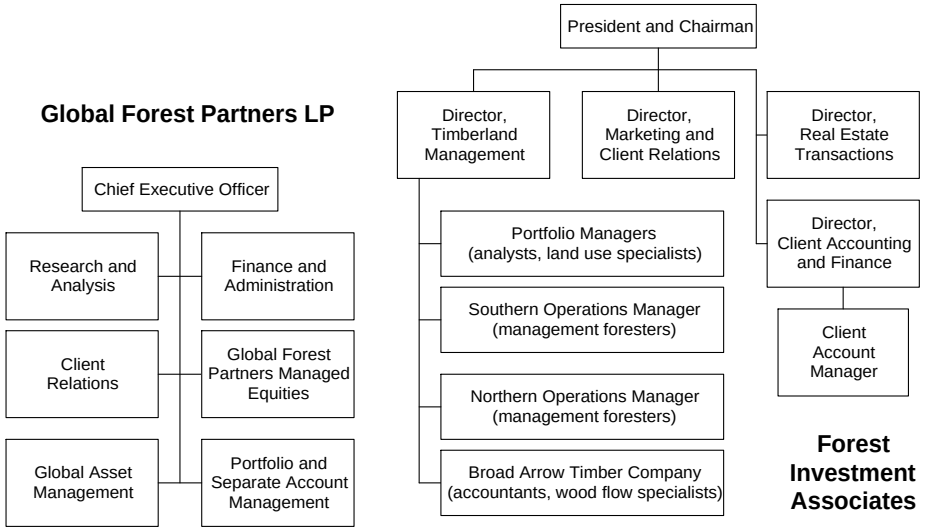


Timber Investment Management Organizations

Timberland investment management organizations (TIMOs) are also active participants in the timber growing industry (Binkley and others 1996, Fernholz and others 2007, Hickman 2007). Acting as a broker for clients, a TIMO is a management organization that is responsible for finding, analyzing and acquiring investment properties that would best suit the needs of their clients. Driven primarily by an interest in maximizing the growth in the value of their investment (namely, timberland), investors in TIMOs tend to be pension funds, insurance companies, foundations, financial institutions, universities, endowments and – occasionally – individual investors (participation in a TIMO usually requires a minimum investment of $100,000). Favorable tax treatment is also a major incentive for investing via a timberland investment management organization. While timberland owning corporations are taxed on income from such land and shareholders are taxed on the corporation's dividends, investors in TIMOs are taxed only once – plus their returns are taxed at lower capital gains rates. As the examples which follow indicate, the administrative organization of TIMOs tend to embrace research and analysis, acquisition and sale of land, client relations and business development, and a regional orientation toward the properties for which they are responsible.

Timber investment management organizations acquired an estimated 15 million acres of timberland since the mid-1980s. In 2005, their forestland ownership was valued at about $15 billion. These purchases were prompted by a number of factors, including changes in federal and state retirement laws which encourage institutional investors to diversify investment portfolios to include more than just fixed-income securities (for example, the federal Employee Retirement Income Security Act ERISA of 1974). Also facilitating TIMO involvement in ownership and management of timberland has been the financial community's recognition that timberland investments held over long periods of time are quite advantageous, most notably favorable the returns from timberland investments (20.1 percent average annual return from 1987 through 1999, 7.8 percent fromincome generated and 12.3 percent from appreciation in timberland value), lower risk associated with timberland than with many other types of investments, and the ability of timberland to serve as a respectable hedge against inflation (Hickman 2007). The organizational structure of three timber management organizations is as follows:





A number of very prominent timber investment management organizations are engaged in the growing and selling of timber in the United States (Table 1). Often responsible for expansive tracts of forest land (individually ranging from 310,700 acres to 2,743,700 acres), in total the 19 example companies identified here have fiduciary responsibilities for 25,635,000 acres of forest land in the United States. Nearly all of the identified TIMOs are private organizations (15 of 19). Although the number of staffs employed by the organizations appears modest given the forest land they oversee, many of them engage the professional support of an array of resource and financial consultants. The strategic interests of the organizations are quite varied, although a common thread is their interest in securing satisfactory returns on investments made by their clients.

Timber investment management organizations and real estate investment trusts share a common interest in forest land and the seeking of favorable returns on investments made therein. In most cases, their strategic interests in timberland are driven by market conditions wherein favorable conditions lead to harvest of timber or sale of property while unfavorable conditions preclude harvest and encourage the holding of forest property in hopes of an appreciation in its value. TIMOs and REITs are usually interested in diversifying their holdings among regions, timber types, and age classes, while vertically integrated wood-based firms usually base such decisions on the location of their manufacturing facilities and forestland holdings. The latter must contend with taxes as a major decision-making factor, while TIMOs and REITs are less so concerned since they are taxed only once, taxed at a lower rate, or are tax exempt. Availability of capital is not always a limiting factor for TIMOs, although such may be a problem for REITs (especially those not publically traded). An important distinction between REITs and TIMOs concerns forestland ownership. REITs actually own the forest land under their control, whereas TIMOs do not own timberland – they only represent (act on behalf of) individual investors that actually own the forest property (Hickman 2007). Other important distinctions between REITs and TIMOs are as follows (Mendell 2007).

	TIMOs	Public REITs
Liquidity	Low – capital normally committed to end of investment	High – shares easily bought and sold
Valuation	Difficult – based on appraisals	Easy – based on share price
Forest Management	Direct Control – buy and sell land, adjust management plan	Indirect Control – shareholder approval
Risk	Low – investors own a tangible asset	Moderate – investors own an equity (share)

The rising presence of REITs and TIMOs as institutions engaged in the ownership, management and selling of timber is in many respects an historic change in the patterns of industrially owned timberland. Although little rigorous analysis has been focused on what such changes mean, one comprehensive analysis offers the following observations (Hickman 2007): *type of forest management practices* – ". . . at present there is little evidence to suggest that the management practices employed by a TIMO or REIT on a given piece of land should be expected to differ markedly from those that would have been applied by a vertically integrated forest products company (VIFPC) . . . some evidence that TIMOs prefer silvicultural treatments that produce benefits in 10 to 15 years . . . TIMOs and REITs are subject to the same forest practice regulations

and mandatory environmental restrictions as apply to other forest owners"; *types of goods and services produced* – of greatest interest to TIMOs and REITs is timber (as it is for VIFPCs) and that other nonmarket goods and services will continue to be "jointly produced" in the future as they were in the past"; *ownership tenure and fragmentation* – ". . . Operating within a 10 to a 15-year time frame, limited evidence suggests that TIMOs . . . frequently dispose of their holdings in smaller sizes than when they were acquired . . . which contrasts sharply with the VIFPCs, that often held forestland for periods of 50 years or more"; *conversion of forestland to other uses* – ". . . because they don't have the same level of responsibility to supply dependent mills as did the VIFPCs, evidence suggests that TIMOs and REITs are more willing to convert forest lands to other uses . . . not uncommon for TIMOs and REITs to have a staff or subsidiary specifically tasked with handling the sale of lands that have been determined to have some 'higher and better use' than continued timber production . . . some TIMOs and REITs willing to enter into conservation easements with environmental organizations, land trusts, and/or governmental agencies"; *support for forestry research* – ". . . some evidence to suggest that TIMOs and REITs are less supportive of forestry research . . . the problem may not be that they simply haven't been in existence long enough to establish a research track record; " and *support for forestry in general* – some evidence to suggest that TIMOs and REITs will not participate as extensively in different forestry organizations at the national and state levels, and not be as aggressive in supporting federal and state legislative initiatives of concern to the forestry sector . . . the new owners may simply need more time to assess the benefits of participating in such cooperative ventures."

Table 1. Timber Investment Management Organizations (TIMO) of the U.S. Wood-based Industry. 2007-2008.

Timber Investment Management Organization (TIMO)	Area of Forest Land (acres)	Organization Staff (approximate)	Organization Long-term Focus
•American Forest Management, Inc (private)	1,500,000 acres	60 persons	Strategy is to ". . . maximize client objectives by consistently providing superior forest resource consulting services and real estate brokerage services."
•Brookfield Asset Management, Inc (public)	899,000 acres (Longview Timberlands, LLC; Acadian Timber Income Fund). Value $1,018 million estimated	NA	Strategy is to ". . . maximize the cash flows from its timber assets, while enhancing the value of these assets over time . . . intend to grow its business by acquiring complementary timberland assets in the region in which it operates."
•Campbell Group, LLC (public)	2,350,000 acres	35 persons	Strategy is to ". . . focus is exclusively on creating acquisition opportunities and managing them to produce superior risk-adjusted returns."
•Conservation Forestry, LLC (private)	310,700 acres	NA	Strategy is to ". . . align private equity with conservation capital for the purpose of acquiring and managing large forest landscapes."
•Forest Capital Partners, LLC (private)	2,100,000 acres	NA	Strategy is to ". . . concentrate holdings in deep timber markets with low-to-moderate risk where we can add value through superior forest operations."
•Forest Investment Associates (private)	980,000 acres	45 persons	Mission is to ". . . achieve financial success as an investment firm specializing in high-quality timberland investments and to be respected for excellent client service and investment performance."
•Forest Systems, Inc (private)	2,200,000 acres	15 persons	Strategy is to " . . . employ a high degree of investment and management discipline and practice outstanding environmental stewardship that is aligned with society's interest in the sustainable management of working forests."

Note: Number of staff persons often estimated.
Source: Corporate Annual Reports, Company Web Sites, Dunn and Bradstreet, Inc. 2008, LexisNexis, Inc., 2008, Mendell 2007, Mergent, Inc., 2008, Sustainable Forestry Initiative, Inc. 2008, Timber Mart-South Market News.

Table 1 (continued).

Timber Investment Management Organization (TIMO)	Area of Forest Land (acres)	Organization Staff (approximate)	Organization Long-term Focus
•Forestar Real Estate Group (public)	350,000 acres (plus 23,000 lease)	NA	Strategy to ". . . acquire and manage timberland investments for institutions, families, and individuals, emphasizing naturally regenerating hardwood and pine forests in the eastern US."
•Forestland Group, LLC (private)	2,100,000 acres	NA	Emphasis on ". . . extracting timber value while enhancing the value and marketability of properties through . . .views, vistas and openings created to give the forest a park-like appearance."
•Fountain Forestry, Inc (private)	790,000 acres	NA	Values are to ". . . provide an exceptional quality service to our clients . . . respect the environment and protect its sustainability while providing for the resource needs of society."
•Global Forest Partners, LP (private)	465,000 acres ($550 million asset value in US)	25 persons	Strategy is to make . . . astute plantation forestry investments in globally competitive timber-producing regions which will enhance portfolio return while reducing overall risk."
•GMO Renewable Resources, LLC (private)	2,743,700 acres (GMO Threshold Timber Corporation – 778,600 acres, Black Bear Forest, Inc – 1,965,100 acres, Gottsaull Tennessee Forest, LLC – 81,400 acres)	NA	Strategy is to ". . . provide sophisticated clients with superior asset management solutions and services . . . to a client base that includes endowments, pension funds, public funds, foundations and cultural institutions."
•Hancock Timber Resource Group (subsidiary of John Hancock Life Insurance Company, subsidiary of Manulife Financial Corporation) (public)	2,398,000 acres.	50 persons	Strategy is to ". . . integrate property-level activities with portfolio-level objectives, such as construction of geographically diversified portfolios, in way that investors can reduce overall portfolio risk from vulnerable to price variation, market fluctuation or environmental hazards within a specific region."

Table 1 (continued).

Timber Investment Management Organization (TIMO)	Area of Forest Land (acres)	Organization Staff (approximate)	Organization Long-term Focus
•Lyme Forest Fund, LP (private)	660,000 acres	Eight persons	Strategy is to ". . . to invest in forestland tracts with compelling qualities and values not fully recognized by others . . . establish a strategic investment niche in properties with unique conservation values . . . in partnership with conservation organizations or government entities willing to purchase some of the non-timber values of a property."
•Molpus Woodlands Group, LLC (private)	660,000 acres	25 persons	Focus is on "long-term investments (10+ years) to ensure optimum cash returns and responsible forest stewardship simultaneously . . . doing so with a full range of administrative and operational forest management services."
•Regions Morgan Keegan (RMK) Timberland Group (affiliate of Morgan Keegan and Co., Inc.) (private)	1,200,000 acres	25 persons (in U.S.)	Strategy to "... provides superior investment returns for clients by acquiring and managing forestland and its associated values, while respecting the environmental and social integrity of the forest and the community . . . create an overall acquisition strategy for clients based on investment return and risk characteristics of individual timberland investment regions, and the age class and product distribution of the forests acquired within those regions . . . tailor timberland portfolios to clients' investment horizons and objectives for return, risk and liquidity."
•Resource Management Service, LLC (private)	2,479,000 acres	10 persons	Strategy is to ". . . buy, sell, and manage timberland for investors and landowners . . . emphasizing understanding of client investment needs with an emphasis on maximizing the total return to the investor."
•TimberVest, LLC (private)	850,000 acres (estimated value of $1,800 million)	40 persons	Strategy is to ". . . target opportunistic, domestic-only timberland assets that are the least efficient and that are largely overlooked by most investors . . . and structuring these investments to provide significant growth and income . . . purchasing smaller properties diversified by geography and characteristic."
•Wagner Forest Management, LTD (private)	2,500,000 acres.	75 persons	NA

TIMBER HARVESTING AND TRANSPORTING INDUSTRY

General Character of Industry

The timber harvesting segment of the wood-based industry is engaged in the cutting and assembling of timber in ways that enable it to be further processed by wood-based manufacturing entities. Specifically, establishments within the harvesting industry focus on the cutting of trees (harvesting or logging) and their subsequent transformation into primary timber products, including logs, pilings, poles, pulpwood, and tree and wood chips. The timber harvesting industry also includes establishments that are involved in the transportation of timber, but only when transporting timber is not the primary activity of an establishment (U.S. Census Bureau 2008a).

Establishments operating in the timber harvesting industry in 2007 exceed 9,800 by a small margin. These establishments engaged the work efforts of nearly 59,597 employees which, in total, received a total payroll of nearly $2.1 billion. Each establishment averaged six employees and an annual payroll of $210,000. As indicated by the following (Appendix Table 2), the timber harvesting industry has experienced significant declines in establishments and employees. From 1997 through 2007, the number of establishments operating in the industry declined 28 percent, an average annual decline of over three percent over the eleven-year period (Allred 2009). For the same period, employment was also down 28 percent – more than 23,000 fewer employees in 2007 than in 1997 (U. S. Census Bureau 2009a).

Year	Establishments	Employees	Annual Payroll (million dollars)
2007	9,810	59,597	2,057.8
2006	10,038	61,400	2,005.3
2005	10,357	63,226	2,012.7
2004	10,926	69,007	2,038.4
2003	10,977	68,020	1,966.7
2002	11,447	68,962	1,973.0
2001	12,098	72,732	1,968.8
2000	12,620	78,129	2,057.2
1999	13,011	79,195	2,084.9
1998	13,606	79,357	2,070.0
1997	13,533	83,204	2,011.9

In 2007, 10 states (all but one located in the South or West) account for over half (55 percent) the industry's 9,810 establishments and 64 percent of its 59,597 employees. These states were: Oregon – 794 establishments and 60,98 employees, Alabama – 667 and 4,783, Washington – 614 5,021, Georgia – 599 and 4,891, North Carolina – 527 and 3,076, Mississippi – 506 and 3,293,

Arkansas – 439 and 2,597, Maine – 422 and 2,826, Virginia – 411 and 2,652, Louisiana – 397 and 2,862 (U. S. Census Bureau 2009a).

Establishments operating within the industry, as measured by employees per establishment, are not very large (nationwide average of six employees per establishment). Eighty-three percent of the industry's 2007 establishments had only one to nine employees, 16 percent had 10-99 employees, and less than 1 percent had 100 employees or more. In the same year, four establishments located in Washington reported more than 100 employees each, while in Virginia one establishment reported employment of 500 to 999 persons. Distribution of employees among employee size classes of establishments have remained virtually the same during the period 1998 through 2006; at no time during this period did any establishment within the industry report 1,000 or more employees (U. S. Census Bureau 2009a).

Major Companies in Industry

The extent and organization of the timber harvesting industry can be better appreciated by examining specific companies that comprise the industry. For purposes here, 867 companies reporting timber harvesting as their primary line of business in 2008 were identified (Dunn and Bradstreet, Inc. 2008, LexisNexis, Inc. 2008, Mergent, Inc. 2008). Although substantial in number, the 867 companies examined are but a portion of the companies that make up the 2007 timber harvesting industry in total, namely about 9 percent of industry-wide establishments, 28 percent of revenue or value of shipments, and 38 percent of the industry's total employees.

The timber harvesting companies examined are generally quite modest in size. Seventy-eight percent reported revenues in the range of $1 million to $3.9 million (11 percent – $4 million to $6.9 million, 3 percent – $7 million to $9.9 million, 1 percent – $10 million to $12.9 million). At the extremes, 6 percent of the companies reported 2007 revenues of less than one million dollars; only 1 percent reported revenues of $13 million or more. Most of the 867 companies employee 20 to 34 persons (43 percent), with companies employing less than five persons being quite uncommon (7 percent) as are companies employing 55 or more persons (1 percent) (26 percent – five to 14 employees, 27 percent 15 to 24, 24 percent 25 to 34, 9 percent – 35 to 44, 6 percent – 45 to 54).

Thirty-nine of the examined companies each reported revenue of $5 million or more in 2007 (total of $289.4 million, average per company of $7.4 million) (Table 2). Six of these companies had income of $10 million or more each, while 19 each reported revenue of less than $6 million. Washington, Oregon, Georgia, California and Mississippi (in rank order) were the most common locations for the 39 companies. Revenue wise, the 1 largest companies among the 39 are C&C

Logging LLC (Washington) with annual revenue of $20 million (established in 1967, incorporated in state of Washington, operates at a single location) and Mullis Logging, Inc. (Georgia) with annual revenue of $17.4 million (established in 1996, incorporated in state of Georgia, operates out of a single location, certified as a Georgia Master Timber Harvester). The revenue of C&C Logging LLC is four times larger than that reported by the 39th ranked company.

Table 2. Timber Harvesting Companies in the Timber Harvesting Industry of the U. S. Wood-based Industry. 2007-2008.

Company	Revenue (thousand dollars)	Employ-ees	Company	Revenue (thousand dollars)	Employ-ees
C&C Logging LLC (WA)	20,000	80	Bighorn Logging Corporation (OR)	5,600	35
Mullis Logging, Inc. (GA)	17,400	37	Soper-Wheeler Co (CA)	5,600	25
Bennett Timber Co, LLC (LA)	17,100	34	Steve Bolin Logging, Inc. (AR)	5,600	45
Steve Henderson Logging, Inc. (ID)	14,000	75	Anderson Logging, Inc. (CA)	5,500	100
Silver Bay Logging, Inc. (AK)	10,300	75	John L. Shadd Enterprises (FL)	5,500	80
Wyss Logging, Inc. (WA)	10,000	20	Mistletoe Corp (WA)	5,500	55
J&B Logging & Timber, Inc. (NC)	9,500	12	Sanders Logging Co, Inc. (GA)	5,500	18
Columbia River Log Scaling (OR)	9,300	13	Whitestone Logging, Inc. (OR)	5,500	10
Delbert L. Wheeler Co (WA)	9,000	50	Colville Timber Resource (WA)	5,300	97
Reece Logging, Inc. (GA)	8,000	42	John Wheeler Logging, Inc. (CA)	5,200	102
Croman Corp (OR)	7,200	35	Chilton Logging, Inc. (WA)	5,000	45
Axton Timber Co, Inc. (GA)	7,000	12	D&H Logging Co (OR)	5,000	35
Johnny McCool Logging (MS)	7,000	50	Erickson Logging, Inc. (WA)	5,000	11
Mid Atlantic Tree Harvesters (VA)	7,000	25	East Mississippi Pole Co (MS)	5,000	20
Hanington Bros, Inc. (ME)	6,800	39	Gustafson Logging C0 (OR)	5,000	22
Dailey Co Logging, Inc. (TX)	6,000	15	Kake Tribal Logging & Timber (AK)	5,000	20
Eastern Logging, Inc. (NH)	6,000	30	Omega Logging Co (OH)	5,000	22
Forest Products, Inc. (TX)	6,000	6	Timber Resources, Inc. (MS)	5,000	15
Hofenbredi Timber (OR)	6,000	35	Usher Land and Timber (FL)	5,000	32
Travis Taylor Co (LA)	6,000	12			

Note: Includes only companies whose primary line of business is logging and have sales revenue of $5 million or more. In some cases, revenue and employees are estimated by cited reference.
Source: Dunn and Bradstreet, Inc. 2008, ECNext, Inc. 2008 LexisNexis, Inc. 2008, Mergent, Inc. 2008.

Timber harvesting is not the only business of interest to many of the companies examined. Even though 74 percent of the 867 companies report timber harvesting as their primary and only line of business, 225 actively pursue a wide variety of business interests beyond timber harvesting. The most common being sawmill and planing mill operations, trucking and freight hauling, millwork, and highway, street and bridge construction. Below is a detailed description of the extent to which companies, whose primary business is timber harvesting, diversify into businesses beyond timber harvesting (many companies operate in more than one nontimber harvesting business). Most of the below businesses are closely related to wood processing and manufacturing. However, an

appreciable number are not (for example, oil and gas operation support activities, fabricated wire manufacture). Examples of firms engaged in businesses far removed from wood processing are Thomas Timberland Enterprises, Inc. (Pennsylvania, 2007 sales of $5.0 million) engages in sawmill and millwork businesses and in land clearing and construction site preparation businesses; BP Timber Co. (Louisiana, 2007 sales of $1.8 million) engages in businesses such as corn farming, trucking and freight hauling, soybean farming, and hog and pig farming; Junction City Wood Co., Inc. (Arkansas, 2007 sales of $6.1 million) is involved in nontimber harvesting businesses such as farm and garden machinery and equipment and in the wholesaling of motor vehicle supplies and parts; and the Soper-Wheeler Company (2007 sales of $5.6 million), which owns 97,000 acres of timberland in California, also has a thriving nursery and tree production business.

Companies	Secondary non-logging business
642	Logging only, no secondary business
67	Sawmills and planing mills
42	Trucking and freight hauling, general and specialized
28	Millwork, windows, doors
23	Highway, street and bridge construction
12	Excavation, land clearing,
12	construction site preparation
9	Lumber, millwork and panel product wholesaler
9	Flooring and dimension material manufacture
9	Corrugated and fiber box manufacture
9	Agriculture products (cattle, crops, orchards)
9	Forestry services and support activities (reforestation, planning)
7	Timber growing and management
6	Wood treating and preservation
5	Building and construction material retailer
5	Real estate agent, broker services, land development
5	Industrial and nonresidential building construction
4	Automotive supplies, parts, repairs, gasoline
4	Firewood and fuel wood wholesaler
4	Landscape and garden services and equipment
4	Log and pulpwood broker and wholesaler
4	Structural wood product manufacture (truss systems)
4	Single-family home construction
4	Veneer and plywood manufacture
4	Wood fencing manufacture (misc. wood products)
3	Air transportation, scheduled or non-scheduled
3	Electrical equipment repair and maintenance
3	Mining and construction equipment manufacture, wholesaler
3	Retail food merchandising (meat, fish, groceries)
2	Oil and gas operation support activities
2	Support for rail transport (log loading)
1	Concrete products and services
1	Cut stone and stone product manufacture
1	Equipment and vehicle leasing
1	Fabricated wire manufacture
1	Game and hunting preserve services
1	Hotels, motels and tourist courts
1	Industrial machinery and equipment wholesaler
1	Plumbing, heating and air conditioning services
1	Pole, post and piling manufacture
1	Public relations services
1	Waste management services
1	Wood kitchen cabinets

Timber harvesting (logging) may also be a secondary business of companies whose primary business in not timber harvesting. Of 1,279 companies reporting involvement in timber harvesting, but not so as a primary business, 79 companies indicated their primary business as follows (Dunn and Bradstreet, Inc. 2008, LexisNexis, Inc. 2008, Mergent, Inc. 2008).

Highway, street and bridge construction – 17 companies
Timber growing and harvesting – 14
Industrial and commercial building construction – 14
Forestry support activities (engineering, mapping) – 10
Oil and gas operation support activities – 7
Excavation and site preparation – 5
Single and multi- family housing (log homes) – 4
Agricultural products (cattle, crops, orchards) – 3
Landscaping and forest nurseries – 3
Water, sewer and utility line construction – 1
Drywall and insulation installation – 1

Examples of companies engaged primarily in one or more of the above businesses, but actively involved in timber harvesting, are Sentinel Industries, Inc. (Ashland, MO, 2007 sales of $6.0 million) – primary business multifamily housing construction; Manigg Enterprises, Inc. (Alpena, MI, 2007 sales of $13.1 million) – primary line of business excavation and site preparation; CJC Enterprises (Wake Forest, NC, 2007 sales of $1.3 million) – primary line of business water and sewer line construction; Holland, Inc. (Irving, TX, 2007 sales of $30.0 million) – primary line of business athletic and recreation facility construction; and Serenity Farms Landscaping, Inc. (Sheboygan, WI, 2006 sales of $1.5 million) – primary business landscape architectural services.

Large geographically disbursed wood-based companies reporting timber harvesting (logging) as their primary business at a specific location, may also engage in a number of businesses at the same location. For example, Weyerhaeuser Company reports timber harvesting (logging) to be its primary business in Albany, Washington, a site where it also engages in the manufacture of structural wood members (truss systems). Similarly for other Weyerhaeuser Company locations where timber harvesting is the primary business (Rainier, WA – forestry services, and Bowling Green, KY – corrugated and solid fiber containers).

TIMBER MANAGEMENT SUPPORTING INDUSTRY

General Character of Industry

The timber management supporting segment of the wood-based industry provides technical and managerial support necessary for the production and harvesting of timber. Establishments providing such support focus on activities such as cruising and estimating timber, fire prevention and fire fighting, management plan preparation, pest control services, reforestation and site preparation, and timber valuation and volume estimation (U. S. Census Bureau 2008a). Establishments focused on public administration and conservation of forest lands are not typically

considered part of the timber management support industry (for example, federal and state forestry agencies).

Over 1,700 establishments employing 13,740 persons were active in the timber management supporting industry in 2007. Over the ten-year period 1998 through 2007, the number of establishments in the industry grew nearly 21 percent, while employment from 1999 through 2005 hovered around an average of 14,700 with a modest decline in 2006 and 2007. (Appendix Table 2)(U.S. Census Bureau 2009a).

Year	Establishments	Employees	Annual Payroll (million dollars)
2007	1,755	13,740	451.7
2006	1,682	13,491	438.8
2005	1,701	14,260	422.9
2004	1,786	15,157	396.3
2003	1,762	14,969	421.0
2002	1,797	14,679	425.0
2001	1,553	15,173	373.1
2000	1,547	14,650	352.6
1999	1,493	14,148	319.8
1998	1,451	13,042	280.5

Only 3 percent of the industry's firms are organized in such a way that more than one establishment (physical location where business is performed) reports to a firm's central office (only 47 such firms in 2005). Since 1998, this ratio has remained nearly constant. The industry's establishments and employees are most commonly located in the following states (2007): Oregon – 258 establishments and 3,503 employees, Washington – 131 and 1,050, Georgia – 125 and 859, Alabama – 124 and 895, California – 76 and 722, Mississippi – 96 and 464, Montana – 94 and 73, North Carolina – 76 and 257, Louisiana – 59 and 253, Arkansas – 57 and 977, and South Carolina – 63 and 326. Combined, the establishments and employees in these states accounted for 66 percent and 68 percent, respectively, of the industry's national totals (U.S. Census Bureau 2009a).

The establishments operating in the industry are modest in size, at least in terms of employees per establishment. In 2007, the average number of employees per establishment nationwide was eight persons, although the average was considerably higher in some states, namely Arkansas and Oregon – 17 and 14 employees per establishment, respectively. Of the industry's 1,755 establishments in 2007, 86 percent had only one to nine employees, while only 12 percent reported 10 to 99 employees. Only 14 of the industry's 2007 establishments reported 100 or more employees, and they were located in Alabama (two establishments), Arkansas (one), California (one), Georgia (one), Idaho (one), New York (one), and Oregon (five) (U.S. Census Bureau 2009a).

Major Companies in Industry

Review of specific companies operating in the timber management support industry can provide addition insight to the industry's structure and operation. With such in mind, 286 companies whose primary line of business in 2008 was timber management support activities were identified from various company directories (Dunn and Bradstreet, Inc. 2008, LexisNexis, Inc. 2008, Mergent, Inc. 2008). Although these companies are substantial in and of themselves, they represent a very modest part of the industry total. In 2007, they constituted only about 16 percent of the industry's establishments and accounted for account for about 48 percent and 60 percent of the industry's revenue and employees, respectively.

The companies examined reported revenues that ranged from less than $10,000 to $22 million, with 86 percent reporting revenue of $3.9 million or less (20 percent – less than $1 million, 66 percent $1 million to $3.9 million, 7 percent – $4 million to $6.9 million, 2 percent – $7 million to $9.9 million, 2 percent – $10 million to $12.9 million, and 3 percent – $13 million or more). Although information about number of employees per company is reported in various was (full-time, part-time, or both), the 286 companies generally each have a modest number of employees. For the 8,270 total employees reported by the companies, slightly less than half (47 percent) have less than 25 employees while nearly one third (32 percent) have 25 to 44 employees. A respectable number of companies (21 percent) employ more than 45 persons. Examples of the latter companies are Mountain Forestry, Inc. (323 employees, Oregon), Summit Forests, Inc. (278 employees, Oregon), and Superior Forestry Services, Inc. (200 employees, Arkansas), companies which provide reforestation and related services.

The forestry services provided by the 286 companies are wide ranging. Although many companies provide more than one type of service, the distribution of companies by major service is as follows:

- General forestry services – 64 percent (for example, Woodland Forestry, LLC, four employees, North Carolina; Atlantic Coast Forestry, Inc., 80 employees, Virginia).
- Fire fighting services – 13 percent (for example, Firestorm Wildland Fire Suppression, Inc., 20 employees, California; Lost River Fire Management Services, Inc., 25 employees, Oregon).
- Forest management services – 8 percent (for example, F&W Forestry Services, Inc., 60 employees, Georgia; Fountain Forestry, Inc., 25 employees, New Hampshire).
- Reforestation services – 5 percent (for example, Mountain Forestry, Inc., 323 employees, Oregon; Superior Forestry Services, Inc., 200 employees, Arkansas).

- Fire prevention services – 4 percent (for example, Wildland Fire Associates, Inc., five employees, Colorado; South East Fire Prevention, Inc., three employees, Georgia).
- Timber cruising, valuation and estimating services – 3 percent (for example, Cascade Appraisal Services, Inc., five employees, Oregon; Selkirk Timberland Service, Inc., four employees, Idaho).
- Preparation of forest management plans – 2 percent (for example, Milliken Forestry, Inc., 25 employees, South Carolina; Forest Sp Consultants, 10 employees, Wisconsin).
- Forest pest control services – 1 percent (for example, Aero Tech, Inc., 12 employees, New Mexico; Horizon Helicopters, five employees, Idaho).

Eighty-four of the 286 companies examined were dominating in terms of revenue generated in 2007 (Table 1). Each reporting at least $2 million of proceeds in 2007, the total revenue of these leading firms exceeded $450.8 million for an average of $5.4 million per company. Oregon is home to the offices of 24 of the leading companies, followed (in rank order) by California (eight), Louisiana (six), and Alabama, Georgia and Washington (five each). Of the 84 companies, 13 of the companies had revenue of $10 million or more each (44 percent of the total revenue of the 84 companies). The following objectives or mission of six of these companies demonstrates the breath of their business interests.

Neptune Aviation Services, Inc.: Neptune Aviation is proud [of it's]more than thirteen years in the aerial fire suppression business . . . and is a proven leader in applied business philosophies that have resulted in increased safety, experience, quality assurance, and flexibility to our valued customers."

GFP Enterprises, Inc.: ". . . is a private sector wildland firefighting company that provides multiple government agencies with aid in the suppression of wildland forest fires . . . we have a reputation as a leader in the wildland fire suppression industry . . . a reputation founded and built on safety, quality and performance."

American Forest Management Co.: Mission is to ". . . maximize our clients' objectives by consistently providing superior forest resource consulting services and real estate brokerage services . . . [doing so by] exhibiting integrity, business ethics, service quality, and stewardship of the natural resource which is unsurpassed."

Reforestation Services, Inc.: ". . . is a full service application company specializing in vegetation management, insect control, seeding, and fertilization for the forestry and related markets . . . we invest time, money and other resources into well qualified and motivated people, state of the art application equipment to meet the application challenges of the present and the future."

Table 3. Timber Management Support Companies in the Timber Management Supporting Industry of the U.S. Wood-based Industry. 2007-2008.

Company	Revenue (thousand dollars)	Employees	Company	Revenue (thousand dollars)	Employees
Neptune Aviation Services, Inc. (MT)	22,000	40	Umpqua Valley Forestry (OR)	3,200	60
GFP Enterprises, Inc. (OR)	21,200	7	Canal Forest Resources, LLC (NC)	3,100	25
Superior Forestry Services, Inc. (AR)	20,700	100	C&H Reforesters, Inc. (OR)	3,000	5
American Forest Management Co (SC)	18,200	22	Express Forestry, Inc. (AR)	3,000	20
Reforestation Services, Inc. (OR)	16,000	42	Hancock Forest Management, Inc (WA)	3,000	50
Heavy Lift Helicopters, Inc. (CA)	15,000	46	Ironwood Capital Partners, LLC (GA)	3,000	20
Mountain Forestry, Inc (OR)	14,800	323	Professional Reforestation of OR, Inc. (OR)	3,000	60
Drennen Forestry Services, Inc. (AL)	14,000	84	Central Emergency Services, Inc. (AK)	2,800	60
Summit Forests, Inc (OR)	12,700	278	Ardco, Inc. (AZ)	2,700	3
Neptune Aviation Services, Inc. (MT)	11,400	55	Wild Fire Services, Inc. (WA)	2,700	50
F&W Forestry Services, Inc (GA)	11,000	60	National Reforestation, Inc (CA)	2,700	50
Carolina Virginia Timber, Inc. (VA)	10,000	3	Sound Forest Technologies, LLC (CA)	2,700	50
Grayback Forestry, Inc (OR)	10,000	70	Woodland Specialists, Inc. (AL)	2,600	??
Aero Tech, Inc. (NM)	8,900	12	Chaparral Reforestation, Inc. (OR)	2,500	1
T. L. James & Co, Inc. (LA)	8,600	5	Coria Contracting Services, Inc (OR)	2,500	20
Reforestation Unlimited, Inc. (LA)	8,200	25	Jefferson Resource Co, Inc. (CA)	2,500	5
Ozark Mountain Forestry, Inc (FL)	8,000	180	Mathis Land & Timber Co (MS)	2,500	26
Quicksilver Contracting Co (OR)	7,600	35	Resource Management Services, Inc (LA)	2,500	28
Cade Wood, Inc. (LA)	7,000	3	Southland Spray Services, LLC (LA)	2,500	2
Southern Select Forestry Services (GA)	7,000	5	Superior Trees, Inc. (FL)	2,500	20
Aero Tech, Inc. (NM)	6,000	12	Fourth Corner Forestry (CO)	2,400	60
Alpha Services, LLC (ID)	6,000	5	Northwest Log Scalers, Inc. (OR)	2,300	45
Columbia Timber Co, Inc. (FL)	6,000	3	Beavers Forestry, Inc. (OR)	2,200	45
Lakeside Environmental Consultants, Inc (PA)	6,000	9	Professional Consolidated Services, LLC (NC)	2,200	50
Williams Forestry and Associates (GA)	6,000	5	Forest Garcia Service, LLC (NC)	2,200	50
Firestorm Wildland Fire Suppression, Inc (CA)	5,700	20	BA Reforestation, LLC (OR)	2,100	40
Southern Pine Inspection Bureau (FL)	5,300	50	North Pacific Forestry, Inc. (OR)	2,100	40
Larson and McGowin, Inc (AL)	5,000	15	Ponssee North America, Inc. (WI)	2,100	20
North Tree Enterprise, inc. (NV)	5,000	35	Summit Helicopters, Inc. (VA)	2,100	40
Patrick Corp (OR)	5,000	75	Strata Forestry, Inc (OR)	2,100	60
L&B Reforestation, Inc (OR)	4,900	100	Alabama Forest Products, Inc (AL)	2,000	4
Southern Oregon Log Scaling & Grading (OR)	4,900	119	California Reforestation, Inc. (CA)	2,000	35
Advanced Timber Services, Inc. (LA)	4,000	4	Renewable Forestry Resources, LLP (WA)	2,000	50
Evergreen Forestry Services (ID)	4,000	100	C&M Reforestation (OR)	2,000	40
G'e Foreste (OR)	4,000	75	N D Williams Timber Co (TX)	2,000	15
Map, Inc. (OR)	4,000	3	Benson Timber Services, Inc. (NC)	2,000	1
PacRim Log Scaling Bureau (WA)	4,000	98	Ramirez Reforestation, Inc (WA)	2,000	35
Alfonso Gallegos, Inc (CA)	3,500	3	Redding Tree Growers Corp (CA)	2,000	100
Atlantic Coast Forestry, Inc. (VA)	3,500	80	Timberland South, Inc. (GA)	2,000	1
Redcastle Resources, Inc. (UT)	3,500	39	Time Limited Forestry, Inc (AL)	2,000	7
Manuel Q. Franco Reforestation (OR)	3,400	60	Washburn Contract Services, Inc. (OR)	2,000	50

Note: Includes only companies whose primary line of business is support activities for forestry and have sales revenue of $2 million or more. In some cases, revenue and employees are estimated by cited reference. Employees may include full-time, part-time or both.
Source: Dunn and Bradstreet, Inc. 2008, ECNext, Inc. 2008, LexisNexis, Inc. 2008, Mergent, Inc. 2008.

Drennen Forestry Services, Inc.: '. . . is a full service forestry contractor since 1983 [and] have been contracting with private landowners, forestry consultants, state and federal agencies, institutional and industrial landowners and land managers for timber harvesting and reforestation . . . [and manage] the application of forestry herbicides for site preparation, conifer release, weed control, and timber stand improvement."

F&W Forestry Services, Inc.: ". . . mission is to help clients maximize the value, age, and enjoyment of their forest land and forest resource according to their individual objectives, needs and desires . . . serve small and large nonindustrial landowners, investors, and financial institutions . . . commitment to professional excellence enables clients to enjoy forestland benefits today while conserving and renewing the resource for tomorrow."

Timber management supporting companies often have a variety of other business interests. Although 83 percent of the 286 companies examined reported timber management support services as their primary and only line of business in 2007,48 indicated they actively pursue a wide variety of other business interests. As indicated by the following, the most common secondary business engaged in by these 48 companies was timber harvesting, nursery management (including landscape services), and various aspects of real estate sales and appraisals (many companies operate in more than one non-timber management supporting business).

Companies	Secondary nonforestry service business
238	Timber management services, no secondary business
6	Timber harvesting
4	Nursery, tree production and landscape services
4	Real estate agency-broker-appraiser
2	Custom computer programming services
2	Non-scheduled air transportation
2	General business consulting, investment advice
2	Highway, street and bridge construction
2	General engineering services
2	Surveying and mapping
2	Forest and agricultural crop pest control and spraying
2	Durable goods merchandiser and wholesaler
24	Other secondary nonforestry service businesses[1]

[1] Other secondary non-forestry businesses (one company per business): timber growing, land subdivision-development, environmental cleanup services, environmental consulting, transportation equipment wholesaler, air transportation support activities, farm labor contractor-manager, farm supply merchandiser, farm management services, industrial building construction, site preparation contractor, medical training services, laboratory testing services, dairy cattle production, support for mining and mineral extraction, educational support services, artistic and writing services, restaurant management, sports team and club management, convenience retail store management, airport operation and management, petroleum product wholesaler, industrial machinery-equipment rental, and specialized long-distance trucking.

some of these businesses are closely related to wood processing and manufacturing (for example, although engaged primarily in reforestation activities, Professional Reforestation of Oregon, Inc. [Oregon], and Drennen Forestry Services, Inc. [Alabama, Oregon] engage in timber harvesting). However, an appreciable number are not (for example, highway and bridge construction, mining and mineral management services), examples of which are American Forest Management, Inc. (South Carolina, 2007 sales of $18.2 million) which provides real estate agency and brokerage services, Summit Helicopters, Inc. (Virginia, 2007 sales of $2.1 million) which furnishes a variety of non-scheduled air transportation, and Canal Forest Resources, LLC (North Carolina, 2007 sales of $3.1 million) which offers customized computer programming services.

Companies whose primary business does not involve wood processing or manufacturing may secondarily offer various types of timber management support services. Seventy-four companies report involvement in the latter -- but not so as their primary business. Most prevalent of the latter are companies primarily engaged in timber growing and harvesting and in construction of industrial and commercial buildings (Dunn and Bradstreet, Inc. 2008, LexisNexis, Inc. 2008, Mergent, Inc. 2008).

Companies	Primary nonforestry service business	Companies	Primary non-forestry service business
7	Industrial and commercial building construction	2	Construction and mining equipment wholesaler
6	Timber growing operations	2	Environmental remediation services
6	Timber harvesting	2	Farm supply and equipment wholesaler
5	General engineering and management services	2	Industrial building management and leasing
5	Helicopter and air transportation services	2	Industrial machinery and equipment wholesaler
5	Sawmills and planing mills	2	Land subdivision and development
4	Nursery and landscape services	2	Lumber and building material wholesaler
4	Pulpwood production		
2	Aircraft parts, maintenance and repair services	2	Softwood veneer and plywood manufacturing
		14	Other primary nonforestry service businesses [2]

[2] Other primary nonforestry service businesses (one company per business): aerial photography and map making, beef cattle ranching, coal and lignite surface mining, citrus grove farming, engineered wood product manufacturing, firefighting and related equipment manufacturing, highway and street construction, industrial organic chemical manufacturing, log and lumber broker-wholesaler services, measuring and controlling device manufacturing, paper mills, product certification and performance services, security guard and patrol services, and tobacco farming.

Examples of companies operating in the above businesses are U.S. Natural Resources, Inc. (Pennsylvania, 2007 sales of $92.6 million) which engages mainly in surface mining for bituminous coal and lignite, Scientific Certification Systems, Inc. (California, 2007 sales of $1.9 million) which provides certification, testing and auditing services regarding food safety and environmental protection, and HJW GeoSpatial, Inc. (California, 2007 sales of $5.0) which engages in the acquisition, analysis, and application of geospatial data.

A number of major wood-based companies focus part of their operations on the provision of timber management support services. In most cases their efforts are focused on the timber management information needs of nonindustrial private landowners. Example companies engaged in such activities are as follows.

Meadwestvaco – Company's Cooperative Forest Management (CFM) program provides family forest landowners with sustainable forest management advice, including professional forest management plans, assistance in locating suitable contractors, information regarding timber sales, help with American Tree Farm System certification, timber marking and improved seedlings. In 2007, 1,744 U.S. family forest landowners were enrolled in CFM, representing 1,017,164 acres of forestland.

Pope Resources, LP – Company's Management and Consulting program engages forestry and analytical professionals that provide comprehensive technical forest management services including inventory management, GIS, silvicultural system modeling, growth and yield, and report publication for third-party clients. In 2007, the company provided forest management support activities for more than 400,000 acres of industrial forestland in the Pacific Northwest in addition to handling varied contracts, large and small, for private landowners and municipalities.

International Paper Company, Inc. – Company's Sustainable Forest Technology Program provides private landowners and institutional investors with the knowledge and resources to help them meet a wide variety of sustainable forest management goals. Among the services provided are financial advice (including, tax administration), marketing of timber (including, bidding practices, contract preparation), timber harvesting (including, harvest scheduling, best management practice compliance, safety procedures), purchasing advantages (including financial advantages when purchasing fertilizers, herbicides, tree seedlings, contractor services), security services (including, timber protection on trucks), and access to the results of research produced by various public and private organizations.

Weyerhaeuser Company – Company's Land Owner Assistance Program provides private owners with support services such as management plan preparation, no-cost supply of seedlings, and help in regenerating harvested forest land. In 2007, 580 landowners (103,000 acres) participated in the program (received 3.5 million seedlings and help in regenerating 13,800 acres (5,500planted, 8,300 natural regeneration). Separately, the company provides information on reforestation and best management practices to indirect wood suppliers (10,100 loggers in 2007).

Timber investment management organizations (TIMOs) are also active providers of timber management support services. These services are focused primarily on investors (clients) that participate in the TIMO. For example, the Hancock Timber Resource Group prepares forest management plans for investors, plans which are designed to ensure that investor properties are managed in a sustainable manner while also meeting client objectives. These plans take into account landscape and environmental conditions and are focused on enhancing soil productivity, reducing risk from wildlife, insects and ice and wind damage, enhancement of wildlife habitat and water quality, and the attainment of a healthy balance of forest age classes so as to ensure a sustainable flow of timber. Deltic Timber Corporation is also a timber investment management organization that actively provides timber management support services to its investing clients. The company provides a wide variety of support services, including the appraisal of timber and timberland values, marketing and selling of timber, supervision of logging operations, management of timber inventories, maintenance of boundary lines, and provision of various accounting services. Deltic's foresters also supervise landowner approved silvicultural work and special projects such as prescribed burning, reforestation, aerial herbicide and fertilizer application, mechanical site preparation, land surveying, and road and trail construction.

WOOD PRODUCT MANUFACTURING INDUSTRY

Industry-Wide Conditions

The manufacturing segment of the wood-based industry is an integral part of the nation's manufacturing sector in general. The value of the industry's 2007 shipments exceeded $322 billion or 6 percent of the five trillion dollars in shipment values generated by the nation's manufacturing sector in general (Table 4). This positioned the wood-based manufacturing industry as the nation's sixth largest in terms of shipment values from manufacturing activities, immediately behind the transportation equipment manufacturing industry ($734 billion), chemical manufacturing ($722 billion), petroleum and coal product manufacturing ($606), food manufacturing ($587 billion), and the computer and electronic products manufacturing industry ($395 billion). Although the industry's shipment values were behind these industrial giants, it was ahead of manufacturing industries such as pharmaceutical and medicine ($188 billion), plastics and rubber ($212 billion), primary metal ($258 billion), and machinery manufacture ($348 billion) (U. S. Census Bureau 2009b). In current values, the industry's shipment values increased at an average annual rate of 3 percent from 2002 through 2007. This contrasts with a rate of increase of 6.4 percent for the U.S. manufacturing segment generally during the same period. In 2006, export related shipments were 10 percent of the group's total shipment values (U.S. Census Bureau 2007a).

The wood-based industry is a national leader in terms of the number of establishments in which manufacturing activities occur. More than 39,000 establishments actively manufactured wood-based products in 2007, or over 13 percent of all manufacturing establishments nationwide (Table 4). With 60,300 establishments, the fabricated metal products industry was the only industry to operate with more establishments. In terms of number of establishments, the wood based-industry exceeded highly visible manufacturing industries such as the printing and related support industry (32,200 establishments), food manufacturing industry (19,200), and the computer and electronic product manufacturing industry (13,800)(U. S. Census Bureau 2009b). Companies (i.e., combined establishments) operating as wood-based enterprises in the industry totaled 35,571 in 2007, or about 1.1 establishments per company (average of 1.2 for all U.S. manufacturing industries).

Table 4. Economic Characteristics of the U. S. Wood-based Manufacturing Industry, by Major Industry Group. 1998, 2002-2007.

Characteristic and Year	Wood Products Manufacturing	Paper Manufacturing	Wood Furniture Manufacturing	Total Wood-based Manufacturing	Total U. S. Manufacturing
Value of Shipments ($ million)					
2007	102,002.8	176,018.4	44,835.7	322,856.9	5,339,345.0
2006	112,404.2	170,360.6	48,258.3	331,023.1	5,019.963.5
2005	112,017.5	162,848.2	46,568.3	321,434.0	4,735,383.7
2004	103,420.2	153,989.0	45,298.8	302,708.0	4,265,784.0
2003	91,240.2	149,270.3	42,133.5	282,644.0	3,977,165.4
2002	88,985.2	153,655.3	42,769.4	285,409.9	3,920,631.8
1998	92,142.2	156,251.0	37,122.0	285,515.2	3,914,815.8
Capital Expenditures ($ million)					
2007	3,223.9	6,608.2	948.9	10,781.0	155,775.7
2006	3,609.5	7,592.4	1,064.6	12,266.5	135,888.7
2005	3,018.1	5,597.9	863.5	9,479.5	128,325.2
2004	2,713.5	5,165.9	844.9	8,724.3	115,112.8
2003	2,175.7	5,920.5	1,089.5	9,185.7	113,184.9
2002	2,415.2	6,259.8	1,000.2	9,675.2	123,013.0
1998	2,762.8	8,517.9	1,091.6	12,372.3	151,905.0
Establishments					
2007	16,835	4,984	17,443	39,262	293,919
2006	16,735	5,139	17,330	39,204	331,062
2005	16,707	5,273	17,328	39,308	333,460
2004	16,783	5,422	17,366	39,571	339,083
2003	16,808	5,456	17,276	39,540	341,849
2002	17,052	5,546	17,696	40,294	344,341
1998	17,640	5,927	15,727	39,294	366,249
Employees					
2007	514,212	417,367	315,352	1,246,931	13,333,390
2006	536,093	414,048	326,405	1,276,546	12,990,344
2005	539,103	429,580	331,122	1,299,805	13,168,822
2004	535,246	439,989	349,272	1,324,507	13,404,292
2003	511,431	464,325	344,100	1,319,856	13,865,811
2002	540,102	491,832	371,386	1,403,320	14,715,371
1998	586,389	576,114	376,166	1,538,669	17,056,922
Employee Payroll ($ million)					
2007	17,487.7	20,804.0	10,610.7	48,902.4	612,474.1
2006	18,140.9	20,640.0	11,011.1	49,792.0	592,342.1
2005	17,832.3	20,700.8	10,672.3	49,205.4	579,891.0
2004	17,038.8	21,561.1	10,776.7	49,376.6	569,414.0
2003	15,631.2	21,772.6	10,184.5	47,588.3	564,770.9
2002	16,038.2	21,492.4	10,524.2	48,054.8	576,495.0
1998	15,308.3	22,656.6	9,298.4	47,263.3	590,038.8

Source: U. S. Census Bureau 2006a, 2009a, 2009b.

The 1.3 million employees employed by the wood-based industry in 2007 represented 9.8 percent of all U.S. manufacturing employment and realized a payroll of nearly $50 billion (8.4 percent of U.S. manufacturing generally)(Table 4). Employment in the wood-based industry's ranked fourth among other major manufacturing industries in the U.S., behind the transportation and equipment industry (1.5 million employees), fabricated metal product industry (1.6 million), and the food manufacturing industry (1.4 million), but larger than employment in the computer and electronics manufacturing industry (1.0 million employees), plastics and rubber products industry (0.9 million), and the chemical manufacturing industry (0.8 thousand)(U. S. Census Bureau 2009b). In 2007, most of the industry's establishments – 69 percent – each employed fewer than 20 persons (only 8 percent each employed more than 100). Employment in the wood-based manufacturing industry declined 11 percent from 2002 through 2007 (annual average of about 2 percent), while total manufacturing nationwide declined 9 percent during the same period.

As with any industry, new capital expenditures are required to sustain the economic vitality of the wood-based industry. For the latter in 2007, these investments totaled nearly $10.9 billion, or 3.3 percent of the product values shipped in that year (Table 4). Such a proportion is higher than the national average of 3.0 percent for all manufacturing industries, although less than occurs in industries such as the nonmetallic mineral product manufacturing industry (6.1 percent) and the printing industry (4.4 percent)(U. S. Census Bureau 2009b). Although capital expenditures by the wood-based industry declined nearly 10 percent from 2002 through 2004, they increased moderately from 2004 through 2007 (24 percent).

The 20 largest companies engaged in wood-based manufacturing activities in 2006 contributed nearly $115 billion in revenue to industry-wide manufacturing sales or about 35 percent of industry-wide shipment values (Table 5). Seventeen of the companies are identified as Fortune 1000 companies, although their sales pale in comparison to sales of the nation's giant companies (Exxon Mobil – $456 billion sales, General Electric – $336 billion, Microsoft – $260 billion). Nearly all (98 percent) of the revenue of the 20 wood-based companies originates from wood-based manufacturing operations — for nine firms, wood-based operations are the only source of revenue. Twelve of the 20 companies rely primarily on paper products as their major source of revenue. Four firms are wood-based revenue leaders among the top 20, namely Kimberly-Clark Corporation, Georgia-Pacific Corporation, International Paper Company, and Weyerhaeuser Company. These firms have been ranked among the Fortune 500 companies for the past 50 years and in 2006 accounted for nearly 56 percent of the top 20 sales and 19 percent of industry-wide shipment values.

Table 5. Largest 20 U.S. Wood-based Manufacturing Companies, by Wood-based Manufacturing Revenue and Total Company Revenue. 2006-2007.

Company	Wood-Based Manufacturing Operations		Company-wide Operations	
	Revenue ($ millions)	Major Source of Revenue	Revenue ($ Millions)	Employees
Kimberly-Clark Corp (136)	18,282	PP	18,282	53,000
Georgia-Pacific Corp (NR)	17,715	PP/WP	19,649	55,000
International Paper Co (114)	14,925	PP	22,730	51,500
Weyerhaeuser Co (147)	13,154	PP/WP	16,427	37,857
Smurfit-Stone Container Corp (334)	7,420	PP	7,420	22,700
MeadWestvaco Corp (356)	6,599	PP	7,092	24,000
Newpage Corp (845)	4,500	PP	4,500	8,500
Temple-Inland Corp (557)	3,850	PP/WP	12,000	12,000
Sonoco Products Co (550)	3,247	PP	4,183	18,600
Bemis Co (586)	3,656	PP	3,656	15,687
Masco Corp (223)	2,829	FP	11,770	52,000
Universal Forest Products (770)	2,513	WP	2,513	8,400
Graphic Packaging Corp (773)	2,421	PP	2,421	7,400
Packaging Corporation of America (810)	2,316	PP	2,316	8,350
Rock-Tenn Company (841)	2,316	PP	2,316	9,500
Anderson Corporation (NR)	2,130	WP	2,500	9,000
Furniture Brands International (854)	2,062	FP	2,082	11,900
Louisiana-Pacific Corp (968)	1,670	WP	1,715	5,100
Avery Dennison Corp (382)	1,636	PP	6,308	37,000
Verso Paper Corp (NR)	1,629	PP	1,629	2,900
TOTAL	114,870	-	151,509	450,394

Note: WP = Wood Products, PP=Paper Products, FP=Furniture Products. Parentheses contains 2008 Fortune 500 Rankings. NR= Not ranked because of ownership change or lack of information.
Source: Time Warner, Inc. 2008.

Major Industry Segments

Wood Product Manufacturing Group

The wood product manufacturing group engages in the cutting, shaping and assembling of wood into a variety of products (U.S. Census Bureau 2008a). Its nine industries are organized around manufactured products as follows: sawmills and wood preservation, veneer and plywood, engineered wood products, reconstituted wood products, millwork, wood containers and pallets, manufactured homes (mobile), prefabricated wood buildings, and other wood products (Figure 1). These nine industries manufacture a diverse array of wood-based products, ranging from insulation board and window frames to log cabins and farm buildings, and from railroad ties and poles and pilings to wood shingles and finger-jointed lumber.

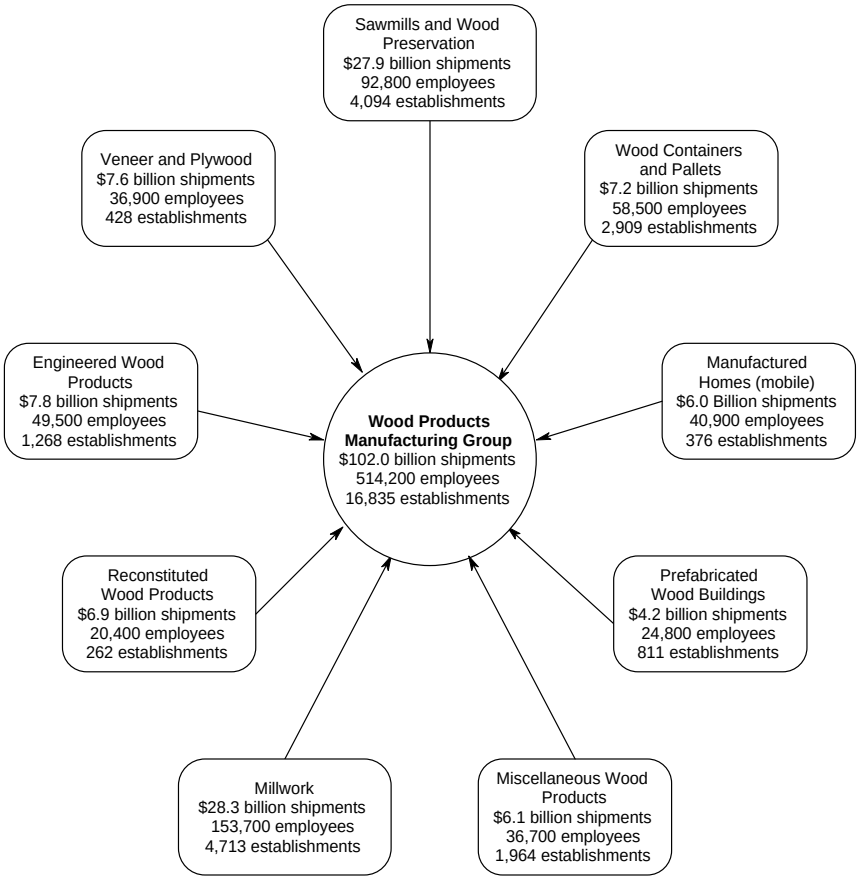


Figure 1. Industries of the Wood Products Manufacturing Group of the U.S. Wood-based Manufacturing Industry. 2007.

Shipments and Capital Expenditures. Shipments produced by the wood product manufacturing group in 2007 exceeded $102 billion in value and involved the employment of more than 514,000 persons located at 16,835 establishments (Table 6). In terms of shipment values, the largest industry in the group engaged in millwork manufacturing activities (windows, doors, flooring), namely 28.3 billion, followed by the sawmill and wood preservation industry which in 2007 manufactured $27.9 billion worth of wood-based products. These two industries accounted for well over half the shipment values generated by the wood products manufacturing group (55 percent). The average establishment within the group shipped $6.1 million in product value in 2007 (26 percent less than wood-based manufacturing industry in general), with the reconstituted wood products industry leading in this respect ($26.3 million per establishment). In 2007, export related shipments were 6.1 percent of the group's total shipment values (6.0 percent in 2005) (Daniels 2008, U.S. Census Bureau 2007a). From 2002 through 2007, an average of 68 percent of the group's production capacity was utilized.

The group's value added by manufacture exceeded $41 billion in 2007, or about $2.4 million per establishment (Table 6). Leaders in this respect were the reconstituted wood products industry ($7.3 million per establishment) and the veneer and plywood industry ($6.9 million per establishment). The group's 2007 capital expenditures ($3,223.9 million) accounted for 30 percent of such expenditures by the wood-based manufacturing industry. The sawmills and wood preservation industry lead in capital expenditures within the group, while such expenditures per establishment were lead by the reconstituted wood products and the veneer and plywood industries, namely $1.2 million and $0.6 million, respectively.

Establishments and Employees. The wood products manufacturing group accounted for a major portion of the establishments operating in the wood-based manufacturing industry generally, namely 16,835 or 43 percent in 2007 (Table 6). Accounting for over half the latter (52 percent), the millwork and the sawmills and wood preservation industries were leaders in this respect, namely 28 percent and 25 percent, respectively. In 1998, 805 more establishments operated within the group than operated in 2007, a sum reflecting a decline of about 35 to 40 establishments per year (Table 4). Most of this percent decline in establishments occurred in the sawmills and wood preservation industry and the miscellaneous wood products category (wood handles, stepladders, dowels). Companies (combined establishments) operating as wood product manufacturing enterprises tend to operate as single establishment enterprises (Appendix Table 3). In 2007, about 1.1 establishments were reported for each company. Only the manufactured homes and reconstituted wood product industries had substantially higher ratios, namely 1.7 and 1.5.

The wood products manufacturing group employed more than 514,000 persons in 2007 – 41 percent of all employees engaged in wood-based manufacturing generally (Table 6). Forty-eight percent of these employees worked in the millwork and the sawmills and wood preservation industries, industries that combined accounted for 51 percent of the group's 2007 $17.5 billion payroll. Eighty-one percent of the group's employees are classified as production workers whose average hourly wage is $14.43 – about 17 percent less than the rate for the wood-based industry in general; only one of the group's industry's is above the industry-wide average ($16.68). The reconstituted wood products industry generated over $70 in value added per production hour (14 percent more value added per production hour than the next ranked industry, namely prefabricated wood buildings) and 43 percent more than the group's average value added per production hour ($49.27). In 2007, export related employment was 5.8 percent of the group's total employment (5.7 percent in 2005) (U.S. Census Bureau 2007a).

Table 6. Major Economic Characteristics of the Wood Products Manufacturing Group of the U.S. Wood-based Manufacturing Industry, by Industry. 2007.

Industry	Total Value of Shipments ($ million)	Value Added by Manufacture ($ million)	Production Capacity Utilization (percent)	Capital Expenditures ($ million)	Gross Value of Depreciable Assets ($ million)
Sawmills and Wood Preservation	27,866.4	8,739.0	78	961.5	14,978.7
Veneer and Plywood	7,608.3	2,540.7	75	232.9	3,121.3
Engineered Wood Products	7,755.1	3,547.4	72	188.2	4,186.8
Reconstituted Wood Products	6,896.5	2,443.2	72	328.0	7,051.6
Millwork	28,300.9	12,673.3	69	910.7	9,200.1
Wood Containers and Pallets	7,235.9	3,493.7	71	238.5	2,164.7
Manufactured Homes (mobile)	6,052.7	2,581.6	60	85.9	1,348.7
Prefabricated Wood Buildings	4,209.8	2,034.9	62	68.4	1,298.8
Other Miscellaneous Wood Products	6,077.2	3,190.1	57	209.8	2,684.6
Total	102,002.8	41,243.9	68	3,223.9	46,035.3

Industry	Establishments	Total Employees	Payroll ($ million)	Production Workers	Production Worker Hourly Wage ($)	Value Added per Production Hour ($)
Sawmills and Wood Preservation	4,094	92,805	3,662.6	86,523	15.31	48.20
Veneer and Plywood	428	36,919	1,298.6	32,299	15.10	36.98
Engineered Wood Products	1,268	49,503	1,639.5	36,117	13.44	49.28
Reconstituted Wood Products	262	20,426	890.9	16,076	18.08	70.58
Millwork	4,713	153,739	5,201.3	121,816	14.98	53.73
Wood Containers and Pallets	2,909	58,467	1,520.0	47,485	11.19	36.12
Manufactured Homes (mobile)	376	40,905	1,297.7	32,010	14.05	42.51
Prefabricated Wood Buildings	811	24,774	861.2	17,195	14.40	61.97
Other Miscellaneous Wood Products	1,964	36,674	1,115.9	27,952	13.52	58.76
Total	16,835	514,212	17,487.7	417,473	14.43	49.27

Note: Production capacity utilization percent is annual average of 2002 through 2007.
Source: U.S. Census Bureau 2007b and 2009b,

The number of persons employed in the wood products manufacturing group has declined substantially since 1998, with the group shedding about 12 percent of its workforce through 2007 (Table 4). Some of the more dramatic declines from 1997 through 2007 occurred in the sawmills and wood preservation industry (29 percent), veneer plywood and engineered wood products industry (24 percent), and the manufactured homes industry (40 percent)(Appendix Table 3). Combined, these three industries eliminated nearly 68,900 employees during the 11 year period 1997 though 2007. On a more positive side, the millwork, the wood containers and pallets, and the prefabricated wood buildings industries experienced a combined gain of about 20,100 employees during the same period. On average, 30 persons are employed at each of the group's establishments, with the manufactured homes (mobile) and the reconstituted wood products industries leading in this regard, namely 109 and 78 respectively. Over the period 1997 through 2007, six of the group's seven industry's have been fairly stable in terms of number of employees per establishment. The exception being the manufactured homes industry where employees per establishment declined 49 percent from 1997 through 2007 (213 to 109).

Major Companies. Although companies operating in the wood product manufacturing group may operate in other segments of the wood-based manufacturing industry in general, 40 large wood-based companies generated approximately $31.4 billion in revenue as a result of their operations in the wood product manufacturing group (10 percent of group's total 2007 value of shipments)(Table 7). This sum makes up about 42 percent of the $73.2 billion generated by company wide operations of the 40 companies. The top five companies account for 56 percent of the 40 firms' wood products manufacturing revenue, namely Weyerhaeuser Company (18 percent), Georgia-Pacifc Corporation (18 percent), Universal Forest Products (8 percent), Anderson Corporation (7 percent), and Louisiana-Pacific Corporation (5 percent). Seventeen of the companies attribute 75 percent or more of their total company wide revenue to the manufacture of wood products, while two companies attribute less than 5 percent (Boise Cascade Holding, LLC, Rayonier, Inc.). All the revenue of 14 companies can all be traced to the latter (for example, Universal Forest Products, Columbia Forest Products, Sierra Pacific Industries). Among the most common businesses of the 40 companies are sawmill operations (for example, Columbia Forest Products, Temple-Inland, Inc.), veneer and plywood manufacture (for example, Hampton Affiliates, Potlatch Corporation), millwork operations (for example, Anderson Corporation, Pella Corporation), and manufacture of reconstituted wood products (Roseburg Forest Products Company, Hood Industries, Inc.). Twenty-two of the companies are privately owned and are not engaged in public sale or exchange of stock.

Table 7. Largest 40 Companies Operating in the Wood Products Manufacturing Group of the U. S Wood-based Manufacturing Industry. 2006-2007.

Company	Revenue from Manufacture of Wood Products (Million $)	Total Company Wide . . .		Primary Wood Products Manufacturing Businesses
		Revenue (Million $)	Employees	
Weyrhaeuser Company	5,699	16,427	37,857	Sawmills, Veneer and Plywood, Engineered Wood Products, Reconstituted Wood Products
Georgia-Pacific Corporation (Koch Industries) (P)	5,553	19,638	55,000	Sawmills, Veneer and Plywood, Engineered Wood Products, Reconstituted Wood Products
Universal Forest Products	2,513	2,513	8,400	Sawmills, Engineered Wood Products, Wood Preservation, Manufactured Housing
Andersen Corporation (P)	2,130	2,500	9,000	Windows and Doors, Millwork
Louisiana-Pacific Corporation	1,670	1,715	5,100	Veneer and Plywood, Engineered Wood Products, Reconstituted Wood Products
Pella Corporation (P)	1,275	1,300	9,000	Windows and Doors, Millwork
Marvin Windows and Doors (P)	1,275	1,300	5,000	Windows and Doors, Millwork
Hampton Affiliates (P)	1,100	1,250	1,500	Logging, Sawmills, Veneer and Plywood, Engineered Wood Products, Millwork
Champion Enterprises, Inc	942	1,296	6,500	Manufactured Homes (mobile)
Columbia Forest Products, Inc (P)	860	860	3,450	Veneer and Plywood, Millwork
Temple-Inland, Inc	806	3,926	12,000	Sawmills, Reconstituted Wood Products
JELD-WEN, Inc (P)	610	1,878	20,000	Sawmills, Millwork, Pallets
Clayton Homes, Inc (Berkshire Hathaway, Inc)	536	1,199	6,600	Manufactured Homes (mobile), Prefabricated Wood Buildings
Roseburg Forest Products Company (RLC Industries) (P)	517	1,200	4,590	Sawmills, Millwork, Reconstituted Wood Products, Veneer and Plywood, Engineered Wood Products
Palm Harbor Homes, Inc	512	555	2,900	Prefabricated Wood Buildings, Manufactured Homes (mobile)
International Forest Products Limited (INTERFOR)	492	611	440	Sawmills

Note: Excludes wholesale and retail distribution business activities. Privately owned company indicated by letter "P" in parenthesis. In some cases, revenue from manufacture of wood products is estimated.

Source: Company annual reports, U.S. Securities and Exchange Commission filings, Dunn and Bradstreet, Inc. 2008, ECNext, Inc 2008, LexisNexis, Inc. 2008, and Mergent, Inc. 2008.

Table 7 (continued).

Company	Revenue from Manufacture of Wood Products (Million $)	Total Company Wide . . .		Primary Wood Products Manufacturing Businesses
		Revenue (Million $)	Employees	
Plum Creek Timber Company, Inc	471	1,675	2,000	Sawmills, Veneer and Plywood, Reconstituted Wood Products
Potlatch Corporation	465	1,900	3,800	Sawmills, Veneer and Plywood
Sierra Pacific Industries (P)	443	443	3,600	Sawmills, Millwork
Simpson Timber Company (Kamilche Co) (P)	325	325	1,980	Sawmills, Millwork, Veneer and Plywood
Pope and Talbot, Inc (P)	325	841	2,373	Sawmills
Skyline Corporation	272	366	2,300	Manufactured Homes (mobile)
Koppers, Inc (Koppers Holdings, Inc)	258	258	633	Wood Preservation
Stimson Lumber Company (P)	245	245	2,000	Sawmills, Reconstituted Wood Products
PALCO (Maxxam, Inc) (P)	225	225	500	Veneer and Plywood, Sawmills, Millwork
Cavalier Homes, Inc	221	228	1,771	Manufactured Homes (mobile)
Boise Cascade Holdings, LLC (P)	216	5,413	10,190	Sawmills, Veneer and Plywood, Engineered Wood Products
IFCO Systems North America, Inc (IFCO Systems)	181	647	4,075	Wood Pallets
Timber Products Co, LP (P)	175	175	1,200	Veneer and Plywood, Reconstituted Wood Products
Cavco Industries, Inc	170	170	1,075	Manufactured Homes (mobile)
States Industries, Inc (P)	125	125	525	Sawmills, Millwork
Hood Industries, Inc (P)	110	130	1,150	Reconstituted Wood Products, Veneer and Plywood
Cox Industries, Inc (P)	105	152	400	Wood Preservation
Advanced Environmental Recycling Technologies, Inc	97	97	664	Reconstituted Wood Products
Liberty Homes, Inc	101	169	800	Prefabricated Wood Buildings, Manufactured Homes (mobile)
McFarland Cascade Holdings (P)	112	112	250	Wood Preserving
Rayonier, Inc	88	1,148	2,000	Sawmills, Reconstituted Wood Products
Anderson-Tully Co (P)	87	87	754	Veneer and Plywood, Sawmills
Rex Lumber Company (P)	82	82	335	Sawmills, Millwork

Paper Manufacturing Group

The paper manufacturing group engages in themanufacture of pulp (separation of cellulose fibers from other impurities in wood), paper (matting pulp fibers into sheets), and converted paper products (cutting and shaping paper sheets) (U.S. Census Bureau 2008a). The group is composed of nine industries that are commonly divided into two major industry segments – manufacture of pulp and paper, and manufacture of converted paper products (Figure 2). The former includes pulp mills, paper mills, and paperboard mills, while the latter include the manufacture of paperboard containers, paper bags and coated and treated paper, and the manufacture of stationary products and sanitary products. As occurs with other industries within the wood-based manufacturing industry generally, the products produced by the paper manufacturing group are very diverse. They range from the manufacture of newsprint and paperboard to the manufacture of corrugated boxes and sanitary food containers, and from the manufacture of laminated paper and envelopes to the manufacture of tissue paper, disposable diapers, fiber cans and tubes. Various types of paper bags laminated with plastic are considered part of the paper manufacturing group, while chemically-treated photosensitive papers are excluded from the group.

Shipments and Capital Expenditures. Shipments produced by paper manufacturing group in 2007 exceeded $176 billion in value and involved the employment of more than 417,000 persons located at 4,984 establishments (Table 8). In terms of shipment values, the largest industry in the group engaged in the manufacture of paperboard containers (fiber boxes, cans, drums), namely $50.9 billion, closely followed by the paper and newsprint which in 2007 manufactured $49.7 billion worth of wood-based products. These two industries accounted for nearly three of every 10 dollars in shipment values generated by the wood products manufacturing group (53.1percent). The average establishment within the group shipped $35.3 million in product value in 2007 (four times more than the wood-based manufacturing industry in general) , with the paper and newsprint mill industry leading in this respect ($189.8 million per establishment). In 2007, export related shipments were 14.8 percent of the group's total shipment values (15.3 percent in 2005)(Daniels 2008, U.S. Census Bureau 2007a). Over the period 2002 through 2007, an average of 79 percent of the group's production capacity was utilized.

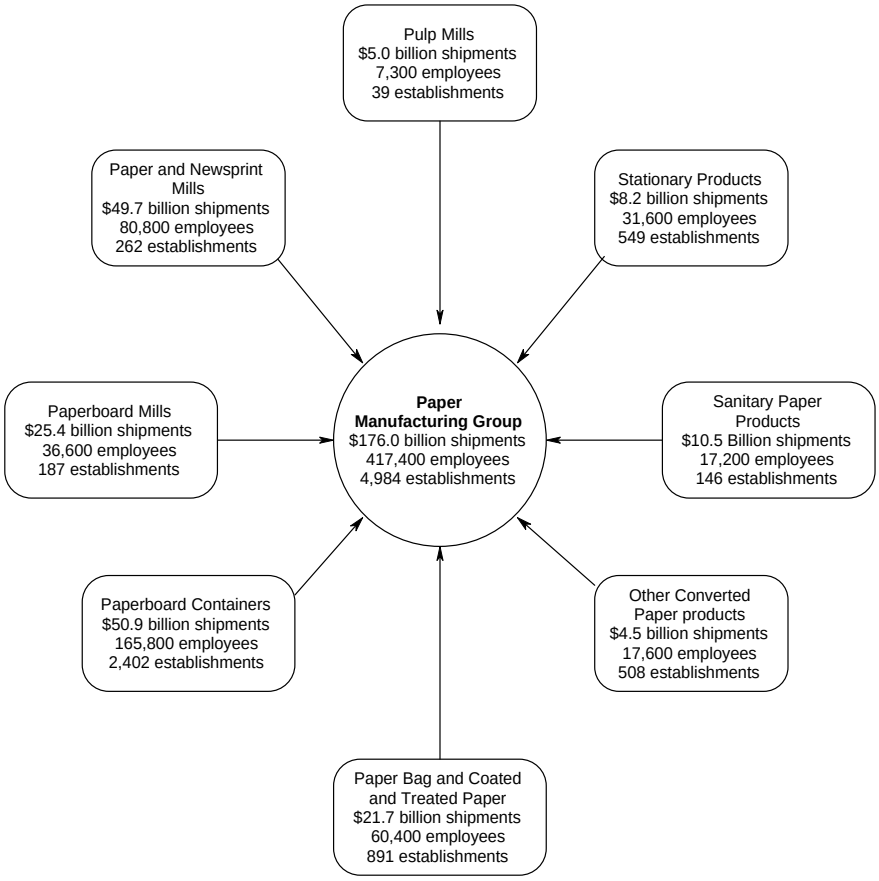


Figure 2. Industries of the Paper Manufacturing Group of the U.S. Wood-based Manufacturing Industry. 2007.

The group's value added by manufacture approached $82 billion in 2007, or about $16.4 million per establishment (Table 8). Leaders in this respect were the paper and newsprint industry ($99.7 million per establishment), paperboard mills industry ($66.2 million per establishment), and the pulp mills industry ($58.3 million per establishment). In 2007, the group's capital expenditures ($6.6 billion) accounted for 61 percent of such expenditures by the wood-based manufacturing industry. The paper and newsprint industry led the group in total capital expenditures (nearly $2.3 billion) and in capital expenditures per establishment ($8.6 million). The pulp mills and the paperboard mills industries followed closely in the latter measure, namely, namely $7.1 million and $6.0 million, respectively.

Table 8. Major Economic Characteristics of the Paper Manufacturing Group of the U.S. Wood-based Manufacturing Industry, by Industry. 2007.

Industry	Total Value of Shipments ($ million)	Value Added by Manufacture ($ million)	Production Capacity Utilization (percent)	Capital Expenditures ($ million)	Gross Value of Depreciable Assets ($ million)
Pulp Mills	5,027.4	2,272.8	91	276.1	7,880.4
Paper and Newsprint Mills	49,732.1	26,124.1	79	2,261.2	61,409.5
Paperboard Mills	25,354.8	12,388.1	95	1,124.3	32,350.3
Paperboard Containers	50,900.2	19,414.1	71	1,455.4	19,800.1
Paper Bag and Coated and Treated Paper	21,737.4	9,966.7	68	825.5	10,008.8
Stationary Products	8,242.0	3,760.4	74	146.6	2,881.8
Sanitary Paper Products	10,488.4	5,712.9	75	374.6	4,870.0
Other Converted Paper Products	4,536.1	2,301.5	68	144.5	1,594.3
Total	176,018.4	81,940.6	79	6,608.2	140,795.2

Industry	Establishments	Total Employees	Payroll ($ million)	Production Workers	Production Worker Hourly Wage ($)	Value Added per Production Hour ($)
Pulp Mills	39	7,268	504.6	5,794	29.91	176.20
Paper and Newsprint Mills	262	80,838	4,920.0	64,341	27.16	191.23
Paperboard Mills	187	36,641	2,451.8	28,828	28.18	194.05
Paperboard Containers	2,402	165,839	7,387.0	126,592	17.55	72.13
Paper Bag and Coated Treated Paper	891	60,373	2,798.1	44,368	18.73	108.95
Stationary Products	549	31,628	1,197.5	24,609	15.94	75.39
Sanitary Paper Products	146	17,198	842.8	13,933	20.40	190.28
Other Converted Paper Products	508	17,582	702.2	13,472	16.78	85.68
Total	4,984	417,367	20,804.0	321,937	20.46	115.01

Note: Production capacity utilization percent is annual average of 2002 through 2007.
Source: U.S. Census Bureau 2007b and 2009b,

Establishments and Employees. The 4,984 establishments operating in the paper manufacturing group accounted for only 13 percent of the establishments operating in the wood-based manufacturing industry generally (Table 8). Accounting for nearly half of these establishments (48 percent) was the paper board containers industry, while the pulp mills and the sanitary paper products industries combined accounted for only 3 percent of the group's establishments. In 1998, 943 more establishments operated within the group than operated in 2007, a sum reflecting a decline of about 90 to 95 establishments per year (Table 4). Most of this decline in establishments over this period (71 percent or nearly 670 establishments) occurred in the paperboard containers and the stationary products industries (Appendix Table 4). Although the group's pulp mills industry has historically had very few establishments (average of 43 from 1997 through 2997), the year-to-year variation in the number of these establishments has been very modest (annually varying about plus or minus one establishment around the average from 1997 through 2007). Companies (combined establishments) operating as paper manufacturing enterprises tend to operate more so as multiple establishment enterprises than occurs in the wood products manufacturing group generally. In 2007, about 1.4 establishments were reported for each company. Leading in this respect were the paperboard mills, paper and newsprint mills, and paperboard containers industries with ratios of 2.5, 1.7, and 1.7, respectively.

The paper manufacturing group employed more than 417,000 persons in 2007 – 34 percent of all employees engaged in wood-based manufacturing generally (Table 8). Forty percent of these employees worked in the paperboard containers industry and received a payroll in 2007 that exceeded $7 billion (36 percent of group's total). Seventy-seven percent of persons employed in the paper manufacturing group are classified as production workers, whose average hourly wage is $20.46 – about 23 percent more than the rate for the wood-based industry in general. Only two of the group's eight industries are above the average hourly wage rate for the group's production workers generally; all but one above the industry-wide average ($16.68). The paperboard mills industry generated more than $194 in value added per production hour, somewhat above the same measure for the paper and newsprint and sanitary paper products industries ($191.23 and 190.28, respectively). In 2006, export related employment was 14.9 percent of the group's total shipment values (15.3 percent in 2005) (U.S. Census Bureau 2007a).

The number of persons employed in the paper manufacturing group has declined substantially since during the period 1998 through 2007, namely 28 percent or a loss of nearly 159,000 employees (Table 4). Although all of the group's industries have experienced declines in employment from 1997 through 2007, the most dramatic decreases in absolute numbers occurred in the paper and newsprint industry and the paperboard container industry. The former shed 40 percent of its workforce (54,500 persons) while the latter reduced the number of its employees by

20 percent (42,700 persons) (Appendix Table 4). These two industries combined eliminated more than 97,000 employees over a 10-year period. In terms of employees per establishment, the paper manufacturing group experienced a decline of 13 persons per establishment from 1998 through 2007, with the greatest absolute declines occurring in the paper and newsprint mills (minus 118), pulp mills (minus 39), and paperboard mills (minus 36) industries. None of the group's industries experienced gains in employees per establishment during the nine-year period, although the stationary products industry remained nearly the same. On average, 84 persons are employed at each of the group's establishments, with the paper and newsprint mills industry and the paperboard mills industry leading in this regard, namely 308 and 195 respectively.

Major Companies. Although companies operating in the paper manufacturing group may operate in other segments of the wood-based manufacturing industry in general, 40 large wood-based companies generated approximately $111.4 billion in revenue as a result of their operations in the wood product manufacturing group in 2006-2007 (63 percent of group's total value of shipments)(Table 9). This sum makes up about 72 percent of the $154.0 billion generated by company wide operations of the 40 companies. The top five companies account for 55 percent of the 40 firms' wood products manufacturing revenue, namely Kimberly-Clark Corporation (16 percent), International paper Company (14 percent), Georgia-Pacific Corporation (11 percent), Weyerhaeuser Company (7 percent) and Smurfit-Stone Container Corporation (7 percent). Thirty of the companies attribute 75 percent or more of their total company wide revenue to the manufacture of wood products, while two companies attribute less than 25 percent (Greif, Inc. and Boise Cascade Holdings, LLC). All the revenue of 18 companies can all be traced to the latter (for example, Verso Paper Corporation, Altivity Packaging, LLC, Buckeye Technologies, Inc.). Among the most common businesses of the 40 companies are paper bags and coated and treated paper (for example, Avery Dennison Corporation, Verso Paper Corporation), paper board mills (for example, Temple-Inland, Inc., Menasha Corporation), paperboard containers (for example, Chesapeake Corporation, Interstate Resources) and paper mills (for example, Newpage Corporation, Neenah Paper, Inc.). Fifteen of the companies are privately owned and are not engaged in public sale or exchange of stock.

Table 9. Largest 40 Companies Operating in the Paper Manufacturing Group of the U.S. Wood-based Manufacturing Industry. 2006-2007.

Company	Revenue from Manufacture of Paper Products (Million $)	Total Company Wide . . .		Primary Paper Product Manufacturing Businesses
		Revenue (Million $)	Employees	
Kimberly-Clark Corporation	18,282	18,282	53,000	Paper Mills, Sanitary Paper Products
International Paper Company	14,925	22,730	51,500	Pulp Mills, Paper Bags and Coated and Treated Paper, Paperboard Containers
Georgia-Pacific Corporation (Koch Industries) (P)	12,162	19,649	55,000	Pulp Mills, Paperboard Mills
Weyerhaeuser Company	7,455	16,427	37,857	Paperboard Containers
Smurfit-Stone Container Corporation	7,420	7,420	22,700	Paperboard Mills, Paperboard Containers
MeadWestvaco	6,599	7,092	24,000	Paperboard Mills, Paper Mills, Paper Bags and Coated and Treated Paper
Newpage Corporation (Cerberus Capital Management LP) (P)	4,500	4,500	8,500	Paper Mills, Paper Bags and Coated and Treated Paper
Temple-Inland, Inc	3,044	3,926	12,000	Paperboard Containers, Paperboard Mills
Sonoco Products Company	3,247	4,183	18,600	Paperboard Mills, Paperboard Containers
Bemis Company	3,656	3,656	15,678	Paper Bags and Coated and Treated Paper
Graphic Packaging Corporation	2,421	2,421	7,400	Paperboard Mills, Paperboard Containers, Paper Bags and Coated and Treated Paper
Packaging Corporation of America	2,316	2,316	8,350	Paperboard Mills, Paperboard Containers
Rock-Tenn Company	2,315	2,315	9,500	Paperboard Mills, Paperboard Containers
Avery Dennison Corporation	1,636	6,308	37,300	Paper Bags and Coated and Treated Paper
Verso Paper Corp (Verso Paper Holdings, LLC) (P)	1,629	1,629	2,900	Paper Bags and Coated and Treated Paper
American Greetings Corporation	1,465	1,776	8,800	Stationery Products
Sappi Fine Paper North America (S D Warren Co) (P)	1,335	1,335	2,863	Paper Mills, Paper Bags and Coated and Treated Paper

Note: Excludes wholesale and retail distribution business activities. Privately owned company indicated by letter "P" in parenthesis. In some cases, revenue from manufacture of wood products is estimated.

Source: Company annual reports, U.S. Securities and Exchange Commission filings, Dunn and Bradstreet, Inc. 2008, ECNext, Inc. 2008, LexisNexis, Inc. 2008, and Mergent, Inc. 2008.

Table 9 (continued).

Company	Revenue from Manufacture of Paper Products (Million $)	Total Company Wide . . .		Primary Paper Product Manufacturing Businesses
		Revenue (Million $)	Employees	
Wausau Paper Corporation	1,240	1,240	2,800	Paper Mills, Paperboard Mills, Paper Bags and Coated and Treated Paper, Paperboard Containers
P. H. Glatfelter Company	1,158	1,158	3,854	Paper Mills, Paper Bags and Coated and Treated Paper
Potlatch Corporation	1,115	1,900	3,800	Paper Mills, Paperboard Mills, Sanitary Paper Products
Altivity Packaging, LLC (P)	1,087	1,087	8,300	Paper Mills, Paperboard Mills, Paperboard Containers, Paper Bags and Coated and Treated Paper
Neenah Paper, Inc	990	990	2,450	Pulp Mills, Paper Mills
Cenveo, Inc	897	2,047	10,700	Stationery Products
Chesapeake Corporation	880	1,060	5,427	Paperboard Containers
Appleton Paper, Inc (Paperweight Development Corp) (P)	861	963	3,000	Paper Bags and Coated and Treated Paper
Caraustar Industries, Inc	854	854	3,570	Paperboard Mills, Paperboard Containers
Green Bay Packaging, Inc (P)	850	850	3,000	Paperboard Mills, Paper Bags and Coated and Treated Paper
Buckeye Technologies, Inc.	803	803	1,550	Pulp Mills
Menasha Corporation (P)	790	869	3,084	Paperboard Mills, Paperboard Containers
The Newark Group, Inc (P)	768	923	3,169	Paperboard Mills, Paper Bags and Coated and Treated Paper
Greif, Inc	697	3,322	10,300	Paperboard Containers, Paper Bags and Coated & Treated Paper
Schweitzer-Mauduit International, Inc	625	655	3,541	Paper Mills, Paper Bags and Coated and Treated Paper
AbitibiBowater, Inc (US)	603	1,090	2,615	Pulp Mills, Paper Mills, Paperboard Mills, Paper Bags and Coated and Treated Paper, Recycling
Boise Cascade Holdings, LLC (P)	601	5,413	10,190	Paperboard Mills, Paper Mills, Paper Bags and Coated and Treated Paper
Pratt Industries, Inc (Visy Industries)(P)	527	713	3,500	Paper mills, Paperboard Mills, Paperboard Containers
Pope & Talbot, Inc. (P)	425	841	2,373	Pulp Mills, Sanitary Paper Products
National Envelope Corporation (P)	400	425	5,000	Stationery Products
Interstate Resources (Merlands Netherlands, BV) (P)	300	300	800	Paperboard Mills, Paperboard Containers
DURO Bag Manufacturing Co (P)	298	298	3,000	Paper Bags and Coated and Treated Paper
Nashua Corporation	276	280	761	Paper Bags and Coated and Treated Paper

Wood Furniture Manufacturing Group

The wood furniture manufacturing group is engaged in a variety of processes that cut, bend, mold, laminate and assemble wood into furniture and related products (U.S. Census Bureau 2008a). The group's six industries are organized around the following product lines: wood kitchen cabinets and countertops (including bathroom vanities); nonupholstered wood household furniture (assembled or unassembled); wood television, radio, and sewing machine cabinets; wood office furniture (assembled or unassembled); custom architectural woodwork and millwork (display fixtures, gondolas, wall shelving, window detail, wall paneling); and showcases, partitions, shelving, and lockers (assembled or unassembled) (Figure 1). The latter product group fabricates products made of wood as well as nonwood materials and includes establishments exclusively making furniture parts (for example, frames).

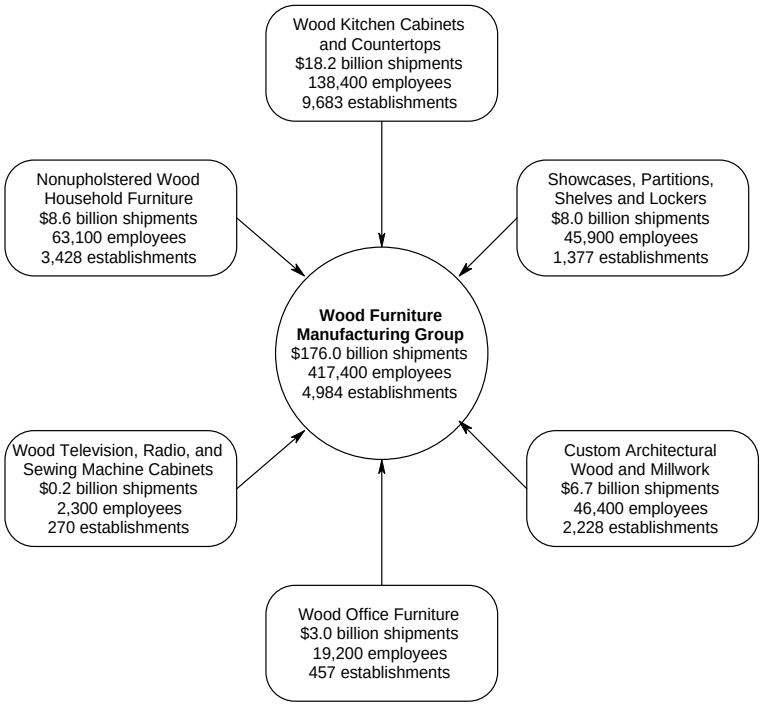


Figure 3. Industries of the Wood Furniture Manufacturing Group of the U.S. Wood-based Manufacturing Industry. 2007.

Shipments and Capital Expenditures: Shipments produced by wood furniture manufacturing group in 2007 approached $45 billion in value and involved the employment of more than 315,000 persons located at 17,443 establishments (Table 10). In terms of shipment values, the largest

Table 10. Major Economic Characteristics ofthe Wood Furniture Manufacturing Group of the U.S.Wood-based Manufacturing Industry, by Industry. 2007.

Industry	Total Value of Shipments ($ million)	Value Added by Manufacture ($ million)	Production Capacity Utilization (percent)	Capital Expenditures ($ million)	Gross Value of Depreciable Assets ($ million)
Wood Kitchen Cabinets and Countertops	18,225.3	10,957.8	79	424.8	5,128.3
Nonupholstered Wood Household Furniture	8,652.6	4,159.4	61	131.0	2,852.1
Wood Television, Radio, and Sewing Machine Cabinets	234.0	126.7	55	7.9	70.3
Wood Office Furniture	2,979.0	1,766.0	51	55.9	1,041.4
Custom Architectural Wood and Millwork	6,730.2	4,198.7	71	162.8	1,733.1
Showcases, Partitions, Shelves and Lockers	8,014.6	4,013.1	59	166.6	2,455.7
Total	44,835.7	25,221.8	63	948.9	13,280.9

Industry	Establishments	Total Employees	Payroll ($ million)	Production Workers	Production Worker Hourly Wage ($)	Value Added per Production Hour ($)
Wood Kitchen Cabinets and Countertops	9,683	138,379	4,419.4	107,206	14.54	51.33
Nonupholstered Wood Household Furniture	3,428	63,066	1,836.6	49,764	13.21	43.47
Wood Television, Radio, and Sewing Machine Cabinets	270	2,333	66.1	1,541	12.18	40.96
Wood Office Furniture	457	19,237	685.3	15,167	14.95	55.86
Custom Architectural Wood and Millwork	2,228	46,417	1,957.9	32,184	17.37	65.24
Showcases, Partitions, Shelves and Lockers	1,377	45,920	1,645.4	34,481	14.64	59.26
Total	17,443	315,352	10,610.7	240,343	14.68	52.99

Note: Production capacity utilization percent is annual average of 2002 through 2007.
Source: U.S. Census Bureau 2007b and 2009b.

industry in the group engaged in the manufacture of wood kitchen cabinets and countertops, namely $18.2 billion, followed by two distant but nearly equal second place industries – nonupholstered wood household industry (shipment values of $8.6 billion) and showcases, partitions, shelves and locker industry (shipment values of $8.0 billion). These three leading industries accounted for nearly 78 percent of the shipment values generated by the wood furniture manufacturing group. The average establishment within the group shipped $2.6 million in product value in 2007 (68 percent less than wood-based manufacturing industry in general), with the showcases, partitions, shelves and locker industry leading in this respect ($5.8 million per establishment). Over the period 2002 through 2007, an average of 63 percent of the group's production capacity was utilized. The group has experienced significant competition influenced in recent years by furniture manufacturing in other countries (Buehlmann and Schuler 2009, Wan and Bullard 2009).

The group's value added by manufacture was more than $25 billion in 2007, or about $1.4 million per establishment (Table 10). Leaders in this respect were the wood office furniture industry ($3.8 million per establishment) and the showcases, partitions, shelves and lockers industry ($2.9 million per establishment). In 2007, the group's capital expenditures ($949 million) accounted for a modest 9 percent of such expenditures made by the wood-based manufacturing industry generally. The wood kitchen cabinets and countertops and the showcases, partitions, shelves and lockers industries lead in capital expenditures within the group, while such expenditures per establishment were lead by the wood office and the showcases, partitions, shelves and lockers industries – about $120,000 each. The capital expenditures for the entire group averaged only $54,000 per establishment in 2007.

Establishments and Employees. The wood furniture manufacturing group accounted for a sizeable portion of the establishments operating in the wood-based manufacturing group generally, namely 17,443 or 44 percent in 2007 (Table 10). Accounting for three-fourths of the latter, the wood kitchen cabinets and countertops and the nonupholstered wood household furniture industries combined were leaders in this respect, namely 55 percent and 20 percent, respectively. In 2007, about 250 fewer establishments operated within the group than operated in 2002, a sum reflecting a decline of about 40 to 45 establishments per year (Table 4). Most of this decline in establishments occurred in the wood office furniture and the nonupholstered wood household furniture industries (decline of 31 percent and 12 percent from 1998 through 2007, respectively) (Appendix Table 5). From 1997 through 2007, the number of establishments increased substantially in two of the group's industries, namely wood kitchen cabinets and countertops industry (gain of 22 percent) and custom architectural wood and millwork industry (gain of 103 percent). Companies (combined establishments) operating as wood furniture manufacturing enterprises tend to operate as single

establishment enterprises. For the group in general, the ratio of establishments to companies in 2007 was nearly 1:1. All industries within the group had ratios very close to this group average.

The wood furniture manufacturing group employed more than 315,000 persons in 2007 – 25 percent of all employees engaged in wood-based manufacturing generally (Table 10). Forty-four percent of these employees worked in the wood kitchen cabinets and countertops industry, while an additional 20 percent were employed by the nonupholstered wood household furniture industry. Combined, these two industries accounted for nearly two-thirds of the group's employees and $6.2 billion of its 2007 payroll. Seventy-six percent of the group's employees are considered production workers whose average hourly wage is about $14.68 – about 12 percent less than the rate for the wood-based industry in general ($16.68). Only one of the group's hourly production worker wages exceed the wood-based industry's national average, namely the custom architectural wood and millwork industry. The latter industry generated more than $65 in value added per production hour (10 percent more value added per production hour than the next ranked industry) and 23 percent more than the group's average value added per production hour ($53.42).

The number of persons employed in the wood furniture manufacturing group experienced an appreciable decline during the nine year period 1998 through 2007, namely a decrease of nearly 61,000 employees (Table 4) (Appendix Table 5). Four of the group's six industries experienced declines from 1997 through 2007, with the most dramatic occurring in the nonupholstered wood household furniture industry (loss of 65,200 employees or 51 percent), and the showcases, partitions, shelves and lockers industry (loss of 29,500 percent 39 percent). On a more positive note, the industry manufacturing wood kitchen cabinets and countertops experienced an employment gain of 39,100 persons (39 percent), while the custom architectural wood and millwork industry gained 22,000 employees (90 percent) during the same 1997 through 2007 period. On average, 18 persons are employed at each of the group's establishments, with the wood office furniture industry leading in this respect while at the other extreme the wood television, radio, and sewing machine cabinets had the fewest, namely 42 and 7 employees per establishment, respectively. The group's six industry's have been fairly stable in terms of number of employees per establishment over the nine-year period 1997 through 2007. The exceptions being the nonupholstered wood household furniture industry (decline from 35 to 18) and the wood television and related cabinets industry (decline from 44 to 9).

Major Companies. The largest 25 firms generating revenue from the manufacture of wood furniture had combined revenue from such a source of $14.2 billion (32 percent of group's total 2007 value of shipments)(Table 11). This sum represents slightly more than half (51 percent) of the $28.1 billion generated by the company wide operations (wood and nonwood) of the 25 companies.

Table 11. Largest 25 Companies Operating in the Wood Furniture Manufacturing Group of the U.S. Wood-based Manufacturing Industry. 2006-2007.

Company	Revenue from Manufacture of Wood Furniture (Million $)	Total Company Wide . . .		Primary Wood Furniture Manufacturing Businesses
		Revenue (Million $)	Employees	
Masco Corporation	2,829	11,770	52,000	Nonupholstered Wood Household Furniture, Wood Kitchen Cabinets and Countertops
Furniture Brands International, Inc	2,062	2,082	11,900	Nonupholstered Wood Household Furniture, Wood Office Furniture
La-Z-Boy, Inc	1,457	1,677	11,729	Wood Office Furniture; Nonupholstered Wood Household Furniture; Wood Television, Radio, and Sewing Machine Cabinets
MasterBrands Cabinets, Inc (Fortune Brands, Inc)	1,250	1,250	6,000	Wood Kitchen Cabinets and Countertops
Sauder Woodworking Co (P)	725	725	3,400	Nonupholstered Wood Household Furniture; Wood Television, Radio, and Sewing Machine Cabinets
American Woodmark Corporation	707	761	5,148	Wood Kitchen Cabinets and Countertops
Universal Furniture Corporation (P)	670	670	12,000	Nonupholstered Wood Household Furniture; Wood Television, Radio, and Sewing Machine Cabinets
Kimball International, Inc	614	1,142	7,560	Wood Office Furniture; Nonupholstered Wood Household Furniture; Wood Television, Radio, and Sewing Machine Cabinets
Ashley Furniture Industries, Inc (P)	472	508	3,800	Nonupholstered Wood Household Furniture; Wood Television, Radio, and Sewing Machine Cabinets;
Klaussner Furniture Industries (P)	452	515	6,000	Nonupholstered Wood Household Furniture, Wood Office Furniture
Ethan Allen Interiors, Inc	368	1,005	6,000	Nonupholstered Wood Household Furniture; Wood Office Furniture; Wood Television, Radio, and Sewing Machine Cabinets

Note: Excludes wholesale and retail distribution business activities. Privately owned company indicated by letter "P" in parenthesis. In some cases, revenue from manufacture of wood products is estimated. Furniture Brands International, Inc. Includes the following subsidiaries: Broyhill Furniture Industries, Drexel Heritage Furniture Industries, Henredon Furniture Industries, Lane Furniture Industries, Maitland-Smith Furniture Industries, Hickory Business Furniture Industries, and Thomasville Furniture Industries.
Source: Company annual reports, U.S. Securities and Exchange Commission filings, Dunn and Bradstreet, Inc. 2008, ECNext, Inc. 2008, LexisNexis, Inc. 2008, and Mergent, Inc. 2008.

Table 11 (continued).

Company	Revenue from Manufacture of Wood Furniture (Million $)	Total Company Wide . . .		Primary Wood Furniture Manufacturing Businesses
		Revenue (Million $)	Employees	
Hooker Furniture Corporation	316	316	950	Nonupholstered Wood Household Furniture; Wood Office Furniture; Wood Television, Radio, and Sewing Machine Cabinets
Bassett Furniture Industries, Inc	300	335	1,440	Nonupholstered Wood Household Furniture; Wood Television, Radio, and Sewing Machine Cabinets; Wood Office Furniture
Stanley Furniture Company	282	282	1,800	Nonupholstered Wood Household Furniture, Wood Office Furniture
Haworth, Inc (P)	280	1,392	8,140	Wood Office Furniture
Bush Industries, Inc (P)	270	340	2,750	Nonupholstered Wood Household Furniture, Wood Office Furniture
Rush Industries, Inc (P)	150	150	1,450	Nonupholstered Wood Household Furniture
Wood-Mode, Inc (P)	175	175	2,250	Wood Kitchen Cabinets and Countertops
Cardell Cabinetry, Inc (P)	173	173	2,000	Wood Kitchen Cabinets and Countertops
Flexsteel Industries, Inc	144	425	2,250	Nonupholstered Wood Household Furniture, Wood Office Furniture
Vaughan-Bassett Furniture Co (P)	117	117	1,564	Nonupholstered Wood Household Furniture; Wood Television, Radio, and Sewing Machine Cabinets
Schnadig Corporation (P)	107	107	400	Nonupholstered Wood Household Furniture; Wood Television, Radio, and Sewing Machine Cabinets
Chromcraft Revington, Inc	98	123	904	Nonupholstered Wood Household Furniture; Wood Office Furniture; Wood Television, Radio, and Sewing Machine Cabinets
Bertch Cabinet Manufacturing (P)	96	96	1,450	Wood Kitchen Cabinets and Countertops
Herman Miller, Inc	93	1,919	6,574	Wood Office Furniture, Wood Showcases, Partitions, Shelves and Lockers

Note: Chromcraft Revington, Inc. includes the following subsidiaries: Chromcraft Corp., Peters-Revington Corp., Silver Furniture Co., Inc., Cochrane Furniture Company, Inc., and Korn Industries, Inc.

The leading five companies account for 59 percent of the 25 firms' wood furniture manufacturing revenue, and are: Masco Corporation (20 percent), Furniture Brands International, Inc. (15 percent), La-Z-Boy, Inc. (10 percent), MasterBrands Cabinets (Fortune Brands, Inc.) (9 percent), and Sauder Woodworking Company (5 percent). Nineteen of the companies attribute 75 percent or more of their company wide revenue (wood and nonwood sources) to the manufacture of wood products, while three companies attribute less than 5 percent to wood furniture manufacture (Masco Corporation, Haworth, Inc., and Herman Miller, Inc.) All the revenue of 11 companies can all be traced to wood furniture manufacture (for example, MasterBrands Cabinets, Inc., Hooker Furniture Company, Schnadig Corporation). Among the most common businesses of the 25 companies are nonupholstered wood household furniture (Sauder Woodworking Company, Ethan Allen Interiors, Inc.), wood television and related cabinets (Bassett Furniture Industries, Inc., Vaughan-Bassett Furniture Company), and wood office furniture (Kimball International, Inc., Flexsteel Industries, Inc.). Twelve of the 25 companies are privately owned and are not engaged in public sale or exchange of stock.

Geographic Arrangement

The wood-based manufacturing industry is organized geographically in manners that facilitate the efficiency of its operations and delivery of its manufactured product to consumers. The considerations that influence the location of manufacturing facilities are very complex, although often of special importance is access to raw material, availability of skilled employees, efficient transportation systems and flexibility in legal and institutional environments that foster a positive climate for business. Although these considerations vary in importance for each enterprise, and for specific manufacturing facilities of each enterprise, there are industry-wide location patterns that are informative about the industry's geographic organization and structure.

Shipments, Establishments and Employees

Shipment Values. The 2006 shipment values of the wood-based manufacturing industry originated primarily from manufacturing activities occurring in the eastern portion of the nation, namely 85 percent from the North and South combined (South – 51 percent, 13 states; North – 34 percent, 20 states). The remaining portion – 15 percent – originated from the nation's 17 Western states (Table 12). Except for a modest 1 percent shift from the North to the South, this industry-wide regional source of shipment values has remained virtually unchanged since 2002. When compared to the source of shipment values for all U. S. Manufacturing industries nationwide (North – 44 percent, South – 38 percent, West – 15 percent), shipments of the wood- based manufacturing industry more frequently originate from the South but less so than from the North. In 2006, the five leading states in terms of wood-based shipment values were California (6 percent), Wisconsin (6 percent), Pennsylvania (6 percent), Georgia (5 percent), and Texas (4 percent). These states combined accounted for about 27 percent of the industry's $331 billion in 2006 shipment values nationwide. Seven additional ranked states would be required in order to meet this percentage; 26 states each contribute less than 1 percent to the national total.

The within region ranking of shipment values of major segments of the wood-based industry varies only modestly from region to region (Table 13). Converted paper products leads in proportionally ranked importance within all regions except the South where it ranked second in 2006. Ranked last within all regions (and nationally) was the veneer, plywood and engineered wood products industry. The greatest variation in ranked importance across all regions occurred with the sawmills and wood preservation industry. In the West, the latter was third most important in terms of shipment values while in the North it was ranked last along with the veneer, plywood and engineered wood products industry.

Table 12. Value of Shipments of U.S. Wood-based Manufacturing Industry, by Region and Major Industry Group. 2002-2006.

Major Industry Group	North		South		West	
	Dollars (million)	Percent	Dollars (million)	Percent	Dollars (million)	Percent
Wood-Product Manufacturing						
2006	36,679	33	46,207	41	29,518	26
2005	36,892	33	45,532	41	29,593	26
2004	34,710	34	41,335	40	27,375	26
2003	31,202	34	37,101	41	22,937	25
2002	28,806	32	35,502	40	24,677	28
Paper Manufacturing						
2006	77,969	46	69,334	41	23,058	13
2005	75,883	47	65,435	40	21,530	13
2004	70,846	46	63,048	41	20,095	13
2003	70,745	47	59,398	40	19,127	13
2002	74,757	48	57,738	38	21,160	14
Wood Furniture Manufacturing						
2006	23,365	49	16,043	33	8,850	18
2005	22,291	48	15,018	32	9,259	20
2004	21,698	48	14,653	32	8,948	20
2003	20,201	48	13,656	32	8,277	20
2002	17,514	47	12,048	34	7,048	19

Source: U. S. Census Bureau 2006a, 2008b and 2009a.

Wood Product Manufacturing. Shipment values of the wood products manufacturing segment of the industry originated primarily from the South (41 percent) in 2006, although shipment values from the North were only 8 percent less, namely 33 percent of the national total (Table 12). Except for the West, which experienced a modest 2 percent decline over the period 2002 through 2006, regional contributions to national shipment values have proportionally remained virtually the same. Oregon, California, North Carolina and Texas were leading states in terms of contribution to nationwide wood product shipment values (25 percent combined) in 2006. Within region state leaders were: North – Pennsylvania and Wisconsin with 29 percent of region's shipment values, South – North Carolina and Texas with 25 percent, and West – Oregon and Washington with 47 percent. In 2002, shipment values of the largest wood product manufacturing industries and states within each region were as follows (U. S. Census Bureau 2005):

• North: Sawmills and wood preservation (26 percent); veneer, plywood and engineered products (22 percent); manufactured homes and prefabricated wood buildings (20 percent); millwork (19 percent); and wood containers and pallets (13 percent). The four leading states within the region in 2002 were Pennsylvania (16 percent of regional shipment values), Indiana (13 percent), Wisconsin (10 percent), Ohio (9 percent) and Michigan (8 percent)

Table 13. Regional Importance of Major Segments of the U.S. Wood-based Manufacturing Industry, by Shipment Values, Establishments, and Employees. 2006.

Region	Industry and Regional Rank					
	Sawmills and Wood Preservation Products	Veneer, Plywood and Engineered Wood Products	Millwork, Containers, Pallets, and Buildings	Pulp, Paper and Paperboard Products	Converted Paper Products	Wood Furniture Products
			Shipment Values			
North	6 (4 percent)	6 (4 percent)	3 (18 percent)	2 (21 percent)	1 (35 percent)	3 (18 percent)
South	5 (11 percent)	6 (10 percent)	3 (14 percent)	1 (29 percent)	2 (24 percent)	4 (12 percent)
West	3 (16 percent)	6 (12 percent)	2 (20 percent)	3 (16 percent)	1 (21 percent)	5 (15 percent)
Nationwide	5 (9 percent)	6 (8 percent)	3 (17 percent)	2 (24 percent)	1 (27 percent)	4 (15 percent)
			Establishments			
North	3 (11 percent)	4 (3 percent)	2 (28 percent)	5 (2 percent)	2 (14 percent)	1 (42 percent)
South	2 (14 percent)	4 (6 percent)	3 (26 percent)	5 (2 percent)	3 (10 percent)	1 (42 percent)
West	3 (7 percent)	4 (6 percent)	2 (27 percent)	5 (1 percent)	2 (8 percent)	1 (51 percent)
Nationwide	3 (11 percent)	5 (5 percent)	2 (27 percent)	6 (2 percent)	3 (11 percent)	1 (44 percent)
			Employees			
North	6 (5 percent)	5 (6 percent)	2 (25 percent)	4 (11 percent)	1 (28 percent)	2 (25 percent)
South	6 (11 percent)	6 (11 percent)	1 (24 percent)	4 (12 percent)	3 (19 percent)	2 (23 percent)
West	5 (11 percent)	4 (13 percent)	2 (25 percent)	6 (6 percent)	3 (16 percent)	1 (29 percent)
Nationwide	6 (8 percent)	5 (9 percent)	2 (25 percent)	4 (10 percent)	3 (22 percent)	1 (26 percent)

Note: Ranking is 1 = high to 6 = low. Number in parentheses is portion of a region's total.
Source: U. S. Census Bureau 2006a, 2008b and 2009a.

• South: Sawmills and wood preservation (39 percent), veneer, plywood and engineered products (23 percent), millwork (14 percent), and manufactured homes and prefabricated wood buildings (13 percent). The four leading states within the region were North Carolina (15 percent of regional shipment values, and Alabama, Georgia and Texas (12 percent each).

• West: Sawmills and wood preservation (37 percent), millwork (24 percent), and veneer, plywood and engineered products (23 percent). The four leading states within the region in 2002 were Oregon (34 percent), California (27 percent), Washington (18 percent), and Idaho (7 percent).

Paper Product Manufacturing. Shipment values of the paper products manufacturing segment of the industry originated primarily from the North's 20 states (46 percent) in 2006, although shipment values from the South were only 5 percent less (Table 12). Regional contributions to total national shipment values of the paper products industry have remained quite stable over the period 2002 through 2006, although a modest decline in the North appears to have resulted in a similarly modest gain in the South. Wisconsin, Pennsylvania, Georgia and California were leading states in terms of contribution to nationwide paper product shipment values (26 percent combined) in 2006. Within region state leaders are: North – Wisconsin and Pennsylvania with 32 percent of region's shipment values, South – Georgia and Alabama with 26 percent and West – California and Washington with 65 percent. In 2002, shipment values of the largest paper product manufacturing industries and states within each region were as follows (U. S. Census Bureau 2005):

• North: Paperboard containers (38 percent), pulp, paper and paperboard mills (33 percent), and paper bag and coated and treated paper (13 percent). The four leading states within the region in 2002 were Wisconsin (27 percent), Pennsylvania (18 percent), Ohio (10 percent) and New York (9 percent).

• South: Pulp, paper and paperboard mills (47 percent) and paperboard containers (34 percent). The four leading states within the region were Georgia (25 percent), South Carolina (15 percent), Louisiana (13 percent), and North Carolina (10 percent).

• West: Paperboard containers (59 percent) and pulp, paper and paper board mills (22 percent). The four leading states within the region were California (66 percent), Washington (22 percent), Colorado (4 percent) and Kansas (3 percent).

Furniture Product Manufacturing. In 2006, shipment values of the furniture manufacturing segment of the industry originated primarily from the North (49 percent), with the South and the West combined (30 states) contributing a nearly similar amount (33 percent and 18 percent, respectively) (Table 12). Since 2002, regional contributions to total national shipment values have remained fairly consistent, although the North has experienced a modest gain at the expense of the South and West. California, New York, Florida and Texas were leading states in terms of

contribution to nationwide paper product shipment values (27 percent combined) in 2006. Within region state leaders were: North – New York and Pennsylvania with 26 percent of region's shipment values, South – Florida and Texas with 35 percent of region's shipment values, and West – California and Washington with 51 percent of region's shipment values. In 2002, shipment values of the largest furniture manufacturing industries and states within each region were as follows (U. S. Census Bureau 2005):

• North: Wood kitchen cabinets and countertops (35 percent), nonupholstered wood household furniture (26 percent), showcase, partition, shelving and lockers (23 percent), and custom architectural woodwork and millwork (10 percent). The four leading states within the region in 2002 were Ohio (14 percent), Indiana (12 percent), New York (11 percent) and Pennsylvania (11 percent).

• South: Nonupholstered wood household furniture (40 percent), wood kitchen cabinets and countertops (29 percent), and showcase, partition, shelving and lockers (18 percent). The four leading states within the region were North Carolina (31 percent), Texas (14 percent), Virginia (11 percent) and Georgia (9 percent).

• West: Wood kitchen cabinets and countertops (41 percent), nonupholstered wood household furniture (24 percent), showcase, partition, shelving and lockers (20 percent) and custom architectural woodwork and millwork (11 percent). The four leading states within the region were California (54 percent), Arizona (10 percent), Oregon (8 percent) and Washington (7 percent).

Establishments. Forty-three percent of the industry's 39,204 manufacturing establishments were located in the Northern region's 20 states in 2006, with the remaining 22,370 establishments located in the South (33 percent) and West (24 percent) (Table 14) (Figure 4). This 2006 industry-wide distribution has remained nearly unchanged since 2002. The five leading states in number of establishments were California (8 percent), Pennsylvania (5 percent), Texas (5 percent), New York (5 percent) and Florida (4 percent) – combined they accounted for about 27 percent of total 2006 wood product manufacturing establishments nationwide. Eight additional ranked states would be required in order to meet this percentage; 20 states each contribute one or less percent to the national total. As for comparison with the regional distribution of all U.S. manufacturing establishments (North – 46 percent, South – 28 percent, West – 26 percent), the 2006 wood-based manufacturing industry had proportionally slightly fewer establishments in the North and West and more in the South.

Table 14. Establishments and Employees of U.S. Wood-based Manufacturing Industry, by Region and Major Industry Group. 2002-2006.

Major Industry Group	North		South		West	
	Number	Percent	Number	Percent	Number	Percent
			Establishments			
Wood-Product Manufacturing						
2006	7,079	42	5,856	35	3,800	23
2005	7,125	43	5,855	35	3,727	22
2004	7,197	43	5,869	35	3,717	22
2003	7,185	43	5,846	35	3,777	22
2002	7,287	43	5,979	35	3,786	22
Paper Manufacturing						
2006	2,718	53	1,525	30	896	17
2005	2,790	53	1,573	30	910	17
2004	2,881	53	1,602	30	939	17
2003	2,892	53	1,624	30	940	17
2002	2,997	54	1,643	30	906	16
Wood Furniture Manufacturing						
2006	7,037	41	5,463	31	4,830	28
2005	7,130	41	5,431	31	4,767	28
2004	7,131	41	5,439	31	4,796	28
2003	7,101	41	5,433	32	4,742	27
2002	7,154	40	5,647	32	4,895	28
			Employees			
Wood-Product Manufacturing						
2006	194,486	36	210,924	39	130,683	25
2005	198,535	37	209,679	39	130,889	24
2004	197,693	37	207,372	39	130,181	24
2003	189,169	37	201,366	39	120,896	24
2002	196,967	36	214,558	40	128,577	24
Paper Manufacturing						
2006	209,197	51	149,972	36	54,879	13
2005	220,424	51	153,464	36	55,692	13
2004	224,778	51	157,698	36	57,513	13
2003	238,808	51	165,707	36	59,810	13
2002	250,796	51	178,505	36	62,531	13
Wood Furniture Manufacturing						
2006	141,695	43	110,029	34	74,681	23
2005	141,026	42	112,101	34	77,995	24
2004	147,419	42	121,840	35	80,013	23
2003	144,248	42	121,083	35	78,769	23
2002	154,049	41	133,058	36	84,279	23

Source: U. S. Census Bureau 2008b and 2009a.

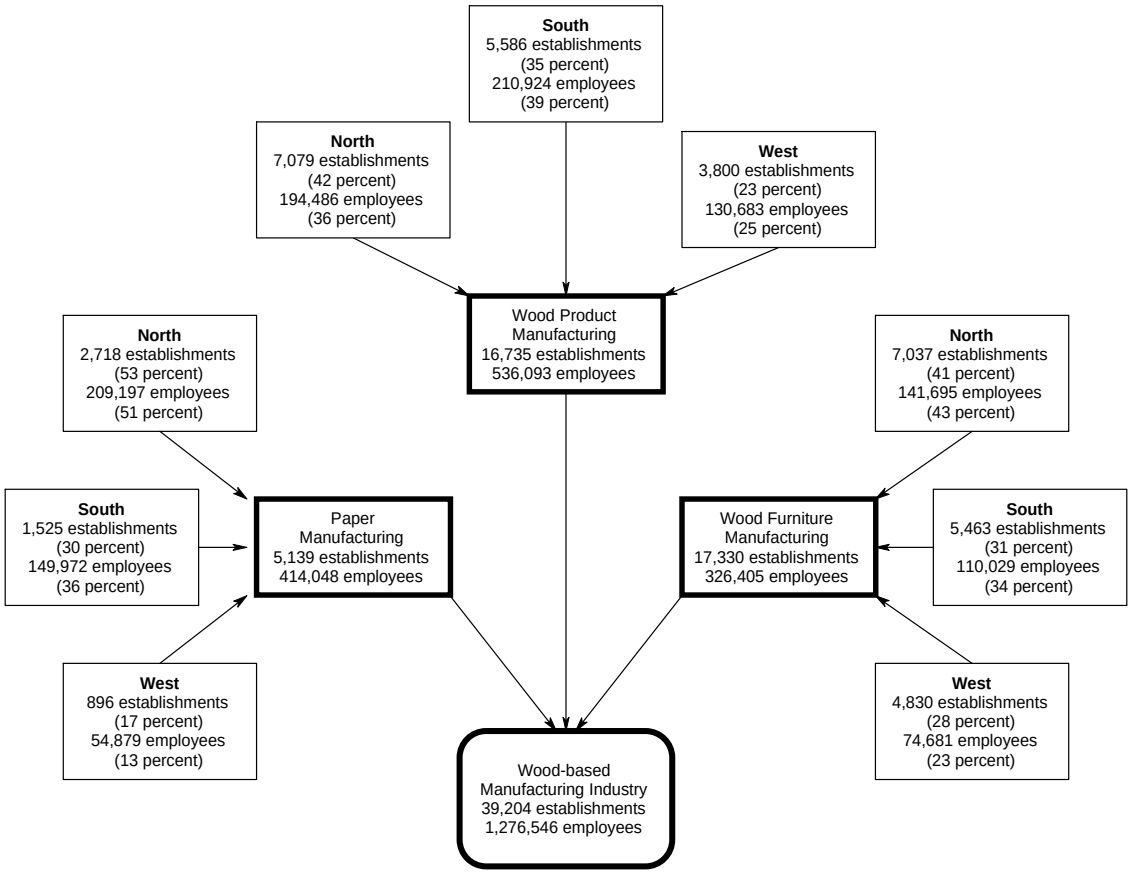


Figure 4. Regional Distribution of Establishments and Employees of the U.S. Wood-based Manufacturing Industry. 2006.

As with shipment values, the within region ranking of establishments operating within major segments of the wood-based industry varies little from region to region (Table 13). However, leading industry segments are different. In 2006, the wood furniture industry lead in proportionally ranked establishment numbers in all regions while the pulp, paper and paperboard products industry ranked last among the five wood-based industry segments considered. These differences were in large part due to the size (capital investment per establishment) of the establishments required to successfully manufacture products in each of the latter industries. Very little variation existed in ranked importance across regions in 2006, especially so for the wood furniture segment, the pulp, paper and paperboard segment, and the veneer, plywood and engineered wood product segment.

Wood Product Manufacturing. Of the 39,204 establishments affiliated with the wood product manufacturing segment of the industry, 42 percent were located in the North in 2006 with the

remaining portion situated in the South and West (35 percent and 23 percent, respectively) (Table 14) (Figure 4). Over the period 2002 through 2006, this regional distribution has remained remarkably consistent. Leading states in number of wood product manufacturing establishments in 2006 were California, Pennsylvania, Texas and North Carolina (23 percent combined). Within region state leaders were: North – Pennsylvania and Ohio with 24 percent of region's establishments, South – Texas and North Carolina with 26 percent of region's establishments, and West – California and Washington with 46 percent of region's establishments. In 2006, establishments in the largest wood product manufacturing industries and states within each region were as follows (U. S. Census Bureau 2008b):

• North: Sawmills and wood preservation (30 percent); millwork (30 percent); wood containers and pallets (22 percent); and veneer, plywood and engineered products (10 percent). The four leading states within the region in 2006 were Pennsylvania (36 percent of regional establishments), Ohio (22 percent), Wisconsin (22 percent), and New York (20 percent)

• South: Sawmills and wood preservation (32 percent); millwork (29 percent); wood containers and pallets (17 percent); and veneer, plywood and engineered products (14 percent). The four leading states within the region were Texas (13 percent), North Carolina (12 percent) and Georgia (10 percent), Tennessee (10 percent).

• West: Millwork (38 percent); sawmills and wood preservation (20 percent); veneer, plywood and engineered products (17 percent); and wood containers and pallets (15 percent). The four leading states within the region in 2006 were California (49 percent), Washington (21 percent), Oregon (20 percent) and Arizona (10 percent).

Paper Product Manufacturing. Establishments engaged in the manufacture of paper products were most common in the North in 2006 (46 percent of national total), although the more than 69,000 paper manufacturing establishments in the South were only 5 percent less than occurred in the North (Table 14) (Figure 4). Only about two of 10 papermaking establishments (23,058) were located in the West in 2006. The regional distribution of establishments changed only slightly over the period 2002 through 2006, with a slight decline in the North being offset with a slight increase in the South. During this period, the West has remained virtually changeless in its portion of national establishments engaged in paper and related manufacturing. California, Ohio, Illinois and New York lead in the number of paper product manufacturing establishments (29 percent combined) in 2006. Within region state leaders were: North – Ohio and Illinois with 24 percent of region's establishments, South – Texas and North Carolina with 31 percent of region's establishments, and West – California and Washington with 68 percent of region's establishments. In 2006, establishments in the largest paper product manufacturing industries and states within each region were as follows (U. S. Census Bureau 2008b):

• North: Paperboard containers (52 percent); paper bag and coated and treated paper (20 percent); pulp, paper and paperboard mills (13 percent); and stationary products (12 percent). The four leading states within the region in 2006 were Ohio (7 percent), Illinois (6 percent), New York (6 percent) and Pennsylvania (5 percent).

• South: Paperboard containers (56 percent); paper bag and coated and treated paper (17 percent); pulp, paper and paperboard mills (14 percent) and stationary products (10 percent). The four leading states within the region were Texas (17 percent), North Carolina (13 percent) Georgia (12 percent) and Tennessee (10 percent).

• West: Paperboard containers (51 percent); paper bag and coated and treated paper (20 percent); pulp, paper and paper board mills (11 percent); and stationary products (10 percent). The four leading states within the region were California (57 percent), Washington (11 percent), Oregon (6 percent) and Colorado (5 percent).

Furniture Product Manufacturing. In 2006, the most common regional location of wood furniture manufacturing establishments was in the North, namely 41 percent of the national total (Table 14) (Figure 4). The remaining 10,293 establishments were located in the South (31 percent) and West (28 percent). As with establishments in the wood products and the paper manufacturing segments of the industry, the regional distribution of furniture manufacturing establishments has remained virtually unchanged since 2002. In 2006, California, Florida, New York and Texas lead in number of wood furniture establishments (29 percent combined). Within region state leaders were: North – New York and Pennsylvania with 24 percent of region's establishments, South – Florida and Texas with 35 percent of region's establishments, and West – California and Washington with 51 percent of region's establishments. In 2006, establishments in the largest wood furniture manufacturing industries and states within each region were as follows (U. S. Census Bureau 2008b):

• North: Wood kitchen cabinets and counter tops (51 percent), nonupholstered wood household furniture (23 percent), showcase, partition, shelving and lockers (11) percent), and custom architectural woodwork and millwork (11 percent). The four leading states within the region in 2002 were New York (15 percent), Pennsylvania (19 percent), Illinois (9 percent) and Ohio (9 percent).

• South: Wood kitchen cabinets and counter tops (60 percent), nonupholstered wood household furniture (19 percent), and showcase, partition, shelving and lockers (10 percent). The four leading states within the region were Florida (20 percent), Texas (16 percent), North Carolina (13 percent), and Georgia (11percent).

• West: Wood kitchen cabinets and counter tops (57 percent) and nonupholstered wood household furniture (23 percent). The four leading states within the region were California (42 percent), Washington (9 percent), Oregon (8 percent), Arizona (7 percent) and Colorado (7 percent).

Employees. In 2006, the industry's nearly 1.3 million employees were located primarily in the North (43 percent) and the South (37 percent) , with a modest 20 percent of the national total located in the West (Table 14) (Figure 4) (number of employees includes estimates for some states where the U. S. Census Bureau seeks to avoid the confidentiality of individual businesses). This industry-wide regional distribution has remained quite consistent over the five year period 2002 through 2006. In the latter year, approximately 32 employees were affiliated with an establishment in the North, 37 in the South and 27 in the West. The leading five states employing persons in the wood-based industry in 2006 were California (7 percent), Wisconsin (5 percent), Pennsylvania (5 percent), North Carolina (5 percent), and Texas (4percent). Combined, these five states combined accounted for about 26 percent of the nation's wood product manufacturing employees. Nearly six additional ranked states would be required in order to meet this percentage; 12 states each contribute less than 5 percent to the national employment total (four state less than 1 percent each – Alaska, Hawaii and Wyoming). As for comparison with the regional distribution of employees affiliated with all U.S. manufacturing enterprises (North – 47 percent, South – 32 percent, West – 21 percent), the North and West regions of the wood-based manufacturing industry proportionally have modestly fewer employees while the West has more.

Within regions, major segments of the wood-based industry rank quite differently in terms of employee numbers in 2006 (Table 13). For example, each of the three regions ranks a different industry as most important in terms of employees, notably the converted paper products industry in the North, furniture products industry in the West, and millwork, containers, pallets and buildings industry in the South. At the other extreme, the pulp, paper and paperboard product industry ranked lowest in the West while the sawmill and wood preservation industry was accorded the same low position in the North and South in 2006. Considerable variation also existed across regions in 2006. The converted paper products industry was the number one employer in the North in 2006 but ranked number three in the South and West, and in the West the pulp, paper and paperboard product industry is ranked sixth while it is ranked fourth in the other two regions. Similar within region differences existed for the veneer, plywood and engineered wood products industry – fourth in importance in the West but only sixth in the South.

Wood Product Manufacturing. Enterprises engaged in the manufacture of wood products employed more than 536,000 persons in 2006, three-quarters of which were located in the South (39 percent) and the North (36 percent) (Table 14) (Figure 4). For the most part, this distribution across regions has remained very consistent during the period 2002 through 2006. California, Oregon, Pennsylvania and Wisconsin were leading states in terms of contribution to nationwide wood product manufacturing employment (23 percent combined). Within region state leaders were: North – Pennsylvania and Wisconsin with 32 percent of region's employees, South – North Carolina and

Texas with 28 percent of region's employees, and West – California and Oregon with 54 percent of region's employees. In 2006, employment by the largest wood product manufacturing industries and states within each region were as follows (U. S. Census Bureau 2008b):

• North: Millwork (38 percent); sawmills and wood preservation (17 percent); veneer, plywood and engineered products (17 percent); manufactured homes and prefabricated wood buildings (15 percent); and wood containers and pallets (13 percent). The four leading states within the region in 2006 were Pennsylvania (16 percent of regional employees), Wisconsin (14 percent), Indiana (10 percent) and Minnesota (8 percent).

• South: Sawmills and wood preservation (26 percent), veneer, plywood and engineered products (26 percent), millwork (25 percent) and manufactured homes and prefabricated wood buildings (14 percent). The four leading states within the region were North Carolina (13 percent of regional employees, Texas (12 percent), Georgia (11 percent) and Alabama (10 percent).

• West: Millwork (29 percent), veneer, plywood and engineered products (27 percent), sawmills and wood preservation (23 percent), and manufactured homes and prefabricated wood buildings (14 percent). The four leading states within the region in 2006 were California (27 percent), Oregon (23 percent), Washington (14 percent), and Arizona (9 percent).

Paper Product Manufacturing. Nationwide, over half (51 percent) of the 2006 employees are affiliated with paper manufacturing enterprises were located in the North, although nearly 150,000 persons were so engaged in the South (Table 14) (Figure 4). Only 13 percent of paper manufacturing employees are located in the West in 2006. The regional distribution of employees has remained constant over the period 2002 through 2006. Leading states in number of paper product manufacturing employees in 2006 were Wisconsin, California, Ohio and Pennsylvania (25 percent combined). Within region state leaders were: North – Wisconsin and Ohio with 28 percent of region's employees, South – Georgia and North Carolina with 26 percent of region's employees, and West – California and Washington with 71 percent of region's employees. In 2006, employment by the largest paper product manufacturing industries and states within each region were as follows (U. S. Census Bureau 2008b):

• North: Paperboard containers (48 percent); pulp, paper and paperboard mills (24 percent); paper bag and coated and treated paper (13 percent); and stationary products (10 percent). The four leading states within the region in 2006 were Wisconsin (21 percent), Pennsylvania (14 percent), Ohio (11 percent) and Illinois (11 percent).

• South: Pulp, paper and paperboard mills (14 percent), paperboard containers (37 percent); and paper bag and coated and treated paper (12 percent). The four leading states within the region were Georgia (13 percent), North Carolina (12 percent), Texas (11 percent) and Tennessee (9 percent).

• West: Paperboard containers (49 percent); pulp, paper and paper board mills (29 percent); and paper bag and coated and treated paper (10 percent). The leading states within the region were California (40 percent), Washington (19 percent), Oregon (10 percent) and Arizona, Colorado, Kansas, Nebraska and Utah (4 percent each).

Furniture Product Manufacturing. The industry's furniture manufacturing segment employed more people in the North than any of the nation's other two regions in 2006. However, the South and West were significant contributors to the industry's total number of employees in the latter year (34 percent and 23 percent, respectively) (Table 14) (Figure 4). Since 2002, regional contributions to total national shipment values have remained fairly consistent, although the North has experienced a modest gain, primarily at the expense of the South. Leading state contributors to national employment in the furniture industry in 2006 were California, North Carolina and Texas (28 percent combined). Within region state leaders were: North – Indiana and New York with 25 percent of region's employees, South – North Carolina and Texas with 39 percent of region's employees, and West – California and Arizona with 59 percent of region's employees. In 2006, employment by the largest furniture manufacturing industries and states within each region were as follows (U. S. Census Bureau 2008b):

• North: Wood kitchen cabinets and countertops (39 percent); nonupholstered wood household furniture (20 percent); showcase, partition, shelving and lockers (20 percent), and custom architectural woodwork and millwork (12 percent). The four leading states within the region in 2006 were Indiana (14 percent), Ohio (13 percent), New York (12 percent) and Pennsylvania (11 percent).

• South: Wood kitchen cabinets and countertops (42 percent); nonupholstered wood household furniture (26 percent); and showcase, partition, shelving and lockers (18 percent). The four leading states within the region were North Carolina (20 percent), Texas (18 percent) and Alabama and Florida (10 percent each).

• West: Wood kitchen cabinets and countertops (50 percent); nonupholstered wood household furniture (20 percent); showcase, partition, shelving and lockers (14 percent); and custom architectural woodwork and millwork (11 percent). The four leading states within the region were California (43 percent), Arizona (9 percent) and Washington and Oregon (8 percent each).

Geographic Presence of Industry

The wood-based manufacturing industry is composed of 40 industries that operate in many – but not all – states (Tables 15 and 16). The geographic pattern of their occurrence among states and across regions provides an additional perspective on the spacial structure of the industry. For purposes of analysis, focus was on whether one or more of an industry's 2006 establishments operated within a state. Applying such a standard, each of the nation's 50 states had an average of

31 different wood-based industries operating within its borders in 2006; regional averages per state were: North -- 33 industries, South – 36 industries, and West – 26 industries (Table 15). As for the industry's major group's, the wood product manufacturing group and the paper product manufacturing group each had 13 different industries operating in each of the nation's 50 states, even though the former was composed of six fewer industry types (14 wood product manufacturing industries versus 20 paper manufacturing industries). Of the six industries that compose the furniture segment of the wood-based industry in 2006, on average all had establishments in each of the nation's 50 states.

National and regional averages can mask some very important differences regarding the presence or absence of an industry within a state or region. For example, in 2006 four states had the maximum number of industries (40) operating within their border, namely California, Georgia, Michigan and Texas – each of which had operating establishments affiliated with 14 wood products industries, 20 paper products industries, and six furniture products industries (Table 15). In contrast, least diverse were Alaska (11 industries out of a potential 40) and Delaware (18 out of 40). Considering all states: four had 40 different industries, 17 had 35 to 39 different industries (for example, North Carolina, Ohio, Washington), 11 had 30 to 34 different industries (for example, Indiana, Louisiana, Utah), seven had 25 to 29 different industries (for example, Maine, Maryland, Nebraska), and nine had 24 or fewer different industries (for example, New Mexico, Montana, West Virginia). In 2006, all 14 wood product industries were present in 10 of 13 Southern states (for example, Alabama, Mississippi, Virginia), six of 20 Northern states and four of 17 Western states. In only four states (California, Georgia, Michigan, Texas) are all 20 paper products industries represented – two states on the South and one each in the North and West.

The 40 industries that compose the wood-based manufacturing industry generally are more common in some states than in others (Table 16). For the most part, the 14 industries that composed the 2006 wood products group were present in nearly all states, of which the most noteworthy (operate in all 50 states) were the sawmills industry, wood windows and doors industry, miscellaneous millwork industry, wood containers and pallets industry, prefabricated wood buildings industry, and industries manufacturing other wood products. The softwood veneer and plywood industry was the least common in terms of representation among states – only occurring in 22 states, half of which were in the South. In the North, seven of the group's 14 industries occurred in each of the region's 20 states, while 11 of the group's industries were present in all 13 Southern states. The industries of the wood product group that have a large number of establishments tended to be present in many different states. Most notable in this respect was the sawmills industry (3,731 establishments), wood containers and pallets industry (2,839 establishments) and the miscellaneous millwork industry (2,129 establishments) – each of which had

operations in all 50 states and combined accounted for about 57 percent of the group's total 2006 establishments.

Table 15. Wood-based Manufacturing Establishments in the U.S., by State and Major Industry Group. 2006.

Region and State	Number of Industries			Region and State	Number of Industries			Region and State	Number of Industries		
	Wood Products	Paper Products	Furniture Products		Wood Products	Paper Products	Furniture Products		Wood Products	Paper Products	Furniture Products
North				South				West			
Connecticut	10	16	6	Alabama	14	13	5	Alaska	8	0	3
Delaware	8	5	5	Arkansas	13	111	6	Arizona	13	14	6
Illinois	13	18	6	Florida	14	8	6	California	14	20	6
Indiana	14	17	6	Georgia	14	20	6	Colorado	13	11	6
Iowa	13	15	6	Kentucky	13	17	6	Hawaii	8	4	4
Maine	13	10	6	Louisiana	14	15	4	Idaho	14	7	6
Maryland	12	11	6	Mississippi	14	14	6	Kansas	12	14	5
Massachusetts	12	17	6	North Carolina	14	19	6	Montana	12	2	5
Michigan	14	20	6	Oklahoma	12	12	6	Nebraska	11	9	5
Minnesota	14	19	5	South Carolina	14	16	6	Nevada	11	8	6
Missouri	13	16	6	Tennessee	14	17	6	New Mexico	11	7	5
New Hampshire	11	9	6	Texas	14	20	6	North Dakota	9	2	6
New Jersey	13	18	6	Virginia	14	17	6	Oregon	14	15	6
New York	14	19	6					South Dakota	12	6	4
Ohio	14	19	6					Utah	13	13	6
Pennsylvania	14	19	6					Washington	14	19	6
Rhode Island	10	9	5					Wyoming	11	2	3
Vermont	12	7	6								
West Virginia	12	6	6								
Wisconsin	13	18	6								

Note: Possible industries within a major industry segment: wood Products – 14 industries, paper products – 20 industries, furniture products – six industries.
Source: U. S. Census Bureau. 2008b.

Table 16. Wood-based Manufacturing Establishments in the U.S., by Region and Industry. 2006.

Wood-based Industries	States and Region
Wood Products Industries	
Sawmills [3,731]	50 states --- 20 North, 13 South, 17 West
Wood Preservation [492]	45 states --- 18 North, 13 South, 14 West
Hardwood Veneer and Plywood [316]	42 states --- 19 North, 13 South, 10 West
Softwood Veneer and Plywood [138]	22 states --- 6 North, 11 South, 5 West
Engineered Wood Members (except truss) [162]	40 states --- 17 North, 12 South, 11 West
Truss Manufacturing [1,085]	44 states --- 20 North, 13 South, 17 West
Reconstituted Wood Products [255]	48 states --- 18 North, 13 South, 11 West
Wood Windows and Doors [1,461]	50 states --- 20 North, 13 South, 17 West
Cut Stock, Resawing Lumber and Planing [1,077]	46 states --- 18 North, 13 South, 15 West
Miscellaneous Millwork (including flooring) [2,129]	50 states --- 20 North, 13 South, 17 West
Wood Container and Pallets [2,839]	50 states --- 20 North, 13 South, 17 West
Manufactured Homes (mobile) [395]	40 states --- 13 North, 12 South, 15 West
Prefabricated Wood Buildings [796]	50 states --- 20 North, 13 South, 17 West
Other Wood Products [1,859]	50 states --- 20 North, 13 South, 17 West
Paper Products Industries	
Pulp Mills [44]	20 states --- 7 North, 9 South, 4 West
Paper Mills (except newsprint) [325]	41 states --- 18 North, 13 South, 10 West
Newsprint Mills [23]	14 states --- 4 North, 6 South, 4 West
Paperboard Mills [205]	37 states --- 17 North, 13 South, 7 West
Corrugated and Solid Boxes [1,624]	49 states --- 20 North, 13 South, 16 West
Folding Paperboard Boxes [411]	39 states --- 16 North, 13 South, 10 West
Setup Paperboard Boxes [103]	30 states --- 15 North, 9 South, 6 West
Fiber Can, Tube, Drums and Related Products [249]	41 states --- 19 North, 13 South, 9 West
Nonfolding Sanitary Food Containers [53]	25 states --- 12 North, 9 South, 4 West
Coated and Laminated Packaging Paper [109]	30 states --- 16 North, 8 South, 6 West
Coated and Laminated Paper [516]	41 states --- 18 North, 13 South, 10 West
Plastics, Foil and Coated Paper Bags [56]	22 states --- 11 North, 7 South, 4 West
Uncoated Paper and Multi-wall Bags [113]	34 states --- 14 North, 13 South, 7 West
Laminated Aluminum Foil Packaging [39]	22 states --- 13 North, 6 South, 3 West
Surface-Coated Paperboard [51]	24 states --- 11 North, 10 South, 3 West
Die-Cut Paper and Paperboard Office Supplies [222]	38 states --- 15 North, 13 South, 10 West
Envelope Manufacturing [221]	34 states --- 15 North, 9 South, 10 West
Stationary, Tablet and Related Products [111]	31 states --- 13 North, 11 South, 7 West
Sanitary Paper Products [129]	33 states --- 13 North, 11 South, 9 West
Other Converted Paper Products [535]	45 states --- 18 North, 13 South, 14 West
Furniture Products Industries	
Wood Kitchen Cabinet and Countertops [9,608]	50 states --- 20 North, 13 South, 17 West
Nonupholstered Wood Household Furniture [3,673]	50 states --- 17 North, 13 South, 17 West
Wood Television, Radio, Sewing Machine Cabinets [240]	39 states --- 20 North, 11 South, 11 West
Wood Office Furniture [502]	43 states --- 20 North, 12 South, 11 West
Custom Architectural Woodwork and Millwork [1,574]	49 states --- 20 North, 13 South, 16 West
Showcases, Partitions, Shelves and Lockers [1,733]	49 states --- 20 North, 13 South, 16 West

Note: Brackets [ ] contain number of nationwide industry establishments.
Source: U. S. Census Bureau. 2008b.

The state-by-state occurrence of the 20 industries which comprise the paper products group was not dominated by a single industry or group of industries in 2006 (Table 16). In no case did an industry within the group occur in all states, although the corrugated and solid box industry came close (49 states). Three industries were present in 41 states, namely the paper mills industry (except news print) industry, the fiber can, tube, drums and related products industry, and the coated and laminated paper industry. Operating in the fewest number of states were the newsprint mills industry (14 states) and the pulp mills industry (20 states). In the South, nine of the group's 20 industries were present in all the region's 13 states in 2006, while in only one case – corrugated and solid box industry – was an industry represented in all 20 Northern states. This same industry was most common across the 17 Western states (occurs in 16 states). The industry with the most establishments – corrugated and solid boxes industry with 1,624 establishments – was present in 49 states, while the industry with the fewest establishments – newsprint mills industry with 23 establishments – was present in only 14 states.

The six industries of the furniture products group were present in nearly all states, with the notable exception being the wood televison, radio, and sewing machine cabinets industry (39 of 50 states). Two of the group's industry were present in all 50 states – the wood cabinet and counter tops industry and the nonupholstered wood household industry – and had the largest number of establishments (about 77 percent of the group's total). Except for the nonupholstered wood household industry, the group's eight industries are present in all 50 states in the North and were present in four states in the South but only two states in the West.

Organizational Location of Companies

Wood-based companies can be geographically structured in a variety of ways. Of concern to their managers are configurations that will promote a company's strategic interests and subsequently advance the company's mission. In some cases, companies will be organized in manners that maintain a close proximity to the forest resources on which they depend, while in other cases a company's geographic orientation will be heavily influenced by an interest in securing access to important markets, seeking the availability of quality employees, and finding reliable transportation and communication systems (Gibson and others 1994, Scherer and Ross 1990).

Industry-wide information about the geographic distribution of companies (defined as combined establishments) is not always readily available. However, since the wood-based industry is composed primarily of companies that operate as a single establishment, the geographic distribution of companies operating in the industry can be generalized from the geographic distribution of the industry's establishments (U.S. Census Bureau 2005) (in 2002, 89 percent of the

establishments in the wood product manufacturing group were part of companies with a single establishment, 64 percent in the paper manufacturing group, and 98 percent in the wood furniture manufacturing group). Using such an approach, the 2006 regional distribution of companies for the industry's major groups is estimated as follows (based on Table 17):

- Wood product manufacturing group – 14,938 companies (North – 42 percent, South – 35 percent, West – 23 percent).
- Paper manufacturing group – 3,292 companies (North – 53 per cent, South – 30 percent, West – 17 percent).
- Wood furniture manufacturing – 16,966 companies (North – 41 percent, South – 31 percent, West – 28 percent).

The geographic location of wood-based companies can be further highlighted by the location of company corporate home offices. Although not suggested as representative of the wood-based manufacturing industry generally, the 2008 location of the corporate home office of 98 wood-based companies can be instructive (Appendix Table 6). Excluding AbitibiBowater, Inc.(corporate home office in Montreal, Canada), forty-four of the companies examined had corporate offices in the North, 34 in the South and 19 in the West. Leading in the number of corporate home offices in 2008 was Oregon with eight companies (for example, JELD-WEN, Inc., Roseburg Forest Products Company, Pope and Talbot, Inc) and Virginia with seven companies (for example, Vaughan-Bassett Furniture Co., American Woodmark Corporation, Chesapeake Corporation). Other states with a notable number of corporate home offices of wood-based industry companies in 2008 were Illinois (six), Michigan (six), Texas (6), Washington (six) and Texas (six).

Wood-based companies can also have a regional presence via the administrative entities (division, branch, subsidiary, affiliate, group or joint venture) that form their organizational structure (Table 16). In 2008, 11 companies with corporate revenue exceeding $3,600 million had 281 administrative entities (top-most administrative level) located in 36 different states (North – 15 states, South – 13 states, West – eight states). International Paper Company lead the group with 123 entities located in 28 different states. In some cases, the company had more than one entity in a state – for example, 13 in Tennessee and 12 in Texas. In the same revenue category, Sonoco Products Company also had a widespread presence among states (86 entities in 30 different states, six states with more than six entities each). In the $1,000 million to $3,600 million revenue category, 10 of the example companies had slightly fewer entities, namely 63 entities in 23 different states (North – 12 states, South – seven states, West – four states). Leading companies in this category were Wausau Paper Corporation (12 entities in five states) and Universal Forest Products (10 entities in seven states). The 10 example companies with $1,000 million or less in annual revenue had 58 entities spread across 20 states (North – nine states, South – eight states, West – three states).

Leading was Grief, Inc. with 15 entities in 11 states (although no more than three entities in any single state).

Table 17. Major Companies Operating in U.S. Wood-based Manufacturing Industry, by State Location of Corporate Offices. 2008.

Company and Major Sales or Revenue Category	Location (state) of Corporate Home Office	Top-most Administrative Entities within Company	
		Location (state) and Number of Entities	Total
A. $3,600 million or more			
Newpage Corp	OH	MI(1), WI(1)	2
Smurfit-Stone Container Corp	IL	IL(4), MO(1), WI(1)	6
Temple-Inland Corp	TX	TX(6), LA(1), IN(1)	8
Georgia-Pacific Corp	GA	GA(10), WA(1), WI(1), FL(1)	13
Kimberly-Clark Corp	TX	WI(3), TX(2), GA(2), TN(1), NM(1)	8
Weyerhaeuser Co	WA	WA(10), MS(2), AR(1), ID(1), OR(1), CA(1)	16
MeadWestvaco Corp	CT	CT(1), OH(1), NY(1), FL(1), VA(1), GA(1)	6
Bemis Co	WI	WI(6), MN(2), TN(1), TX(1), IN(1), PA(1), OH(1)	13
International Paper Co	TN	TN(13), TX(12), GA(10),AR(8), SC(7), LA(6), AL(6), NC(6), MI(5), CT(5), OH(5), NY(4), CA(4), IL(4), VA(4), PA(3), ME(3), FL(3), MS(3), WI(2), KY(2), NJ(2), UT(1), MO(1), MA(1), OR(1), IN(1), MN(1)	123
Sonoco Products Co	SC	OH(8), WI(7), TN(7), NC(6), SC(6), GA(6), AL(4), VA(3), IN(3), IL(3), WA(3), PA(3), MA(3), CA(2), LA(2), TX(2), KY(2), FL(2), NY(2), NJ(2), MO(1), ID(1), IA(1), ME(1), WV(1), KS(1), OK(1), MI(1), AR(1), CO(1)	86
B. $1,000-$3,600 million			
Furniture Brands International	MO	NC(6)	6
P. H. Glatfelter Company	PA	WI(1)	1
Packaging Corp of America	IL	IL(2), TX(1)	3
Louisiana-Pacific Corp	TN	ME(1), ID(1), TX(1)	3
Graphic Packaging Corp	GA	IL(2), GA(1), MN(1), GA(1)	5
Potlatch Corp	WA	AR(2), MN(2), CA(2), WA(1), ID(1)	8
Wausau Paper Corporation	WI	WI(8), OH(1), MS(1), KY(1), NH(1)	12
Rock-Tenn Company	GA	GA(3), NC(1), CA(1), MN(1), NJ(1), NY(1)	8
Avery Dennison Corp	CA	CA(1), OH(1), PA(1), IL(1), NY(1), MA(1), SC(1)	7
Universal Forest Products	MI	MA(2), CA(2), CO(2), CT(1), NV(1), WI(1), GA(1)	10
C.$1,000 million or less			
Hampton Affiliates	OR	OR(1)	1
Roseburg Forest Products Co	OR	OR(3)	3
Sauder Woodworking Co	OH	OH(1)	1
Pope & Talbot, Inc	OR	OR(11)	11
Columbia Forest Products, Inc	OR	OR(3)	3
Klaussner Furniture Industries	NC	NC(3), OH(1)	4
Menasha Corporation	WI	WI(4), CA(1), PA(1), IN(1)	7
JELD-WEN, Inc	OR	WI(2), IN(1), OR(1), LA(1)	5
Champion Enterprises, Inc	MI	MI(3), TN(1), IN(1), FL(1), CO(1), NY(1)	8
Greif, Inc	OH	IL(3), PA(2), OH(2), MI(1), WV(1), GA(1), TX(1), VA(1), KY(1), MS(1), LA(1)	15

Note: Top-most entities are a company's leading organizational structures through which cooperate strategies and operations are carried out. They may be labeled in various ways, including division, branch, subsidiary, affiliate, group or joint venture. Excluded are individual plants, sales offices and entities located in foreign countries.
Source: LexisNexis, Inc. 2008.

Economic and Business Concentration

The logic of a private enterprise system rests in large measure on the existence of active competition in free markets. Vigorous competition, void of overwhelming entry barriers to markets by relatively few firms, is generally viewed as a prerequisite to market performance that is progressive and socially acceptable. A commonly used measure of concentration is the extent to a few firms in an industry dominate in terms of shipment values, employees, assets, capital expenditures and raw material. Such measures are not without fault and certainly have never been excused from widespread criticism, including the appropriateness of the geographic level to which they are applied (regional, national, international) and the ability to clearly define an industry and the intent of those firms that operate within it (Ellefson and Stone 1984, Sherer and Ross 1990). While acknowledging such limitations, concentration measures do provide, at the very least, a starting point from which to discuss the degree towhich some firms may have inordinate influence over an industry.

Shipment Values

Control of industry-wide shipment valuesis among the more common measures of economic concentration. Although such might be considered arbitrary, benchmarks have been suggested for concentration of shipment values in an industry's top eight companies: extreme concentration – 75 percent or more, high concentration – 50 to 74 percent, moderate concentration – 25 to 49 percent, and low concentration – 24 percent or less (Adams 1981). Concentration of shipment values varies considerably across manufacturing industries in the United States. The tire (545 companies), metal can (82 companies), and suit and overcoat (200 companies) manufacturing industries in 2002, the 20 largest companies accounted for more than 80 percent of each industry's shipment values. At the other extreme, the 20 largest firms in the commercial printing (32,572 companies), forging and stamping (2,623 companies), and sheet metal work(4,139 companies) industries seldomaccount for more than 30 percent of the values of products shipped in 2002 by their industries. For all U.S. manufacturing industries in 2002, the average four- and eight-firm concentration ratios are 22 percent and 31 percent respectively (U. S. Census Bureau. 2006b).

Using shipment values as the measure, the wood-based manufacturing industry is composed of some of the least concentrated industries in the nation. Making use of the most current information, few of the 40 industries (six-digit level NAICS code)that make up the wood-based manufacturing industry are highly concentrated (U.SCensus Bureau 2006b) (Table 18). At the four-company level, none had concentration percentages that exceeded 80 percent in 2002 while the five that exceeded the 50 percent level accounted for only 2 percent of industry-wide shipment values

in that year. Most of the 40 industries – 27 out of 40 – had four-company concentration levels within the range of 20 to 59 percent and accounted for only 22 percent of industry-wide shipment values. At the 20 company level, concentration was somewhat greater, namely 25 of 40 the industries had levels exceeding 60 percent and accounted for one third of the wood-based industry's 2002 shipment values.

Table 18. Shipment Value Concentration Ratios in the U.S. Wood-based Manufacturing Industry, by Major Industry Group. 2002.

Company Level and Concentration Ratio Range	Wood Product Manufacturing		Paper Manufacturing		Wood Furniture Manufacturing		All Wood-based Industries	
	Number of Industries	Shipment Values (percent)	Number of Industries	Shipment Values (percent)	Number of Industries	Shipment Values (percent)	Number of Industries	Shipment Values (percent)
Four-company								
0-19	6	7	0	0	2	4	8	4
20-39	5	10	5	9	3	19	13	13
40-59	2	6	12	20	0	0	14	9
60-79	1	2	3	4	1	1	5	2
80-100	0	0	0	0	0	0	0	0
Twenty-company								
0-19	1	1	0	0	0	0	1	1
20-39	5	16	0	0	2	9	7	8
40-59	3	11	1	1	3	20	7	11
60-79	2	7	7	25	0	0	9	11
80-100	3	13	12	52	1	2	16	22

Note: Based on six-digit level NAICS industry codes.
Source: U.S. Census Bureau. 2006b.

The wood product manufacturing group was the least concentrated segment of the wood-based industry in 2002 (Table 19). In that year, only 10 percent of the group's shipment values ($8.9 billion) originated from its four largest companies (remaining 15,343 companies accounted for more than $80.1 billion), while a modest 38 percent was produced by the group's next 50 largest companies. At the four company level, two of the group's industry's have concentration levels that stand out, namely the veneer and plywood industry (389 total companies) and the manufactured homes (mobile) industry (241 total companies) – the largest four companies in each accounting for 45 percent of each industry's shipment values. At the other extreme, three industries had a four-company concentration level of 17 percent or less, namely the millwork industry (17 percent, 4,432 industry total companies), sawmills and wood preservation industry (15 percent, 3,858 industry total companies), and the wood containers and pallets industry (7 percent, 2,792 industry total companies). The latter industry was the least concentrated of all industries engaged in wood-based manufacturing

Table 19. Shipment Value Concentration Ratios in the U. S. Wood-based Manufacturing Industry, by Major Industry Segment. 1997 and 2002.

Industry	Percent of Total Value of Shipments Accounted for by the Largest . . . Companies							
	Four		Eight		Twenty		Fifty	
	2002	1997	2002	1997	2002	1997	2002	1997
Wood Product Manufacturing	10	10	15	17	25	26	35	38
Sawmills and Wood Preservation	15	14	21	20	31	31	42	44
Veneer and Plywood	45	40	58	54	75	71	88	86
Engineered Wood Products	38	43	47	50	58	60	70	70
Reconstituted Wood Products	35	43	50	58	73	76	91	91
Millwork	17	16	26	24	36	35	47	46
Wood Containers and Pallets	7	6	10	9	17	14	27	23
Manufactured Homes (mobile)	45	44	64	60	81	81	92	92
Prefabricated Wood Buildings	22	17	29	25	41	38	60	58
Paper Manufacturing	26	18	43	31	54	51	63	67
Pulp Mills	61	59	88	86	99	100	100	100
Paper Mills	50	34	66	55	81	80	94	94
Paperboard Mills	48	34	68	53	88	82	99	98
Paperboard Containers	29	19	43	33	59	50	70	65
Paper Bag and Coated and Treated Paper	27	27	36	35	51	51	67	68
Stationery Products	29	28	45	42	64	61	79	76
Sanitary Paper Products	56	63	74	77	90	92	96	99
Wood Furniture Manufacturing	23	20	30	28	42	40	50	53
Wood Kitchen Cabinets and Countertops	29	18	35	26	43	36	50	45
Nonupholstered Wood Household Furniture	24	26	35	36	50	50	62	64
Wood Television, Radio, and Sewing Machine Cabinets	64	46	75	63	85	86	93	97
Wood Office Furniture	34	35	43	42	56	55	72	70
Custom Architectural Wood and Millwork	10	8	15	12	23	20	36	34
Showcases, Partitions, Shelves and Lockers	14	10	20	16	32	26	45	41

Note: Includes estimates where the U.S. Census Bureau withholds information to avoid disclosure of information about individual companies.
Source: U. S. Census Bureau, 2001a and 2006b.

in 2002 – 7 percent at the four company level (2,788 of 2,792 total companies accounting for only $0.4 billion of the industry's $5.1 billion in shipment values in 2002) and 23 percent at the 50 company level (2,742 companies accounting for only $1.2 billion of the total). At the 50 company concentration level, three of the group's industries might be considered to be highly or extremely concentrated, namely manufactured homes (mobile) industry (50 of 241 companies controlling 92

percent of shipment values), reconstituted wood products industry (50 of 180 companies controlling 91 percent) and the veneer and plywood industry (50 of 389 companies controlling 86 percent).

Shipment values are more concentrated in the paper manufacturing group (Table 19). Twenty-six percent of the group's $153.8 billion in shipment values in 2002 originated from the group's largest four companies in 2002 (3,533 of 3,537 total companies accounted for $39.7 billion), while 85 percent originated from the largest 50 companies (3.487 companies accounted for $130.7 billion). At the four company level, three of the group's industrious each account for over half of their industry's shipment values, namely the paper mills industry (183 companies accounted for half of the industry's $45.2 billion shipment values), sanitary paper products industry (105 companies, 56 percent of $9.5 billion) and the pulp mills industry (17 companies, 61 percent of $3.6 billion). For the later industry, all of the industry's shipments are generated by the 20 companies that make up the industry. At the 50 company level, very high levels of concentration occur in the paper mills industry (94 percent of industry's shipment values produced by 137 companies), sanitary paper products industry (99 percent by 59 companies) and paperboard mills industry (99 percent by 30 companies). At the four company level, the least concentrated of the paper manufacturing group's industries were the paper bag and coated and treated paper industry (741 companies account for 27 percent of shipment values), stationary products industry (521 companies, 29 percent) and the paperboard containers industry (1,540 companies, 29 percent).

The six industries that compose the wood furniture manufacturing group are not greatly concentrated – five of the six have four-company concentration levels that are less than 39 percent (Tables 18 and 19). The notable exception is the wood television and related cabinet industry (only 201 companies) whose four and 50 company concentration levels were 64 percent and 97 percent, respectively. Within the wood furniture group, two industries that had a sizeable number of companies in 2002 also had quite modest levels of concentration. With 9,452 total companies, the wood kitchen cabinet and countertop industry's largest four companies were responsible for only 29 percent of the industry's $14.3 billion in shipment values in 2002 – 9,448 companies accounted for more than $14.2 billion of this total. Similarly and with 3,975 total companies, the nonupholstered wood furniture industry's largest four companies account for more than $11.5 billion of the industry's $11.6 billion in 2002 shipments. Even at the 50 company concentration level, most of the group's industries are but modestly concentrated. Notable exceptions are the nonupholstered wood furniture household furniture industry ($7.2 billion of $11.6 billion in shipment values), wood office furniture industry ($2.1 billion of $2.9 billion), and the wood television and related cabinet industry (97 percent of $0.4 billion in shipment values).

Evidence of fewer companies accounting for a larger portion of shipment values within the wood-based manufacturing industry is mixed. At the four company concentration level, the wood product segment of the industry has remained the same (10 percent) during the period 1997 through 2002, although six of eight industries within the group had higher levels in 2002 than in 1997. Especially notable in this respect was the veneer and plywood industry (40 percent in 1997, 45 percent in 2002). As for longer term changes in concentration levels within the wood product group (and acknowledging possible changes in industry definitions), concentration levels at the four-company level for selected industries are (Appendix Table 7):

- Sawmill industry increased 7 percent from 1963 through 2002 (11 percent to 18 percent).
- Wood preservation industry decreased 4 percent from 1954 through 2002 (30 percent to 26 percent, with a high of 37 percent in 1966).
- Veneer and plywood industry increased 9 percent from 1972 through 2002 (36 percent to 45 percent).
- Millwork industry increased 7 percent from 1972 through 2002 (10 percent to 17 percent, with a high of 20 percent in 1987 and 1992).
- Manufactured homes and prefabricated wood buildings industry decreased 27 percent from 1972 through 2002 (61 percent to 34 percent).

From 1997 through 2002, the paper manufacturing group generally experienced an 8 percent increase in shipment values attributable to the group's four largest companies (Table 19). During this same five-year period, five of the group's seven industries registered increases in four-company concentration levels. Especially large increases were experienced by the paperboard mills (plus 14 percent), paper mills (plus 16 percent) and paperboard containers industries (plus 20 percent). Conversely, the group's sanitary products industry declined seven percentage points at the four company level during the same period. Changes at four company level over longer periods of time for some of the group's industries are as follows (Appendix Table 7):

- Pulp mills industry increased 15 percent from 1958 through 2002 (46 percent to 61 percent).
- Paper mills industry increased 24 percent from 1963 through 2002 (26 percent to 50 percent).
- Paperboard mills industry increased 25 percent from 1963 through 2002 (27 percent to 48 percent).
- Paperboard containers industry decreased 1 percent from 1963 through 2002 (30 percent to 29 percent, with a high of 35 percent in 1987 and 1992).

For some of the paper manufacturing group's industries, concentration at lower company levels has been especially significant (Appendix Table 7). For example, the 20 largest companies in the pulp

mills industry have been responsible for nearly all the industry's shipment values during the period 1958 through 2002 (97 percent plus, except for 81 percent in 1997). Similarly for the paper board mills industry at the 50 company concentration level, where 90 to 99 percent of the industry's shipments have been attributable to the industry's 50 largest companies during the nearly 40 years beginning in 1963.

The wood furniture manufacturing industry generally has experienced a moderate increase in concentration from 1997 to 2002 at the four company level – 20 percent to 23 percent, respectively (Table 19). Four of the group's industries became more concentrated, with the wood kitchen cabinets and countertops industry and the wood television industry leading in this respect, namely 11 percent and 18 percent respectively. Changes in concentration levels (four-company level) over longer periods for selected industries are as follows (Appendix Table 7):

- Wood kitchen cabinets and wood household furniture industry increased 13 percent from 1972 through 2002.
- Wood office furniture industry increased 6 percent from 1954 through 2002.
- Wood television and related cabinet industry increased 22 percent from 1972 through 2002.

Employees and Establishments

The extent to which few firms dominate employment within an industry is also an important measure of economic concentration (employees are full and part-time persons on the payroll of operating establishments) (U.S. Census Bureau 2008b). In general, the wood-based industry is composed of establishments each of which employee relatively few people. In 2007, 37 percent of the industry's establishments employed fewer than five employees each; 87 percent had less than 50 employees apiece. Less than 1 percent (about 45 establishments) had 1,000 or more employees in 2007. For comparison purposes, the 2007 distribution establishments by employment size class for all manufacturing in the United States was one to 19 employees – 69 percent of establishments, 20 to 99 employees – 22 percent, 100 to 249 employees – 6 percent and 250 or more employees – 3 percent. As for the industry's 1,246,931 employees, 72 percent (about 898,000) were employed in establishments that had between 20 and less than 500 employees each. Only a modest number of employees worked in establishments with relatively few employees in 2007, namely about 87,300 persons (7 percent of industry total) in establishments with less than 10 employees each. At the other extreme, only 12 percent (about 159,600 employees) of the industry's employees worked at establishments with 1,000 or more employees (U.S. Census Bureau 2008b). For all U.S. manufacturing industries, the largest portion (22 percent) work in establishments with 100 to 249 employees (U.S. Census Bureau 2008b).

Table 20. Employment Concentration in the U. S. Wood-based Manufacturing Industry, by Major Industry Segment and Employment-Size Class. 1998 and 2007.

Industry	Percent of Establishments with . . .									
	1 to 19 Employees		20 to 99 Employees		100 to 249 Employees		250 to 499 Employees		500 + Employees	
	2007	1998	2007	1998	2007	1998	2007	1998	2007	1998
Wood Product Manufacturing	66	66	27	26	6	6	1	2	*	*
Sawmills and Wood Preservation	67	67	26	26	6	6	1	1	*	*
Veneer and Plywood	39	33	32	37	17	17	11	13	1	*
Engineered Wood Products	44	49	47	44	7	6	1	1	1	0
Reconstituted Wood Products	30	33	33	33	34	30	2	4	1	*
Millwork	70	69	23	24	5	5	2	1	*	1
Wood Containers and Pallets	71	72	27	27	2	1	*	*	0	0
Manufactured Homes (mobile)	33	21	19	13	38	40	9	20	1	6
Prefabricated Wood Buildings	64	66	28	27	7	6	0	1	*	*
Paper Manufacturing	35	32	39	40	20	20	4	5	2	3
Pulp Mills	19	18	19	30	25	16	28	21	9	15
Paper and Newsprint Mills	24	9	25	20	18	22	15	19	18	30
Paperboard Mills	13	9	34	34	29	31	14	12	10	14
Paperboard Containers	28	26	45	47	25	25	2	2	*	*
Paper Bag and Coated and Treated Paper	44	14	35	34	16	18	4	5	1	2
Stationery Products	49	50	31	32	16	13	3	4	1	1
Sanitary Paper Products	36	32	30	25	19	19	9	11	6	13
Wood Furniture Manufacturing	76	72	19	22	3	4	1	1	1	1
Wood Kitchen Cabinets and Countertops	88	89	10	10	1	1	1	*	*	*
Nonupholstered Wood Household Furniture	86	81	10	13	2	3	1	2	1	1
Wood Television, Radio, and Sewing Machine Cabinets	94	76	5	18	1	2	0	2	0	2
Wood Office Furniture	63	61	26	28	7	7	3	3	1	1
Custom Architectural Wood and Millwork	67	65	29	32	4	3	*	*	0	*
Showcases, Partitions, Shelves and Lockers	61	62	32	31	6	6	1	1	*	*
All U.S Manufacturing	69	67	22	24	6	6	2	2	1	1

Note: An asterisk indicates lessthan 1 percent. Includes estimates where the U.S. Census Bureau withholds information to avoid disclosure of data for individual companies.
Source: U.S. Census Bureau 2008b.

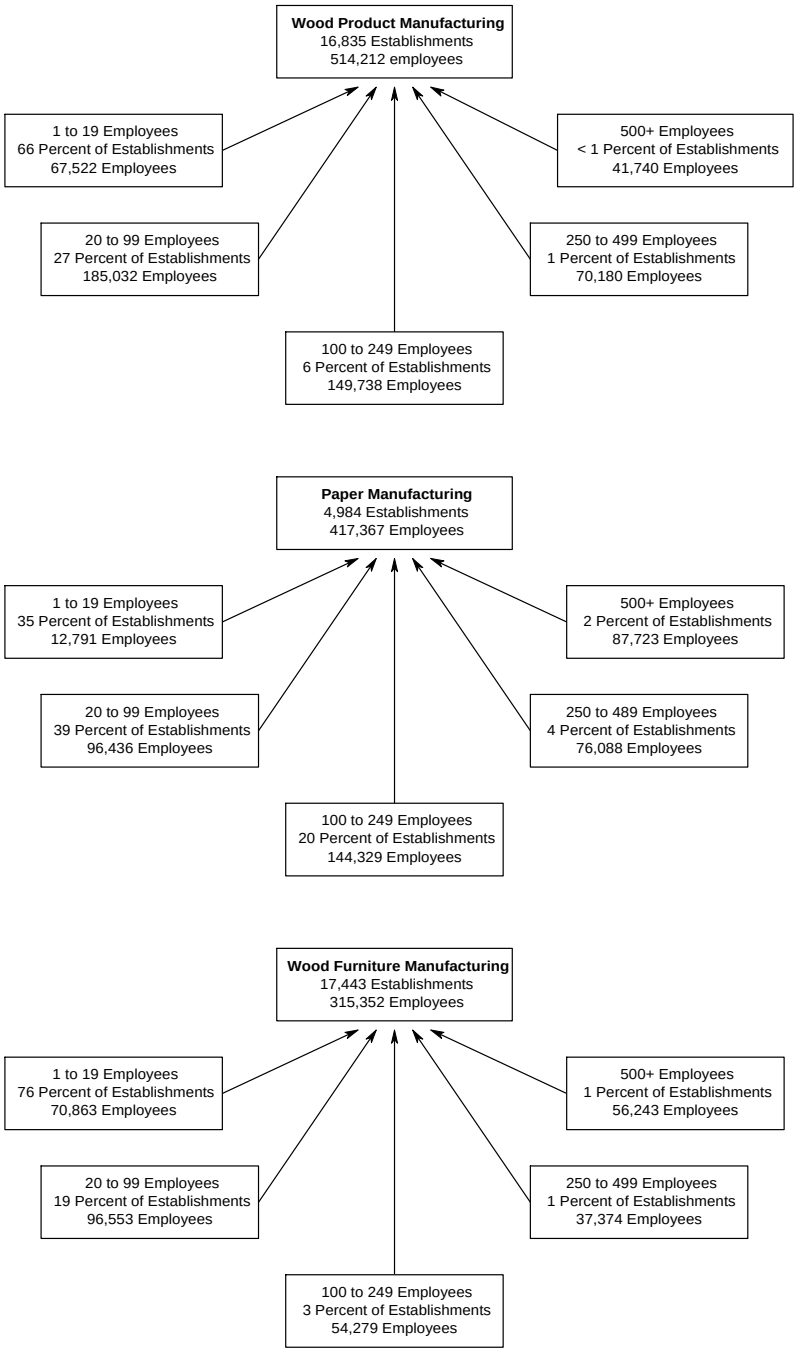


Figure 5. Employment Concentration in Major Industrial Groups of the U.S. Wood-based Manufacturing Industry.2007.

The wood-based industry's wood products group is composed principally of establishments that individually employ relatively few people (Table 20, Figure 5). In 2007, 66 percent of the group's 16,835 establishments had 19 or fewer employees, while 93 percent employed less than 100 employees (about half of the group's total employees). A very small portion (270 establishments, about two percent) of the group's establishments singly employed more than 250 people. In terms of employees, nearly 150,000 persons were employed in establishments with 100 to 249 persons (about 29 percent of employees in the wood products group). As for the eight industries that comprise the group, five had more than 60 percent of their establishments as a place of work for fewer than 20 employees (Table 20). In 2007, the wood containers and pallets industry had 71 percent of its establishments of such and employee size. Although establishments with few employees are a very common feature of the wood products group, five of the group's industries had a limited portion of their establishments (usually less than 2 percent each) each employing 250 to 499 persons. The exceptions were the veneer and plywood industry and the manufactured home (mobile) industry which registered 11 percent (48 establishments) and 9 percent (33 establishments), respectively.

The paper manufacturing group tends to have establishments that individually employ sizeable numbers of persons (Table 20, Figure 5). In 2007, 6 percent of the group's 4,984 establishments each employed 250 or more employees (about 39 percent of the employees in the paper manufacturing group), while 26 percent (almost 1,300 establishments) individually employed 100 or more employees (about 74 percent of total employees). However, there were a respectable number of establishments that singly employed a very modest number of employees, namely 74 percent (nearly 3,700 establishments) of the group's establishments employed fewer than 100 persons. As an employee size class, paper manufacturing establishments with 100 to 249 employees had the largest number of employees in 2007, namely 35 percent (more than 144,000 employees) of the paper group's total employees. All seven of the group's industries had a sizeable number of establishments that individually employ a large number of workers (250 plus employees). Thirty-three percent (87 of 262) of the paper and newsprint mills industry's establishments each had more than 250 employees (more than 80,800 persons), while 28 percent of the establishments (14 of 39) in the pulp mills industry were of the same employment size (employing over 2,300 persons, or about 75 percent of the industry's total employment).

The 17,443 establishments operating in the wood furniture manufacturing group also tend to individually be relatively small in terms of employees (Table 20, Figure 5). In 2007, 76 percent of the group's establishments (nearly 13,260 establishments) employed fewer than 20 employees each; 95 percent (16,570 establishments) was each a place of employment for less than 100 persons. In terms of total employee numbers, the largest number of employees resides with establishments

that singly employ 100 to 249 persons, namely 17 percent (about over 54,000 employees) of the group's total employees. Industry's within the group that especially tend toward small establishments employment-wise are the wood television and related cabinets industry, wood kitchen cabinet industry and the nonupholstered wood household furniture industry. Establishments employing fewer than 100 persons each in these three industries are very common, namely 99 percent of establishments, 98 percent and 96 percent, respectively. However, one of the group's industries does have a number of establishments each of which has 250 or more employees – wood office furniture industry, 4 percent of industry's establishments so classified (Schuler and others 2001, Wan and Bullard 2008).

Evidence of fewer establishments accounting for a larger portion of employees in the wood-based manufacturing industry is mixed (Table 20). At the 100 or more employment level for the period 1998 through 2007, all the industry's major groups experienced a decrease in employee concentration per establishment – about 1 per cent each during the nine year period. Of the 21 industries considered, seven increased their portion of employees in establishments with fewer than 100 persons – nine experienced declines in the same category (five no change). Most noticeable for changes in the proportion of establishments with fewer than 100 employees were the following industries:

- Engineered wood products industry – 93 percent to 91 percent of establishments
- Reconstituted wood products industry – 66 percent to 63 percent
- Manufactured homes (mobile) industry – 34 percent to 52 percent
- Pulp mills industry – 48 percent to 38 percent
- Paper and newsprint mills industry – 29 percent to 59 percent
- Paperboard mills industry – 43 percent to 57 percent
- Paper bag and coated and treated paper industry – 48 percent to 79 percent
- Nonupholstered wood household furniture – 94 percent to 96 percent

Business Assets and Income

Concentration of enterprise influence can also be judged by the degree to which business assets and incomes are controlled by few companies (assets are properties used to carry on a commercial enterprise). In 2005, manufacturing corporations nationwide had asset distributions that were heavily skewed to firms with fewer business assets, namely less than 1 percent of the nation's corporations, each with assets of more than $500 million, controlled 91 percent of manufacturing assets, while 95 percent of corporations, each has less than $1 million in assets, had control over only 1 percent of all manufacturing assets (U.S. Department of the Treasury 2008). The allocation of business assets within the wood-based manufacturing industry mirrors these national conditions.

Seventy percent of the corporations operating in the wood products group of the wood-based industry each had less than $1 million in assets in 2005. Combined, these corporations controlled only 1 percent of the group's total assets. In contrast, those wood product corporations that individually controlled $500 million or more in assets had command more than 77 percent of the group's total assets in 2005. None of the group's corporations reported $2,500 million or more in assets. A more detailed accounting of the how the group's business assets are distributed among companies in various asset classes is as follows (includes estimates where U.S. Department of the Treasury withholds information to avoid disclosure of data for individual companies) ($ thousands) (U.S. Department of the Treasury 2008):

$999 or less: 70 percent of corporations, 1 percent of total industry assets
$1,000 to $4,999: 22 percent of corporations, 5 percent of total industry assets
$5,000 to $9,999: 3 percent of corporations, 2 percent of total industry assets
$10,000 to $24,999: 3 percent of corporations, 3 percent of total industry assets
$25,000 to $49,000: 1 percent of corporations, 3 percent of total industry assets
$50,000 to $99,000: 1 percent of corporations, 3 percent of total industry assets
$100,000 to $499,000: less than 1 percent of corporations, 6 percent of total industry assets
$500,000 to $2,499,999: less than 1 percent of corporations, 77 percent of total industry assets
$2,500,000 or more: none

Universal Forest Products and Louisiana-Pacific Corporation are major enterprises operating in the wood products group of the wood-based industry. Using them as examples, the assets of the former in 2007 ($957 million) were distributed as follows: current assets (cash, inventories, accounts receivable) – 52 percent; property, property, plants and equipment – 28 percent; and goodwill, intangible assets (trade secrets, patents, knowledge) – 20 percent. For Louisiana-Pacific, the asset distribution ($3.2 billion) in 2007 was: current assets – 33 percent; timber and timberlands – 2 percent; plants, machinery, equipment – 33 percent; and goodwill and other assets – 34 percent (Form 10-K filed with U.S. Securities and Exchange Commission).

Business asset control within the converted paper product industry exhibit characteristics similar to those found in the wood products group. Eighty-three percent of the industry's corporations each had less than $5 million in assets yet combined accounted for less than 3 percent of the industry's total assets. At the other extreme, 85 percent of the industry's assets were mastered by large corporations (each controlling $500 million or more in assets), although they represented fewer than 1 percent of the corporations in the industry. Specifically ($ thousands) (U.S. Department of the Treasury 2008):

$999 or less: 56 percent of corporations, less than 1 percent of total industry assets
$1,000 to $4,999: 27 percent of corporations, 2 percent of total industry assets
$5,000 to $9,999: 8 percent of corporations, 2 percent of total industry assets

$10,000 to $24,999: 6 percent of corporations, 3 percent of total industry assets
$25,000 to $49,000: 2 percent of corporations, 2 percent of total industry assets
$50,000 to $99,000: 1 percent of corporations, 2 percent of total industry assets
$100,000 to $499,000: less than 1 percent of corporations, 4 percent of total industry assets
$500,000 to $2,499,999: less than 1 percent of corporations, 10 percent of total industry assets
$2,500,000 or more: less than 1 percent of corporations, 75 percent of total industry assents

The asset control situation was somewhat different for the pulp, paper and paperboard segment of the wood-based industry. Although the preponderance (95 percent) of the industry's total assets resided with large asset holding corporations ($500 million or more each), the portion of corporations holding assets in the range of about $1 million to less than $500 million was distributed over more asset classes than occurred in the wood products and converted paper products industries. Even with such a broader distribution, 37 percent of the industry's corporation in the less than $500 million category controlled less than 1 percent of the industry's total assets. Specifically ($ thousands) (U.S. Department of the Treasury 2008):

$999 or less: 20 percent of corporations, less than 1 percent of total industry assets
$1,000 to $4,999: 17 percent of corporations, less than 1 percent of total industry assets
$5,000 to $9,999: 4 percent of corporations, less than 1 percent of total industry assets
$10,000 to $24,999: 14 percent of corporations, less than 1 percent of total industry assets
$25,000 to $49,000: 10 percent of corporations, less than 1 percent of total industry assets
$50,000 to $99,000: 6 percent of corporations, 1 percent of total industry assets
$100,000 to $499,000: 11 percent of corporations, 4 percent of total industry assets
$500,000 to $2,499,999: 12 percent of corporations, 18 percent of total industry assets
$2,500,000 or more: 4 percent of corporations, 77 percent of total industry assents

Kimberly-Clark Corporation and MeadWestvaco are examples of corporations that are prominent in the paper manufacturing group of the wood-based industry. In 2007, the former's total assets ($18.4 billion) were distributed as follows: current assets (cash, inventories, accounts receivable) – 33 percent; property, property, plants and equipment – 44 percent; goodwill, intangible assets (trade secrets, patents, knowledge) – 16 percent; other assets – 7 percent. For Mead Westvaco, the asset distribution ($9.8 billion) in the same year was: current assets – 22 percent; property, plants, equipment, forestland – 43 percent; goodwill assets – 9 percent; and other assets (including prepaid pensions) – 26 percent (Form 10-K filed with U.S. Securities and Exchange Commission).

Business income is also heavily skewed toward larger wood-based manufacturing corporations. For the wood product group, 32 percent of its total receipts in 2005 were received by corporations with business assets of $500 million to $2,500 million each. In contrast, only 9 percent of such receipts were attributable to corporations with assets of less than $1 million. For the paper manufacturing group, the distinction between large and small receipt categories is even greater. Fifty-six percent of the group's receipts originate from corporations with assets of $500 million to

$2,500 million each, while only 4 percent arise from paper manufacturing corporations that individually had assets of less than $1 million in 2005 (U.S. Department of the Treasury 2008).

Capital Expenditures

Capital expenditures for new and used plants and equipment can also provide insight about the ability of a few firms to exert unreasonable influence over the functioning of an industry. Capital expenditures are those incurred in order to create business benefits beyond a current taxable year, including the replacement of (or addition to) manufacturing establishments and the purchase of equipment that will add to (or replace) existing plant capacity. The purchase of land is not considered a capital expenditure nor are investments made for routine maintenance and repairs (U.S. Census Bureau 2005). The most recent information about the distribution of capital investments among different size establishments was 2002. In that year, the distribution for all manufacturing industries within the United States was: establishments with one to 19 employees – 5 percent of capital expenditures, 10 to 49 employees – 16 percent, 100 to 249 employees – 19 percent, 250 to 499 employees – 17 percent, and 500 or more employees – 43 percent (U.S. Census Bureau 2005).

The wood-based manufacturing industry's capital expenditures ($9,675.2 million) were unevenly distributed among establishments of different size in 2002. In the latter year, the industry's smaller establishments (one to 19 employees) accounted for a very modest portion of the industry's total capital expenditures, namely 5 percent. In contrast, 31 percent of industry-wide capital expenditures in 2002 occurred in establishments with 500 or more employees. As for the remaining 64 percent of the industry's capital expenditures, such was distributed quite evenly among other categories of establishment size as follows: establishments with 20 to 99 employees – 20 percent, 100 to 249 employees – 23 percent, and 250 to 499 employees – 21 percent (U.S. Census Bureau 2005).

Capital expenditures by the wood products group were most prevalent among establishments that employed 20 or more but fewer than 250 persons (Table 21). In 2002, these establishments accounted for 67 percent of the group's $2,416 million in 2002 capital investments. If establishments employing 250 to 499 persons are added, the portion rises to 81 percent. Capital investments in the wood containers and pallets industry overwhelmingly occurred in lesser sized establishment, namely 86 percent of the industry's $120.5 million in capital investments occurred in establishments with fewer than 100 employees. Notably, capital investments in the millwork industry and the manufactured (mobile) homes industry occurred primarily in establishments employing 250 or persons — 35 percent and 45 percent respectively. In 2002, capital investment within the wood products group was largest within the sawmills and wood preservation industry ($793.0 million). Over three-quarters of its investments occurred in establishments with less than 250 but more than

20 employees. Such was quite consistent with the distribution of capital investments for entire group.

Table 21. Capital Expenditure Concentration in the U. S. Wood-based Manufacturing Industry, by Major Industry Segment and Employment-Size Class. 1997 and 2002.

Industry	Percent of Capital Expenditures in Establishments with . . .									
	1 to 19 Employees		20 to 99 Employees		100 to 249 Employees		250 to 499 Employees		500 + Employees	
	2002	1997	2002	1997	2002	1997	2002	1997	2002	1997
Wood Product Manufacturing	10	12	35	32	32	32	14	14	9	10
Sawmills and Wood Preservation	11	11	38	39	39	36	12	11	0	3
Veneer and Plywood	3	2	13	13	32	27	44	46	8	12
Engineered Wood Products	13	13	54	52	30	29	11	6	2	0
Reconstituted Wood Products	1	3	10	14	76	77	12	5	1	1
Millwork	10	12	38	34	17	25	14	11	21	18
Wood Containers and Pallets	32	29	54	55	10	12	4	4	0	0
Manufactured Homes (mobile)	2	1	12	4	41	34	32	40	13	21
Prefabricated Wood Buildings	11	12	37	32	27	23	22	29	3	4
Paper Manufacturing	2	1	12	10	20	22	24	17	42	50
Pulp Mills	*	*	2	4	33	5	33	37	32	54
Paper and Newsprint Mill	*	*	2	2	6	8	31	16	61	74
Paperboard Mills	*	*	8	6	16	12	26	29	50	53
Paperboard Containers	4	2	30	29	46	57	9	6	11	6
Paper Bag and Coated and Treated Paper	3	3	19	21	25	34	14	19	39	23
Stationery Products	5	4	24	19	32	51	11	22	28	4
Sanitary Paper Products	1	1	12	10	20	11	16	24	51	54
Wood Furniture Manufacturing	14	14	29	26	19	15	20	16	18	29
Wood Kitchen Cabinets and Countertops	20	27	23	26	18	14	24	10	15	23
Nonupholstered Wood Household Furniture	13	9	21	14	13	20	19	17	34	40
Wood Television, Radio, and Sewing Machine Cabinets	14	14	19	39	47	28	10	19	10	0
Wood Office Furniture	7	5	38	17	15	31	32	31	8	16
Custom Architectural Wood and Millwork	20	21	58	55	19	16	3	5	0	3
Showcases, Partitions, Shelves and Lockers	8	10	37	37	30	21	15	15	10	17

Note: An asterisk indicates less than 1 percent. Includes estimates where the U.S. Census Bureau withholds information to avoid disclosure of data for individual companies.
Source: U.S. Census Bureau. 1999 and 2005.

The more than $6,260 million in capital investments made by the paper manufacturing group in 2002 were concentrated in the group's larger establishments (Table 21). Sixty-six percent of these investments occurred in establishments with more than 250 employees – 86 percent in those with

100 or more employees. Dominating this distribution toward larger establishments was the paperboard mills industry and the sanitary paper products industry, each with more than half of its capital investments occurring in establishment with more than 500 employees. The paper and newsprint mills industry leads in the latter category with more than 60 percent of its 2002 capital investments occurring in the latter sized establishments. In 2002, the same industry registered the largest capital investments ($2,734.7 million) of all industry's within the group. Very few of these investments were made in establishments with less than 100 employees (about 2 percent); nearly all were in establishments with 250 or more persons, namely 92 percent.

Capital investments by the wood furniture manufacturing group were reasonably well distributed across five major categories of establishment size (average of 20 percent per category) (Table 21). Only capital investments in the 20 to 99-employee size category deviated appreciably from the average, namely 9 percent higher. Forty-three percent of the group's capital investments occurred in smaller establishments – less than 100 employees – while 38 percent occurred in the group's larger establishments – 250 or more employees. The wood kitchen cabinets and countertops industry lead in capital investments made in 2002, namely $443.0 million. The latter was distributed rather evenly over all establishment size classes, although the largest portion (43 percent) was made in establishments with fewer than 100 employees.

Evidence of a larger portion of capital investments being made by larger establishments in the wood-based manufacturing industry is mixed (Table 21). All the industry's groups experienced declines in the portion of large establishments accounting for capital investments from 1998 through 2002. This was especially evident for the wood furniture group's larger establishments (employing 250 or more employees), where in 2002 there were 7 percent fewer firms accounting for capital investments than in 2002. The story is reversed for smaller establishments, namely more such establishments (less than 100 employees) at the group-wide level assumed a larger portion of capital investments between 1998 and 2002: wood product manufacturing– 35 percent to 45 percent, paper manufacturing – 11 percent to 14 percent, and wood furniture manufacturing – 40 to 43 percent. Of the 21 industries considered, 13 increased the portion of capital expenditures by establishments with fewer than 100 persons – seven experienced declines in the same category (one stayed the same) (Table 21). The largest increase (22 percent to 45 percent) occurred in the wood office furniture industry, while the largest decrease (53 percent to 33 percent) occurred in the wood television and related cabinets industry.

Diversification and Subsidiaries

The wood-based manufacturing industry is one of the most varied manufacturing industries in the United States. To conclude that the millwork industry is similar to the paperboard container industry, and that the veneer and plywood industry is similar to the wood office furniture industry would be an improper conclusion. Each segment of the industry typically has special requirements for labor, technology and raw materials, and has often adopted very unique organizational structures as are required to meet the diverse needs of their customers. An appreciation of the industry's diversity can be gained by assessing the range of company operations both within and outside the industry, by reviewing the extent to which establishments specialize in a primary product or service, and by examining the expanse of company connections (subsidiaries, joint ventures, affiliates, holding companies) that often give structure to the assortment of enterprises operating within the industry.

Industry-wide Diversification

Corporations operating in the wood-based manufacturing industry conduct business in a variety of the industry's wood-based segments. In 2002, 28 of the industry's companies reported operating in an average of four of the industry's major segments (contrast with the seven major segments of 55 companies studied in 1978 [O'Laughlin and Ellefson 1981]) (Table 22). Three of these 28 companies operated in two or fewer wood-based industries, namely Sappi Fine Paper North America (paper bags and coated and treated paper), Cox Industries, Inc. (sawmills and wood preservation; veneer, plywood and engineered wood products), and Bemis Company (paperboard containers, paper bags and coated and treated paper). Operating in eight different segments of the industry were International Paper, Georgia-Pacific (Koch Industries), Weyerhaeuser Company, and Potlatch Forest Products. Greater appreciation of within-industry diversification can be obtained by looking at the product and service mix of specific companies, examples of which are as follows (also Appendix Table 8) (company annual reports, Form 10-K filed with U.S. Securities and Exchange Commission):

Sonoco Products

Consumer Packaging (36 percent of 2007 sales, 63 plants worldwide)
- Rigid packaging – paper
- Rigid packaging – plastic
- Ends and enclosures – metal
- Printed flexible packaging – laminations and engraving

Paper and Tubes and Cores (42 percent of 2007 sales, 122 plants worldwide)
- Paper – paper board, box board, liner board

Tubes and Cores – Tubes, packaging, pallet components
Packaging Services (13 percent of 2007 sales)
Service centers – Custom packaging, artwork
Point-of-purchase – Semipermanent displays
Other Products (9 percent of 2007 sales)
Wire and cable reels – Steel, wood, poly-fiber
Molded and extruded plastics – Extrusion technology products
Paperboard specialities – Custom-printed glass

Pope Resources

Timberland Operations (67 percent of 2007 revenue)
Fee timber – Harvest and sale of logs
Land sales – timberland
Other Operations – minerals, communication towers
Timber Management and Consulting (4 percent of 2007 revenue)
Timberland management
Timber management consulting
Timber Investment Management
Real Estate (29 percent of 2007 revenue)
Development properties
Commercial properties
Rental properties
Land sales

UPM-Kymmene Corporation

Magazine Papers Division (32 percent of 2007 sales)
Coated papers
Uncoated papers
Newsprint Division (15 percent of 2007 sales)
Standard newsprint
Machine-finished uncoated papers
Fine and Specialty Papers Division (28 percent of 2007 sales)
Coated wood-free papers
Label Division (10 percent of 2007 sales)
Self-adhesive label stock
Wood Products Division (12 percent of 2007 sales)
Sawmills
Plywood
Other Products (3 percent of 2007 sales)
Real Estate
Logistic operations
New venture investments

Table 22, Manufacturing Diversification Withinand Out of the U.S. Wood-Based Manufacturing Industry, by Company and Major Industry Segments. 2007.

Company	Industry													
	Timber Tract Operations	Logging	Sawmills, Wood Preservation	Veneer, Plywood, Engineered Wood	Reconstituted Wood Products	Millwork, Doors, Windows	Wood Containers, Pallets	Pulp Mills Paper Mills	Paperboard Mills	Paperboard Containers	Paper Bags, Treated Paper	Stationery Products	Nonwood-based Industries
International Paper Company	●		●	●				●	●	●	●	●	
Georgia -Pacific Corporation	●		●	●	●			●	●	●	●		
Weyerhaeuser Company	●	●	●	●	●			●	●	●			●
Kimberly-Clark Corporation									●	●	●		●
Smurfit-Stone Container Corp.								●	●	●	●		●
MeadWestvaco								●	●	●	●	●	●
Avery Dennison										●	●	●	●
Temple-Inland, Inc.	●		●	●	●				●	●			●
Sonoco Products Company									●	●	●		●
Grief Inc.	●	●					●		●	●			
Bemis Company										●	●		
Boise Cascade Holdings, LLC			●	●				●	●	●	●	●	●
Universal Forest Products			●	●	●	●							
Graphic Packaging Corporation									●	●	●		●
NewPage Holding Company								●			●	●	
Louisiana-Pacific Corporation	●	●		●	●								
Packaging Corp of America	●								●	●			●
Sappi Fine Paper North America											●		●
Plum Creek Timber Company	●	●	●	●		●							
Hampton Affiliates	●	●	●			●							●
Wausau Paper Corporation								●			●	●	
Potlatch Corporation	●	●	●	●	●			●	●		●		●
Columbia Forest Products, Inc.			●	●	●	●							
Roseburg Forest Products	●	●	●	●	●	●							
Simpson Timber Company		●	●	●		●			●	●	●		●
Green Bay Packaging			●							●	●		
Cox Industries, Inc.			●	●									●
Longview Fibre Company	●							●	●	●	●	●	●

Source: Company annual reports, filings with U.S. Securities a nd Exchange Com mission, Dunn and Bradstreet, Inc. 2008, ECNext, I nc. 2008, LexisNexis, Inc. 2008, and Mergent, Inc. 2008.

Wood-based companies are not averse to diversifying outside the wood-based industry. Of 28 companies previously identified (Table 22), 16 have significant operations in industries that are other than wood-based. Examples of this outside diversification are (Appendix Table 8): Weyerhaeuser – real estate, Kimberley-Clark – surgical supplies, MeadWestvaco – speciality chemical supplies, Sonoco Products – plastic bottle manufacturing and metal tube manufacturing, Avery Dennison – paints, adhesives and sealants, Temple-Inland – real estate, insurance and mortgage banking, Boise Cascade – roofing, siding and insulation, Graphic Packing Corporation – industrial machinery, Plum Creek Timber Company – real estate and land subdivision, Champion Enterprises – land subdivision and single-family home construction, Pella Corporation – metal windows and doors, Plum Creek Timber Company – real estate, Potlatch – real estate, Cox Industries – construction materials, Simpson Timber Company – recyclable material merchant and materials recovery.

Primary Products Specialization

The wood-based manufacturing industry may be diverse in the range of products it manufactures and the many different industries within which it operates. However, most of the industry's establishments concentrate on the manufacture of a primary product of their own choosing (Table 23). As used here, product specialization is the portion (percent) of an establishment's total value of shipments that can be attributed to the establishment's primary product (U. S. Census Bureau 2009b). In 2007, 94 to 95 percent of the shipment values of the industry's establishments were attributable to the sale of a primary product. For comparison purposes, highly specialized nonwood-based industries in 2007 were the semiconductor machinery industry (100 percent, $14.8 billion in shipment values), computer storage device industry (100 percent, $8.4 billion) and the metal can industry (99 percent, $13.6 billion). Conversely, least specialized among the nation's manufacturing industries in 2007 were the motor vehicle air-conditioning industry (79 percent, $5.8 billion), leather goods industry (79 percent, $0.5 billion) and the cyclic crude oil industry (72 percent, $6.0 billion) (U. S. Census Bureau 2009b).

Product specialization within each of the industry's major groups is very similar. Consider the wood products group where in 2007 95 percent or more of the shipment value of each of the group's nine major industries was attributable to a primary product (Table 23). The millwork industry was the least specialized (95 percent), while the manufactured homes (mobile) industry reported 99 percent of its shipments coming from its principal product, namely mobile homes. During the period 2002 through 2007, product specialization changed modestly, registering only a one or 2 percent increase for all the group's industries. Over a longer period – 1977 through 2007

Table 23. Primary Product Specialization in the U.S. Wood-based Manufacturing Industry, by Major Industry Group. 2002 and 2007.

2002 and 2007 Primary Products Specialization Ratio (percent)

Wood Products Manufacturing – 95,97

Sawmills and Wood Preservation – 95,96
- Sawmills – 96,96
- Wood Preservation– 93,96

Veneer and Plywood – 93,96
- Hardwood Veneer and Plywood – 95,96
- Softwood Veneer and Plywood – 91,97

Engineered Wood Products – 94,96
- Engineered Wood Members – 97,98
- Truss Systems – 92,93

Reconstituted Wood Products – 97,99

Millwork – 91,95
- Wood Windows and Doors – 93,97
- Cut Stock, Resawn Lumber and Planing – 89,92
- Other Millwork (including flooring) – 92,96

Wood Containers and Pallets – 97,98

Manufactured Homes (mobile) – 99,99

Prefabricated Wood Buildings – 95,96

Miscellaneous Wood Products – 94,99

Paper Manufacturing – 94,94

Pulp Mills – 95,95

Paper and Newsprint Mills – 95,95

Paperboard Mills – 93,95

Paperboard Containers – 94,94
- Corrugated and Solid Fiber Boxes – 98,98
- Folding Paper Board Boxes – 96,95
- Setup Paperboard Boxes – 87,87
- Fiber Cans, Tubes and Drums – 96,97
- Nonfolding Sanitary Food Containers – 93,92

Paper Bag and Coated and Treated Paper – 86,92
- Coated and Laminated Packaging Paper – 89,90
- Coated and Laminated Paper – 89,91
- Uncoated Paper and Mutiwall Bags – 95,96
- Laminated Aluminum Foil Packaging – 75,87
- Surface-Coated Paperboard – 94,98

Stationary Products – 92,91
- Die-Cut Paper and Paperboard – 91,96
- Envelopes – 98,98
- Stationary, Tablets and Related Products – 86,79

Sanitary Paper Products – 92,92

Other Converted Paper Products – 96,97

Wood Furniture Manufacturing – 91,93

Wood Kitchen Cabinets and Countertops – 96,97

Nonupholstered Wood Household Furniture – 96,90

Wood Television, Radio, and Sewing Machine Cabinets – 90,93

Wood Office Furniture – 89,91

Custom Architectural Wood and Millwork – 94,92

Showcases, Partitions, Shelves and Lockers – 92,95

Note: Includes estimates where the U.S. Census Bureau withholds information to avoid disclosure of data for individual companies. Engineered Wood Members industry does not include truss system industry.
Source: U. S. Census Bureau. 2006a and 2009b.

– only the sawmills industry and the softwood and hardwood veneer and plywood industries had definite increases in product specialization (9, 4 and 4 percent, respectively). Only the group's wood preserving industry reported a decrease over the 30-year period (Appendix Table 9).

Although not necessarily representative of the 15,085 companies operating in the industry's wood product group in 2007, three example companies provide further insight about product specialization within the group (Mergent, Inc. 2008):

> •Deltic Timber Corporation ($149 million total revenue in 2007): woodlands (grow and market timber in domestic markets) – 27 percent, mills (lumber, timbers, decking, finger-jointed studs) – 53 percent; and real estate (large scale residential and commercial development) – 20 percent.
>
> •Louisiana-Pacific Corporation ($1,704 million total revenue in 2007) oriented strand board (structural panels) – 48 percent, composite wood products (siding, decking) – 26 percent, engineered wood products (joists, laminated lumber) – 19 percent, and plastic building products (siding, decking, mouldings) – 7 percent.
>
> •Palm Harbor Homes, Inc. ($555 million total revenue in 2007): factory-built housing (multi-section and modular homes) – 92 percent, financial services (insurance, mortgage services) – 8 percent.

The paper manufacturing group is also highly specialized in the products it manufactures (Table 23). The group's overall specialization ratio in 2007 was 94 percent, with the pulp mills, paper and newsprint mills, and paperboard mills industries leading in this regard (ratio of 95 percent each). Although only 4 percentage points below these industries, the least specialized within the group was the stationary products industry (91 percent). From 2002 through 2007, two of the group's eight industries increased the intensity of their product specialization. Most significant in this respect was the paper bag and coated and treated paper industry (86 percent to 92 percent). Of the paper group's industries, only the stationary products industry reported a decline in specialization (92 percent to 91 percent) and four reported no change during the period 2002 to 2007. Product specialization over the 30 year period 1977 through 2007 increased substantially within two of the group's industries, namely the pulp mills and the paperboard mills industries (9 percent and 11 percent, respectively) (Appendix Table 9).

Product specialization among the 3,484 companies operating in the paper group in 2007 can also be further appreciated by looking at the experiences of three example companies (Mergent, Inc. 2008):

•Pope and Talbot, Inc. ($841 million total revenue in 2006): wood products (manufacture and sale of dimension lumber) – 44 percent; paper products (newsprint, tissue, high grade paper) – 56 percent.

•Boise Cascade Holdings, LLC ($5,414 million total revenue 2007): wood products (particleboard, dimension lumber, laminated beams) – 11 percent, paper products (pulp, containerboard, uncoated paper) – 28 percent, packaging and newsprint (newsprint, corrugated containers) – 14 percent, building material distribution (wood product sale to professional builders) – 47 percent.

•Bemis Company ($3,656 million total revenue 2007) flexible packaging (barrier laminates for food, medical and personal care) – 82 percent and pressure sensitive materials (package labeling) – 18 percent.

The wood furniture manufacturing group was the least specialized (average of 93 percent) of the three major groups operating in the wood-based industry (Table 23). Yet even so characterized, two of the group's six industries reported specialization ratios of 95 percent or more. Least specialized in 2007 was the nonupholstered wood household furniture (90 percent). Four of the group's industries confirmed an increase in product specialization from 2002 through 2007. The group's other two industries declined in specialization, with an especially large decline the nonupholstered wood household furniture (96 percent to 90 percent). Over the period 1977 through 2007, only the wood office furniture industry experienced a significant increase in product specialization (Appendix Table 9). Three examples of the 17,132 companies operating in the wood furniture group can provide further insight about product specialization within the group (Mergent, Inc. 2008):

•Masco Corporation ($11,770 million total revenue in 2007): cabinets (cabinets for kitchens, baths, offices) – 24 percent, plumbing products (faucets, bath and shower units) – 29 percent, decorative architectural products (paint, hardware) – 15 percent, installation services (installing of cabinets, doors, windows) – 22 percent, and speciality products (windows, doors, radiators) – 10 percent.

•Bassett Furniture Industries, Inc. ($335 million total revenue in 2007): design and manufacture of furniture products – 74 percent, retail distribution of furniture products – 26 percent, and investment and real estate – unknown portion.

•Ethan Allen Interiors, Inc. ($1,355 million total revenue 2007): design and manufacture of furniture products – 48 percent and retail distribution of furniture products – 52 percent.

Subsidiaries and Joint Ventures

Product and industry diversification can be shaped by the extent to which enterprises promote and successfully implementing cooperative arrangements. These arrangements are assigned

a variety of names, including affiliates, joint ventures, holding companies and partially or wholly-owned subsidiaries. For the most part, they are distinct and legally separate entities (for tax and regulatory purposes) that can incur debt, sign contracts, and undertake activities in their own self-interest, often doing so without consequence to the financial or legal position of parent companies (except to the extent of the parent's investment in the entity). Such cooperative linkages can offer a variety of benefits to a parent corporation. For example, expand into new markets, secure new technologies, access needed natural resources and production facilities, secure needed physical and managerial resources, bring on board important labor and managerial skills, achieve economies of scale required for efficient operations, and reduce the riskiness of operating in some foreign countries (Ellefson and Stone 1984, Hollingsworth 1991).

Subsidiaries. Controlled by a parent company through ownership of shares, subsidiaries are common approaches to promoting enterprise diversity (variously known as companies, corporations, limited liability companies). An often common premise is that ownership of 50 percent plus one share is sufficient for a parent company to form and control a subsidiary. Companies operating within the wood-based industry very often form subsidiaries as a way of promoting their corporate mission. In 2007, 32 example companies operated a total of 1,755 subsidiaries or an average of about 55 per company (Table 24). The four leading companies in this respect accounted for over half of these subsidiaries (Avery Dennison Corporation, Kimberly-Clark Corporation, Masco Corporation, Sonoco Products Company). Among the 32 example companies, subsidiaries operating in foreign countries are most common, namely 63 percent of the 1,755 total. As for ownership of subsidiaries, 95 percent are wholly owned (51 percent or more owned by a parent company).

The range of and intent of subsidiaries can best be appreciated by example. Consider the following companies and some of their domestic subsidiaries (Mergent, Inc. 2008, company annual reports, filings with U.S. Securities and Exchange Commission):

> •Temple-Inland, Inc. (30 subsidiaries): Inland Paper, Inc., Midwest Sheets Company, Scotch Investment Company, Sunbelt Insurance Company, Temple-Inland Insurance Company, Texas South-Eastern Railroad Company, Corporate Commercial Reality, Inc., and TIN Land Financing Company. Company also operates subsidiaries in Mexico, Japan and Puerto Rico.
>
> •Louisiana-Pacific Corporation (29 subsidiaries): Ketchikan Pulp Company, GreenStone Industries, Inc., New Waverly Transportation, Inc., US GreenFiber LLC, Abitibi LP Engineered Wood, Inc., and LP Pinewood SPV, LLC. The company also operates subsidiaries in Canada, Mexico and Chili.

Table 24. Subsidiaries and Affiliates of Com panies in the U. S. Wood-based Manufacturing Industry , by Domestic and Foreign Positioning. 2007.

Company	Total	Domestic		Foreign	
		Number	50 Percent or Less Owned	Number	50 Percent or Less Owned
Avery Dennison Corporation	254	25	0	229	0
Kimberly-Clark Corporation	191	43	0	148	2
Masco Corporation	177	69	3	108	11
Sonoco Products Company	162	49	0	113	0
Weyerhaeuser Company	141	95	9	46	0
Greif, Inc.	128	19	0	109	2
Chesapeake Corporation	90	20	0	70	0
Smurfit-Stone Container Corporation	75	25	10	50	19
Bemis Company	72	12	0	60	7
Universal Forest Products	50	42	4	8	4
Koppers, Inc.	40	11	0	29	0
Temple-Inland, Inc.	30	22	2	8	1
Graphic Packaging Corporation	30	9	0	21	0
Rock-Tenn Company	28	14	0	14	0
Furniture Brands International	25	19	0	6	0
Bukeye Technologies	24	13	0	11	0
Plum Creek Timber Company	24	24	0	0	0
Champion Enterprises, Inc.	24	19	0	5	0
Caraustar Industries	22	18	0	4	0
Louisiana-Pacific Corporation	29	15	0	14	6
P.H. Glatfelter Company	22	10	1	12	4
TreeSource Industries	21	21	0	0	0
Pope and Talbot, Inc.	18	7	0	11	0
Neenah Paper, Inc.	17	7	0	10	0
Bassett Furniture Industries	14	14	2	0	0
Bosie Cascade Company	11	9	0	2	0
Wausau Paper Corporation	9	8	0	1	0
International Paper Company	9	3	0	6	0
Packaging Corporation of America	8	4	0	1	0
MeadWestvaco	5	7	0	1	0
Cavalier Homes, Inc.	3	3	0	0	0
Nashua Corporation	2	1	0	1	0

Source: LexisNexis, Inc. 2008, Mergent, Inc. 2008.

•Wausau Paper Company (nine subsidiaries): Rhinelander Paper Company, Mosinee Paper Corporation, Bay West Paper Corporation, Sorg Paper Company, and Middletown Hydraulic Company. The company also operates a subsidiary in the United States Virgin Islands.

•Champion Enterprises (24 subsidiaries): Star Fleet, Inc., North American Housing Corporation, Champion Development Corporation, Champion Home Builders Company, Western Homes Corporation, Highland Manufacturing Company, and New Era Building Systems, Inc. The company also operates subsidiaries in Canada and the United Kingdom.

Affiliates. A company may establish an affiliate status with another company over which it may, or may not, have control. In some cases, an affiliate relationship is established as a means of avoiding the appearance of control. Although often difficult to identify, examples of affiliate structures in the wood-based industry are (Mergent, Inc. 2008, company annual reports, filings with U.S. Securities and Exchange Commission):

•Kimberly-Clark: (a) Kimberly-Clark De Mexico, S.A. De C.V: Mexico, 48 percent ownership, sanitary paper products, 600 employees; and (b) Kimberley-Clark Trading Company, Sdn. Bhd: Malaysia, 100 percent ownership, sanitary paper products, 100 employees.

•Masco Corporation: (a) Morgantown Plastics: United States, unknown ownership arrangement, plastic moulding, 285 employees; and (b) Rubinetterie Mariani S. p. A: Italy, 100 percent ownership, wood kitchen cabinets and countertops, unknown number of employees.

•Temple-Inland, Inc.: ATC Panels: Canada, 100 percent ownership, reconstituted wood products, 115 employees.

•Universal Forest Products, Inc.: (a) D&R Framing, LLC: United States, 50 percent ownership, framing contractors and carpentry, 35 employees; and (b) Pinelli Universal, S. De R. L. De C. V.: Mexico, millwork, 450 employees.

•Weyerhaeuser Company: (a) Boom Chain Transportation Company, Ltd.: Canada, 40 percent ownership, transportation services, unknown number of employees; and (b) Lisaak Forest Resources, Ltd.: Canada, 49 percent ownership, forest management services, unknown number of employees.

Holding Companies. A holding company is a company that owns part, all, or a majority of another companies' outstanding stock. Such a company does not produce goods or services, but rather its purpose is to own shares of other companies and thereby have control over their actions. Holding companies are a way of reducing investment risk for its owners and a way for owners to own and control of a number of different companies. As with affiliates, holding companies are often

difficult to identify. Examples must suffice (Mergent, Inc. 2008, company annual reports, filings with U.S. Securities and Exchange Commission).

> •Boise Cascade Holdings, LLC: (a) Boise Cascade Holdings, United States, 100 percent ownership, sawmills, plywood and millwork, 10,000 employees; (b) Building Products Limited, United Kingdom, 100 percent ownership, engineered wood products distribution, 14 employees.
>
> •Cellu Tissue Holdings, Inc.: (a) Cellu Tissue Corporation, United States, paper mills and medical supplies, 100 employees; (b) Coastal Paper Company, United States, paper mills, 112 employees; (c) Menimnee Acquisition Corporation, United States, coated and laminated paper, 125 employees.
>
> •Capricorn Holdings, Inc. (Capricorn Investment Group): (a) Whitestone Acquisition Corporation, United States, sanitary paper products, 100 employees; (b) Mrs. Fields Holding Company, speciality foods, about 535 employees.
>
> •P. H. Glatfelter Company: (a) Ecusta Australia Pty. Ltd., Australia, newsprint mills, unknown number of employees; (b) Newtech Pulp, Inc., Philippines, newsprint mills, 85 employees; () Papeteries de Cascadec S. A.: France, newsprint mills, 150 employees; (d) Papierfabrik Schoeller & Hoesch GmbH & Co. KG, Germany, paper mills, 550 employees.
>
> •International Paper Company: Fifteen holding companies in 19 different countries, products such as paper manufacturing, decorative wood products, real estate services, packaging and containers, paper board, and paper wholesalers, about 2,000 employees.
>
> •Smurfit-Stone Container Corporation: (a) Smurfit-Stone Container Canada Corporation, Inc., Canada, 100 percent ownership, newsprint mills, 265 employees; (b) Stone Container Japan Corporation, Ltd., Japan, 100 percent ownership, newsprint mills, unknown number of employees.

Joint Ventures. An entity formed between two or more parties to undertake economic activity together, a joint venture can be for a single specific project only or can proceed as a continuing business relationship. In either case, the parties involved contribute equity and subsequently share in the revenues, expenses, and control of the joint venture. A joint venture may be a corporation, limited liability company, partnership or other legal structure, depending on a number of considerations including taxation and tort liability. Companies operating in the wood-based industry have formed a number of joint ventures over the years, many of which no longer exist.[3] Examples

[3]Joint ventures in 1981 that no longer exist or had different ownership structures in 2008 are Bear Island Paper Company (Dow Jones, Inc., Washington Post, Inc, Bato Company), Boise Southern (Boise Cascade, Southern Natural Resources, Inc.), Brunswick Pulp and Paper Company (Mead Corporation, Scott paper), Crown Simpson (Crown Zellerbach, Simpson Timber), Georgia Kraft (Mead Corporation, Time, Inc), Gray's Harbor Paper Company (Hammermill Paper Company, ITT Rayonier), Halsey Pulp Company (American Can, Pope and Talbot, Inc.), Leaf River Forest Products, Inc (Great Northern Nekoosa, Ktmi Kymmene Oy), Mountain Tree Farm (Weyerhaeuser Company,

of joint ventures operating during the period 1995 through 2008 are as follows (Mergent, Inc. 2008, company annual reports, filings with U.S. Securities and Exchange Commission):

•Northern Pacific Paper Corporation (United States): Joint venture of Weyerhaeuser Company and Nippon Paper Group. 50 percent Weyerhaeuser Company ownership and 50 percent Nippon Paper Group ownership. Newsprint mills. 525 employees.

•Aracruz Productos de Maderia S.A. (Brazil) Joint venture of Weyerhaeuser Company and Aracruz Celulose S.A. 50 percent Weyerhaeuser Company ownership and 50 percent Aracruz Celulose S.A. ownership. Hardwood veneer and plywood. Unknown number of employees.

•Showa Products Ltd. (Japan): Joint venture of Sonoco Products Company and Showa Martusutsu Company, Ltd. 100 percent Sonoco ownership. Packaging machinery manufacture. 310 employees.

•RTS Packaging (United States): Joint venture of Sonoco Products Company and Rock-Tenn Company. 65 percent Rock-Tenn Company ownership and 35 percent Sonoco Products Company ownership. Paperboard mills. 50 employees.

•Southern Diversified Timber, LLC (United States): Joint venture of Plum Creek Timber Company and the Campbell Group, LLC. 91 percent Campbell Group ownership and 9 percent Plumb Creek Timber Company ownership. Timberland and timber management. Unknown number of employees.

•Kimberley-Clark Australia Pty. Ltd. (Australia): Joint venture of Kimberly-Clark Corporation and Amcor Ltd. 50 percent Kimberly-Clark Corporation ownership and 50 percent Amcor Ltd. Ownership. Paper mills. 300 employees.

•Hogla-Kimberly Ltd. (Israel): Joint venture of Kimberly-Clark Corporation and Hadera Paper Ltd. 50.1 percent Kimberly-Clark Corporation ownership and 49.9 percent Hadera Paper Ltd. ownership. Sanitary paper products. Unknown number of employees.

•Premier Boxboard Ltd. LLC (United States): Joint Venture of Caraustar Industries and Temple-Inland, Inc. 50 percent Caraustar Industries ownership and 50 percent Temple-Inland Inc. ownership. Container board mill. Unknown number of employees.

Scott Paper Company), St. Lawrence Pulpand Paper Company (Sonoco Products, Potsdam Paper), Schoeller Technical Papers, Inc (Mead Corporation, Schoeller Fininz K.G.) And Sylvcachem Corporation (St. Regis Paper, SCM Corporation) (Ellefson and Stone 1984).

Enterprise Ownership

Legal Form of Ownership

Ownership of wood-based manufacturing enterprises can be configured in a variety of ways. For example, it can occur as a single individual (sole proprietorship, where owner assumes all responsibility for business assets and liabilities), a group of partners (for example, general and limited partnerships defined by the extent of ownership involvement in business activities), or a state chartered corporation that offers ownership opportunities via the issuance of transferable shares (stock). Combinations of these ownership types are also possible, including S-Corporations (75 or fewer shareholders enjoying the liability benefits of a corporation and the tax status of a partnership) and limited liability companies (LLC) (limited liability of a corporation, tax status of sole proprietorships and limited partnerships). In the United States, the corporate form of organization is most common, representing the choice of organization for 80 percent of all manufacturing companies in 2002. Partnerships and individual proprietorships account for the next largest type of legal organization (18 percent) (U. S. Census Bureau 2005).

The cooperate form of legal organization also dominates the wood-based industry (Table 25). In 2007, an estimated 72 percent of companies engaged in wood product manufacturing were so organized, while 89 percent involved in paper manufacturing chose to organize in such a fashion. Companies within the industry's wood product manufacturing segment tend to organize less often as partnerships and individual proprietorships than occurs nationwide for manufacturing companies generally (25 percent and 18 percent, respectively), although the number (and proportion) of individual proprietorships has steadily declined since 1992. The industry's paper manufacturing segment is inclined toward fewer partnerships and individual proprietorships than the national average (10 percent and 18 percent, respectively), and the portion of these forms within the paper industry has remained fairly constant since 1992 (U. S. Census Bureau 2005).

The corporate form of legal organization also dominates measures such as number of employees, capital expenditures, and value of shipments (Table 25). Such is especially so for the industry's paper manufacturing segment, where corporate structures associated with the latter three measures accounted for 94 or more percent of their magnitude since 1992. Except for changes in the magnitude of employees, capital expenditures, and value of shipments, the proportion of their allocation to the corporate, partnership, and individual proprietorship structures for wood product and paper manufacturing has remained fairly stable since 1992.

Table 25. Legal form of Ownership of Companies in the U.S. Wood-based Manufacturing Industry, by Major Industry Group and Type of Ownership. 1992-2007.

Major Industry Group	Companies	Employees	Capital Expenditures (million dollars)	Value of Shipments (million dollars)
Wood Product Manufacturing				
Corporate				
2007	10,861 (72)	462,791 (90)	2,902 (90)	92,823 (91)
2002	11,053 (72)	489,007 (90)	2,182 (90)	81,343 (91)
1997	10,554 (68)	506,523 (89)	2,564 (89)	79,646 (90)
1992	18,908 (56)	579,500 (88)	1,549 (88)	74,148 (91)
Individual Proprietorship				
2007	2,414 (16)	10,284 (2)	32 (1)	2,040 (2)
2002	2,425 (16)	10,911 (2)	36 (1)	1,391 (2)
1997	3,472 (22)	21,162 (4)	68 (2)	2,034 (2)
1992	10,447 (31)	42,800 (7)	116 (7)	3,640 (4)
Partnership				
2007	1,358 (9)	35,995 (7)	258 (8)	6,120 (6)
2002	1,420 (9)	38,002 (7)	182 (8)	5,969 (6)
1997	1,129 (7)	20,070 (3)	98 (4)	3,217 (4)
1992	2,336 (7)	19,200 (3)	58 (3)	2,458 (3)
Other or Unknown				
2007	452 (3)	5,142 (1)	32 (1)	1,020 (1)
2002	457 (3)	2,645 (1)	16 (1)	382 (1)
1997	466 (3)	22,279 (4)	139 (5)	3,574 (4)
1992	2,187 (6)	14,200 (2)	37 (2)	1,319 (2)
Paper Manufacturing				
Corporate				
2007	3,101 (89)	392,325 (94)	6,278 (95)	165,457 (94)
2002	3,144 (89)	462,554 (94)	6,000 (95)	145,483 (94)
1997	1,319 (77)	558,078 (97)	8,289 (96)	145,959 (97)
1992	3,941 (92)	620,400 (99)	7,873 (99)	131,707 (99)
Individual Proprietorship				
2007	104 (3)	4,174 (1)	66(1)	1,76 0(1)
2002	99 (3)	2,049 (1)	20 (1)	503 (1)
1997	182 (11)	1,784 (1)	11 (1)	265 (1)
1992	198 (5)	1,000 (*)	3 (*)	97 (*)
Partnership				
2007	244 (7)	16,695 (4)	198 (3)	7,041 (4)
2002	257 (7)	25,020 (4)	226 (3)	7,251 (4)
1997	105 (6)	5,856 (1)	74 (1)	1,890 (1)
1992	76 (2)	4,100 (1)	79 (1)	1,267 (1)
Other or Unknown				
2007	35 (1)	4,174 (1)	66 (1)	1,760 (1)
2002	36 (1)	1,813 (1)	14 (1)	529 (1)
1997	105 (6)	8,556 (1)	221 (2)	2,182 (1)
1992	49 (1)	1,000 (*)	7 (*)	130 (*)

Note: Information for 2007 is estimated. Number in parentheses are percent of total within industry for the year. Asterisk indicates less than one percent. Comparison of 1992 data with data for 1997, 2002 and 2007 may be problematic because of changes in the classification of certain industries.
Source: U. S. Census Bureau 2005.

Wood-based manufacturing enterprises may legally organize in any of the aforementioned manners. They may also be considered private entities, operating as sole proprietors, general or limited partnerships, or corporations wherein the owner(s) chose not to provide the public with access to the benefits (or costs) of the enterprise through such mechanisms as ownership of common stock. Of the 22 companies identified as examples in the timber tract industry, over two-thirds are considered private, while 12 of the 13 example firms operating in the logging industry are considered private (Tables 1 and 2). Nearly the same portion (65 percent)of the leading 66 companies in the industry's wood products manufacturing segment are private, while almost half (47 percent) the leading 75 firms in the pulp manufacturing industry operate as private enterprises (Tables 7 and 9). Of 35 leading example wood furniture companies, nearly six of 10 are considered private (Table 11).

Demographic Character of Owners

The extent to which persons of different race and gender own commercial enterprises is an important reflection of the economic and social opportunities offered by the wood-based manufacturing industry. Focusing on gender, the combined wood product manufacturing and paper manufacturing segments of the industry are composed of firms that are 73 percent male owned, 10 female owned, and 17 percent equally male-female owned (Table 26)(ownership is defined as having 51 or more percent stock or equity in a firm). Even though larger in absolute number, female ownership of wood product manufacturing firms is less common (10 percent of firms) than occurs in the paper manufacturing segment of the industry (10 percent). In contrast, a larger portion of wood product firms (17 percent) are equally male-female owned. Although changes in industry classifications make comparisons difficult, the portion of male-owned wood product manufacturing firms increased between 1997 and 2002 (70 percent to 73 percent) as did the portion of female-owned firms (7 percent to 10 percent), while equally male-female owned firms declined 6 percent. As for the paper manufacturing industry, the changes between 1997 and 2002 were a 2 percent increase in male-owned firms, 10 percent increase in female owned firms, and a 12 percent decline in equally male-female owned firms. For all U.S. manufacturing firms, the proportions in 1997 and 2002, respectively, were: male – 56 percent and 66 percent; female – 26 percent, 20 percent; and equally male-female – 18 percent, 14 percent (U. S. Bureau of the Census 2001, 2006c).

Table 26. Ownership of Companies in the U. S. Wood Based Manufacturing Industry, by Gender and Race, and Major Industry Group. 2002.

Industry and Ownership Characteristic	Number of Firms		Receipts		Total Employees		Annual Payroll	
	Number	Per-cent	Million Dollars	Per-cent	Number	Per-cent	Million Dollars	Per-cent
Wood Product Manufacturing								
Female-owned	3,917	10	4,240	9	28,540	9	845	9
Male-owned	29,540	73	41,824	85	277,118	84	7,869	84
Equally Male-female Owned	7,059	17	3,247	16	24,574	17	628	7
Total	40,516	100	49,311	100	330,232	100	9,342	100
Hispanic or Latino	1,287	3	711	1	5,761	2	147	1
White	39,375	94	48,912	97	327,662	97	9,277	74
Black or African American	438	1	172	1	863	*	21	*
American Indian/Alaska Native	422	1	96	*	961	*	25	*
Asian	353	1	393	1	2,528	1	76	1
Native Hawaiian/Pacific Islander	22	*	12	*	100	*	3,080	24
Total	41,897	100	50,296	100	337,875	100	12,626	100
Paper Manufacturing								
Female-owned	765	17	3,818	31	17,328	25	660	27
Male-owned	3,311	72	7,976	66	48,922	71	1,671	69
Equally Male-female Owned	491	11	356	3	2,660	4	83	4
Total	4,567	100	12,150	100	68,910	100	2,414	100
Hispanic or Latino	241	5	343	4	1,484	3	52	3
White	4,352	90	8,409	92	52,688	94	1,784	94
Black or African American	134	3	270	3	1,164	2	38	2
American Indian/Alaska Native	9	*	5	*	30	*	1	*
Asian	81	2	90	1	580	1	18	1
Native Hawaiian/Pacific Islander	1	*	1	*	5	*	1	*
Total	4,818	100	9,118	100	55,951	100	1,894	100

Note: Asterisk indicates less than one percent. Entries in each ownership category have 51 or more percent of stock or equity in a firm. Some data entries are estimates based on national aggregate data for all manufacturing industries. Because of survey procedures, totals are not comparable to totals presented by 2002 Economic Census. In some cases, owners of firms had the option of selecting more than one race or gender for an entry.
Source: U.S. Census Bureau 2006c.

Firms in the industry's wood product and paper manufacturing segments combined are dominated by persons of the white race, namely 94 percent in 2002 (Table 26). Minority-owned firms represent slightly more than 6 percent of the combined segments, with persons of Hispanic or Latino background composing the largest portion of this minority aggregate (3 percent). Within each of the industry's major segments, Hispanic or Latino ownership of paper manufacturing firms is slightly more common (5 percent) than occurs with wood product manufacturing firms (3 percent). As for changes in the racial mix of firm ownership between 1997 and 2002, white males continued a 94 percent ownership rate in the wood product manufacturing segment of the industry, while blacks experienced a one percent increase as did persons of Hispanic and Latino background. American Indian ownership declined one percent. Within the paper manufacturing industry changes from 1997 to 2002 were as follows: Asian – 3 percent increase; American Indian – one percent increase; Hispanic or Latino – 2 percent decrease; and white, black and Native Hawaiian – no change. For all U.S. manufacturing industries in 2002, 93 percent are White owned, 4 percent Asian, 2 percent Black or African American, 1 percent American Indian and Alaskan Native, and less than one percent Native Hawaiian and Pacific Islander (U. S. Bureau of the Census, 2001, 2006c).

As for measures of economic importance, female-owned wood product manufacturing firms accounted for nine percent each of the segments receipts, employees and annual payroll (Table 26). Such is considerably less than the 85 percent of receipts, 84 percent of employees, and 84 percent of annual payroll associated with male-owned wood product manufacturing firms. Female owned paper manufacturing firms are more likely to excel in these measures, 31 percent of receipts, 25 percent of employees, and 27 percent of annual payroll. From a racial and ethnic perspective, firms owned by whites clearly dominate in terms of receipts generated (94 percent), employees (97 percent), and annual payroll (74 percent) by wood product manufacture, and by paper manufacture (92 percent, 94 percent, 94 percent, respectively). Only Hispanic and Latino owned firms are anywhere near such magnitudes. Sales, employees, and annual payroll for all U. S. manufacturing industries is distributed among race as follows: white – 92 percent, Asian – 4 percent, Hispanic and Latino – 2 percent, and all others less than one percent each (U. S. Bureau of the Census, 2006c).

Corporate Stock Ownership

Individuals as well as other organizations are provided opportunity to share in the ownership of public corporations. They do so via the ownership of shares of a company's stock. The number of outstanding shares of wood-based manufacturing corporations can range widely. In the case of Pope and Talbot, Inc, the company offers less than 20 million shares, while in the case of the Kimberly-Clark Corporation shareholders own well over 450 million shares (Table 27). For the 35

Table 27. Common Stock Ownership of Publicly-Owned Companies in the U.S. Wood-Based Manufacturing Industry, by Company. 2007.

Company	Stock Shares Outstanding (million)	Estimated Value of Stock (billion dollars)	Stock Shares Owned by . . . (percent)		
			Directors and Executive Officers	Other Individuals and Organizations	
				More Than 5 Percent Each	Others
American Greetings Corp	52.1	1.2	27.9 [22]	57.6 [8]	14.5
American Woodmark Corp	14.9	0.6	30.1 [13]	43.1 [6]	26.8
Avery Dennision Corp	107.0	6.8	1.3 [18]	00.0 [0]	98.7
Bemis Co	107.3	3.5	4.4 [18]	00.0 [0]	95.6
Buckeye Technologies, Inc	38.0	0.5	12.7 [18]	46.8 [5]	40.5
Champion Enterprises. Inc	55.8	0.7	3.2 [14]	49.2 [7]	47.6
Caraustar Industries, Inc	29.0	0.2	4.6 [18]	47.2 [6]	48.2
Cenveo, Inc	53.6	1.3	9.0 [10]	19.8 [2]	71.2
Chesapeake Corp	20.3	0.3	3.4 [14]	42.8 [6]	53.8
Ethan Allen Interiors, Inc	34.3	1.1	15.4 [12]	45.4 [6]	39.2
Fortune Brands, Inc	153.4	1.2	1.5 [15]	00.0 [0]	98.5
Furniture Brands International, Inc	56.5	0.8	2.6 [16]	59.4 [8]	38.0
Graphics Packaging Corp	200.9	0.9	3.7 [11]	79.3 [5]	17.0
Greif, Inc	46.6	2.6	15.2 [13]	30.0 [5]	54.8
International Paper Co	446.7	15.9	1.1 [26]	31.8 [4]	67.1
Kimberly-Clark Corp	453.8	31.2	10.3 [17]	12.0 [2]	77.7
La-Z-Boy, Inc	51.8	0.6	4.5 [14]	52.3 [6]	43.2
Louisiana-Pacific Corp	94.2	2.1	1.0 [13]	26.5 [3]	72.5
Masco Corp	391.3	10.3	3.8 [16]	37.5 [4]	58.7
MeadWestvaco Corp	186.0	5.7	1.5 [22]	23.1 [3]	75.4
Neenah Paper, Inc	15.4	0.6	4.1 [13]	21.8 [3]	74.1
Packaging Corp of America	106.2	25.7	12.8 [12]	30.4 [3]	56.8
P. H. Glatfelter	45.3	7.9	1.3 [17]	21.1 [3]	77.6
Pope and Talbot, Inc	17.1	0.1	8.9 [12]	40.2 [5]	50.9
Potlatch Corp	20.4	1.9	4.4 [15]	25.9 [3]	69.7
Plum Creek Timber Co	303.0	7.0	13.3 [10]	27.7 [2]	59.0
Rayonier, Inc	77.4	3.3	4.8 [18]	13.6 [2]	81.6
Rock-Tenn Co	40.4	1.3	17.7 [17]	8.2 [1]	74.1
Sappi Ltd	214.5	3.6	0.9 [12]	99.1 [5]	00.0
Smurfit-Stone Container Corp	257.0	2.9	1.4 [26]	39.1 [4]	59.5
Sonoco Products Co	100.3	3.8	5.0 [23]	6.7 [1]	88.3
Temple-Inland, Inc	110.8	6.3	3.1 [26]	8.9 [4]	88.0
Universal Forest Products, Inc	19.6	0.9	11.6 [16]	21.4 [5]	67.0
Wausau Paper Corp	52.7	0.7	12.3 [14]	36.9 [5]	50.8
Weyerhaeuser Company	236.8	16.1	3.1 [29]	21.5 [2]	75.4

Note: Numbers in brackets are number of persons or organizations. Fortune Brands, Inc. information reflects conditions for MasterBrands Cabinets, Inc. Potlatch Corp information reflects conditions prior to company conversion to a real estate investment trust.
Source: U.S. Securities and Exchange Commission 2007, Yahoo Finance, Inc. 2007.

example companies (public) identified here, an average of 120 million shares per company (valued at $ 4.8 billion per company) were owned by various individuals and organizations in 2007.

Directors and executive officers are often prominent owners of stock offered by the companies which employ them. For the 35 example companies identified here, such persons owned an average of 7.4 percent of their company's shares, with American Woodmark Corporation and American Greetings Corporation having directors and officers holding the highest portion – 30.1 percent (valued at $180 million), and 27.9 percent (valued at $335 million) (Table 27). Concentration of stock among shareholders owning five or more percent a company's stock can be significant. For example, an average of four stockholders own more than 5 percent of a company's outstanding shares owned and average of 32 percent of a company's stock for the 35 companies considered. In 2007, Avery Dennision Corporation, Fortune Brands Inc., and Bemis Company were clearly dominant in the diversity of their stock owners, namely 98.7 percent, 98.5 percent, and 95.6 percent, respectively, was owned by persons or organizations other than directors and executive officers or by persons or organizations owning 5percent of stock or more. The most concentrated stock ownership (director and executive officers plus individuals and organizations with 5 percent or more ownership) was reported by Sappi Ltd. (17 owners with 100 percent of stock), American Greeting Corporation (30 owners with 86 percent), Graphics Packaging Corporation (30 owners with 83 percent), and American Woodmark Corporation (19 owners with 73 percent).

The stock of wood-based manufacturing companies is often owned by institutional investors, namely organizations that are financially very sophisticated and trade in large volumes of stock (such as pension funds, corporate profit-sharing plans, mutual funds, college endowment funds). For 35 leading wood-based manufacturing companies in 2007, an average of 46 percent of each company's stock was owned by the company's 10 largest instructional investors (Appendix Table 10). Among companies having a large portion (60 percent or more) of their stock owned by such investors are American Greetings Corporation (67.4 percent, 184 institutional investors), La-Z-Boy Inc (65.9 percent, 136 owners), Caraustar Industries Inc (63.1 percent, 96 owners), Champion Enterprises 61.8 percent, 162 owners), Furniture Brands International Inc (63.3 percent, 177 owners), and Pope and Talbot, Inc (61.7 percent, 64 owners). In contrast, the 10 largest institutional investors in the following companies account for only a modest portion of company stock, namely Sappi Ltd (7.7 percent, 41 institutional investors), Graphics Packaging Corporation (19.4 percent, 88 investors), Plum Creek Timber Company (24.3 percent, 478 investors), and Kimberly-Clark Corporation (31.5 percent, 839 investors). For the 35 example companies identified here, the most frequent institutional investors in 2007 were:

Vanguard Group (21 companies)
Barclays Global Investors, Ltd (20 companies)
T. Rowe Price Associates, Inc (9 companies)
Franklin Resources, Inc (9 companies)
Morgan Stanley Asset Management, Inc (8 companies)
Wellington Management Company (8 companies)
Goldman Sachs Asset Management, Inc (8 companies)
Wells Fargo & Company (5 companies)
Bank of America Corporation (5 companies)
Putnan Investment Management (3 companies)

Some owners of stock are part of well-known families. For example, in the 1980s, Dupont family interests were prominent owners of Kimberly-Clark and Louisiana-Pacific stock, while Mead family interests owned nearly 44 percent of the 10.7 million shares issued by Consolidated Paper Company in 1980 (Ellefson and Stone 1984). In 2007, Weyerhaeuser family interests owned 47.2 percent of Potlatch Corporation outstanding shares (William T. Weyerhaeuser owned 2.1 percent of company's shares). Other family-owned enterprises involving the manufacture or sale of wood products are Gould Paper Corporation (wholesale distributor of fine paper), 84 Lumber (retail lumber merchandising), and Koch Industries (owner of Georgia-Pacific Corporation).

Foreign Ownership

Wood-based manufacturing enterprises in the U.S. can be owned by persons or organizations located in other countries. For purposes of analysis, a U. S. business enterprise is foreign-owned affiliate (direct investment) when a foreign person owns at least 10 percent of the voting securities of an enterprise or an equivalent interest if the enterprise is unincorporated. A person is broadly defined to include individuals, partnerships, trusts, corporations, and governments (Bureau of Economic Analysis 2006). In 2002, foreign direct ownership of enterprises within the U. S. manufacturing sector generally was as follows: 10,322 establishments (2.9 percent of all U. S. establishments), 1.8 million employees (12.0 percent of total), and $693 billion in value of shipments (17.7 percent). In terms of values of shipments in 2002, foreign ownership was most dominate within industries manufacturing nonmetallic mineral products (29.9 percent of U. S. total), (chemical products 29.8 percent), and petroleum and coal products (25.5 percent) (U.S. Department of Commerce 2006).

Foreign direct investment in wood-based manufacturing companies approached $14.4 billion in 2008, a sum that has increased since 2005 at an annual average rate of about 9 percent per year. Of the 2008 industry total, 79 percent ($11.4 billion) was invested in the industry's paper

manufacturing group, an amount distributed nearly equally between the groups' pulp, paper and paperboard mills industry and the converted paper products industry. The wood-based manufacturing industry is a very modest portion of foreign direct investments made in all U.S. manufacturing industries, namely less than 1 percent of $2.3 trillion. A more detailed description of foreign direct investment in the wood-based manufacturing industry is as follows (estimates for wood furniture products) (million dollars)(U.S. Department of Commerce 2009a).[4]

	---------- Paper ----------				
Year	Pulp, Paper and Paperboard Mills	Converted Paper products	Total	Wood Products	Wood Furniture Products
2004	9,161	2,306	11,467	1,621	545
2005	6,254	2,631	8,885	1,726	362
2006	7,165	2,583	9,748	1,832	179
2007	5,747	5,164	10,911	2,260	172
2008	5,992	5,415	11,407	2,473	500

Foreign ownership of the U. S. wood-based manufacturing industry in 2002 accounted for approximately 4.9 percent of the industry's establishments, namely 390, and were responsible for employment of more than 78 thousand persons – somewhat less than 19 percent of industry's total employees (Table 28). As for the values of wood products manufactured and shipped by foreign--owned establishments, the total in 2002 exceeded $19.8 billion or about 15.5 percent of the industry's total in that year. The paper manufacturing segment of the industry dominated in foreign ownership in terms of the portion of establishments, employees and shipment values attributable to foreign ownership (Table 28). In all of these measures, the three major segments of the wood manufacturing industry account for a very small portion of totals for all U. S. manufacturing. As for trends in foreign ownership, the number of foreign-owned affiliates in the wood products manufacturing segment of the industry has been fairly stable from 1999 through 2004, although the number of employees has declined since 2000 (approximately 16 percent). In absolute numbers, employees of foreign-owned paper manufacturing affiliates have declined appreciably from 1999 through 2004, namely 24,100 persons or about 15 percent (US Bureau of Economic Analysis 2007) (Table 29).

[4] As foreign direct investment occurs in the U.S. wood-based manufacturing industry, so too do U.S. based companies make investments in industries located in other countries. In 2008, such investments totaled $15,665 million dollars, a sum originating from the industry's paper group ($13,241 million, 84 percent), wood products group ($1,872 million; 12 percent) and the wood furniture products group ($552 million; 4 percent [estimated]). The paper group's total was divided between the pulp, paper and papermills industry (76 percent) and the converted paper products industry (24 percent) (U.S. Department of Commerce 2009a).

Table 28. Foreign Majority-Owned Affiliates in the U.S. Wood-Based Manufacturing Industry, by Major Industry Group and Ownership Characteristic. 2002.

Characteristics of Majority-Owned Affiliates	Major Industry Group		
	Wood Products Manufacturing	Paper Manufacturing	Wood Furniture Manufacturing
Foreign-owned Establishments			
Number of Foreign-owned Establishments	145	213	32
Percent of Industry's Manufacturing Establishments	0.85	3.84	0.18
Percent of All U. S. Manufacturing Establishments	0.04	0.06	0.01
Employees of Foreign-owned Establishments			
Number of Employees at Foreign-owned Establishments	19,192	45,756	13,313
Percent of Industry's Manufacturing Employees	3.59	9.22	3.76
Percent of All U. S. Manufacturing Employees	0.13	0.32	0.09
Hourly Wages of Production Workers in Foreign-owned Establishments			
Production Worker Hourly Wages at Foreign-owned Establishments	$12.51	$21.41	$11.84
Industry's Production Worker Hourly Wages (2005)	$13.85	$19.71	$14.14
All U.S. Industry Production Worker Hourly Wages	$16.47	$16.47	$16.47
Value of Shipments of Foreign-owned Establishments			
Value of Shipments of Foreign-owned Establishments (millions)	$2,948	$16,070	$746
Percent of Industry's Value of Shipments	3.31	10.45	1.78
Percent of All U.S. Manufacturing Value of Shipments	0.08	0.41	0.02

Note: Employment by foreign majority-owed affiliates in the U.S. wood-based industry in 2008: wood products group – 14,400; paper group – 32, 100; and wood furniture products (estimated) – 6,900.
Source: U. S. Department of Commerce 2006 and 2009b, and Appendix Table 11.

Table 29. Foreign-owned Affiliates in the U. S. Wood-based Manufacturing Industry, by Major Industry Group and Affiliate Characteristic. 1999-2004.

Industry and Year	Number of Foreign-owned Affiliates	Assets of Foreign-owned Affiliates ($ million)	Sales of Foreign-owned Affiliates ($ million)	Employees of Foreign-owned Affiliates
Wood Products Manufacturing				
1999	37	8,455	4,129	27,400
2000	38	13,099	5,852	29,200
2001	40	14,447	5,466	26,500
2002	38	15,587	6,294	25,900
2003	33	18,608	6,811	25,300
2004	34	*14,049	*5,580	*24,600
Paper Manufacturing				
1999	295	40,398	35,531	166,200
2000	287	43,250	37,724	166,100
2001	275	45,373	37,010	158,900
2002	272	44,284	34,003	154,200
2003	257	48,241	33,785	145,200
2004	270	50,189	40,359	142,100

Note: Asterisk indicates estimate. The number of foreign owned affiliates in the forestry and logging industry were: 5 affiliates each in 1999 and 2002, and 4 affiliates each in 2000, 2001, 2003 and 2003. In 2007, foreign-owned affiliates in the forestry and logging industry involved assets of $310 million (average of $345 million from 2004 through 2007) and an estimated 1,000 employees.
Source: U.S. Department of Commerce 2007 and 2009b.

Foreign business parents of U.S. wood-based establishments tend to be concentrated in Canada, Europe, and Asian-Pacific countries (Appendix Table 11). For 11 foreign countries (or regions) considered, 28 percent (88) of foreign-owned establishments in the U.S. were owned by firms located in Canada. Next most common were establishments with parent firms located in Japan and other Asia-Pacific countries (18 percent), followed by the United Kingdom with firms owning 14 percent of the 317 identified foreign-owned firms. The number of employees at foreign-owned firms followed a somewhat different pattern: 33 percent located at establishments owned by a Canadian parent firm, 17 percent associated with a firm in Japan or other Asia-Pacific country, and 13 percent with a parent company in Germany. As for wood-based manufacturing industries in which establishments are most likely to be owned by a foreign parent, converted paper products and plywood and engineered wood products tend to dominate foreign interests. Companies located in Latin America, Canada, and Japan or other Asia-Pacific countries are especially prominent in this respect.

Wisconsin is dominant among states with wood-based manufacturing establishments owned by foreign companies, namely 27 establishments of which 24 are engaged in the manufacture of paper products (Appendix Table 12). Six of Wisconsin's 27 foreign-owned establishments have

parent firms in Canada. Also having a sizeable in having foreign owned wood-based manufacturing establishments are California (24), Georgia (24), Texas (20) and North Carolina (18). Of 31 states identified as having foreign-owned wood-based manufacturing establishments, the latter four plus Wisconsin account for 39 percent of the groups' total number of foreign-owned establishments. Excluding an "other countries" category, parent firms in Canada are most commonly represented in the 31 states (75 of 290 establishments).

The foreign parent companies of wood-based manufacturing enterprises located in the United States are among the world's leading companies. A detailed review of 81 companies indicated that the firms were located in 26 different countries and in 2006 averaged $720 million in sales world wide (Table 30). The parent firm's sales ranged from a modest $95 million (Canada's Viceroy Homes, Ltd) to over $18 billion (Finland's Stora Enso Oyj). Canada's presence in the U.S. was especially prominent in that 19 parent firms (nine of which had worldwide sale exceeding one billion dollars) operated 24 wood-based subsidiaries in the U.S. The 81firms were responsible for 113 wood-based subsidiaries that operated in 20 different wood-based industries in the United States. On average, each parent firm operated in two different industries. Although parent firms often operated in more than one industry, the frequency of their industry presence was as follows:

Paper product wholesaler – 14 companies
Paper and news print mills – 10
Millwork manufacturing – six
Paperboard containers – five
Paper bag and coated treated papers – four
Pulp mills – three
Reconstituted wood products – two
Sawmills – two
Paper recycling – two
Cooperage – two
Wood furniture – two

In addition to the above, one foreign parent firm operated in each of the following industries: paperboard mills, speciality papers, hardwood veneer and plywood, lumber wholesaler, lumber-plywood wholesaler, wood pallets, forestry services, paperboard mills, and millwork wholesaler.

The 81 foreign-owned company's and their subsidiaries operating in the U.S. wood-based industry are presented in further detail elsewhere (Appendix Table 13). Company's worthy of special note as examples are Finland's Stora Enso Oyj which is engaged worldwide in a variety of paper manufacturing and distribution activities, and had worldwide revenues of over $18 billion in 2006. The firm operates two major subsidiaries in the United States, namely Enso International and Stora Enso North America Corporation, the latter of which employed 5,400 persons and had 2006 sales of $2.8 billion. Also noteworthy is Svenska Cellulosa Aktiebolget (SCA) of Sweden, $14 billion revenue generator (2006) that has major subsidiaries in the United States, including SCA Americas and its various affiliates (1,800 employees). The United Kingdom's DS Smith Plc is also a prominent firm operating in the U.S., with worldwide sales of $2.6 billion, an important portion

of which originates from the firm's U.S. based paper bag and treated paper operations. Japan has an important presence in the U.S. wood-based industry via the Oji Paper Company, Ltd's (over $11 billion worldwide sales) Kanzaki Speciality Papers, Inc, and via Nippon Paper Industries Company (Nippon Paper Group, 2006 sales of nearly $6 billion) which is engaged in a US located joint venture with Weyerhaeuser Company known as the North Pacific Paper Corporation. Other prominent foreign companies operating in the United States include IFCO Systems N.V of the Netherlands (3,000 employees engaged in wood pallet manufacture), Smurfit Kappa Group of Ireland operating in the US via Smurfit-Stone Container, Inc (33, 500 employees, $8 billion sales in 2006), and South Africa's Sappi, Ltd (S. D. Warren Company) which operates as Sappi Fine Papers North America in the US (3,300 employees, $1.5 billion sales).

Table 30. Foreign-owned Subsidiaries in the U.S. Wood-based Manufacturing Industry, by Country and Subsidiary Characteristic. 2005-2006.

Country	Number of Parent Firms	Annual Sales of Parent Firms (million dollars)		Number of Parent Firm Wood-based Subsidiaries	Wood-based Industries Operated in by Subsidiaries	Leading Wood-based Industries in which Subsidiaries Operate
		Average	Range			
Australia	2	7,705	4,311 - 11,099	5	3	Paper board containers, paper product wholesaler
Brazil	3	1,611	1,421 - 1,923	3	3	Pulp mills, paper mills, newsprint mills, reconstituted wood products
Canada	19	1,502	95 - 4,457	24	17	Millwork, sawmills, paper mills, paper products wholesaler
Chile	2	2,241	2,106 - 2,376	2	2	Millwork, paper products wholesaler
Denmark	3	429	181 - 913	3	4	Millwork, furniture, hardwood veneer and plywood
England, UK	3	942	69 - 2,640	3	4	Paper bag and coated and treated paper, paper product wholesaler
Finland	5	8,549	1,756 - 18,450	5	5	Paper bag & coated & treated paper, paper mills, paper product wholesaler
France	6	1,481	25 - 5,105	11	5	Cooperage, paper product wholesaler, paper mills
Germany	5	1,346	71 - 1,789	5	8	Millwork, reconstituted wood products, wood furniture
Hong Kong	1	486	486	1	1	Pulp mills
Ireland	1	6,970	6,970	1	4	Paperboard mills, paperboard containers, paper bag & coated & treated paper
Italy	1	2,361	2,361	1	1	Paper products wholesaler
Japan	9	3,800	404 - 11,174	11	8	Paper mills, speciality papers, newsprint mills, paperboard containers
Malaysia	2	391	39 - 743	2	2	Millwork and lumber wholesaler
Mexico	3	586	420 - 753	3	3	Paper mills, paper board containers, paper product wholesalers
Netherlands	1	495	495	10	3	Wood pallets, sawmills, lumber-plywood wholesaler
New Zealand	1	305	305	3	2	Millwork, forestry services
Norway	1	4,180	4,180	1	1	Paper product wholesaler
Portugal	2	587	587 - 1,315	1	1	Cooperage, paper mills, paperboard mills
Singapore	2	1,591	47 - 3,135	2	2	Paper product wholesaler, millwork wholesaler
South Africa	1	4,941	4,941	1	3	Pulp mills, paper mills, paperboard containers
South Korea	1	452	452	1	1	Paper product wholesaler
Sweden	4	4,077	605 - 13,603	11	6	Paper product wholesaler, paper recycling, paper bag & coated & treated paper
Switzerland	1	352	352	1	1	Paper product wholesaler
Taiwan	1	768	768	1	1	Paper product wholesaler
Venezuela	1	179	179	1	1	Paper recycling

Note: Annual sales (revenue) of foreign parent firms includes wood and nonwood-based sources.
Source: Filings with U. S. Securities and Exchange Commission, Uniworld Business Publications, Inc. 2006, corporate annual reports, and various industry directories.

Market Entry and Merger Activity

Entry and Mobility

An industry that posses a healthy level of competition is often characterized as one in which new firms can enter with ease and from which older firms can graciously exit. Applying such measures to the ranks of leading firms within an industry, a sense of its competitiveness can be obtained. However, there are a number of institutional and technical circumstances that may block freedom of entry (or exit) to an industry. For example, established firms may have cost advantages (such as access to special raw materials, patent-protected technologies, exceptionally favorable geographic location), well established and highly differentiated products (such as especially loyal customers and suppliers), economies of scale befitting manufacturing efficiency (such as suitable plant capacity, extensive distribution systems, quality research and development capabilities), and special access to financial resources required to maintain a competitive edge in the marketplace (such as the favorable experiences of past creditors). Some industries are more easy for new entrants, such as new industries with few established firms, while others can be especially difficult, such as industries that are highly concentrated, or manufacture homogenous products (such as lumber and pallets), or are composed of firms whose primary line of business is strategically important to their future (Ellefson and Stone 1984).

Industry-Wide Patterns. The ease with which firms enter the wood-based manufacturing industry, and the rate at which they may abandon it, has been given very limited analytical attention. In order to shed some light on the matter, consider changes in the number establishments operating in the industry. In 2007, the number of establishments operating within the industry was nearly the same as the number operating in 1998 (39,262 and 39,294, respectively) (Table 4). In fact, the largest deviation from the annual average number of establishments (39,530) during period 2002 through 2007 was only a plus 764 (in 2002). As for the industry's major groups, deviation from average yearly change in number of establishments for the same period was wood product manufacturing group – 232 establishments, paper manufacturing – 319 establishments, and wood furniture manufacturing – 290 establishments. By most standards, these are not large shifts in the number of establishments entering or exiting, especially given that the average number of establishments over the six-year period was wood products group – 16,820 establishments, paper group – 5,303 establishments, and wood furniture group – 17,406 establishments. From such a perspective, judgement might be made that new entrants (or exits) from the industry generally, and from each of its major groups, are not extensive. However, such a determination must be tempered by recognizing the industry's especially diverse character. It is not a single generic group; rather,

it is composed of diverse segments involved in the manufacture of a variety of products. Difficult entry in one segment may be easy in another.

Although the information is quite dated, a review of entry rates to the wood-based industry in the mid 1950s provides a more focused picture than the aforementioned nationwide information (Churchill 1959). Compared to all manufacturing industries, the lumber industry in the mid-1950s was especially easy to access (especially for small firms [few employees]); its relative entry rate (ratio of new business to all business) was over twice the national rate for all U.S. manufacturing industries operating in 1956. In terms of absolute number of new businesses, the lumber segment of the wood-based industry lead the wood furniture group and the paper manufacturing group by substantial margins. Nearly 90 percent of the industry's new businesses from 1951 to 1955 were oriented toward the production of lumber. The entry rate for the paper manufacturing group was about half the rate experienced by U.S. manufacturing industries in general. Although providing an interesting perspective on entry and exit to the wood-based industry, the information provided by this review is very out-of-date. Since the 1950s, significant change in the structure of the industry has probably had a substantial influence on today's entry and exit rates.

Capital Requirements. The amount of capital required to enter an industry can also be of concern to entrepreneurs seeking entry to some industries. Discouraging may be the need for large amounts of capital required to construct plants, develop distribution systems and persuade consumers that the products to be produced have virtue. One measure of the amount of capital needed to enter an industry is the value of depreciable assets of existing establishments. In 2002, the national average for depreciable assets per manufacturing establishment for all U.S. manufacturing industries was $6,314,000 ($159,000 per employee)(U. S. Census Bureau 2009b). Using this as a benchmark, inferences can be made about the capital requirements faced by prospective entrants to the wood-based industry. The higher the asset-establishment ratio, the more difficult it may be to enter the industry.

The wood-based industry is composed of industries that have a wide range of capital requirements. Of industry's 38 individual industries, 15 ranked above the national asset-establishment ratio for all U.S. manufacturing industries in 2007 (Table 31). The industry's wood furniture group was the least capital demanding with an average of $1.0 million of assets per establishment, while the wood products group was second least demanding at $2.7 million per establishment. Within the later group, notable exceptions above the national average were the reconstituted wood products industry and the softwood veneer and plywood industry. Other U.S. industries with asset-establishment ratios similar to those in the wood products group are the fabricated structural metal industry ($2.2 million) and the metal window and door industry ($2.6

Table 31. Gross Book Value of Depreciable Assets Per Establishment and Per Employee in the U.S. Wood-based Manufacturing Industry, by Major Industry Segment. 2007.

Industry	Value of Depreciable Assets per Establishment ($1,000)	Value of Depreciable Assets per Employee ($1,000)
Wood Products Manufacturing		
Sawmills	3,617.5	144.8
Wood preservation	3,946.9	152.0
Hardwood veneer & plywood	4,651.5	76.4
Softwood veneer & plywood	13,768.2	92.7
Engineered wood member (except truss)	8,329.4	172.3
Truss manufacturing	2,591.4	68.7
Reconstituted wood products	26,914.3	345.2
Wood windows and doors	2,975.6	55.6
Cut stock, resawing lumber, and planing	2,350.8	85.7
Other millwork (including flooring)	1,012.0	49.3
Wood containers and pallets	744.1	37.0
Manufactured homes (mobile	3,587.1	33.0
Prefabricated wood buildings	1,601.5	52.4
All Industries	2,736.1	87.8
Paper Manufacturing		
Pulp mills	202,061.9	1,084.3
Paper (except newsprint) mills	231,666.0	735.4
Newsprint mills	265,619.1	1,134.4
Paperboard mills	172,996.1	882.9
Corrugated and solid fiber boxes	8,373.3	123.6
Folding paperboard boxes	9,362.7	114.0
Setup paperboard boxes	2,926.9	67.5
Fiber can, tube, drum, & similar products	3,344.2	107.4
Nonfolding sanitary food containers	20,935.3	127.5
Coated packaging paper and plastics film	4,424.2	110.2
Coated and laminated pape	15,023.2	219.0
Plastics, foil, and coated paper bags	6,170.0	96.9
Uncoated paper and multiwall bags	7,124.9	69.1
Laminated aluminum foil for flexible packaging	14,007.3	132.1
Surface-coated paperboard	4,400.7	113.7
Die-cut paper and paperboard office supplies	5,769.7	125.1
Envelope manufacturing	6,639.9	78.8
Stationery, tablet, and related products	2,253.6	67.0
Sanitary paper products	33,356.4	283.2
All Industries	31,099.4	348.2
Wood Furniture Manufacturing		
Wood kitchen cabinets and counter tops	529.6	37.1
Nonupholstered wood household furniture	832.0	45.2
Wood television, radio, and related cabinets	260.2	30.1
Wood office furniture	2,278.8	54.1
Custom architectural woodwork and millwork	777.9	37.3
Showcase, partition, shelving, and lockers	1,783.3	53.5
All Industries	1,050.6	46.1

Note: Depreciable assets are all buildings, structures, machinery, and equipment for which depreciation reserves are maintained. For all U.S. manufacturing industries: $4,828 thousand per establishment, $115 thousand per employee.
Source: U. S. Census Bureau 2009b.

million). When asset-establishment ratios are determined for the paper manufacturing group, the results are dramatically different. In 2007, the group's asset-establishment ratio was 392 percent above the national average for all U.S. manufacturing industries. Of the paper manufacturing group's 19 industries, 12 were above the national average in this measure. Although far less than some U.S. manufacturing industries (for example, petroleum refineries – $723 million per establishment), especially large were depreciable assets per establishment for the newsprint mill ($265 million),paper mill (except newsprint) ($232 million), pulp mill ($202 million), and paperboard mill ($173 million) industries. Comparable to industry's paper group are asset-establishment ratios of the metal can manufacturing industry ($32.0 million) and the synthetic rubber manufacturing industry ($33.6 million). Although depreciable assets per establishment is only a rough proxy for the amount of capital required to enter an industry, the aforementioned evidence suggests entry to certain wood-based industries could be discouraged by the need for large amounts of capital required to construct a manufacturing establishment – especially in most paper manufacturing industries, less so for wood product and wood furniture industries.

Leading Company Turnover. Turnover and mobility of the industry's leading companies provides additional evidence about the ability to enter and exit the wood-based manufacturing industry. If leading firms become solidly entrenched while aggregate concentration for the industry grows, there may be reason for concern. Several studies of the long-term turnover among the largest U.S. corporations have been undertaken over the years (Collins and Preston 1961, Stonebraker 1979). An assessment undertaken in 1961 found that of 100 of the nation's largest U.S. industrial firms (measured by total assets) operating in 1909, only 34 were ranked in the top 100 for the years 1909, 1919, 1929, 1935, 1948 and 1958 (Collins and Preston 1961). Of these 34 firms, 12 firms increased their ranking by 1958 while the ranking of 19 firms declined. Examples of the former are General Electric, Republic Steel and Standard Oil-New Jersey; examples of the latter are Consolidated Coal, International Harvester and Armour and Company. Among the 100 largest firms were 10 wood-based firms, of which only International Paper and Weyerhaeuser existed in 2007 as stand-alone enterprises.

Company	1909	1919	1929	1935	1948	1958
American Can	21	41	49	30	57	31
American Writing Paper	56	-	-	-	-	-
Crown Zellerbach	-	-	84	79	96	63
International Paper	33	76	24	26	44	28
Koppers	-	-	32	43	-	-
Long-Bell Lumber	-	-	85	-	-	-
Minnesota & Ontario Paper Co	-	77	-	-	-	-
St. Regis Paper	-	-	-	99	-	87
Union Bag and Paper	81	-	79	-	94	-
Weyerhaeuser Timber	-	-	-	-	70	61

The ranking of wood-based manufacturing companies among Fortune 500 companies generally provides additional insight about mobility in the ranks of leading wood-based enterprises (Time Warner, Inc. 2008)(Table 32). Ranked according to sales revenue, 61 wood-based firms were among the top 500 U.S. companies at least one year during the period 1955 through 2007. Three companies were so ranked during the entire 52 year period, namely International Paper Company, Kimberly-Clark Corporation and Weyerhaeuser Company. Half the companies were ranked in the top 500 for 15 or more years, 26 for 10 or fewer years. Although companies may be ranked among the top 500, the time period during which the companies were so ranked does not always coincide. For example, Container Corporation of America was ranked among the top 500 for 25 consecutive years, namely 1955 through 1977. However, at least two other companies with the same longevity in ranking — but at different time periods, namely Great Norther Nekoosa (1968 through 1990) and Smurfit-Stone Container (1985 through 2007). In some cases, the appearance of companies among the Fortune 500 has been somewhat erratic, such as Avery-Dennison, American Forest Products, Pop and Talbot, Sutherland Paper Company and Great Northern Paper.

Historical review of the ranking of wood-based companies among Fortune 500 companies generally suggests that turnover among the wood-based industry's largest firms has been quite modest over the past 50 years. For sure, there have been some that have entered this elite group and quickly exited, and some have made an appearance and exited – only to return again. Yet in reality, many of the industry's companies, although often reconstituted through merger and acquisition, have remained among the industry's top revenue producers for many years.

Mergers and Acquisitions

Classifications and Motives. Mergers and acquisitions are actions to combine two or more companies. The former involves firms that agree to move forward as a single company, while the latter involves one company taking over another company and clearly establishing itself as the new owner. Mergers and acquisitions can result in one company surviving while the merged or acquired company goes out of existence (the acquiring company assumes the assets and liabilities of the merged or acquired company). In either case, payment for the acquired company usually is made in cash or in the stock of the acquiring company. Mergers and acquisitions can involve only certain parts of a corporation, such as when the target company becomes a subsidiary of the acquiring (parent) company.(Gaughan 2007).

Table 32. Fortune 500 Wood-based Manufacturing Companies Operating in the U.S. Wood-based Manufacturing Industry, by Company. 1955 -2007.

Company	Total Years Ranked as a Fortune 500 Company	Years Ranked as a Fortune 500 Company	Company	Total Years Ranked as a Fortune 500 Company	Years Ranked as a Fortune 500 Company
International Paper	53	1955 through 2007	Fort Howard Paper	13	1982 through 1994
Kimberly-Clark	53	1955 through 2007	Champion Papers	12	1955 through 1966
Weyerhaeuser	53	1955 through 2007	Hoerner Waldorf	11	1967 through 1977
Georgia-Pacific	51	1955 through 2005	Lily-Tulip Cup	11	1955 through 1965
Mead Corporation	46	1955 through 2001	Longview Fibre	10	1985 through 1994
Union Camp	45	1955 through 1999	Standard Packaging	10	1959 through 1968
Scott Paper Company	41	1955 through 1995	Bowater	9	1986 through 1994
Bemis Company	40	1955 through 1994	Chesapeake Corporation	9	1986 through 1994
Consolidated Papers	40	1955 through 1994	American Forest Products	8	1955 through 1961, 1970
Furniture Brands International	40	1955 through 1994	Minnesota and Ontario Paper	8	1955 through 1962
ITT Rayonier	40	1955 through 1994	Tobin Packaging	8	1955 through 1962
Potlatch	37	1958 through 1994	Westvaco	8	1995 through 2002
Federal Paperboard	36	1959 through 1994	Georgia Kraft	7	1982 through 1988
Koppers	34	1955 through 1988	Oxford Paper Company	7	1955 through 1961
Willamette Industries	33	1970 through 2002	Champion International	6	1995 through 2000
Crown Zellerbach	32	1955 through 1986	KVP Sutherland Paper	6	1961 through 1966
St. Regis Paper Company	30	1955 through 1984	Maryland Cup	6	1978 through 1983
Rath Packaging	29	1955 through 1983	La-Z-Boy Furniture	5	1990 through 1994
Diamond International	28	1955 through 1982	MeadWestvaco	5	2003 through 2007
Hammermill Paper	26	1961 through 1986	Packaging Corporation of America	5	1961 through 1965
Container Corporation of America	23	1955 through 1977	Hines Lumber Company	4	1955 through 1958
Great Northern Nekoosa	23	1968 through 1990	Pope and Talbot	4	1989 through 1991, 1994
Smurfit-Stone Container	23	1985 through 2007	Sutherland Paper Company	4	1955 through 1957, 1959
Temple-Inland	23	1985 through 2007	St. Joe Paper	4	1990 through 1993
Louisiana-Pacific	22	1974 through 1996	Great Northern Paper	3	1956 and 1957, 1966
Avery-Dennison	20	1974, 1975, 1978 through 2005	Basset Furniture Industries	2	1987 and 1988
Inland Container Corporation	19	1960 through 1978	Long-Bell Lumber Company	2	1955 and 1956
Sonoco Products	19	1980 through 1998	Universal Forest Products	2	1994 and 2006
Southwest Forest Industries	16	1972 through 1987	Hudson Pulp and Paper	1	1959
Riegel Paper	14	1959 through 1972	Nekoosa-Edwards Paper	1	1970
Dennison Manufactures	13	1978 through 1990			

Source: Time Warner, Inc. 2008.

Mergers are of three basic types, namely horizontal mergers (merging companies with the same product or service, such as Weyerhaeuser's 1969 merger of Dierks Forest Products), vertical mergers (merging companies work at different stages in the production of a product or service, such as Scott Paper's 1954 merger of Soundview Pulp) and conglomerate mergers (merging companies operate in entirely different industries, such as Montgomery Ward's 1968 merger of Container Corporation of America). Of 96 mergers and acquisitions occurring within the wood-based industry during the period 1951 through 1981, 15 were considered horizontal, 16 vertical and 65 conglomerate. Of the latter, 54 involved only companies operating within the industry (such as Georgia-Pacific and Williams Furniture) and 11 involved wood-based and nonwood-based companies such as Ethyl Corporation and Oxford Paper) (Ellefson and Stone 1984). As with most industrial classification schemes, mergers do not always fit neatly into distinct categories. For example, the company resulting from a merger of a paper company and a lumber company could be considered a conglomerate. However, since the lumber company might serve as an important supplier of chips and roundwood to the paper company, the merger might also be considered a vertical merger (Ellefson and Stone 1984, Gaughan 2007).

Mergers occur for a wide variety of reasons promoted by both the acquiring and the acquired companies. From the former's perspective, motives to merge might be to secure additional influence over markets and resources, expand operations via purchasing existing companies rather than building from scratch, improve operational efficiency by expanding economies of scale, establish a defensive position in a competitive marketplace, and to aggrandiz the personal growth and fortune of company managers. From the acquired companies' viewpoint, merging might be a way of obtaining the financial shelter of another company, diversifing product lines and production facilities, securing critical management skills necessary to promote company goals, and avoiding income and estate taxes (Gaughan 2007). Wood-based manufacturing companies are known to merge for more focused reasons, including securing a more reliable supply of timber, obtaining investment capital needed to replace outdated assets (equipment, manufacturing facilities), facilitating transition of a family-owned company to another other owner, integrating production processes to secure better utilize of raw materials, and stabilizing income and profits by merging with firms that manufacture the same wood-based products (Diamond and others 1999, Ellefson and Stone 1984, LeMaster 1977, Mead 1964). In sum, no simple summary can do justice to the motives for merger. The circumstances and diverse interests of management will determine the exact reasons.

Consequences and Outcomes. The consequences of mergers and acquisitions have been subject of much conjecture, with performance evaluations yielding often conflicting results (Gaughan 2007). For example, ". . . post-acquisition performance for the 50 largest U.S. mergers between 1979 and mid-1984 show significant improvements in asset productivity relative to their

industries, leading to higher operating cash flow returns . . . performance improvement is particularly strong for firms with highly overlapping businesses . . . mergers do not lead to cuts in long-term capital and R&D investments" (Healy and others 1992). In contrast, ". . . despite robust academic interest over 30 years, empirical data reveal that there has been little change in acquisition failure rates . . . 44 to 50 percent failure rates based on manager's self reports . . . and returns to acquiring firm shareholders reveals that acquisitions continue to produce negative average returns"(Cartwright and Schoenberg 2006).

The performance of mergers and acquisitions within the wood-based manufacturing industry has received modest analytical attention over the years, with most attention being directed at the paper industry (Diamond and others 1999, Ellefson and Stone 1984, LeMaster 1977, Mead 1964, Pesendorfer 2003, Mei and Sun 2008). When undertaken, assessments typically involve examination of pre and post-merger company performance (sales, profitability, market share), the results of which are complicated by the diversity of the industry's various segments and the complexity of their structure and operations. In 1999, analysis of merger and acquisition within the industry suggested that merger and acquisition strategies: have not concentrated economic power within the industry; will aid corporate profitability by decreasing industrial capacity (phase out older high-cost plants); and are a means by which companies can secure greater control of raw material supplies (especially in the West), and that ". . . nationwide, most sectors of the forest products industry are competitive . . . in regard to mergers and acquisitions, nothing needs to be done beyond monitoring for market power" (Diamond and others 1999). Focusing on 70 mergers and acquisition (involving 85 firms) from 1990 to 2004, Mei and Sun (2008) concluded that mergers and acquisitions brought considerable increases (at least in the short term) to target firms' market values and were also beneficial to shareholders. An evaluation of merger and acquisition performance in the paper and paperboard industries of the 1980s concluded that the efficiency of most acquiring firms increased after an acquisition and that the total welfare increased in some paper product industries as a result of mergers and acquisitions (Pesendorfer 2003). And an examination of vertical integration of pulp and paper mills between 1900 and 1940 found that pulp and paper production was positively associated with regional concentration, paper-mill capacity, standardized paper grades and merger and acquisition activities (Ohanian 1994).

Industry-wide Patterns. The wood-based industry has an active history of merger and acquisition. During the period 1997 through 2006, 587 wood-based companies reported their intent to acquire another wood-based entity (or company)(less than 1 percent of the national total for all industries) (Table 38). Annually over this 10-year period, an average of 59 wood-based companies

Table 33. Mergers and Acquisitions in the U.S. Wood-based Manufacturing Industry, by Major Industry Group. 1997-2008.

Year	Number of Entities (companies) Acquired and the Industry of the Acquired Entity (company)					
	Manufacturing					
	Wood Products	Paper Products	Furniture Products	Total Entities (companies) Acquired	Forestry and Logging	All U.S. Industries: Total Entities (companies) Acquired
2008	3	12	3	18	0	1,656
2007	5	28	6	39	4	2,108
2006	16	16	3	35	3	2,306
2005	12	13	5	30	4	2,130
2004	11	8	5	24	3	1,819
2003	4	9	4	17	4	1,279
2002	9	14	4	27	4	1,508
2001	14	20	4	38	5	2,219
2000	21	55	21	97	1	4,479
1999	25	61	23	109	2	4,527
1998	29	66	25	120	3	4,575
1997	24	39	10	73	2	3,438

Year	Number of Entities (companies) Seeking to Acquire and the Industry of the Acquiring Entity (company)					
	Manufacturing					
	Wood Products	Paper Products	Furniture Products	Total Entities (companies) Seeking to Acquire	Forestry and Logging	All U.S. Industries: Total Entities (companies) Seeking to Acquire
2008	2	13	5	20	0	1,656
2007	6	9	5	22	2	2,108
2006	24	13	5	45	3	2,306
2005	9	11	4	27	3	2,127
2004	11	17	11	43	4	1,819
2003	4	9	7	24	4	1,279
2002	4	12	5	22	1	1,508
2001	3	15	8	31	5	2,237
2000	18	52	22	95	3	4,479
1999	26	56	23	108	3	4,527
1998	33	59	23	117	2	4,575
1997	25	38	11	75	1	3,438

Note: Information for 2002 through 2006 has been adjusted to reflect a change in the size-of-transaction threshold for reporting acquisition plans (raised from $15 million to $50 million). Total entities seeking to acquire and entities acquired may differ since acquiring entities may seek more than one entity or may abandon efforts to acquire. Industries manufacturing nonwood products are included in the furniture and related product manufacturing industry.
Source: Federal Trade Commission 2009.

proposed to acquire another firm or parts thereof, with peak reporting of intent to do so occurring in 1998 (117 companies), fewest in 2002 (22 companies). The actual number of companies acquired within the wood-based industry from 1997 through 2006 was 601 or an average of 60 entities per year. Intent to acquire and actual acquisitions may differ since companies may abandon plans for an acquisition (result, fewer acquisitions than announced intents) or may acquire more than one entity (subsidiary)within a company (result, more acquisitions than announced intents). Also, estimates of merger activity are conservative since the Federal Trade Commission requires reporting of only acquisitions (proposed or actual) involving $50 million or more in premerger assets (large mergers) (Federal Trade Commission 2008)(in the late 1970s, acquisitions less than $10 million were about 11 percent of total acquisitions) (Ravenscraft and Sherer 1987).

The manufacturing segment of the wood-based industry experienced 627 acquisitions from 1997 through 2008 (Federal Trade Commission 2009) (Table 33). These acquisitions were distributed among the industry's major segments as follows: wood products manufacturing – 28 percent (173 entities acquired), paper manufacturing – 54 percent (341 entities acquired) and furniture manufacturing (including nonwood) – 18 percent (113 entities acquired). As for discernable trends in the number of acquisitions, only 26 percent (163)of the manufacturing firms acquired from 1997 through 2008 were acquired during the last half of this period (2003 through 2008). Seventy-four percent (464) were acquired in the first half. Acquisitions within the furniture industry declined considerably from about 21 to 25 annually in the late 1990s to fewer than five annual in the mid 2000s. Similar declines are apparent for wood products manufacturing – annual average of about 26 in the late 1990s, 10 annually from 2000 through 2008 –, and paper manufacturing – annual average of about 55 in the late 1990s, about 19 annually thereafter.

Company Patterns. Company-specific patterns of mergers within the wood-based manufacturing industry can provide greater appreciation for the unification and dispersal of firms within, into and out of the industry. Involving assets valued at nearly $52 billion in total, the large merger actions of 10 example companies operating in the wood-based industry since 1984 are substantial (buyer/seller, $ million).

- Champion International Corporation: St. Regis Paper Corporation. $1,813.7million. Year – 1984.
- Golden Eagle Industries, Inc.: National Gypsum Company, Inc. $1,200.0 million. Year – 1994.
- Scott Paper Company: Kimberly-Clark Corporation. $9,400.0 million. Year – 1995.
- Weyerhaeuser Company: MacMillian Bloedel, Ltd. Canada. $2,015.6 million. Year – 1999.
- Georgia-Pacific Corporation: Fort James Corporation. $7,374.3 million. Year – 2000.
- International Paper Company: Champion International Corporation. $7,017.2 million. Year – 2000.
- Plum Creek Timber Company: Georgia-Pacific Company (The Timber Company). $2,696.3 million. Year– 2000.
- Weyerhaeuser Company: Willamette Industries. $6,098.3 million. Year – 2000.

• Kohlberg Kravis Roberts and Company: Masonite International Corporation. $1,774.2 million. Year – 2004.
• Koch Industries, Inc.: Geogia-Pacific Corporation. $12,494.8 million. Year – 2005.

Although these mergers and acquisition may seem large, they are relatively modest compared with mergers that have occurred in other sectors of the nation's economy. For example, Exxon purchased Mobil in 1998 for $77.2 billion, Comcast Corporation purchased AT&T in 2001 for $72.0 billion and On Line America (AOL) purchased Time-Warner in 2000 for $164.8 billion.

Merger and acquisition are a continuing and dynamic part of the wood-based manufacturing industry. They are occurrences that continually change the structure of the industry and the manner in which it operates. As a way of giving face to these dynamic changes, 16 of the most recent (2007-2008) acquisitions and mergers were examined (Table 34). Where complete information is available, notable features of these transactions were the total annual sales of 12 of the acquired firms was nearly $8.0 billion while the total annual sales of the acquiring firms purchasing these 12 companies was nearly $70 (average of $670 million and $5.8 billion, respectively). Similarly from an employee perspective, namely 13 acquired firms employed a total of 18,770 persons while the acquiring firms' total employment was 106,000 persons (average of about 145 and about 9,600, respectively). The amount paid by acquiring firms for nine of the firms was $13.3 billion, or an average purchase price of about $1.5 billion. Of the 16 transactions, the most common business of the acquiring firms was private equity investment. The most common businesses of the acquired firm were paper and newsprint mills, paper board mills, and paper board boxes and containers.

The merger and acquisition history of individual companies can provide further appreciation about the importance of merger strategies in the overall development of a company. An example is the Georgia-Pacific Corporation which as of 2005 operated as a privately held, indirect wholly owned subsidiary of Koch Industries. Incorporated in 1927 as the Georgia Hardwood Lumber Company, the company acquired or merged nearly 110 companies or subdivisions of companies over the period 1947 through 2001 (Table 35). During these 54 years, the company acquired and subsequently liquidated some companies (for example, Oregon-Mesabi Corporation, Feather River Mills, Inc., Booth-Kelly Lumber Company), purchased more than 15 nonwood-based enterprises (for example, Tops Chemical Company, Dixie Chemical Products, Inc., Paramount Chemical Corporation, Exchange Oil and Gas Corporation, the polyvinyl chloride resin business of Ethyl Corporation), paid with cash more than $1.6 billion for companies or the subsidiaries of other companies (excluding acquisition payments with company stock), sold more than 18 companies or entities previously purchased (for example, Williams Furniture Division, Chemical Packaging Division, Butler Paper Company, G-P Flakeboard, Inc., Exchange Oil and Gas Corporation),

Table 34. Major Acquisitions and Mergers in the U.S. Wood-based Manufacturing Industry. 2007-2008.

Linden Lumber Company (AL), Division of American Hardwood Industries, acquired (2008) by H.I.G. Capital Management Inc. Acquired company's 2007 sales $47.8 million, 500 employees, business: lumber, plywood and millwork. Acquiring company 2008 sales $7.5 billion, 85 employees, business: private equity investment firm.

Trus Joist (ID), subsidiary of Weyerhaeuser Company, acquired (2008) by Atlas Holdings LLC (CT). Acquired company's 2007 sales $303 million, 300 employees, business: truss manufacturing. Acquiring company 2007 sales $1.2 million, 10 employees, business: private equity investment firm.

Containerboard Packaging & Recycling Business, Weyerhaeuser Company, acquired (2008) ($6 billion)by International Paper Company. Acquired company 2007 sales and employees unknown, business: containerboard and recycling. Acquiring company 2007 sales $21.9 billion, 51,500 employees, business: paper mills, newsprint mills.

Abitibi-Consolidated, Inc (Montreal, Canada) merged (2007) with Bowater Incorporated to form AbitiBowater, Inc. Merged firm 2007 sales $4.0 billion, 11,500 employees, business: paper mills, newsprint mills.

Perry Equipment Corporation (TX) acquired (2007) ($163 million)by CLARCOR, Inc.(TN) and name changed to Peco Facet. Acquired firm 2007 sales unknown, 500 employees, business: oil and gas pipelines. Acquiring firm 2007 sales $921 million, 5,500 employees, business: sanitary food container manufacturing, air purification equipment, motor vehicle parts manufacturing,

FiberMark Inc (VT) acquired (2008) by American Securities Capital Partners LLC (NY). Acquired firm 2007 sales $222 million, 1,710 employees, business: paper mills, paperboard mills. Acquiring firm 2007 sales $2.0 billion, 17 employees, business: private equity investment firm.

Hickory Business Furniture (NC), subsidiary of Furniture Brands International, Inc., acquired (2008) ($75 million) by HNI Corporation (IA). Acquired firm 2007 sales $65 million, 300 employees, business: wood office furniture. Acquiring firm 2007 sales $2.6 billion, 12,600 employees, business: office furniture.

Graham Packaging Holdings Company (PA) acquired (2008) ($700 million)by Hicks Acquisition Company I, Inc, subsidiary of The Blackstone Group L.P (NY). Acquired firm 2007 sales $2.5 billion, 7800 employees, business: plastic bottles, sanitary food containers. Acquiring firm 2007 sales $3.0 billion, 1,020 employees, business: private equity investment firm.

Source: Adapted from LexisNexis, Inc. 2008.

Table 34 (continued).

Altivity Packaging LLC (IL) acquired (2007) by Graphic Packaging Corporation (GA), subsidiary of TPG Capital LP and name changed to Graphic Packaging International. Acquired firm 2007 sales $1.1 billion, 400 employees, business: corrugated and solid fiber boxes. Acquiring firm 2007 sales $2.4 billion, 7,400 employees, business: fiber boxes, paperboard mills

Hoffmaster (WI), subsidiary of Solo Cup Company, acquired (2007) ($170 million) by Kohlberg & Company, LLC (NY) and name changed to Hoffmaster Group, Inc. Acquired firm 2007 sales $1.1 billion, 550 employees, business: sanitary food containers, converted paper products. Acquiring firm 2007 sale unknown, 20 employees, business: private equity investment firm.

Midland Container Corporation (WI), subsidiary of Private Equity Capital Corp, acquired (2008) by Arbor Private Investment (IL). Acquired firm 2007 sales $15 million, 80 employees, business: corrugated and solid fiber boxes. Acquiring firm 2007 sales unknown, employees unknown, business: private equity investment firm.

Stora Enso North America Corp (WI), subsidiary of Stora Enso Oyj, acquired (2008) ($2.5 billion) by Cerberus Capital Management, LP (NY) and name changed to NewPage Corporation. Acquired firm 2007 sales $2.0 billion, 5,400 employees, business: paper mills, coated and laminated paper. Acquiring firm 2007 sales $26 billion, 200 employees, business: private equity investment firm.

Reynolds Consumer Products (VA), subsidiary of Alcoa, Inc., acquired (2008) ($2.5 billion) by Rank Group Ltd. (New Zealand) and name changed to Reynolds Packaging Group. Acquired firm 2007 sales $104 million, 200 employees, business: coated and laminated paper, plastic and aluminum products. Acquiring firm 2007 sales $1.1 billion, 25,000 employees, business: private equity investment firm.

Southern Container Corporation (NY) acquired (2008) ($851 million) by Rock-Tenn Company (GA). Acquired firm's 2007 sales $538 million, 1,000 employees, business: paperboard mills, corrugated and solid fiber boxes. Acquiring firm 2007 sales $2.3 billion, 2,200 employees, business: paper mills, corrugated and solid fiber boxes.

Temple-Inland Financial Services, Inc., Forestar Real Estate Group, Inc, and Guaranty subsidiary Group, Inc. spun-off (2007) from Temple-Inland Inc (TX). Divesting company 2007 sales $3.9 billion, 12,000 employees, business: paperboard mills, sawmills.

SP Newsprint Co (GA), subsidiary of Media General, Inc., acquired (2008) ($350 million) by White Birch Paper Company (CT). Acquired firm 2007 sales $132 million, 30 employees, business: paper mills. Acquiring firm's 2007 sales $16 million, 468 employees, business: newsprint mills, paper mills.

Source: adapted from LexisNexis, Inc. 2008, Mergent, Inc. 2008.

Table 35. Acquisitions and Mergers of the Georgia-Pacific Corporation Operating in the U.S. Wood-based Manufacturing Industry, by Merged Company and Subsidiary. 1947-2001.

Bellingham Plywood Corporation (1947) (WA)
Washington Veneer Co (1948) (WA)
Bellingham Plywood Corp (1948) (WA)
Washington Veneer Co (1948, 1952) (WA)
Hilgard Lumber Co (1950) (IL)
Whatcom Timber Co (1951)
C.D. Johnson Lumber Corp (1951)
Commercial Sash & Door Co (1951)
Acme Door Corp (1952) (WA)
Washington Veneer Co (1952)
Oregon-Mesabi Corp (1955) (CA)
Feather River Pine Mills (1955)
Coos Bay Lumber Co (1956)
Hammond Lumber Co (1956)
Skelton Logging Co (1959)
Booth-Kelly Lumber Co (1959)
Oregon Pacific & Eastern Railway Co (1959)
Plywood Products Corp (1960)
Midland Container Corp (1960) (MO)
Pilot Rock Lumber Co (1960)
W.M. Ritter Lumber Co (1960)
Royal Container Co (1961)
Royal Fibre Corp (1961)
White Containers, Inc (1961)
Bag Co (1961) (IL)
Fleetwood Paper Co (1961) (IL)
Imperial Bag & Paper Sales Co (1961) (IL)
Lumbermans Supply Co (1961)
Jones Veneer & Plywood Co (1961)
National Box & Specialty Co (1962) (WI)
Crossett Co (1962) (AR)
St. Croix Paper Co (1963) (ME)
Vanity Fair Paper Mills, Inc (1963) (NY)
Fordyce Lumber Co (1963)
Lianga Bay Logging Co, Inc (1963)
Puget Sound Pulp & Timber Co (1963) (WA)
Bestwall Gypsum Co (1965)
American Timber Products (1965)
Jeffreys, Spaulding Manufacturing Co(1965)
Spaulding Lumber Co(1965)
Reynolds & Manley Lumber Co (1965) (GA)
National Polychemicals, Inc (partial) (1966) (TX)
Kruse Plywood Corp (1966)
Barrow Manufacturing Co (1966) (NC)
Barrow Land & Timber Co (1966) (NC)
Rounds & Kilpatrick Lumber Co (1967) (CA)
Crater Veneer Co (1967) (OR)
Ferguson-Lander Box Co (1967) (IL)
Williams Furniture Corp (1967) (SC)
Southern Coatings & Chemical Co (1967) (SC)
Ketchikan Spruce Mills (1967) (AK)
Integral Packaging Corp(1968)
Cooperative Equipment Co (1968)
Will-Win Building Corp (1968)
Thomas Reynold Lumber Co (1968)
Weather-Seal, Inc (1968)
Tops Chemical Co (1968)
Ralph Rounds, Inc (1968) (CA)
Will County Printing Co (1968) (IL)
Multi-Colortype Co (1968) (CA, OH)
F.M. Crawford Lumber, Inc (1968)
Urania Lumber Co (1968)
Post Falls Lumber Co (1968)
Multi-Colortype Co (1969)
National Cover & Mfg Co (1969) (LA, MO)
Reynolds-Wilson Lumber Co (1969)
Kountze Lumber Co (1969)
Sturgis Corp (1969)
Cozier Forest Products, Inc (19969)
Louisiana Forest Products Corp (1969)
Hedland Lumber Co, Inc (1969)
Box Canyon Lumber Co (1969)
Tidewater Mills, Inc(1969) (NV)
Meadow River Lumber Co (1970) (WV)
All-Brite Lumber Co (1970)
Dixie Chemical Products, Inc (1971)
Rex Timber Corp (1971)
Timber, Inc (1971)
Popular Panels, Inc (1972)
Eastern Packaging Corp (partial)(1972) (IL)
Boise Cascade Corporation (1973)(CA)
M&J Lumber Co (1974)
Fred Holmes International, Inc (1974)
Fred E. Holmes Lumber Co (1974)
Mendocino Lumber Handlers, Inc (1974)
Redwood Coast Lumber Co (1974)
Counters Pacific Corp (1974)
Paramount Chemical Corp (1974)
Exchange Oil & Gas Corp (1975)
Hudson Pulp & Paper Corp (1979)
Polymer Materials Inc (1979)
Holly Hill Lumber Co (1981) (SC)
Pacific Resins & Chemicals (1981) (WA)
Aqua-Chem Co (1981) (FL)
Big Chief Roofing Co (1981)
American Forest Products Co (1985, 1988)
Riegel Textile Corp (a division) (1985)
Superwood, Inc (1985)
Superior Fiber Products, Inc (1985)
U.S. Plywood Corp (1987)
Visy Board Inc (1987) (GA)
Brunswick Pulp & Paper Co (1988)
Great Northern Nekoosa Corp (1990)
Mor-Lite Distributors Inc (1993)
G-P Flakeboard Ltd (1993)
Domtar Inc (division purchase) (1996)
CeCorr Inc (1998)
Fort James Corp (1999, 2000)
Plum Creek Timber Co, Inc (2001)

Note: Partial acquisitions included. Not listed are acquisitions that the company subsequently sold or otherwise disposed of.
Source: Adapted from Mergent, Inc. 2008.

engaged in more than five acquisitions involving extensive timberlands (for example, Visy Board, Inc. [221,000 acres], Holly Hill Lumber Company, Philippines Lianga Bay Logging Company), and were in some cases ordered by the U.S. Department of Justice to dispose of certain properties before an acquisition could be consummated (for example, disposal of certain operations in Delaware and New York in order to complete acquisition of Domtar, Inc.).

Bemis Company is another example of the diversity of mergers and acquisitions that can occur as a company seeks to promote its mission and business strategies. The company was formed in 1858 and incorporated in 1885 (Missouri) as the Bemis Brothers Bag Company. Its current name was adopted in 1965. Although the company's history of mergers and acquisitions is far more complicated than can be depicted here, some of its acquisitions and dispositions are as follows (adapted from Mergent, Inc. 2008).

Rose Ribbon & Carbon Mfg. Co (1959)
Air-Formed Products Corp (1960)
Plastic Film Co (partial) (1962)
Cia de Sacos Centro Americana, S.A.(1963)
Fabrica Textil Bemis Handal, S.A. de C.V (1963)
Adhesive Engineering Co (1963)
W.T. Winn Co (1964)
Cello-Vision Corp (1964)
Clear Bag Co(1964)
Ross & Roberts, Inc (1964)
Curwood, Inc (1965)
Lawrence Adhesives Co (1965)
Ryegate Paper Mill (merged) (1966).
Rock Wool Engineering & Equipment Co (1966)
Codo Manufacturing Corp. (1966, sold 1973)
Sackner Products, Inc (1966)
Metallurgie & Plastic, S.A. (1966, sold 1978)
Hayssen Manufacturing Co (1966, sold partial 1996, 1997)
Anger Plastic Machinery Co (partial) (1967, sold 1971)
Louisiana Plastics, Inc (1967, sold 1993)
Western Litho Plate & Supply Co (1968, sold 1987)
Brown Printing Co (1969, sold 1979)
Pervel Industries, Inc (partial) (1969, closed 1976)
Custom Resins, Inc (1976)
Accraply, Inc (1977, sold 1997)
Standard Packaging Corp (partial) (1977)
Master Conveyor Corp (1985)
Milprint, Inc (1990)
Princeton Packaging Inc (partial) (1993)
Fitchburg Coated Products (1994)
Hargro Health Care (1994)
Banner Packaging, Inc (1995)
Paper Manufacturers Company, Inc (partial) (1996)
Paramount Packaging, LLC (1996, 1997)
GPOA, LP (partial) (1997)
Techy International S.A (1998)
Perfecseal Limited (partial) (1999)
Morgan Adhesives Company (partial)
Arrow Industries (partial) (2000)
Viskase Companies, Inc (partial) (2000)
Kanzaki Specialty Papers, Inc (partial) (2000)
Duralam, Inc (2001)
E.I. duPont de Nemours and Company (partial) (2002)
Masterpak, S.A. de C.V (2004)
Dixie Toga, Inc (partial) (2005)
Rayton Packaging Inc (2005)

The acquisition and merger actions of an acquiring company frequently focus on the acquired company manufacturing facilities (mills, equipment). However, acquisitions can also involve change in the ownership of timberland. Such may occur when timberland is but one of an acquired company's many assets (comes with the package) or when an acquiring company's interest is strictly on the purchase of timberlands owned by a company. The later case is no different from a company seeking to better its competitive position by acquiring a specific manufacturing subsidiary or division of another company. As examples of how acquisitions can lead to changes in timberland ownership, consider the following 26 transactions involving more than 8.2 million acres of

timberland occuring during the two year period 1996 through 1998 (Diamond and others 1999)(66 percent of acreage was part of a larger acquisition package involving manufacturing facilities).

Year	Seller	Buyer	Acres of Timberland
1996	Riverwood International Corp	Clayton, Dubilier and Rice, Inc	*540,000
1996	Federal Paperboard Co	International Paper Co	*700,000
1996	Cavenham Forest Industries	Weyerhaeuser Company	*661,200
1996	Cavenham Forest Industries	Willamette Industries	*1,080,000
1996	Willamette Industries	Hancock Timber Group	380,000
1996	Willamette Industries	Crown Pacific Partners LP	207,000
1996	Willamette Industries	Temple-Inland, Inc.	230,000
1996	Lake Superior Land Co	Champion International Corp	290,000
1996	Lyons Falls Pulp and Paper Co	Hancock Timber Group, inc	67,000
1996	Riverwood International Corp	Plum Creek Timber Co	*538,000
1996	Plum Creek Timber Co	Stimson Lumber Co	*107,000
1996	Boise Cascade Corp	Mead Corp	*667,000
1996	Weyerhaeuser Company	U.S. Timberlands, Inc	*600,000
1996	Champion International Corp	James River Corp	22,200
1996	Georgia-Pacific Corp	Sierra Pacific Holding Co	*127,000
1996	Undisclosed	Weyerhaeuser Company	240,700
1996	IP Timberland Ltd	R-H Timber Partnership	308,000
1997	Potlatch Corp	Consolidated Paper, Inc	13,332
1997	Kimberley-Clark Corp	Alliance Forest Products, Inc	*400,000
1997	James River Corp	Hancock Timber Group, Inc	95,000
1997	Louisiana-Pacific Corp	Sierra Pacific Industries	38,000
1997	Louisiana-Pacific Corp	Forest Investment Associates	175,000
1997	Trilluim	Crown Pacific Partners LP	65,000
1998	Crown Vantage, Inc	Hancock Timber Group, Inc	108,000
1998	Weyerhaeuser Company	Hancock Timber Group, Inc	260,000
1998	Potlatch Corp & Anderson-Tully Co	Timberland Growth Corp	324,000

* involves acquisition of various manufacturing operations as well as accompanying timberland.

Raw Material Control and Strategies

Open-Market Timber Purchases

Timber purchased on the open market is a workable raw material strategy for many wood-based manufacturing companies. Timber on the open-market originates from very diverse sources that can include nonindustrial private owners of forestland, brokers and agents that bring buyers and sellers in contact with each other, wood-based manufacturing companies selling timber from fee-owned timberland, segments of manufacturing companies that grow and sell timber on the open market, and enterprises that are engaged primarily (sometimes exclusively) in the business of growing and selling timber (real estate investment trusts, timber investment management organizations). Although timber removed from nonindustrial private forests is nearly always destined for open-market sale, very little is known in the aggregate about why and how much timber is purchased on the open market by wood-based manufacturing enterprises. As such, consider timber sourcing and selling by the following companies (corporate annual reports, filings with the U.S. Securities and Exchange Commission).

International Paper Company – In 2007, approximately 65 percent of fiber requirements from roundwood, 80 percent of which was purchased on the open market. Remaining 35 percent of requirements (mainly wood chips) obtained from open-market sources such as private nonindustrial forestland owners. Approximately 3.4 million tons of wood from company forestland sold to other users in 2006.

P.F. Galtfelter Company: In 2008, principal raw material purchases were (a) speciality paper product raw materials – pulpwood, 93 percent open-market purchased (2.1 million short tons), wood generally (and other pulps), 100 percent open-market purchased (95 thousand short tons), and (b) composite product raw materials – wood, pulp, synthetic fiber, metalized base, abaca fiber combined, 96 percent open market purchased (108,400 short tons). To protect market sources of pulpwood, company actively promotes conservation and forest management among suppliers and woodland owners. In addition to sourcing pulpwood in the open market, company has long-term supply contracts that provide access to timber at market prices.

Weyerhaeuser Company: In 2007, $659 million of open-market log sales to unaffiliated customers. In addition, $1,328 million in intersegment sale of timber from company's timberland business segment to other segments such as wood products, container board, cellulose fiber and fine paper. Unaffiliated customers purchased 308 million cubic feet of wood in 2007.

Potlatch Corporation: In 2007, $126 million in open-market log sales to unaffiliated customers. The company purchased about 2.5 million tons of fiber (sawlogs and pulpwood) from its resource business segment (open-market purchase) in 2007, while the segment sold nearly 2.3 million tons of wood fiber to third unaffiliated parties. In selling wood fiber on the open market, the company's

resource business segment "competes with private owners of small tracts and some of the largest timberland companies in the United States." The intersegment sale of timber at open-market prices "motivates company manufacturing segments to optimize operating efficiencies."

Allegheny Wood Products: In 2008, 126 million board feet of timber and logs were purchased on the open market. Approximately 90 percent are for processing at company sawmills, with the remaining portion marketed as veneer logs, peeler logs, export saw logs, and low grade saw logs.

Deltic Timber Corporation: In 2007, $30.5 million of timber sold on the open market (76 percent pine sawtimber, 24 percent pine pulpwood and hardwood sawtimber and pulpwood). Total wood fiber volume sold, more than 1.1 million tons.

Pope Resources, Inc.: In 2007, $33.5 million timber revenue sold to open market customers (55.1 million board feet). Purchasers of timber offered for sale: domestic mills (80 percent of volume), pulp log customers (16 percent of volume) and export brokers (4 percent of volume).

Landowner Cooperative Programs

Wood-based manufacturing companies often provide forestry assistance to private landowners with the prospect that the mature timber will be made available to the firm providing the assistance. The spirit of assistance programs is reflected by P. H. Glatfelter Company 2006 statement ". . . to protect our sources of pulpwood, we actively promote conservation and forest management among suppliers and woodland owners." Usually focused on nonindustrial private forests, assistance ranges from preparation of forest management plans and advice on forest taxation and compliance with environmental regulations to guidance on forest regeneration (site preparation and the offering of free or at cost tree seedlings) and access to company analytical tools (growth and yield modeling) and company equipment and machinery (loan of tree planting equipment). In most cases, the assistance is provided for free or at a reduced cost, although some companies' require that landowner properties be of a minimum size and within a maximum distance from a manufacturing facility. For the most part, little is known in the aggregate about industry landowner assistance programs (number, size, cost and effectiveness of such programs) although in 2008 industry programs of some sort were known to exist in 21 states. (AK, CT, DL, FL, GA, IN, LA, ME, MD, MN, NC, OH, OR, PA, SC, TN, VT, VA, WV, WI and WY) (Pyne 2008). Illustrative as examples of industry landowner assistance programs are those implemented by MeadWestvaco, Georgia-Pacific (Koppers, Inc.) and Weyerhaeuser Company (company annual reports).

MeadWestvaco: Cooperative Forest Management Program provides family forest landowners with forest management advice, including assistance in preparing forest management plans, locating suitable and reliable contractors (loggers, site preparers), accessing sources of quality seedlings,

advising on forest certification procedures and designing and executing timber sales. During the 2005-2006 tree planting season, the program provided free more than 1.4 million conifer seedlings to landowners and assisted in the natural regeneration of nearly 2,000 acres. As of 2006, 1,744 family forests in the U.S. were enrolled in MeadWestvaco's CFM program, representing more than 1,017 thousand areas of forestland. Also enrolled in the program are 520 family forest landowners in Brazil (30, 200 acres). Company contacts for the CFM program are located in Alabama, South Carolina, Texas, Virginia and Tres Barras, Brazil.

Georgia-Pacific Corporation: Forest Management Assistance Program (Forest MAP) provides professional assistance in the preparation and implementation of forest management plans, including expert timber valuations. Assistance is currently available in 10 Southern states, the overall intent of which is to enhance timber productivity through the use of best management practices. All landowners qualifying for Forest MAP assistance are obligated to comply with sustainable forestry practices and with all applicable state and federal laws. As of 2005-2006, an estimated 50 to 60 professional foresters are active in the program and responsible for the forestry activities of more than 350 landowners and a total of more than 350,000 acres of forestland. Georgia-Pacific regions and the intensity of Forest MAP within each is as follows (quarterly ForestMAP newsletters):

Mid-South Region – eight foresters, about 70 landowners, 65,000 acres in Mississippi and parts of Alabama and Louisiana.
Central Region – seven foresters, about 50 landowners, 21,000 acres in Arkansas and parts of Texas and Louisiana.
Southern Area – 13 foresters, 50 landowners, about 46,000 acres in Georgia and parts of Alabama, Florida and South Carolina.
Southern Group – three foresters, 50 landowners, 100,000 acres in parts of Florida and Georgia.
Eastern Region – 10 foresters, 50 landowners, 20,000 to 25,000 acres in North and South Carolina and parts of Virginia.
Southern Region – 13 foresters, 80 landowners, 95,000 acres in Georgia and parts of Alabama, Florida, and South Carolina.

Weyerhaeuser Company: Landowner Assistance Program (LAP) provides private landowners with a range of forest management assistance. In 2007, about 580 landowners participating in the program (98,000 acres) were provided with 2.9 million seedlings at no cost and were assisted in regenerating 3,023 acres through planting and 2,850 acres through natural regeneration. In addition, another 2,700 family forest owners were provided with information about sustainable forestry practices. The company also provides information about reforestation and best management practices to private landowners from whom they purchase wood directly (3,335 in 2007) and to indirect suppliers (5,419 in 2007) such as loggers who supply logs to third-party sawmills that sell

their residual chips to the company. Weyerhaeuser Company also communicates its wood procurement policies to loggers, chip suppliers and wood dealers.

Smurfit-Stone Container Corporation: With virtually no forestland ownership from which to secure raw material, company promotes prompt reforestation and the application of best management practices on private forest woodlands. A major way of doing is via the company's Alabama forest nursery (and tree improvement program) which in 2007 produced more than 24 million pine and hardwood seedlings for planting on private and public lands.

A number of additional companies provide forestry assistance to private forest landowners, or have done so in the past. Examples are Louisiana-Pacific Corporation (Tree Enterprise Program-TEP), Packaging Corporation of America, Menasha Corporation, Smurfit-Stone Container Corporation (Landowner Assistance Program-LOA), NewPage Corporation, Union Camp Corporation (Private Land Utilization Service - PLUS), Stone Container Corporation (Land Owner Assistance Program), Rayonier (Landowner Assistance Management Program-LAMP), Bowater Incorporated (Woodland Improvement Program-WIP)and Sierra Pacific Industries ("Provide information to forest landowners and neighbors to increase their knowledge of forest ecology and management")(company annual reports, Thompson 1998).

Independent Timber Producing Entities

The legal authority to separate timberland ownership from ownership of manufacturing facilities has provided opportunity for wood-based manufacturing companies to maintain a reliable source of raw material while taking advantage of tax rates that are more favorable to certain types of real estate investments. The legal mechanism for doing so is a real estate investment trust (REIT). As discussed in earlier sections of this report (page 4-9), 1997 federal tax rulings enabled companies to separate income from manufacturing operations and timberland and timberland growing operations. With certain restrictions, the latter could legally be considered a REIT which is taxed at a lower rate (and differently) than the former (Hickman 2007). The end result is that a company keeps control over an important source of raw material and is favored with less of a tax burden. Wood-based manufacturing companies that have chosen to establish timberland REITs are Longview Fibre Company, Potlatch Corporation, Plum Creek Timber Company, and Rayonier, Inc.

Contractual Purchasing Agreements

Companies may also reduce uncertainties surrounding raw material supplies via short or long-term timber supply contracts with public and private owners of timbers (Mendell 2008). Again,

aggregate industrywide information about timber purchase agreements is not generally available. However, the following examples provide some insight as to their extent and nature (annual corporate reports, filings with U.S. Securities and Exchange Commission).

Longview Fibre Company: In 2006, company closed a sawmill operation and entered into a five-year agreement (with option to renew)with new owners to provide a specific volume of logs from company timberlands at prevailing market prices. Buyers paid $4 million for the log supply and agreed to supply Longview Fibre Company with wood chips and pulp logs.

Packaging Corporation of America: In 2007, company sold 385,000 acres of timberlands and subsequently entered into a long-term agreement with the purchaser (Southern Timber Ventures, LLC) to supply fiber to the company's Tennessee manufacturing operation.

Plum Creek Timber Company: In 2007, 26 percent of the company timberland (managed by Northern Resource business segment) was sold, although log supply agreements were established with D&G Forest Products (sawlogs, extendable for three years), Escanaba Paper Company (pulpwood, extendable for three years), Swanson Group, Inc. (sawlogs, extendable for five years) and Sappi, Ltd. (pulpwood, extendable for 15 years). Timber is sold under agreement at market prices.

Boise-Cascade Holdings, LLC: In 2005, company sold timberland assets to Forest Capital Partners, Inc. with the stipulation that Forest Capital Partners, Inc. would supply fiber and wood products to certain Boise Cascade mills and manufacturing plants.

Allegheny Wood Products, Inc.: In addition to 2008 fee-owned timber base (63,000 acres), company has an additional 400,000 acres in long term wood supply agreements with small private landowners, large corporate landowners and certain public land agencies.

MeadWestvaco: In 2007, company sold timberland to Wells Timberland REIT and subsequently entered into a long-term supply agreement with the purchaser that certain MeadWestvaco mills would be supplied with timber at market prices. Prior to 2007, MeadWestvaco had 95,000 acres of forestland under long-term contract arrangements.

St. Joe Company: In 2007, company's forestry segment entered into a long-term supply agreement with Smurfit-Stone Container Corporation wherein the St. Joe Company (primarily a real estate and development enterprise) would annually deliver 700,000 tons of pulpwood (through 2012) to certain operations of the Smurfit-Stone Container Corporation.

Weyerhaeuser Company: In 2007, leased 728,000 acres of forest land in Southern United States.

Fee-simple Timberland Ownership

Wood-based manufacturing companies have for many years owned – fee-simple – large tracts of forest land (absolute ownership of real property, limited only by government powers of taxation, eminent domain and police authority). In most cases, their intent in doing so was to promote the vertical integration of their operations (Hickman 2007). However, in today's markets relatively few wood-based firms operate as enterprises that are entirely vertically-integrated, namely they own timberland, grow timber as a raw material, process and fabricate raw timber, and subsequently distribute processed wood products to consumers. From a forestland ownership perspective, an increasing number of wood-based enterprises have chosen to reduce timberland ownership as part of their organizational strategy. Although the distinction is not always easy to make, the focus here is on companies that own forestland (in a vertically integrated sense)that is looked to by the owning company as a source of raw material for its manufacturing operations. Excluded from consideration are timber investment management organizations and most timberland ownerships held by real estate investment trusts, ownership structures which generally do not have manufacturing facilities and are basically in the timber-growing business (not manufacturing) (notable exceptions include Potlatch Corporation, Longview Fibre Company, Plum Creek Timber Company).

Industry-Wide Patterns. In 2007, fee-simple timberland ownerships of wood-based manufacturing enterprises totaled nearly 51 million acres, an amount constituting 10 percent of the nation's timberland area and almost 7 percent of the nation's total forest land area (Table 36, Figure 6). Well over half (57.6 percent) of this 51 million acres of timberland was located in the South, namely 29.2 million acres or about 7.7 million acres more than wood-based manufacturing companies owned in all other regions combined. During the 25-year period prior to 2003, the timberland ownership of manufacturing companies in all regions remained fairly stable (Table 36). But from 2002 through 2007, it declined substantially, namely 40 percent in the North, 19 percent in the South and 16 percent in the Pacific Coast. In all likelihood, these declines reflected a multitude of liabilities associated with corporate fee-ownership of timberland, concerns that lead many companies to sell timberland to nonwood-based investment organizations or to reorganize in such a manner that a company's timberland became a legally separate, tax-advantaged entity (real estate investment trust) (Clutter and others 2005, Fernholz and others 2007, Lutz 2007). As for future timberland ownership, trends from 1977 through 2002 suggest timberland ownership by wood-based manufacturing companies might be in the range of 65 million to 66 million acres in 2020 and 2040, respectively (Haynes and others 2007). Given recent timberland ownership restructuring among many wood-based manufacturing companies, such estimates appear to be high.

Table 36. Timberland Ownership by Companies Operating in the U.S. Wood-based Manufacturing Industry, by Region. 1977-2007, with Projections for 2020 and 2040. (thousand acres).

Region	1977	1987	1997	2002	2007	2020	2040
North							
Northeast	12,789	12,575	10,996	10,855	5,952	-	-
North Central	4,664	4,361	3,795	3,793	2,789	-	-
Total	17,453	16,936	14,791	14,648	8,741	14,600	14,100
South							
Southeast	15,312	16,550	14,508	14,180	9,770	-	-
South Central	21,548	21,438	22,529	21,735	19,467	-	-
Total	36,860	37,988	37,037	35,915	29,237	36,600	36,300
Rocky Mountain							
Great Plains	16	21	0	0	0	-	-
Intermountain	2,079	2,943	2,926	2,926	2,678	-	-
Total	2,095	2,964	2,926	2,926	2,678	3,000	3,000
Pacific Coast							
Pacific Northwest	9,841	9,702	9,121	9,174	7,236	-	-
Pacific Southwest	2,687	2,757	2,982	2,932	2,893	-	-
Total	12,528	12,459	12,103	12,106	10,129	12,000	11,900
Total Wood-based Manufacturing Firms	68,936	70,347	66,857	65,595	50,785	66,100	65,200
Total Timberland Area All Ownerships	492,355	486,317	503,664	503,540	512,602	500,400	493,500
Total Forestland Area All Ownerships	739,619	732,515	744,163	748,922	749,758	741,700	729,900

Note: Pacific Northwest Region includes Alaska, Oregon and Washington
Source: Butler 2008, Haynes and others 2007, Smith and others 2004, Forest Service 2007.

Timberland owned by wood-based manufacturing companies in 2007 contained an estimated 78.2 billion cubic feet of softwood and hardwood growing stock volume (about8 percent of national total all ownerships)(Table 37). From 1977 through 2002, the volume of growing stock on timberland owned by these companies changed only modestly (a decline of about 7 percent nationwide), only to experience a dramatic decline during the five-year period 2002 through 2007 – 21 billion cubic feet of wood volume (21 percent of 2002 levels). The South accounted for an estimated 42 percent (32.8 billion cubic feet) of the national total growing stock in 2007, followed by the Pacific Northwest (19.5 billion cubic feet, nearly 25 percent of the national total). In 2002, over two-thirds (65.9 billion cubic feet) of growing stock owned by wood-based manufacturing companies was softwoods, an amount that declined about 12 percent from 1977 through 2002. In contrast, hardwood timber volumes remained fairly stable during the same period (3 percent decline).

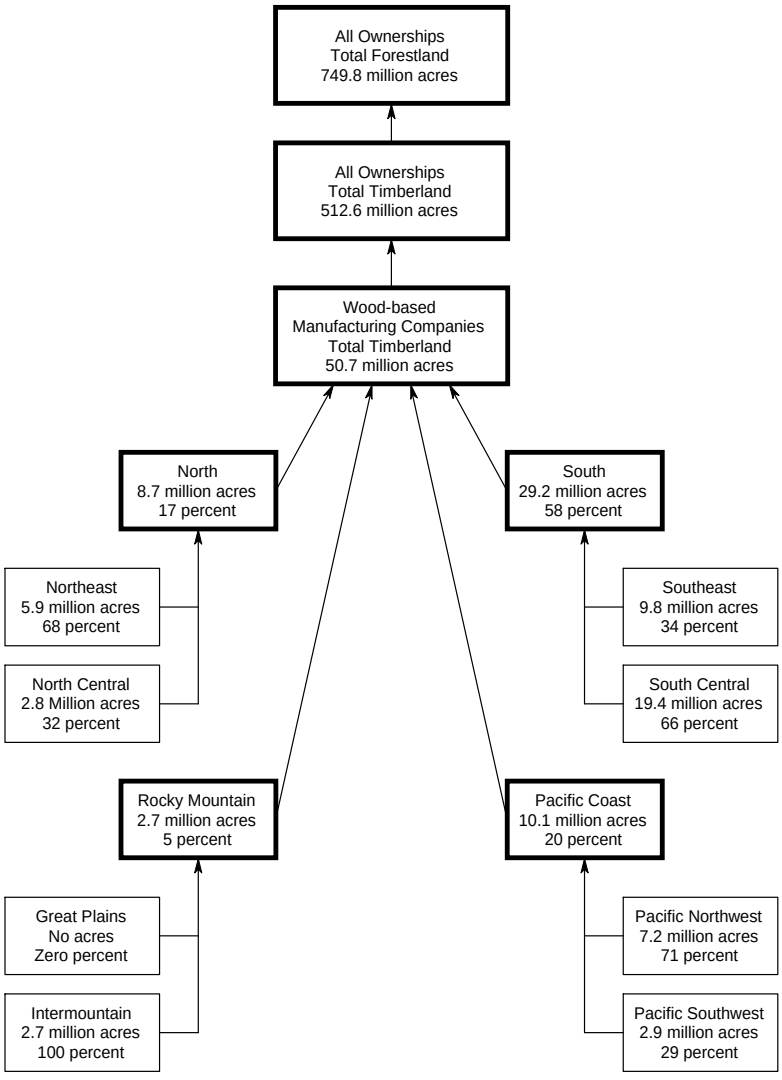


Figure 6. Regional Timberland Ownership by Companies Operating in the U.S. Wood-based Manufacturing Industry. 2007.

Table 37. Timber Volume, Growth and Removals from Timberland Owned by Companies Operating in the U.S. Wood-based Manufacturing Industry, by Region. 1977-2002, with estimates for 2007.

Region	1977	1987	1997	2002	2007
North					
Growing Stock Volume	23,526	23,109	19,204	18,958	11,313
Net Annual Growth	777	574	382	379	226
Removals	405	562	413	394	235
South					
Growing Stock Volume	40,775	41,983	40,807	40,337	32,837
Net Annual Growth	2,294	2,147	2,574	2,722	2,216
Removals	1,776	2,416	2,959	2,852	2,321
Rocky Mountain					
Growing Stock Volume	5,165	5,376	4,803	4,804	4,397
Net Annual Growth	104	126	134	127	116
Removals	180	169	157	153	140
Pacific Northwest					
Growing Stock Volume	29,182	28,303	24,680	24,679	19,466
Net Annual Growth	836	1,183	985	877	692
Removals	1,508	1,445	841	841	663
Pacific Southwest					
Growing Stock Volume	8,136	9,292	10,294	10,293	10,156
Net Annual Growth	158	251	293	292	288
Removals	348	439	362	362	357
Total Wood-based Manufacturing Firms					
Growing Stock Volume	106,784	108,063	99,788	99,071	78,169
Net Annual Growth	4,169	4,281	4,368	4,397	3,538
Removals	4,217	5,031	4,732	4,602	3,716

Note: Estimates for growing stock volume, net annual growth, and removals for 2007 based on 2007 industrial timberland area and 2002 information about growing stock volume, net annual growth and removals. Pacific Northwest Region includes Alaska, Oregon and Washington.
Source: Butler 2008, Haynes and others 2007, Smith and others 2004, Forest Service 2007.

Net annual growth on growing stock owned by wood-based manufacturing firms was an estimated 3.5 billion cubic feet (about 19 percent of national total all ownerships) in 2007, while annual removals (result of harvesting, cultural operations, and land use changes) from growing stock totaled slightly more than 3.7 billion cubic feet (about 30 percent of national total all ownerships) (Table 37). The preponderance of estimated growth and removals from timberland owned by wood-based manufacturing firms occurred in the South (63 percent of nationwide growth, 63 percent of nationwide removals). From 1977 through 2007, annual timber removals have been only slightly more than net annual growth occurring on company timberland, namely and average

of about 310 million cubic feet or 7 percent per year. Regionally, estimated removals exceeded growth in the Pacific Southwest by 24 percent in 2007, with the Rocky Mountain, South, and North regions following (in rank order: 21, five and 4 percent, respectively). Softwood harvested from industrially-owned timberland as a portion of total national softwood harvest increased about 7 percent from 1950 through 2002 (27 percent in 1950, 34 percent in 2002), doing so most dramatically in the Southeast, Northern Rocky, and Pacific Northwest regions. In contrast, the share of softwood harvested from timberland owned by vertically integrated firms in the Pacific Southwest declined nearly 13 percent from 1950 through 2002. For hardwood harvested from industry lands, the proportion of the national total attributable to forest industry lands increased 10 percent during the same 52-year period (17 percent in 1950, 27 percent in 2002) (Adams and others 2006).

Table 38. Productivity of Timberland Owned by Companies Operating in the U.S. Wood-based Manufacturing Industry, by Region and Productivity Class. 2002.

Region	Productivity Class (Percent of Forestland Area)				
	120+	85 to 119	50 to 84	20 to 49	Other or Reserved
North	2.3	12.0	35.0	49.5	1.2
South	20.2	33.4	39.8	6.6	0.0
Rocky Mountain	13.6	27.4	41.4	17.6	0.0
Pacific Northwest	58.7	12.6	11.7	12.1	4.9
Pacific Southwest	49.2	23.7	16.8	5.9	4.4
US Total Industrial Forest Land	22.9	24.9	33.6	17.4	1.2
US Total Forest Land	9.8	13.9	23.3	20.2	32.8

Note: Pacific Northwest Region includes Alaska, Oregon and Washington. Productivity class is potential annual cubic-foot volume growth per acre at culmination of mean annual increment in fully stocked natural stands.
Source: Smith and others 2004.

Forest land owned by timberland owning wood-based firms in 2002 tended to be in higher productivity classes than the national average for all ownerships (Table 38). Nearly 23 percent of industrial forest land was capable of annually producing 120 or more cubic feet of wood fiber, while nationally only about 10 percent of forest land for all ownerships was capable of doing so. When forest land productivity higher than 84 cubic feet annually is considered, nearly half (48 percent) of industrial land was so situated while forest land for all ownerships was but 24 percent. The proportion of forest land owned by timberland owning wood-based firms in the Pacific Northwest and Pacific Southwest was substantially above the national average for the higher productivity classes, namely in the Pacific Northwest 48.9 percent more than all owners and 39.4 more than all owners in the Pacific Southwest.

Company Patterns. Industry-wide information provides important insights about the extent, location and character timberland owned by wood-based manufacturing enterprises. However, equally important to understanding such features is information about the ownership of timberland by specific companies. Unfortunately, such information is very difficult to compile, especially for companies with relatively small holdings and for privately-owned companies that are under no obligation to share such information with the public (Ellefson and Stone 1984, Hagen and others 2005, Sampson and others 2000, O'Laughlin and Ellefson 1992). Such problems aside, it is possible to gain a better perspective on corporate timberland ownership by reviewing the admittedly modest public sources of information that describe the timberland ownership of specific companies (for example, corporate annual reports, trade journals, trade associations, filings with U.S. Securities and Exchange Commission).

The area of forest land owned by 43 prominent wood-based manufacturing firms in 2006-2007 totaled nearly 18.1 million acres or 36 percent of the timberland owned by wood-based manufacturing firms nationwide (Tables 39 and 40). Weyerhaeuser Company and Sierra Pacific Industries accounted for 41 percent of the land owned by the 43 companies, although in 2006 they accounted for only 5 percent of the wood-based manufacturing industry's shipment values and 3 percent of industry-wide employees. The average forest land ownership of the 24 companies owning less than one million acres but 120,000 or more was 361,000 acres. At least one of the 43 companies owns forest land in at least one of 26 different states, with Weyerhaeuser Company and International Paper Company being present in the most number of states (10 and nine, respectively). States that have the most diversity, namely they have within their state the greatest number of different forestland-owning manufacturing companies (average of four companies per state) are Washington (13 different companies), Oregon (12), California (eight), Louisiana (eight), Alabama (six), and Arkansas, Georgia and Mississippi (five each).

The value of forestland owned by wood-based manufacturing companies can be significant. As reported on company annual balance sheets, examples of 2007 timberland values are Weyerhaeuser Company – $3,769 million, International Paper Company – $770 million, MeadWestvaco – $247 million, Greif, Inc. – $197 million, AbitibiBowater, Inc. – $58 million, Wausau Paper Corporation – $5 million and P. H. Glatfelter Company – $ 2 million.

Table 39. Fee-simple Ownership of Forest Land by Companies Operating in the U.S. Wood-based Manufacturing Industry, by Company and State. 2006-2007.

Company	Forest Land (acres)	States
Weyerhaeuser Co	5,700,000	AL, AR, GA, LA, MS, NC, OK, OR, TX, WA
Sierra Pacific Industries	1,930,000	CA, WA
J. D. Irving, Ltd.	1,225,000	ME
MeadWestvaco	817,329	AL, GA, SC, TX, VA, WV
Green Diamond Resource Co	854,300	CA, OR, WA
Roseburg Forest Products Co	700,000	OR, WA
RoyOMartin	600,000	LA
Cascade Timberlands, LLC	522,000	OR, WA
Collins Pine Companies	515,000	CA, OR, PA
Westervelt Co	500,000	AL, MS
U.S. Timberlands Co, LP	489,000	OR, WA
Deltic Timber Corp	438,200	AR, LA
Stimson Lumber Co	400,000	ID, MT, OR, WA
Anderson-Tully Co	300,000	AR, LA. MS
Coastal Lumber Co	300,000	KY, NC, SC, PA, WA
International Paper Co	300,000	AL, GA, FL, LA, MS, NC, SC, TX, VA
Greif, Inc.	269,950	AL, AR, LA, MS
Mendocino Redwood Co, LLC	232,500	CA
Pacific Lumber Co (PALCO)	217,100	CA
AbitibiBowater	192,200	AL, GA, TN
Hampton Affiliates, Corp	167,100	OR, WA
Seneca Jones Timber Co	166,000	OR
UPM-Kymmene-North America	158,200	MN
Swanson Group, LLC	145,000	OR
Menasha Forest Products Corp	140,000	OR, WA
Timber Products Company	120,000	CA
Wausau Paper Corp	120,000	WI
Anthony Forest Products Co	91,100	AR, LA, TX
P.H. Glatfelter Company	75,600	DE, MD, PA, VA
SDS Lumber Co	70,000	OR, WA
Jordon Forest Products	69,200	GA, NC
Alleghney Wood Products	63,000	PA, VA, WV
Bennett Lumber Products, Inc.	61,000	ID, WA
Hunt Forest Products, Inc.	45,000	LA, MN, WI
Robbins Lumber, Inc.	27,200	ME
Finch, Pruyn and Company, Inc.	23,000	NY
Domtar Corp	17,000	ME
Bennett Forest Industries	16,000	ID
Harden Furniture, Inc.	10,000	NY
Big Creek Lumber Co	9,000	CA
PB Lumber, LLC	6,100	WA
RCM Pacific Materials, Inc.	6,000	CA
New Page Corporation	5,400	WI

Source: Corporate annual reports, filings with the US Securities and Exchange Commission, Lutz 2007, Sampson and others 2000, Sustainable Forestry Initiative, Inc. 2008.

Timberland ownership by wood-based manufacturing firms occurs for reasons that are as diverse as the industry itself. For example, timberland provides an insurance policy on capital-intense mills (ameliorate long-term raw material shortages and short-term raw material price fluctuations); timberland is a low-risk investment (asset with substantial liquidity and provides a hedge against inflation); timberland effects capital gains taxation (positive influence on corporate income); and timberland can serve corporate intentions in a strategic sense (competitive advantage in control over raw material supplies). Ownership of timberland can also have disadvantages. As an asset, timberland can tie up large amounts of capital for long periods of time. Moreover, timber being grown as a raw material is subject to the risk of destruction by insects, diseases, and fire. Like all commodity markets, timber markets may be depressed at the time timber is made available for sale (Lonnstedt 2007, O'Laughlin and Ellefson 1982, Sampson and others 2000, Yin and others 1998).

The diversity of timberland owning intentions of wood-based manufacturing companies can be appreciated by the mission and strategy statements of specific companies. Consider the following:

> ". . . our timberland tracts are used for timber investments, real estate investments, rural home and vacation sites, and hunting and recreational tracts." St. Regis Paper Company.
>
> ". . . primary purpose of forestland is for the economical production of quality timber for our mills through sustainable forestry practices . . . timberland is one of the company's most valuable assets and provides a stable raw material source for our manufacturing facilities and financial flexibility for planning the company's growth." Hampton Affiliates.
>
> " . . . we own forest land which helps ensure an adequate supply of timber for our sawmill." Big Creek Lumber Company.
>
> ". . . the ability to rely on our forests as a primary source of logs gives us the flexibility to match our resources to our product mix. Our timberland also gives us stability in the price and supply of logs." Roseburg Forest Products Company.
>
> ". . . with company-owned forestland, Allegheny Wood Products has and continues to build a strong timber reserve which enables the company to produce the finest hardwood products." Allegheny Wood Products.
>
> ". . . the goal of our timberlands business is to maximize returns by selling logs and stumpage to internal and external customers." Weyerhaeuser Company.

> ". . . strive to maintain well-managed, diverse forest landscapes that provides a sustainable source of wood fiber." MeadWestvaco.
>
> ". . . manage timberlands to increase productivity and maximize the long-term value of timber assets . . . consider the timberlands to be most valuable asset and the harvest of stumpage to be the Company's most significant source of income." Deltic Timber Corporation.
>
> ". . . manage forestland with the objective of producing as much high quality wood as possible without compromising the future economic and environmental benefits of our forests. We are aware of the immense value in maintaining and protecting our timberlands." SDS Lumber Company.
>
> ". . . our forest land is one of the company's most valuable assets. A steady flow of raw materials from our own company lands allows us the flexibility to run our manufacturing facilities in the most efficient manner possible." Stimson Lumber Company.

The ownership of forest land by wood-based firms has changed dramatically during the past 20 years. Such has been especially so for vertically integrated firms that have a history of owning large forest properties (usually more than 400,000 acres). Although nationally from 1997 through 2002, industrial forestland (forestland owned by companies or individuals operating wood-using plants)declined only 1.3 million acres, this relatively modest decline masks major land ownership changes within the industry, especially from company to company or from companies to institutional investors and tax advantaged real estate investment trusts (Smith and others 2001, 2004). The primary reasons companies cite for selling forest land are the need to increase investment returns to shareholders, reduce company debt with revenue from sale of forestland, reduce taxes with the use of more efficient tax structures (real estate investment trusts, subchapter S Corporations), reduce impact of large capital gains tax obligations (use of installment notes and certain merger structures), and recognition that raw materials for processing facilities are readily available from sources other than fee-owned forestland (Block and Sample 2001, Clutter and others 2005, Fernholz and others 2007, Hickman 2007, Lonnstedt 2007, Mendell 2007, Sampson and others 2000, Seneca Creek Associates 2007). Some wood-based manufacturing companies offer unapologetic statements regarding the sale of their timberland holdings, such as P.H. Galtfelter (2007 Annual Company Report):

> In 2006, we initiated a strategy to sell substantially all of our timberlands. Through the end of 2007, we have sold approximately 43,400 acres of timberland for an aggregate price of $104.4 million. Although the proceeds reduced debt obligations, the sale of timberland will require us to replace company-owned timberland as a

source of fiber with more costly purchased woods. However, we believe the interest expense reduction and the financial flexibility for investment offer a greater return than the additional higher cost of owning timberland as a source of raw fiber.

Table 40. Fee-simple Ownership of Forest Land by Companies Operating in the U.S. Wood-based Manufacturing Industry, by Company. 1969, 1979, 2000 and 2006.

Company	Forest Land Area (thousand acres)			
	1969	1979	2000	2006
International Paper	6,519	7,110	12,096	300
Weyerhaeuser Co	5,444	5,923	5,745	5,934
Georgia-Pacific	3,500	4,130	0	0
St. Regis Paper Co	2,408	3,179	0	0
Champion International	1,687	3,007	0	0
Great Northern Nekoosa	2,444	2,712	400	0
Boise Cascade	1,981	2,640	2,320	0
Scott Paper	1,772	1,838	0	0
Crown Zellerbach	1,375	1,739	0	0
Union Camp	1,468	1,722	0	0
Time (Temple-Eastex, others)	NA	1,530	0	0
Burlington Northern	NA	1,492	0	0
Continental Group	1,413	1,472	0	0
Diamond International	1,339	1,453	0	0
Mead (MeadWestvaco)	1,091	1,335	2,090	817
Potlatch	1,366	1,311	1,509	0
Westvaco	1,160	1,221	1,326	0
Rayonier (ITT)	1,085	1,072	2,201	0
Bowater (AbitibiBowater)	NA	1,050	800	192
Owens-Illinois	900	1,001	0	0
Louisiana-Pacific	NA	856	947	0
Mobil (Container Corp)	NA	799	0	0
Santa Fe Industries (Kirby)	NA	654	0	0
Johns-Manville (Olinkraft)	NA	584	0	0
Kimberly-Clark	NA	561	757	0
Willamette Industries	NA	548	1,728	0
American Can	NA	500	0	0
Masonite	NA	497	0	0
Southwest Forest Industries	NA	458	0	0
Southern Pacific	NA	450	0	0
Packaging Corp of America (Tenneco)	NA	419	0	0
Federal Paperboard	NA	364	0	0
Hammermill Paper	312	354	0	0
Consolidated Paper	NA	291	0	0
Southern Natural Resources	NA	328	0	0
Cleveland Cliffs	NA	310	0	0
American Forest Products (Bendix)	NA	171	0	0

Note: NA indicates information not available or company was not a member of the wood-based industry. Companies without timberland in 2000 and 2006 had either sold their forest land (but remained active in the wood-based industry), merged their operations (including forest land) with another company, or restructured in a way that their forest land was a legally separate entity.
Source: Ellefson and Stone 1984, O'Laughlin and Ellefson 1982, Sampson and others 2000.

The history of forestland ownership by 37 wood-based companies illustrates the often dramatic changes that have occurred in company ownership of forestland (Table 35). Traditionally considered important industrial owners of forest land, these companies (vertically integrated) owned an estimated 37.3 million acres of forest land in 1969. By 2006, 33 of these companies no longer existed as separate business entities or had sold their forest properties to other entities. These changes have been especially dramatic since 1979. Between the latter (55.1 million acres) and the year 2000 (31.9 million acres), the names of 25 companies commonly associated with ownership of large tracts of forestland were gone, and by 2006 (7.2 million acres) only four of the original 37 large forestland owning companies could be identified. As for which size companies changes most dramatically, companies that owned larger tracts of forestland do not appear to have "disappeared" from landownership any more frequently than companies owning smaller amounts of forestland. However, the amount of forest land "disappearing" from larger forestland owning companies was significantly more (Table 35). Of the 17 (out of 37) aforementioned companies owning less than one million acres in 1979, only three were owners in 2000 and none in 2006. Of those owning more than one million acres in 1979 (20 companies), only nine owned forestland in 2000 and only four in 2006. From 1979 to 2006, 39.7 million acres of forestland owned by the 20 larger companies (more than one million acres) were unaccounted for, while only 8.1 million acres disappeared from the companies owning less than one million acres.

The fate of forestland divested by industrial concerns can be further illustrated by the breakup of the Great Norther Paper Company (Hagan and others 2005) (Figure 7). With forestland holdings of 2.3 million acres in 1980, the Company was the largest single industrial forestland owner in the Northern Forest Region of the United States. In 1990, the holdings as a single unit began to unravel when Great Northern Paper was acquired by Georgia-Pacific Corporation which subsequently sold its forestland in Maine (and paper manufacturing operations) to Bowater, Inc. In 1998, Bowater began to sell its holdings in pieces, and the breakup of the original company began in earnest. As of 2005, the original Great Northern Paper ownership of 2.3 million acres resided with at least 15 owners and involved at least 19 major land ownership transactions. The 2006 ownership distribution is as follows: timberland investors – 60.2 percent, forest industry – 27.9 percent, family-owned small companies – 2.6 percent, Indian Tribes – 2.0 percent, nonprofit organizations – 1.8 percent, state government – 1.3 percent, and other owners – 4.2 percent. An estimated 1.9 million acres of the original Great Northern Paper Company lands are active timber producing lands (working under new ownership), about 100,000 acres are protected reserves and an estimated 500,000 acres are covered by conservation easements.

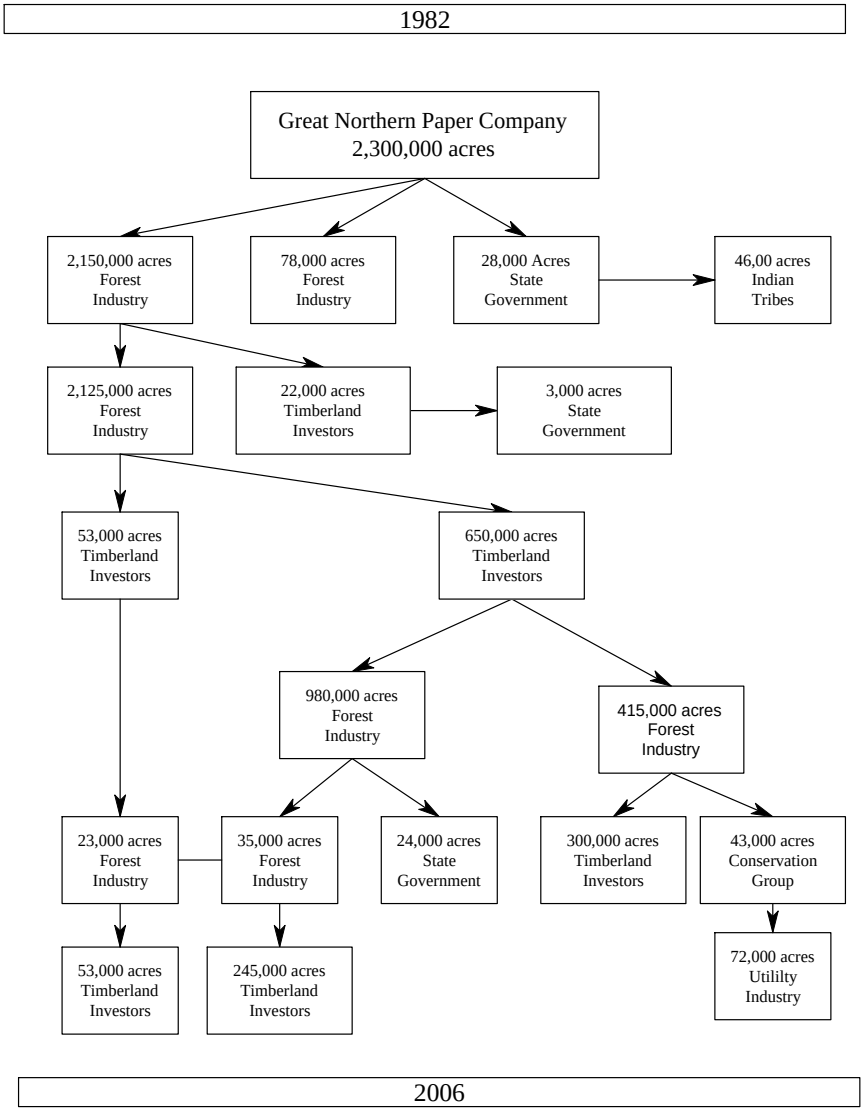


Figure 7. Divestiture of Great Northern Paper Company Timberland. 1982-2006.

Performance

The cornerstone of progressive social and economic systems is the bold and farsighted actions of public and private officials. From an industrial perspective, judging whether such conditions are occurring implies the existence of standards against which market or industrial performance can be judged. From a broad economic perspective, for example, the activities of wood-based manufacturing enterprises should be *efficient* – product decisions respond to consumer demands and scarce resources are not wasted, *progressive* – technical opportunities to improve production processes and provide customers with new and improved products are fully utilized, involve *full employment* – operations facilitate full and stable employment of human resources-, and the result in *equitable conditions* – output are distributed so as to provide for essential human needs and expectation as well as ample rewards for productive efforts. The extent to which an industry's behavior conforms with theses social criteria will determine the harshness (or praise) with which its performance will be judged.

Judging the performance of the wood-based manufacturing industry implies the existence of performance of criteria that are readily measurable. For example, product variety, quality, reliability and price stability; adoption of innovations and capital investments; level, type and compensation of employees; returns to manager and owner investments; sensitivity to racial, ethnic, and gender conditions; and resource stewardship and conservation practices. Because comprehensive and reliable information is more often than not quite scare, relatively few performance indicators of this sort can be addressed. Although some measures are discussed elsewhere in this review (for example, enterprise ownership, environmental stewardship, research and development), considered in what follows are profits and growth, productivity, capacity utilization and conditions of employment.

Profits and Growth

The ability of the wood-based manufacturing industry to generate incomes beyond cost is critical to securing the financial investments necessary to conduct business operations. Although concepts and measurement of profit and returns vary widely among the accounting community (for example, separation of investment returns from timberland versus timber growing on the land; from wood, paper and furniture manufacturing entities within a single enterprise; from wood-based manufacturing outputs from nonwood-based outputs [real estate operations]), profit and growth are important measures of industrial performance.

Table 41. Profit Rates of Corporations in the U.S. Wood-based Manufacturing Industry by Major Industry Group. 1994-2006.

Year	Wood Product Manufacturing	Paper Product Manufacturing			Wood and Paper Manufacturing	All U.S. Manufacturing
		Pulp, Paper and Paperboard Mills	Converted Paper Products	Total		
	- percent -					
2006	5.9	5.9	12.2	8.8	8.1	6.3
2005	7.0	7.9	15.3	11.3	9.6	9.3
2004	5.9	5.2	9.6	7.2	6.7	7.1
2003	4.5	2.6	8.1	6.0	5.4	6.9
2002	5.4	2.1	8.4	5.8	5.6	6.6
2001	4.4	5.0	8.4	6.9	5.8	7.3
2000	5.1	4.3	10.0	6.5	6.1	7.6
1999	6.0	5.4	9.2	7.3	6.7	7.2
1998	5.4	3.3	9.7	6.2	5.9	7.2
1997	4.3	4.7	-	7.2	6.1	7.7
1996	4.5	5.6	-	7.2	6.2	7.6
1995	7.0	8.6	-	8.0	7.6	7.6
1994	5.9	6.9	-	7.1	6.6	7.1

Note: Profit rate is measured by the ratio of corporate net income to corporate total receipts. Includes only corporations reporting a net income (82 percent of returns filed in 2006).
Source: U.S. Department of Treasury. 2008.

Industry-wide Patterns. An important measure of industry-wide profits is the ratio of corporate net income to corporate business receipts. For the 13-year period 1994 through 2006, the profit rates for the combined wood and paper manufacturing groups of the wood-based manufacturing industry ranged between five and slightly more than 9 percent, an annual average of 6.6 percent (Table 41). For all U.S. manufacturing industries combined, profit rates fluctuated between six and slightly more than 9 percent. In only two of the 13 years did the profit rate of corporations in the wood-based manufacturing industry equal or exceed the national average for all manufacturing industries. If the industry was capable of exercising special power to extract excess profits in national marketplaces, such would not be expected. The industry's profit rates were reasonably correlated with annual changes in national profit rates. In seven of 12 possible year-to-year changes, the two were synchronized (four following upward changes, three following downward changes); in five, they moved in opposite directions.

The wood product group of the wood-based manufacturing industry experienced profits in the range of four to 7 percent during the period 1994-2006, with an average of 5.5 percent (Table 41). In none of the 13 years examined did the profit rate of the group exceed the national rate. In contrast, the profit margin of the paper manufacturing segment of the industry exceeded or equaled the latter in six of the years from 1994 through 2006. The group's average profit rate during the

latter was 7.3 percent. Over a nine-year period (1998-2006), a strong profit margin was reported by the converted paper products industry, namely an average of 10.1 percent annually. Profit rates for the wood furniture segment of the industry are not available, although they are probably in the range of returns for the furniture and related products industry generally (5.5 percent to 6.0 percent).

Corporate profits (after taxes) of the wood-based manufacturing industry can vary considerably from year to year. For the period 1987 through 2006, profits of the industry's wood products group ranged from 56 percent above the average for the 20-year period to a low of 68 percent. More dramatic were profit shifts in the paper products group, ranging from 138 percent above the period's average to 110 percent below the average. For the wood products group, profits were below the group's annual average profit during eleven years and above the average for nine years; nine years below and 11 years above for the paper products group. On average, periods of profitability lasted slightly less than three years for the wood products group; for the paper products group, profitable periods were relatively long prior to 1998 (two four-year periods) but counterbalanced by a four-year period of negative profits from 2001 through 2004. A more detailed analysis of profit variation from a group's 20 year average follows (percent) (Bureau of Economic Analysis 2008).

Year	Wood Products	Paper Products	Furniture and Related Products	US Manufacturing
1987	31	12	-26	-34
1988	13	66	-43	-7
1989	14	55	-55	-18
1990	-35	19	-62	-18
1991	-56	-22	-57	-35
1992	-12	-38	-37	-31
1993	19	-30	-14	-20
1994	28	8	-13	7
1995	56	138	-5	27
1996	-17	52	25	29
1997	-16	6	49	42
1998	-68	-38	48	3
1999	48	-10	53	3
2000	-23	19	24	7
2001	-50	-100	-35	-67
2002	-50	-103	-7	-66
2003	-24	-110	-14	-48
2004	41	-19	-3	20
2005	51	7	70	80
2006	-17	88	102	126

The profit ratios attendant to the wood-based manufacturing industry are more meaningful when compared with ratios for other manufacturing industries. Focusing on an average year for the wood-based industry (2004, 6.7 percent), profit rates for similar manufacturing industries are as follows: electrical equipment industry – 6.7 percent ($245.8 billion receipts), fabricated metal product manufacturing – 7.6 percent ($244.0 billion receipts), primary metal manufacturing – 7.6 percent ($168.3 billion receipts), chemical manufacturing – 10.8 percent ($570.6 billion receipts), and computer and electronic equipment – 7.6 percent ($450.2 billion sales). Examples of profit ratios for non-manufacturing industries are agricultural production – 7.9 percent, mining – 12.9 percent, wholesale and retail trade – 3.8 percent, information and publishing – 11.0 percent, finance and insurance – 15.2 percent, and real estate and leasing industry – 15.8 percent (U.S. Department of Treasury 2008).

Company Patterns. Indicators of the financial performance of the nation's larger wood-based manufacturing companies are readily available. Such is especially so for public corporations. Unfortunately for the literal thousands of wood-based companies that are not among the leading 40 or 50 enterprises, such resources are very difficult to obtain. Measures commonly used to judge the financial performance of include (Value Line, Inc. 2008):

Return on Shareholder Equity – annual net profit as a percent of year-end shareholder equity (shareholder capital used by company).
Return on Total Capital – annual net profit as a percent of year-end shareholder equity and long-term debt (shareholder capital and capital obtained from borrowing).
Net Profit Margin – net income as a percent of sales
Sales-Revenue per Share – net sales divided by number of common shares outstanding at year end.
Book Value per Share – net worth (including intangible assets) divided by number of common shares outstanding at year end.

Although not suggested as a representative sample of the more than 35,000 companies operating in the wood-based manufacturing industry, 27 public companies for which financial information was readily available were chosen for review (Table 42). For the period 1999 through 2008, indexes of annual profit and growth for the 27 companies ranged from disappointing to exceptional. Annual return on equity for the companies was a respectable 13.8 percent, while annual return on capital averaged 9.4 percent. However, the range of the former index for specific companies was a low of 4.0 percent annually for Bassett Furniture Industries, Inc. to a high of 48.5 percent annually for Herman Miller, Inc., while for the latter, the index went from a low of 3.5 percent annually for MeadWestvaco to an annual high of 27.0 percent for Herman Miller, Inc. Wood furniture manufacture as a group averaged highest on both annual return to equity (average of 16.3

Table 42. Financial Performance of U.S. Wood-Based Manufacturing Companies, by Company and Performance Measure. 1999-2008.

Company	Total 2008 Company-wide Sales (million dollars	Return on Investment (annual average 1999 - 2008)			Growth per Share (annual average 1999-2008)	
		Return on Equity (percent)	Return on Capital (percent)	Net Profit Margin (percent)	Sales-Revenue (percent)	Book Value (percent)
Wood Products Group						
Champion Enterprises, Inc.	1,296	19.3	8.3	2.4	(8.7)	(7.0)
Louisiana-Pacific Corporation	1,715	14.1	9.1	8.9	(2.5)	3.0
Plum Creek Timber Company	1,675	13.2	7.0	22.1	(4.5)	1.0
Rayonier, Inc.	1,148	13.0	8.7	9.1	(1.0)	2.0
Universal Forest Products	2,513	11.8	8.7	1.9	8.5	14.5
Weyerhaeuser Company	16,427	8.5	6.7	3.7	5.0	(2.5)
Paper Products Group						
Bemis Company	3,656	14.2	9.9	5.7	8.0	9.0
P.H. Galtfelter Company	1,158	8.2	6.2	4.4	5.5	2.0
Grief, Inc.	3,322	12.7	9.2	4.7	16.5	9.0
International Paper Company	22,730	8.0	4.8	2.5	(3.0)	(7.0)
Kimberly-Clark Corporation	18,282	31.9	22.0	11.5	6.5	4.5
MeadWestvaco	7,092	3.8	3.5	2.0	0.5	(4.0)
Neenah Paper, Inc.	990	21.5	11.3	5.8	(0.4)	1.3
Packaging Corporation of America	2,316	12.2	8.4	4.8	5.5	(2.0)
Potlatch Corporation	1,900	11.9	7.4	4.9	(3.8)	(12.6)
Rock-Tenn Company	2,315	9.4	5.9	2.5	7.0	3.5
Sonoco Products Company	4,183	17.3	11.6	5.7	4.0	4.5
Temple-Inland, Inc.	3,926	7.7	6.1	4.2	5.0	(4.5)
Wausau Paper Corporation	1,249	4.3	3.9	1.4	5.0	(2.5)
Wood Furniture Group						
American Woodmark Corporation	761	14.1	12.8	4.0	19.0	14.5
Bassett Furniture Industries, Inc.	335	4.0	4.2	2.8	(2.5)	(2.0)
Ethan Allen Interiors, Inc.	1,005	19.0	17.3	8.9	9.5	8.0
Furniture Brands International, Inc.	2,082	12.4	8.8	4.1	2.0	7.0
Kimball International, Inc.	1,142	6.5	6.5	2.4	3.5	0.5
La-Z-Boy, Inc.	1,677	9.8	7.3	3.0	5.5	3.5
Masco Corporation	11,770	16.4	10.4	7.3	10.5	4.0
Herman Miller, Inc.	1,919	48.5	27.0	5.7	6.5	(5.5)

Note: Return on investment information for MeadWestvaco for 2002 through 2008andfor Neehah Paper, Inc. for 2004 through 2008. Growth per share information for Packaging Corporation of America for 2004 through 2008.
Source: Value Line, Inc. 2008.

percent) and return to capital (average 11.8 percent). The six companies in the wood products group were unassuming in annual return on capital as was the return on equity of the 13 companies focused on the manufacture of paper products.

The annual net profit margin for the 27 companies averaged 5.4 percent for the 10 year period reviewed, with highs being registered for the Plum Creek Timber Company (22.1 percent) and the Kimberly-Clark Corporation (11.5 percent). Eight companies had annual net profit margins of 3.0 percent or less for the 10-year period. In contrast to their standing with returns on equity and returns on capital, companies in the wood products group lead in the annual net profit margin measure (average of 8.0 percent), followed by the wood furniture (4.8 percent) and the paper product (4.6 percent) groups. The lowest combined annual average for the investment indexes (return on equity and capital and net profit margin) was recorded by the Wausau Paper Corporation and International Paper Company, while the highest was established by Plum Creek Timber Company and Louisiana-Pacific Corporation. For sake of comparison, the following are 2008 profit margins for nonwood-based companies engaged in the processing of materials: Monsanto Corporation – 19.4 percent, FMC Corporation – 9.6 percent, Newmont Mining Company – 13.7 percent, US Steel Corporation – 8.9 percent and Owens-Illinois Corporation – 3.3 percent (Forbes, Inc. 2008).

Growth of the 27 corporations, as measured by annual sales revenue per share and book value per share, was erratic over the 10-year period reviewed (Table 42). Although the average annual sales growth of the 27 companies was a plus 4 percent, eight of the corporations reported annual losses during the 10-year period. Most dramatic in this respect were Champion Enterprises, Inc. (minus 8.7 percent annually) and Plum Creek Timber Company (minus 4.5 percent annually). Notable for above average performance in annual sales growth were American Woodmark Corporation (19.0 percent annually), Grief, Inc. (16.5 percent annually) and Masco Corporation (10.5 percent annually). As for annual growth in net worth per share (book value), 17 companies experienced annual gains, of which Universal Forest Products and American Woodmark Corporation were leaders – each registering 14.5 percent annual growth in book value. For the 27 companies generally, the average annual growth over 10 years for the 27 companies was a plus 1.6 percent annually.

Productivity

The wood-based industry is constantly searching for ways of increasing output given the resources that are available for to doing so. Rising production costs and fears of losing competitive advantages in the marketplace are common incentives for seeking these gains in efficiency. The typical measure of an industry's ability to efficiently convert raw materials into products is productivity, which is commonly viewed as ". . . a ratio relating output (goods and services) to one or more inputs which are associated with their output . . . it is an expression of the physical or real volume of goods and services related to the physical or real quantities of inputs (Mark 1983, U.S.

Department of Labor 2008a). Productivity measures include those relating output of an enterprise or an industry to a single input (for example, labor, capital, energy) and those relating output to a combination of inputs (for example, technologies, organization, management skills). Labor productivity is the most commonly used measure, where labor is specified in physical terms (hours of labor worked), while output is similarly defined in appropriate physical terms (for example, lumber volume, tons of pulp). Unfortunately, labor productivity does not reflect the joint effect of a number of interrelated influences such as changes in technology, capital investment per worker, utilization of capacity, layout and flow of material, skill and effort of the work force, managerial skill, and labor-management relations. These problems with labor productivity and problems with productivity concepts and measures generally – including availability of data describing productivity – are cause for concern (Ellefson and Stone 1984). Nonetheless, measures of productivity can provide useful insight to an industry's progress and progressiveness tendencies.

Although the labor productivity measures relate output to one input (labor time), they do not measure the specific contribution of labor, capital, or any other factor of production. Rather, they reflect the joint effect of a number of interrelated influences such as changes in technology, capital investment per worker, utilization of capacity, layout and flow of material, skill and effort of the work force, managerial skill, and labor-management relations. Conceptual and measurement problems aside, productivity provides useful insight to an industry's progress and progressiveness tendencies.

Industry-wide Patterns. Labor productivity within the wood-based manufacturing industry has demonstrated steady gains over the 20 year period 1987 through 2006 (Table 43, Appendix Table 14). Industry-wide productivity in 2006 was 43 percent greater than in 1987, with an average annual gain of 1.9 percent. The most impressive annual gains occurred during the period 2001 through 2006 (annual average of 3.4 percent), with an appreciable gain of 7.6 percent from 2001 to 2002. At only one time during the 20 year period did industry-wide productivity decline – and then only modestly from 94.9 to 94.4 (1994 to 1995). As for productivity gains of the industry's major groups, productivity of the furniture and related products group in 2006 was 51 percent more than in 1987, followed by the paper products group (48 percent) and the wood products group (31 percent). The average annual gain for each of the three groups during the 20-year period was 2.2 percent, 2.1 percent and 1.5 percent, respectively. Within these groups, the industry's with notable productivity gains from 1987 to 2006 were the pulp, paper and paperboard mills industry – 85 percent, showcases, partitions, shelving and lockers industry – 84 percent, and the stationary products industry and sawmills and wood preservation industry, 67 percent each. Productivity actually declined – or increased very modestly – in some wood-based industries (2006 compared

to 1987), namely manufactured homes (mobile) industry – minus 14 percent, veneer and plywood industry – 17 percent, and the paperboard containers industry – 21 percent (Appendix Table 14).

Table 43. Labor Productivity of the U.S. Wood-based Manufacturing Industry by Major Industry Group. 1987-2006.

Year	Wood-based Industry	Wood Products Group	Paper Products Group	Furniture and Related Products Group
1987	89.7	95.0	85.8	88.3
1988	89.7	94.5	87.7	87.0
1989	89.1	95.4	87.4	84.5
1990	90.6	97.5	87.1	87.2
1991	90.8	98.2	88.8	85.3
1992	94.6	100.8	90.6	92.5
1993	94.9	97.6	92.8	94.2
1994	94.4	95.9	95.6	91.8
1995	96.4	97.6	97.8	93.7
1996	96.4	99.2	96.6	93.3
1997	100.0	100.0	100.0	100.0
1998	101.9	101.2	102.3	102.2
1999	103.0	102.9	104.1	101.9
2000	104.0	102.7	106.3	102.9
2001	105.7	106.1	106.8	104.1
2002	114.5	113.6	114.2	115.6
2003	117.7	114.7	118.9	119.5
2004	120.8	115.6	123.4	123.4
2005	125.6	123.1	124.6	129.1
2006	128.6	124.8	127.3	133.6

Note: Labor productivity is ratio of manufacturing output and hour of labor required to generate that output. 1997=100.
Source: US Department of Labor. 2008b.

The labor productivity of the nonwood-based manufacturing industries provides a reference against which to compare productivity within the wood-based industry. For the period 1987 through 2006, the average annual productivity gain for all manufacturing industries in the United States was 2.8 percent; for the wood-based manufacturing industry, 1.9 percent. As described in the aforementioned, the average annual productivity gains for the major segments of the wood-based manufacturing industry for the same period were: wood products – 1.5 percent, paper products – 2.1 percent and furniture and related products – 2.2 percent. Of 13 nonwood-based manufacturing industries reviewed here (3 digit NAICS) , the wood-based industry had greater productivity gains than three of the industries, but less than was reported by 13 of the industries – as the following indicates (US Department of Labor. 2008b).

Wood-based industry gains greater than . . .

Food manufacturing – 1.3 percent
Nonmetalic mineral product manufacturing – 1.4 percent
Fabricated metal product manufacturing – 1.7 percent

Wood-based industry gains less than . . .

Textile mills manufacturing – 3.8 percent
Leather and allied product manufacturing – 3.3 percent
Petroleum and coal product manufacturing – 2.9 percent
Chemical manufacturing – 2.5 percent
Plastics and rubber product manufacturing – 2.6 percent
Primary metal manufacturing – 2.7 percent
Machinery manufacturing – 2.7 percent
Computer and electronics manufacturing – 12.5 percent
Electrical equipment and appliance manufacturing – 2.9 percent
Transportation equipment manufacturing – 3.0 percent

Capital productivity can also be used as a measure of efficiency gains in the wood-based industry. Typically included within the domain of capital assets contributing to productivity gains are equipment, structures, inventories and land. For the wood products group of the industry, the capital productivity index increased 15 percent from 1987 (87) through 2000 (100) and remained a nearly constant 99 from 2001 through 2007 (2000 index = 100). The land productivity portion of the index declined each year from 2001 to 2007, namely 19 percent total. As for the paper products group, the capital productivity index increased substantially from 1987 through 1999 (77 to 100) (30 percent total), although declined 12 percent during the ensuing eight years (100 to 88). The most important factor in the later eight year decline was a downturn in the productivity of equipment (12 percent total). The capital productivity index of the furniture group (includes nonwood furniture manufacturing) increased nearly every year from 1987 through 2007 (66 to 110) – a 21 year increase of 44 percent. The most important contributor to this overall increase was a continuous 20 year annual in crease in the productivity of equipment used in the manufacture of furniture (182 percent total increase in the index) (U.S. Bureau of Labor Statistics 2008c).

Company Patterns. Broad society-wide productivity measures for companies have been suggested by some (Roach 1996). The intent being to determine a company's contributions beyond revenues, assets and profits. Unfortunately, contributions beyond the latter are often difficult to identify and to subsequently measure. In 1980, the gross corporate product (wages, salaries, employee benefits, retained earnings, dividends, taxes paid, depreciation) per employee of 20 individual wood-based companies was assessed (Athanasopoulaos 1981), of which the following were present in the industry as of 2008: Weyerhaeuser – $46,935, International Paper – $ 41,005, Potlatch – $37, 920, Kimberly-Clark – $35,020, Sonoco Products – $27,990, Dennison

Manufacturing – $24,180 and Bemis – $21,779. A more recent assessment of wood-based manufacturing company productivity using broad measures of productivity has not been undertaken.

Company productivity can be portrayed by evaluating corporate revenue (wood and nonwood sales) per employee. At the risk of making inferences from such a partial productivity measure, the ratio of revenue generated (2006-2007) per employee for over 90 companies previously described in this review averaged about $265,300 – ranging from $55,800 per employee to $837,500 per employee. Examples of 30 companies on the upper end of the latter range (averaging $435,201 per employee) are as follows:

Plum Creek Timber Company, Inc. – $837,500
Hampton Affiliates – $833,333
Rayonier, Inc. – $574,000
Verso Paper Corporation – $561724
Boise Cascade Holdings, LLC – $531,207
Newpage Corporation – $529,412
Potlatch Corporation – $500,000
Sappi Fine Paper North America – $466,294
PALCO (Maxxam, Inc) – $450,000
McFarland Cascade Holdings – $448,000
Wausau Paper Corporation – $442,857
International Paper Company – $441,359
Weyerhaeuser Company – $433,922
AbitibiBowater, Inc. –$416,826
Neenah Paper, Inc. – $404,082
Cox Industries, Inc. – $380,000
Interstate Resources – $375,000
Nashua Corporation – $367,937
Pope and Talbot, Inc. – $354,404
Kimberly-Clark Corporation – $334,943
Hooker Furniture Corporation – $332,632
Graphic Packaging Corporation – $327,162
Smurfit-Stone Container Corporation – $326,872
Grief, Inc. – $322,524
Appleton Paper, Inc. – $300,467
P.H. Galtfelter Company – $300,457
MeadWestvaco – $295,500
Herman Miller, Inc. – $291,908
Schnadig Corporation – $267,500
Bassett Furniture Industries, Inc. – $232,639

These company ratios of revenue to number of company employees are put in perspective when compared with similar ratios for a number of nonwood-based companies (2008), namely Owens Corning Corporation – $340,000, Armstrong World Materials – $254,000, International Business Machines – $257,000, Peabody Energy – $571,300, Texas Instruments – $472,000, SandDisk Corporation – $794,000 and Hewlett Packard – $568,000 (Forbes, Inc. 2008).

Capacity Utilization

Managers of establishments operating within the wood-based manufacturing industry are interested in ensuring that the machinery and equipment at their disposal are being fully utilized. Although such may be an achievable goal under normal operating conditions, the ability to fully utilize available production capacity over long periods of time is difficult. Circumstances that detract from such an ability include uncertainties over the demand for products, shortages in the supply of raw materials, equipment breakdowns and malfunctions, needed modernization of equipment, shortages in the supply of a quality labor force. The ability of the industry to anticipate and respond

to such difficulties can be viewed as a measure of performance. As used here, the capacity performance measure is the ratio of a manufacturer's actual production to full production capability (capacity utilization rate) (U.S. Census Bureau 2007b).

The wood-based manufacturing industry used about 69 percent of its full capacity in 2006, with an average rate of about 71 percent over the period 1998 through 2006 (Table 44). For the industry, variation in capacity utilization during the latter period was modest, ranging from a low of 66 percent in 2002 to a high of 77 percent in 1998. Such compares favorably with the capacity utilization rates for all U.S. manufacturing industries, namely 70 percent in 2006 (average of 69 percent 1998-2006) and a difference between capacity extremes of 10 percent. For comparison, 2006 rates for other manufacturing industries (3-digit NAICS) are food products – 71 percent, textile products – 70 percent, chemicals – 67 percent, plastics and rubber products – 69 percent, primary metals – 73 percent, computers and electronics – 72 percent, and electrical equipment – 69 percent (U.S. Census Bureau 2007b).

As for the capacity utilization of the industry's major groups from 1998 through 2006, leading was the paper group with an average of 79 percent – 12 percent above the 67 percent reported for each of the industry's other two groups. As for extremes in capacity utilization rates for individual industries over the eight year period examined, the paper board mills, pulp mills, and paper mills lead industry-wide with 93, 91, and 88 percent, respectively. In contrast, showcases, partitions, and shelving industry was least able to demonstrate a high capacity utilization rate (59 percent) over the eight-year period, as was the wood television and radio cabinet industry (61 percent), nonupholstered wood household furniture industry (65 percent) and the wood office furniture industry (65 percent). In 2006, 10 (nearly 60 percent) of the 17 industries reviewed here were below the average for all U.S. manufacturing. For the period 1998-2006, the wood containers and pallets and the paperboard mills industries had the highest single-year capacity utilization rates, 97 percent in 2004 and 98 percent in 2006, respectively. The lowest single-year rates for the same period were the 51 percent recorded by the wood television and radio cabinet industry (51 percent in 2006) and the 2005 low of 52 percent registered by the wood containers and pallets industry (after a high of 97 percent the previous year)(U.S. Census Bureau 2007b).

Table 44. Production Capacity Utilization Rates of the U.S. Wood-based Industry, by Major Industry Group. 1998-2006.

Major Industry Group	Capacity Utilization Rate (percent)					
	2006	2005	2004	2002	2000	1998
Wood Products Manufacturing	65	70	73	54	65	74
Sawmills and Wood Preservation	75	82	83	75	74	71
Veneer, Plywood and Engineered Products	65	80	78	66	75	83
Millwork	64	66	67	73	70	72
Wood Containers and Pallets	80	52	97	59	67	79
Paper Manufacturing	79	75	77	81	79	83
Pulp Mills	94	92	93	87	88	91
Paper Mills	88	80	88	89	87	93
Paperboard Mills	98	95	94	93	87	90
Paperboard Containers	70	68	67	74	73	78
Paper Bag and Coated and Treated Paper	67	68	66	71	74	74
Stationary Products	68	72	75	65	65	69
Sanitary Paper Products	74	68	72	79	85	85
Wood Furniture Manufacturing	63	66	67	62	69	73
Wood Kitchen Cabinet and Countertops	76	80	92	73	65	77
Nonupholstered Wood Household Furniture	62	60	54	65	73	74
Wood Television, Radio,Sewing Machine Cabinets	51	58	60	67	71	61
Wood Office Furniture	56	71	65	42	76	81
Custom Architectural Woodwork and Millwork	75	68	73	66	71	87
Showcases, partitions, shelving and lockers	56	59	60	60	60	60
All U.S. Manufacturing Industries	70	71	70	63	71	73

Note: Information reflects conditions at establishments with five of more employees.
Source: U.S. Census Bureau. 2007b.

Employment Conditions

Employee Compensation. The nation's wood-based manufacturing industry employed over 1.2 million workers in 2007, a sum representing 9.4 percent of employees in all U.S. manufacturing industries (Table 4). The industry's payroll totaled $4.9 billion in 2007, distributed among the major groups as follows: wood products – 36 percent, paper products – 42 percent, and wood furniture products – 22 percent. Production worker hourly wage rates were highest among employees in the paper product group at $20.46 per hour, a rate ranging from a low of $17.55 per hour (excluding the "other concentrated paper product category") a high of $29.91 per hour in the pulp mills industry Table 8). Of the group's seven industries, five had a 2007 average wage rate that exceeded the

national average for all U.S. manufacturing industries ($18.63 per hour). Employees in the wood products group experienced wage rates that were about 13 percent below the industry's average, ranging from $11.19 per hour in the wood containers and pallets industry to a high of $18.08 in the reconstituted wood products industry (Table 6). None of the group's industries exceeded the national average for all U.S. manufacturing industries. Average wages of production workers engaged in wood furniture manufacture were the lowest among the wood-based industry's three major groups, namely $4.68 per hour or about 31 percent short of the average for all U.S. manufacturing industries (Table 10). The three wood-based industries with the largest payrolls in 2007 (millwork, paperboard containers, wood kitchen cabinets) accounted for a about one-third of the industry's total employee payroll.

The average wage rates of production workers in the wood-based industry have increased during the 11 year period 1997 through 2007 in both current and indexed (1997=100) terms (Appendix Table 15). Except for the industry's wood products group from 2002 to 2003 and the paper products group from 2006 to 2007, the index of average wage rates for each of the industry's major groups increased annually during the latter period. Such is consistent with changes in indexed wage rates for production workers in all U.S. manufacturing industries. In 2007, the wood furniture group's production worker real wages were 44 percent greater than in 1997, followed by wood products (30 percent) and paper products (26 percent) – although the latter two were less than was reported for all U.S. manufacturing industries, namely 33.2 percent. Within the wood-based industry, especially notable differences between 1997 and 2007 occurred for the nonupholstered wood furniture industry (50.5 percent), paperboard mills industry (37.1 percent) and the millwork industry (35.8 percent), with appreciably less change occurring in the wood container and pallets industry (28.2 percent) and the pulp and paper mills industry 26.1 percent). The average annual change in real wages of production workers over 1997-2007 was wood products – 1.8 percent, paper products – 2.3 percent and wood furniture – 3.3 percent. Except for the latter, the wood products and paper products groups were below the average annual change in indexed wages for all U.S. manufacturing industries. For the period 1999 through 2008, the Consumer Price Index increased 20.6 percent at an average annual increase of 2.5 percent (1999=100).

Employee compensation for services rendered often include more than direct wage payments. Also important are employer payments to social security and similar legally mandated programs (worker's compensation insurance, unemployment tax, disability insurance, Medicare), as well as numerous benefit programs initiated by employers or the result of collective bargaining. The latter two can include pension plans (defined contribution, defined benefit), health insurance premiums, stock purchase plans and deferred profit-sharing plans. Not often included in supplemental benefits are company-operated facilities such as cafeterias, in-plant medical services, and employee discounts

on company products. In 2007, 22 percent of total compensation in the wood-based industry was provided in the forms other than wages (about $14.5 billion), an increase of about 5 percent (Ellefson and Stone 1984). The distribution of nonwage compensation was nearly uniform across the industry's major groups and consistent with the average for all U.S. Manufacturing industries. As indicated by the following (in percent), the largest portion of nonwage benefits in 2007 went to social security, workers compensation insurance, unemployment tax, disability insurance and Medicare ($4.5 billion) (U.S. Census Bureau. 2009b).

Form of Compensation	Wood Products	Paper Products	Wood Furniture Products	All U.S. Manufacturing Industries
Wages	78	77	78	77
Health Insurance	8	8	8	8
Pension Plans	3	4	3	4
Social Security and Related Programs	11	11	11	11
Total	100	100	100	100

Occupational Injury and Illness. Industrial accidents, disabilities and deaths are personal tragedies as well as costly occurrences for wood-based manufacturing enterprises. The latter may involve payment of wages for various nonproductive activities, including the salary of the injured employee, supervisor time required to investigate an accident, and payment of overtime wages required to maintain production levels. Also of concern is the cost of repairing damaged equipment, training new and existing employees and the delay or failure to deliver products to customers. Recognizing these costs, a variety of state and federal laws have been enacted for purposes of establishing a work environment that will help prevent occupational injuries and illnesses. Among such laws are the federal Occupational Safety and Health Act (wide-ranging safety measures for specific industries), Construction Safety Act (safety measures for construction and maintenance of roads), Longshoreman's and Harbor Worker's Compensation Act (safety measures for loading and unloading barges and ocean vessels), and various motor carrier safety regulations involving the transport of products, including timber and wood products.

Table 45. Injuries, Illnesses and Fatalities in the Wood-based Industry in the United States, by Industry. 2008.

Industry	Nonfatal Cases				Fatal Cases (total number)
	Recordable Cases		Cases with Days Away From Work or Work Restrictions		
	Total Number	Cases per 100 Employees	Total Number	Cases per 100 Employees	
Timber Growing and Harvesting	-	-	-	-	98
Timber Tract Operations	*	0.6	*	*	5
Logging	2,300	4.3	1,500	2.9	93
Wood Product Manufacturing	33,400	7.2	17,400	3.8	27
Sawmills and Wood Preservation	7,200	6.9	3,600	3.4	12
Veneer and Plywood Manufacture	2,000	4.8	1,100	2.6	*
Engineered Wood Products	3,500	7.4	1,700	4.1	*
Reconstituted Wood Products	400	2.5	200	1.0	*
Millwork	8,200	6.4	4,000	3.2	*
Wood Containers and Pallets	4,900	9.0	2,900	5.4	*
Other Wood Products	7,200	6.0	3,900	3.7	7
Paper Manufacturing	17,400	3.7	9,400	2.0	15
Pulp, Paper and Paperboard Mills	4,000	3.0	2,100	1.5	12
Paperboard and Containers	6,400	3.6	3,600	2.0	*
Paper Bag and Coated and Treated Paper	3,300	4.4	1,700	2.3	*
Stationary Products	1,600	5.1	900	3.0	*
Other Paper Products	2,100	6.3	1,100	2.7	*
Wood Furniture Manufacturing	17,300	7.8	9,400	4.3	*
Wood Kitchen Cabinets and Countertops	7,800	7.4	4,400	4.4	*
Nonupholstered Wood Household Furniture	3,200	7.1	1,600	3.6	*
Wood Office Furniture	1,100	7.1	600	4.3	*
Custom Architectural Woodwork and Millwork	1,300	8.7	800	4.7	*
Showcases, partitions, shelving and lockers	3,900	8.7	2,000	4.3	*
U.S. Manufacturing Industries	689,700	5.0	372,900	2.7	404

Note: Information for major industry groups includes miscellaneous industry categories not specifically identified. Asterisk indicates information not reported separately or incidents are small so as not to be meaningfully measured.
Source: U.S. Department of Labor. 2008d.

The manufacturing industry in the United States experienced 690,000 nonfatal occupational injuries in 2008. In addition to these events, 404 persons lost their lives as a result of some employment related manufacturing incident. The wood-based manufacturing industry is a significant contributor to these undesired occurrences. In 2008, the industry reported 68,100 cases of injury and

illness and experienced over 40 deaths resulting the manufacture of wood products, 10 percent of each's national total for all manufacturing (Table 45). Contributing to these conditions within the wood-based industry are a variety of factors, including numerous outdoor operations, movement of heavy nonuniform raw material, use of large sawing and planing machinery, and many small operators that often lack safe equipment or lack sensitivity to conditions required for a safe work environment. Fortunately, the industry's incidence rates (nonfatal) for occupational accidents and illnesses has decreased appreciably since 2003 (incidents per 100 employees), namely (U.S. Department of Labor. 2008d):

Year	Wood Product Group	Paper Product Group	Wood Furniture Group	Wood-based Industry	All U.S. Manufact-uring
2008	7.2	3.7	7.8	6.2	5.0
2007	7.8	4.0	7.2	6.3	5.6
2006	8.5	4.3	7.8	6.9	6.0
2005	9.4	4.4	7.7	7.2	6.3
2004	10.0	4.9	8.3	7.7	6.6
2003	10.0	4.8	8.7	7.8	6.8

Fatal work-related incidents occurring within the wood-based industry are primarily the result of an event involving equipment and machinery or conditions involving transportation of materials or products. Of the 42 fatalities reported within the wood and paper product segments of the wood-based manufacturing industry in 2008, 23 were machinery related, 7 transportation related, and 12 unspecified as to cause. This distribution is similar to the distribution of causes of work-related fatalities reported for all manufacturing industries in the United States (28 percent equipment related, 25 percent transportation related)(U.S. Department of Labor. 2008d).

The occurrence of nonfatal cases of occupational injury and illness within the wood-based manufacturing industry is not to be excused. However, relative to incident rates in certain other manufacturing industries, rates within the wood-based industry appear modest. For example, the aluminum smelting and alloying industry – 13.7 injury and illness cases per 100 employees, leather and hide tanning industry – 10.7, travel trailer and camper manufacturing industry – 10.6, fabricated structural metal industry, and the truck trailer manufacturing industry – 9.8. Non-manufacturing industries with especially high incidence rates include skiing facilities – 14.2, heavy and civil engineering construction – 12.9, and ambulance services – 10.9 (U.S. Department of Labor. 2008d).

The industry's paper manufacturing group recorded the lowest incident rate for occupational injury and illness in 2008, the group's pulp, paper and paperboard mills segment being especially

notable in this respect (Table 45). The wood product segment's incident record was nearly twice that of the paper group, driven by the very high incident rate reported by the wood container and pallets industry, namely 9.0 cases per 100 employees. The industry's highest incidence of occupational injury and illness cases in 2008 occurred within the wood furniture manufacturing group (7.8 percent per 100 employees), with group's architectural wood industry and the showcase and partitions industry leading in recordable cases, each with 8.7 per incidents 100 employees (U.S. Department of Labor. 2008d).

The impact of occupational injury and illness cases within the wood-based industry is substantial. In 2008, 36,200 cases of injury or illness required days away from work or certain restrictions on the type of work an injured or ill employee could perform. Again, the wood furniture segment of the industry lead in the rate at which these work performance restrictions occurred (cases per 100 employees). Work-related injury and illness is not uniform across all sizes of establishments (as measured by number of employees). For the industry's major groups, the higher incident rates tend to occur in establishments of modest size ((U.S. Department of Labor. 2008d).

Wood Product Group		Paper Product Group		Wood Furniture Group	
Employees	Incidence Rate	Employees	Incidence Rate	Employees	Incidence Rate
1-10	3.1	1-10	1.4	1-10	3.9
11-49	7.9	11-49	4.5	11-49	5.5
50-259	7.9	50-259	4.3	50-259	6.8
250-999	5.2	250-999	3.1	250-999	5.7
1,000+	4.1	1,000+	2.0	1,000+	4.7

Research and Development

Research and development is a major focus of many organizations in the United States. In 2006, investment in industrial research and development from all sources was nearly $247.7 billion, $171.8 billion (69 percent) of which occurred within the nation's manufacturing sector. Of research and development occurring in the latter, 90 percent ($155.2 billion) was investment made by manufacturing companies (and certain nonfederal sources) that employed more than 660,000 full-time scientists and engineers (National Science Foundation 2009a). Research and development is generally understood as the search for fuller understanding of a subject and subsequent application of that understanding toward useful materials and systems (National Science Foundation 2006).

Industry-wide Patterns

Wood-based manufacturing industries in the United States invested an estimated $2.4 billion in research and development in 2006, a very large portion of which was in all likelihood focused on wood utilization and development (0.1 percent of total for all U.S. manufacturing industries) (Ellefson and others 2010) (Table 46). Over the eight-year period 1999 through 2006, industry-wide research and development investments averaged about $2.1 billion per year, although annual investments have fluctuated from 11 percent increases (2002 to 2003, 2005 to 2006) to a 14 percent decline (2003 to 2004). As described below, 86 percent of the industry's 2006 research and development investments were made by companies operating within the paper manufacturing group (National Science Foundation 2009a) (millions of current dollars).

Major Industry Group	1999	2000	2001	2002	2003	2004	2005	2006
Wood Products	70	105	182	145	151	167	220	195
Paper Products	1,768	1,929	1,903	1,859	2,078	1,648	1,771	2,030
Wood Furniture Products	84	96	102	88	102	140	136	140
Total (million)	$1,922	$2,130	$2,187	$2,092	$2,331	$1,955	$2,127	$2,365

Research and development investments similar in magnitude to those made by the wood-based industry occur in a number of nonwood-based manufacturing industries. For example (2006), the electrical equipment and components industry – $2.3 billion, plastics and rubber products industry – $2.2 billion, and the electrical equipment and appliances industry – $2.3 billion. However, the wood-based industry's research and development investments pale in comparison to industries such as the pharmaceuticals and medicine industry – $38.9 billion, computer and electronics industry – $56.8 billion, and the aerospace products and parts industry – $16.4 billion (National Science Foundation 2009b, National Science Board 2008).

Table 46. Research and Development Activities of Private Wood-based Manufacturing Companies in the United States, by Major Industry Group. 2006.

Wood Products Manufacturing Group	Paper Manufacturing Group	Wood Furniture Manufacturing Group
R&D Expenditures Total - $195,000,000	R&D Expenditures Total - $2,030,000,000	R&D Expenditures Total - $140,000,000
Distribution of Companies by R&D Expenditures	Distribution of Companies by R&D Expenditures	Distribution of Companies by R&D Expenditures
Less than $200,000 – 277 companies	less than $200,000 –26 companies	Less than $200,000 – 171 companies
$200,000 to $999,999 – 29 companies	$200,000 to $999,999 – 14 companies	$200,000 to $999,999 – 89 companies
$1 million to $9.9 million –20 companies	$1 million to $9.9 million – 9 companies	$1 million to $9.9 million –62 companies
$10 million to $99.9 million – 3 companies	$10 million to $99.9 million – 2 companies	$10 million to $99.9 million – 14 companies
$100 million or more -- no companies	$100 million or more – one company	$100 million or more – 7 companies
Portion of Domestic Sales = 0.76 percent	Portion of Domestic Sales = 1.39 percent	Portion of Domestic Sales = 0.76 percent
Distribution of R&D Expenditures by Type of Research [329]	Distribution of R&D Expenditures by Type of Research [52]	Distribution of R&D Expenditures by Type of Research [343]
Basic Research – $ 7,000,000	Basic Research – $ 21,000,000	Basic Research – $ 2,000,000
Applied Research – $72,000,000	Applied Research – $439,840,000	Applied Research – $30,000,000
Development – $ 116,000,000	Development – $ 1,577,000,000	Development – $ 108,000,000
Distribution of R&D Expenditures by Size of Company	Distribution of R&D Expenditures by Size of Company	Distribution of R&D Expenditures by Size of Company
5-49 employees – $ 4,485,000	5-49 employees – $ 46,690,000	5-49 employees – $ 3,220,000
50-249 employees – $ 7,605,000	50-249 employees – $ 79,170,000	50-249 employees – $ 5,460,000
250-999 employees – $ 15,999,000	250-999 employees – $ 166,460,000	250-999 employees – $ 11,480,000
1,000-9,999 employees – $ 47,580,000	1,000-9,999 employees – $ 495,320,000	1,000-9,999 employees – $ 34,160,000
10,000+ employees – $ 119,340,000	10,000+ employees – $ 1,242,036,000	10,000+ employees – $ 85,680,000
Distribution of R&D Costs by Type of Cost	Distribution of R&D Costs by Type of Cost	Distribution of R&D Costs by Type of Cost
Wages of R&D Personnel – 46 percent	Wages of R&D Personnel – 38 percent	Wages of R&D Personnel – 55 percent
Employer Fringe costs for R&D Personnel – 12 percent	Employer Fringe costs for R&D Personnel – 12 percent	Employer Fringe costs for R&D Personnel – 8 percent
Materials and Supplies – 10 percent	Materials and Supplies – 23 percent	Materials and Supplies – 17 percent
R&D Depreciation – 3 percent	R&D Depreciation – 5 percent	R&D Depreciation – 2 percent
Other Costs – 29 percent	Other Costs – 22 percent	Other Costs – 18 percent
Distribution of Companies by R&D Performing Area	Distribution of Companies by R&D Performing Area	Distribution of Companies by R&D Performing Area
Biotechnology – 3 percent	Biotechnology – 2 percent	Biotechnology – less than 1 percent
Software Development – 2	Software Development – 32 percent	Software Development – 6
Materials Synthesis and Processing – 56	Materials Synthesis and Processing – 21 percent	Materials Synthesis and Processing – 14
Other Areas – 39	Other Areas – 45 percent	Other Areas – 79
Scientists and Engineers	Scientists and Engineers	Scientists and Engineers
Total – 1,710	Total – 3,767	Total – 2,246
Portion of Total Employees – 1.60 percent	Portion of Total Employees – 2.13 percent	Portion of Total Employees – 1.30 percent

Note: Number in brackets is number of companies. In some cases, estimates were made for nondisclosed information (data source avoiding disclosure of confidential company information) and for separation of information describing combined (multiple) industries.
Source: National Science Foundation 2009a.

The funding for research and development undertaken by wood-based manufacturing companies originates primarily from company and nonfederal sources (for example, joint ventures and state governments). In 2006, an estimated 96 percent of the $2.4 billion invested in research by the industry was from these two sources, with the remaining 4 percent provided by the federal government (nearly all of which focused on development activities). The industry's paper products group received nearly all of the industry's federal funding ($210 million to $215 million of an estimated $228 million). For comparison, of the total funding of research and development by companies in all manufacturing industries, 10 percent originated from federal sources, with the aerospace products industry (27 percent) and the electro-medical and control instruments industry (43 percent) on the high side. Industries with federal funding emphasis similar to that occurring among wood-based manufacturing companies in 2006 were the nonmetallic mineral products industry (8 percent) and the basic metals industry (5 percent) (National Science Foundation 2009b).

The ratio of research and development investments to company domestic sales is a commonly used benchmark for judging the importance of research and development to an industry. In 2006, the overall ratio for companies performing research and development within the wood-based industry was about 1 percent, with the industry's major groups performing as follows: wood products group – 0.85 percent, paper products group – 1.39 percent, and wood furniture group – 0.76 percent (Table 46). In 2006, the ratio for all manufacturing companies in the United States was 4.0 percent, although the portion of sale devoted to research and development in some industries was substantial: computer and electronics industry – 10.8 percent, pharmaceuticals and medicine industry – 13.6 percent. More aligned with the wood-based industry in 2006 were the textiles and apparel industry – 1.4 percent, fabricated metals industry – 1.4 percent, and the electrical equipment and component industry – 2.5 percent (National Science Foundation 2009a).

Research and development is not universally performed by companies operating in the wood-based industry. In some cases, the investments of individual companies therein are very modest or not all. In 2006, 23 percent of 936 surveyed companies indicated they did not investment in research and development. Of the 77 percent that did make such investments, 65 percent invested some – but less than $200,000 –, while only 3 percent of reporting companies invested at least $10 million but less than $100 million. As indicated below (and in Figure 8), only eight companies invested $100 million or more in research and development during 2006 (National Science Foundation 2009a).

Major Industry Group	Research and Development Investments (companies)						
	None	Some but Less than $200,000	$200,000 to $999,999	$1 million to $9.9 million	$10 million to $99.9 million	$100 million or more	Total Comp-anies
Wood Products	77	277	29	20	3	0	406
Paper Products	14	26	14	9	2	1	66
Wood Furniture Products	121	171	89	62	14	7	464
Total	212	474	132	91	19	8	936

Investments in research and development by wood-based companies are more likely to be made by companies considered large in size, with size being defined by number of employees. In 2006, more than 61 percent of research and development investments made by wood-based companies engaged in such activities occurred in companies with 10,000 or more employees, while small companies (less than 250 employees) accounted for but 6 percent of the total (Table 46). When compared to all manufacturing industries in the United States, the proportion for each of these categories is nearly the same, namely 61 percent and 9 percent respectively. As for the industry's major groups, the portion of research and development attributable to large companies (10,000 plus employees) was identical for wood products, paper products and wood furniture products, namely 61 percent each. In absolute magnitude, however, companies with 10,000 or more employees in the paper product group accounted for the largest portion of industry-wide research and development investments in 2006, namely $1.2 billion or 52 percent (National Science Foundation 2009a).

Company investments in research and development are distributed among various cost categories (Table 46). For wood-based manufacturing companies in 2006, the wages of research and development personnel (for example, scientists, engineers, technicians, secretaries) accounted for 46 percent of such investments. The remaining 54 percent was distributed as follows: materials and supplies (17 percent), personnel fringe costs (for example, health plans, retirement plans) (11 percent), depreciation of property and equipment (3 percent), and various other costs (for example, company overhead, utilities, taxes, books, periodicals) (23 percent). For the most part, this industry-wide distribution was uniform across the industry's major groups. The notable exception was the wood furniture group where over half (55 percent) of research and development funds were wages paid to company personnel. For all manufacturing industries in the United States, a slightly lesser portion of research and development costs were accounted for by wages (44 percent), while for

other cost categories the distribution was very similar to that occurring in the wood-based manufacturing industry (National Science Foundation 2009a).

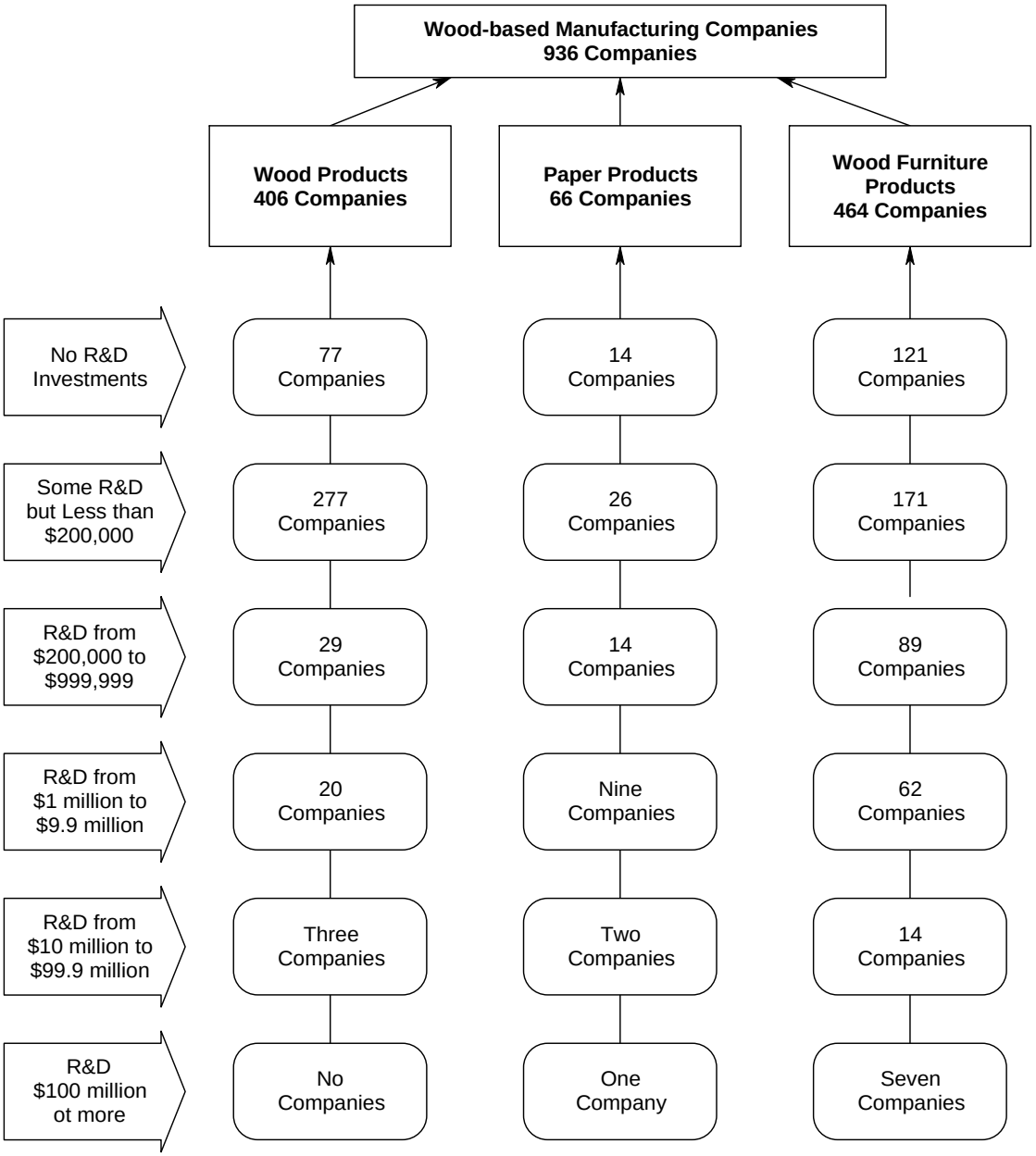


Figure 8. Research and Development Performing Wood-based Manufacturing Companies in the United States. 2006.

Research and development engaged in by wood-based companies can focus on a wide variety of subjects, of which biotechnology, software development, and materials synthesis are but three major categories (Hovgarrd and Hansen 2004). In 2006, about 2 percent of the industry's companies were engaged in biotechnology research, namely the use of scientific and engineering data and techniques for the study and solution of problems concerning living organisms (Table 46). Across all the industry's major groups, this proportion of companies varied only slightly with the high percentage (3 percent) occurring among companies in the wood products manufacturing group. As for software development as a focus of research (formulation of programs, applications and routines to be used by computers, excluding those used for internal company use), a relatively large portion – 32 percent – of companies engaged in paper and related manufacturing were engaged in software development. For the same research emphasis, the proportion of wood product and wood furniture companies were far less for each, namely 2 percent and 6 percent, respectively. Research involving materials synthesis and processing (formulation and manipulation of new materials) was the focus of about 30 percent of companies industry wide. However, the proportion varied from a high of over half (56 percent) of the companies in the wood products group to a low of 14 percent of companies in the wood furniture manufacturing group. About two of 10 companies in the paper group were engaged in such research. Unfortunately for purposes of making comparisons, the research performing category labeled "other" was very large, namely averaging nearly 54 percent. In 2006, the research subject distribution for all manufacturing companies in the United States was as follows: biotechnology – 5 percent, software development – 18 percent, materials synthesis and processing – 33 percent, and other areas – 44 percent.

Research and development performed by wood-based manufacturing companies is heavily skewed toward development, namely the translation of research findings into new products or processes or significant improvements to existing products or processes (including the design of prototypes) (Table 46). Of the $2.4 billion invested in 2006 by wood-based companies performing research and development, 76 percent focused on development activities. Particularly notable in this respect was the paper and wood furniture segments of the industry, where development investments exceed three-fourths of each group's total research and development investments. Applied research (translation of basic research toward new knowledge that has specific commercial objectives with respect to products, services, processes, or methods) accounted for 20 percent of industry-wide research and development in 2006 ($777 million of $2,365 million), with applied research emphasis among the industry's major groups distributed as follows: wood product manufacturing – 37 percent ($72 million), paper product manufacturing – 22 percent ($440 million), and wood furniture manufacturing – 21 percent ($9 million). Research pursuing new scientific knowledge that may not have specific or immediate commercial outcomes – basic research – was a modest $30 million for the wood-based industry in 2006, the largest portion of which – $21 million – occurred in the paper

products manufacturing group. For purposes of comparison, the 2006 distribution of research and development investments among basic, applied and development for all manufacturing industries in the United States was: basic – 4 percent, applied – 20 percent and development – 76 percent (National Science Foundation 2009a).

Wood-based manufacturing companies employ a variety of scientists and engineers to implement their research and development programs.[5] In 2006, an estimated 7,723 full-time equivalent scientists and engineers were so engaged by the industry – a modest 1.1 percent of all such persons so engaged in 2006 by all manufacturing companies in the United States (Table 46). The paper manufacturing segment employs the largest portion of the industry's scientists and engineers and had the largest portion of total employees considered scientists and engineers, namely 49 percent and 2.1 percent, respectively. In terms of direct financial support per scientist or engineer in 2006, the paper products segment was the leader with an estimated $221,087 per scientist followed by the wood products segment and the wood furniture products segment with $169,946 and $136,923 per scientist, respectively. In 2006, the national average for all manufacturing industries was $233,737 per full-time equivalent scientist or engineer (National Science Foundation 2009a).

The number of scientists and engineers employed annually by wood-based companies during the period 2000 through 2006 was about 8,350, with 1,420, 5,240 and 1,690 being the average per year for the wood products, paper products, and wood furniture products groups, respectively. As indicated by the following, trends in the number of scientists employed over this seven-year period are not very noticeable (National Science Foundation 2009b).

Major Industry Group	2000	2001	2002	2003	2004	2005	2006
Wood Products	700	1,600	2,000	1,550	1,100	1,278	1,710
Paper Products	5,346	4,990	4,396	7,088	4,976	6,116	3,767
Wood Furniture Products	1,685	1,872	1,373	1,248	1,622	1,810	2,246
Total	7,731	8,462	7,769	9,886	7,698	9,204	7,723

Longer term assessment of full-time equivalent scientists and engineers employed by the wood-based industry is difficult to evaluate because the information source (National Science Foundation) changed the definition of the industry's major groups in the mid-1990s. Recognizing this inconsistency in reporting, company employed researchers (full-time equivalents) industry-wide

[5] Scientists are defined as persons engaged in scientific work that requires knowledge (gained either formally or by experience) of physical, biological, mathematical, statistical, or computer concepts which has been acquired through completion of a 4-year college program or equivalent. Not considered scientists are persons engaged in routine activities involving quality control, product testing, and market research (National Science Foundation 2009b).

increased quite dramatically in the decade of the 1970s, becomes fairly stable in the decades of the 1980s and 1990s, and subsequently experiences a modest decline through 2006 (estimate for 1990) (National Science Foundation 1990):

Year	Lumber, Wood Products and Wood Furniture Industry	Paper and Allied Products Industry	Total Wood-based Industry
1960	700	2,400	3,100
1970	1,100	2,900	4,000
1980	2,200	7,500	9,700
1990	1,500	6,800	8,300
2000	-	-	7,731
2006	-	-	7,723

Research and development entities operated by wood-based manufacturing companies were located in all 50 states in 2006 (Table 47). In any specific state, the total research and development investment made by companies varied considerably between major groups of the industry as described below (the amount for some states is not available so as to avoid disclosure of confidential company information) (National Science Foundation 2009a):

> Wood Products Manufacturing Group: Investment of less than $500,000 in each of 24 states and an investment of $500,000 or more in each of 19 states.
>
> Paper Products Manufacturing Group: Investment of less than $500,000 in each of eight states and an investment of $500,000 or more in each of 38 states.
>
> Wood Furniture Products Manufacturing Group: Investment of less than $500,000 in each of 23 states and an investment of $500,000 or more in each of 24 states.

Although physically located in a particular state, wood-based company research and development entities very often engage in research that is regional and, in some cases, national and international in scope. Focusing only on the state location of such entities, the industry's research and development presence can be considerable in some states (Table 47). Of 38 states for which information is available, research investments by paper product companies in only five states accounted for 72 percent of the paper group's total for those states: $427 million in Ohio, $205 million in Wisconsin, $79 million in Texas, $69 million in Georgia, and $36 million in Washington. Although more modest in amount, wood furniture manufacturing companies made research and development investments of $32 million in Michigan, $13 million in Indiana, $11 in North Carolina, $7 million in Wisconsin, and $6 million in California. The most notable state locations of the wood

Table 47. Research and Development by U.S. Wood-based Manufacturing Companies, by State and Major Industry Group. 2006.

Wood Products Industry Company R&D Expenditures in State		
Less than $500,000	$500,000 or more	Confidential
AK, AL, CO, CT, HI, ID, KS, LA, ME, MO, MS, MT, ND, NH, NJ, NM, NV, RI, SD, UT, VA, VT, WV, WY	AR ($1 million), AZ ($1 million), CA ($22 million), FL ($4 million), GA ($11 million), IA ($12 million), IL ($1 million), IN ($1 million), KY ($1 million), MI ($7 million), NE ($1 million), NY ($1 million), OR ($7 million), PA ($28 million), SC ($2 million), TN ($4 million), TX ($4 million), WA ($2 million), WI ($12 million)	DL, MA, MD, MN, NC, OH, OK
Paper Products Industry Company R&D Expenditures in State		
Less than $500,000	$500,000 or more	Confidential
AK, HI, MT, ND, NM, SD, WV, WY	AL ($4 million), AR ($4 million), AZ ($1 million), CA ($36 million), CO ($6 million), CT ($19 million), FL ($10 million), GA ($69 million), IA ($3 million), ID (($8 million), IL ($19 million), IN ($6 million), KY ($2 million), LA ($2 million), MD ($17 million), ME ($12 million), MI ($10 million), MO ($8 million), MS ($1 million), NE ($1 million), NC ($11 million), NH ($3 million), NJ ($22 million), NV ($1 million), NY ($11 million), OH ($427 million), OK ($4 million), OR ($5 million), PA ($22 million), RI ($1 million), SC ($32 million), TN ($21 million), TX ($79 million), UT ($3 million), VA ($15 million), VT ($2 million), WA ($36 million), WI ($205 million)	DL, KS, MA, MN
Wood Furniture Products Company Industry R&D Expenditures in State		
Less than $500,000	$500,000 or more	Confidential
AK, AR, AZ, CT, DL, FL, HI, ID, KS, LA, MD, ME, MT, ND, NH, NM, NV, RI, SC, SD, VT, WV, WY	AL ($1 million), CA ($6 million), GA ($1 million), IL ($2 million), IN ($13 million), KY ($2 million), MA ($3 million), MI ($32 million), MN ($5 million), MO ($2 million), MS ($3 million), NC ($11 million), NJ ($1 million), NY ($2 million), OH ($1 million), OK ($1 million), OR ($1 million), PA ($4 million), TN ($3 million), TX ($1 million), UT ($1 million), VA ($2 million), WA ($2 million), WI ($7 million)	CO, IA, NE

Note: Information available from data source for some states is confidential so as to avoid disclosure of confidential company information.
Source: National Science Foundation 2009a.

products segment of the industry were Pennsylvania and California, where in 2006 companies invested $28 million and $22 million, respectively, in wood products research and development. Although confidential information for some states makes judgements about research magnitudes somewhat suspect, states in which total company investments in research and development might be considered quite modest (less than $500,000 each in three or fewer of the industry's three major groups) were Alaska, Delaware, Hawaii, Kansas, Montana, North Dakota, New Mexico, South Dakota, West Virginia and Wyoming.

Wood-based manufacturing companies are not indifferent to having research and development performed by organizations outside the United States. In 2006, five wood product companies reported investing $8 million ($1.6 million per company) in research performed by organizations located in foreign countries. Two companies in the industry's paper product group reported investing $32 million ($16 million per company) in research carried out by such organizations, while six companies in the industry's wood furniture group committed $2 million ($0.3 million per company) to research conducted by foreign-based organizations. Although substantial, these amounts are very modest compared to foreign research services sought by other manufacturing industries in the United States. For example, the transportation equipment industries and the chemicals industry invested an average of $77 million per company and $43 million per company, respectively, in research and development carried out by organizations located in other countries. Nationally, the average for all manufacturing industries was $20 million per company (National Science Foundation 2009a).

Company Programs

Company investments in wood utilization research and development can be further appreciated by reviewing the research programs of individual companies. Consider as examples, the research programs of 26 public companies for which information is readily available (company annual reports, 10 -K reports to US Securities and Exchange Commission) (Table 48) (Appendix Table 16) (Ellefson and others 2010). Although varying considerably from company to company, the 26 wood-based manufacturing companies invested $788 million in research and development programs in 2008 (average of $30 million per company), or about on-third of the industry's total investments for such purposes ($2.4 billion in 2006) (Table 46). Leading in research and development investments in 2008 were Kimberly-Clark Corporation ($297.0 million), Avery Dennison Corporation ($94.0 million), Furniture Brands International, Inc. ($88.1 million) and Weyerhaeuser Company ($64.0 million). In absolute magnitudes, such leaders pale in comparison to 2005 research and development investments by General Electric ($2.4 billion), 3M Corporation

Table 48. Research and Development Expenditures by Public U.S. Wood-based Manufacturing Companies, by Company. 2003-2008.

Company	Year (million dollars)					
	2008	2007	2006	2005	2004	2003
Advanced Environmental Recycling Technologies, Inc.	0.3 [*]	0.3 [*]	0.3	0.1	-	-
Avery Dennison Corporation	94.0 [1.4]	95.5 [1.5]	87.9	85.4	81.8	74.3
Bemis Company	25.9 [0.7]	26.0 [0.1]	25.0	24.0	21.0	21.4
Buckeye Technologies, Inc.	8.2 [1.1]	8.2 [0.1]	8.3	9.2	9.4	9.3
Flexsteel Industries, Inc.	3.1 [0.8]	3.3 [0.8]	3.3	3.0	2.9	2.7
Furniture Brands International, Inc.	88.1[2.9]	80.7 [3.8]	72.7	65.9	-	-
Georgia-Pacific (Koch Industries)	-	-	-	-	61.0	64.0
Graphic Packaging Holding Company	8.0 [0.2]	9.2 [*]	11.4	9.9	9.6	7.4
Herman Miller, Inc.	38.8[2.4]	38.8 [2.0]	42.1	36.7	-	-
IFCO Systems North America, Inc.	5.6[0.8]	4.8 [0.7]	-	-	-	-
International Paper Company	22.0[0.1]	24.0 [0.1]	45.0	63.0	67.0	71.0
Kimball International, Inc.	16.0[1.3]	16.0 [1.4]	17.0	15.0	16.7	17.6
Kimberley-Clark Corporation	297.0[1.6]	276.8 [1.5]	301.2	319.5	279.7	-
Koppers, Inc.	2.8[0.2]	2.8 [0.1]	2.5	2.8	2.2	-
MeadWestvaco Corporation	61.0[0.9]	62.0 [0.9]	65.0	50.0	74.0	80.0
Nashua Corporation	0.7[0.3]	0.8 [0.3]	0.6	0.6	2.1	2.5
Neenah Paper, Inc.	6.5[0.1]	6.4 [0.6]	3.5	2.2	1.5	2.1
Packaging Corporation of America	6.9[0.3]	7.6 [0.3]	6.9	6.8	6.1	6.1
Rayonier, Inc.	5.0[0.4]	5.0 [0.4]	6.0	6.0	7.0	9.0
Rock-Tenn Company	0.3[*]	0.7 [*]	0.8	-	-	-
Schweitzer-Mauduit International, Inc.	8.3[1.1]	8.0 [0.1]	7.3	9.0	9.3	8.3
Smurfit-Stone Container Corporation	3.0[*]	3.0 [*]	4.0	9.0	8.0	5.0
Sonoco Products Company	15.9[0.4]	15.6 [0.3]	12.7	14.7	15.4	14.2
Universal Forest Products	3.7[0.2]	3.2 [0.1]	4.1	-	-	-
Wausau Paper Company	2.5[0.2]	2.6 [0.2]	2.1	1.9	1.9	2.2
Weyerhaeuser Company	64.0[0.8]	71.0 [0.4]	69.0	61.0	55.0	51.0

Note: No entry indicates information not available or company not part of wood-based industry. Number in brackets indicate research and development expenditures as a percent of company sales. An asterisk indicates less than 0.1 percent.
Source: Company annual reports, and filings with U. S. Securities and Exchange Commission, Ellefson and others 2010.

($1.1 billion) and Dow Chemical Corporation ($1.0 billion) (Technology Review 2005). Although declining in 2008, companies that have experienced consistent growth (current dollars) in research and development investments from 2003 through 2007 are Avery Dennison Corporation, Flexsteel Industries, Inc., Packaging Corporation of America and Weyerhaeuser Company. Notable declines

over the same period have occurred for International Paper Company, Nashua Corporation and MeadWestvaco Corporation.

Research and development expenditures as a proportion of a wood-based company's sales averaged 0.8 percent for the 22 companies for which information was available (Table 48). Such a level was somewhat less than the 1 percent reported for all wood-based manufacturing companies and considerably below the 4.0 percent of all manufacturing companies in the United States (Table 46). Leading among the example wood-based companies in this measure were Furniture Brands International, Inc.(2.9 percent), Herman Miller, Inc. (2.4 percent), Kimberley-Clark Corporation (1.6 percent), and Avery Dennision Corporation (1.4 percent).[6]

The intent of research and development programs implemented by wood-based companies varies considerably, depending on the type of technology a company needs in order to succeed in the marketplace. Some companies firmly believe that their ". . . research and product development capabilities have played an important role in establishing a reputation for high quality, superior products" (Schweitzer-Mauduit International, Inc.). Review of the research intentions of 21 of the 26 wood-based companies (Ellefson and others 2010) suggests that companies consider their research programs to be important for a number of reasons, including support for the implementation of company business strategies generally, development of new and improved products and processes required in order to remain competitive in the marketplace, reduce the cost of manufacturing products and distributing them to customers, and seek solutions to sensitive environmental problems associated with the manufacture of certain products. Companies also appear to use their research programs as a way of building customer loyalty by providing technical support based on the findings of research activities. They also make known their reliance on a parent organization for their research needs (for example, IFCO Systems North America, Inc. ". . . engage in ongoing product improvement efforts through parent company research programs, we do not have separate research and development expenditures).

When research intentions are actually made known by wood-based companies, such often tend to describe research and development intentions generally – only occasionally is there a specific

[6] Governments use direct (specific development projects) and indirect (cost-share, tax relief) incentives to foster research and development by companies (Martin and Scott 2000). Tax relief can take the form of a tax allowance, exemption-deductions, or tax credits (reduction in tax liability). An important example of the latter is the federal research and experimentation tax credit (established by the Economic Recovery Act of 1981, as amended) which enables companies to take a 20 percent credit for qualified research above a base amount for activities undertaken in the United States. In 2003, 10,400 companies claimed $5.5 billion in tax credits, including most wood-based manufacturing companies with research programs (for example, Avery Dennison Corporation, Bemis Company, International Paper Company, Weyerhaeuser Company). At least 32 states have similar research and development tax credits (National Science Board 2008).

focus on wood utilization. However, an appreciation of the latter can be gained by example (Ellefson and others 2010).

> • *Buckeye Technologies, Inc*. "Focus on developing new products, improving existing products, and enhancing process technologies to further reduce costs and respond to environmental needs . . . focus on advanced products and new applications to drive future growth"
> •*International Paper Company*. "Direct research and development activities to short and long-term technical assistance needs . . . and to process, equipment and product innovations."
> •*Kimball International* ". . . development of manufacturing processes, major process improvements, new product development and design, information technology, and wood related technologies."
> •*Nashua Corporation.* "Direct research toward developing new products and processes and improving product performance, often in collaboration with customers."
> •*Rayonier, Inc.* "R&D efforts in performance fiber business directed primarily at developing existing core products and technologies."
> •*Schweitzer-Mauduit International, Inc*. ". . . dedicated to developing paper product innovations and improvements to meet the needs of customers."
> •*Verso Paper Company*. ". . . work with customers in developing and modifying products to accommodate their evolving needs and to identify cost saving opportunities within company operations.
> •*Weyerhaeuser Company*. "Research is a strategic business investment to help the company and its customers achieve sustainable competitive advantage by creating and preserving options in the face of uncertainty about the future competitive environment."

Wood utilization research and development is identified as an interest of the research programs implemented by 22 of the 26 companies reviewed. Specifically mentioned in the research goal or mission statement of these companies is some aspect of wood utilization, such as "new product development or improvement," "improvement of pulping, bleaching and chemical recovery processes," "develop new products and enhance existing technologies," "develop new engineering systems for homes," "create a successful foundation for new products," and "focus on recyclable products to replace waxed packaged products." In only two cases is research involving forest management identified within a mission statement, namely International Forests Products Ltd. (INTERFOR) (applied research and development in the areas of environment and forest management) and Rayonier, Inc. (research on genetic tree improvement and applied silvicultural programs with the intent of identifying management practices that will improve financial returns from timber assets).

The research and development programs of the 26 companies reviewed here often involves collaborative initiatives as frequently occurs in other countries (Nakamura and others 2003). For example, prior to 2008 MeadWestvaco Corporation cooperated with India's Council on Scientific and Industrial Research (CSIR), especially "research which focuses on sustainable packaging solutions, process innovations related to biomass conversion and packaging innovations utilizing

advanced materials." Similarly, International Paper Company has a one-third interest in ArborGen, LLC, a joint research and development venture with other forest products and biotechnology companies. Wood-based companies also have seen fit to establish research programs at facilities in countries other than the United States. Although the number of companies doing so appear modest, some probably involve research and development focused on wood utilization:

- Brazil – MeadWestvaco Corporation, Schweitzer-Mauduit International, Inc.
- Canada – Graphic Packaging International Corporation, International Forest Products Ltd.
- China – Avery Dennison Corporation
- France – Georgia-Pacific (Koch Industries), Schweitzer-Mauduit International, Inc.
- Germany – Neenah Paper, Inc.
- India – Avery Dennison Corporation
- Peoples Republic of China – MeadWestvaco Corporation
- Philippines – Schweitzer-Mauduit International, Inc.

Philanthropic foundations affiliated with wood-based companies also support research and development focused on wood utilization. In most cases, however, the focus of such research is on grants for the education of future scientists to be engaged in such research (for example, the International Paper Company Foundation) or grants for the construction of research facilities (or equipment) that will be involved in wood utilization research. Examples of companies with a foundation (or foundations affiliated with a company) that are known to provide grants for forestry, forest products and environmental purposes are MeadWestvaco Corporation, Bemis Company, Kimberly-Clark Corporation, Champion Enterprises, Louisiana-Pacific Corporation, Masco Corporation, and Furniture Brands International (Ellefson and Kilgore 2009). Unfortunately, a comprehensive review of wood-based corporate philanthropic activities is not available (last comprehensive review by Ellefson and Stone 1984).

Environmental and Resource Stewardship

Environmental Commitment

The wood-based manufacturing industry is sensitive to the many environmental consequences that can result from the myriad of activities and processes that must be implemented in order to provide consumers with useful products at acceptable prices. In response to outcomes that potentially might prove harmful to natural and human environments, many companies within the industry have formally committed themselves to actions that will reduce or eliminate harmful environmental effects. These commitments are typically established by corporate governing boards and are formally presented as public statements of corporate policy and mission. As diverse as the wood-based manufacturing industry is, so are the environmental concerns that companies are intent on addressing. Although a truly representative sample of these concerns, and of company-stated commitments to deal with them, would be difficult to fix conclusively, the variety of subjects addressed and the diversity of corporate actions to deal with them can be appreciated by the following quoted examples (found in company annual reports, company position papers, annual sustainability reports, environmental policy statements, and filings with the U.S. Securities and Exchange Commission).

Responsible fiber sourcing . . .

> •. . . committed to certifying 100 percent of company lands by the end of 2008 . . . and to partner with suppliers to ensure that all fiber comes from certified sources. *AbitibiBowater, Inc*. 2008.
> •. . . ensure that the wood purchased by our operations originates from producers who practice sustainable forestry. *Green Diamond Resource Company*. 2008.
> •. . . expect our suppliers to comply with all applicable environmental laws, wherever suppliers operate. *Kimberly-Clark Corporation*. 2008.
> •. . . strive to maximize wood fiber from suppliers that have had their forestry operations or wood procurement activities certified by [a forest certification system] . . . with a goal of purchasing 100 percent of wood fiber from certified suppliers. *Kimberly-Clark*. 2008.
> •. . . company verifies the source of the wood fiber we procure and uses only fiber from forests that are sustainably managed . . . company will not procure fiber that is harvested illegally or in violation of traditional or civil rights, or from forests where high conservation values are threatened by management activities, forests being converted to plantations or nonforest use pr forests where genetically modified trees are planted. *Verso Paper Company*. 2008.

Product development . . .

•. . . committed to responsible product stewardship . . . aim to manufacture innovative products with a lighter environmental impact. *AbitibiBowater, Inc*. 2008.

•. . . design company products with an eye toward environmental benefit as well as economic value, and manufacture them using environmentally responsible processes. *Verso Paper Company*. 2008.

•. . . ongoing product design efforts include forward integration of components, materials redesign, and product life cycle considerations . . . use non-VOC adhesives and coatings, minimize packaging content, minimize scrap, and manage energy use. *Trendway Corporation*. 2008.

•. . . will strive to continuously improve tissue manufacturing processes and product designs to minimize fiber use, consistent with product performance and competitive market conditions. *Kimberly-Clark Corporation*. 2008.

•. . . offer and encourage the use of environmentally sustainable or eco-certified products to our customers. *Cenveo, Inc*. 2008.

Monitoring and evaluating . . .

•. . . regularly review company practices and procedures to monitor and report on environmental performance. *International Forest Products, Ltd.* 2007.

•. . . measure, monitor and publically report company forest management performance. *Green Diamond Resource Company*. 2008.

•. . . all company operations will conduct periodic environmental audits to assess and improve environmental performance. *Pope and Talbot, Inc*. 2008.

•. . . company will implement a verification system for its wood fiber procurement activities . . . and will report the results at least annually to interested stakeholders. *Kimberly-Clark*. 2008.

•. . . evaluate environment performance at all facilities and use this information to facilitate continuous improvement. *Cenveo, Inc*. 2008.

Resource management . . .

•. . . quickly replant harvested areas, often well before forestry regulations required company to do so. *Green Diamond Resource Company*. 2008.

•. . . reforest promptly after harvesting by planting within the first available planting season, not to exceed 24 months. *Weyerhaeuser Company*. 2008.

•. . . after each harvest we move quickly to reforest the site, either by planting tree seedlings or by promoting natural regeneration . . . we are committed to reforesting all harvested areas within five years. *MeadWestvaco*. 2008.

•. . . committed to system of principles, objectives and performance measures that integrates the reforestation, managing, growing, nurturing, and harvesting of trees for useful products with the conservation of soil, air and water quality, wildlife and fish habitats, and aesthetics. *Packaging Corporation of America*. 2008.

•. . . reforestation planting is done by elevation and zone to mirror the natural surroundings . . . committed to protecting the entire ecosystem: water, wildlife, fish, air quality, scenic vistas and recreational. *Timber Products Company*. 2008.
•. . . mission is to realize the maximum value of every acre of land we own, and to do so within the parameters of forestry practices that ensure long-term sustainability . . . every acre harvested is reforested, either through our own replanting or through natural regeneration. *Potlatch Corporation*. 2008.

Efficiency and waste . . .

•. . . use raw materials, water, energy and other resources efficiently and manage our production processes prudently. *Verso Paper Company*. 2008.
•. . . company is committed to taking aggressive action to reduce the amount of energy we use in manufacturing and distributing our products . . . waste reduction goals focus on finding beneficial reuse options for all of our manufacturing, nonhazardous, solid wastes. *Kimberly-Clark Corporation*. 2003.
•. . . utilizing materials, natural resources, and energy efficiently to produce products and services that support sustainable growth. *Georgia-Pacific Corporation*. 2008.
•. . . committed to recycling water in our manufacturing processes and to ensuring treatment to established standards before we return it to nature. *MeadWestvaco*. 2008.

Legal conformity . . .

•. . . meet, and often exceed, government regulations governing forestry practices. *Green Diamond Resource Company*. 2008.
•. . . meet or exceed water quality laws and best management practices so as to protect water quality, water bodies and riparian areas. *Weyerhaeuser Company*. 2008.
•. . . go beyond compliance with laws, regulations and standards to which we voluntarily subscribe whenever possible, not because it's required but because it's the right thing to do. We expect our contractors to comply with all laws, regulations and rules. *Verso Paper Company*. 2008.
•. . . company will comply with all applicable environmental laws and regulations . . . conform with or surpass applicable standards governing emissions and discharges from company facilities. *Pope and Talbot, Inc.* 2008.
•. . . maintain and where possible exceed compliance with all applicable environmental rules and regulations . . . and minimize the impact of our operations on the environment. *Cenveo, Inc*. 2008.
•. . . committed to meeting or exceeding all regulatory standards that pertain to water usage, acknowledging that water is essential in manufacturing many of our products. *Mead Westvaco*. 2008.

Management of unique resources . . .

> •. . . project threatened and endangered species and cooperate with government agencies to determine how company forest lands can contribute to their conservation . . . identify special ecological, geologic and historical sites and mange them in a manner appropriate for their unique features. *Weyerhaeuser Company*. 2008.
> •. . . committed to sustained yield forestry practices so that corporate lands continue to provide a source of fiber for corporate products and an attractive habitat for wildlife. *Kimberly-Clark Corporation*. 2003.
> •. . . company lands are involved in four Habitat Conservation Plans throughout the country, as well as conservation agreements for the grizzly bear in Montana and the red-cockaded woodpecker in Arkansas, Louisiana and Mississippi . . . company continues to seek opportunities to protect land that has visual, historic, recreation, forestry, wildlife habitat and other significant attributes. *Plum Creek Timber Company*. 2008.
> •. . . manage forests and lands of special significance (biologically, geologically, historically or culturally important) in a manner that takes into account their unique qualities and to promote a diversity of wildlife habitats, forest types, and ecological or natural community types. *Hampton Affiliates*. 2008.

Climate change . . .

> •. . . believe company can play an important role in reducing greenhouse gas emissions that contribute to global climate change . . . company has reduced greenhouse gas emissions from our paper mills and are committed to further reducing direct emissions. *Verso Paper Company*. 2008.
> •. . . fo-fill our responsibility to lower carbon emissions through our voluntary, legally binding commitment to reduce direct carbon dioxide equivalents by 6 percent from a 1998-2001 baseline by the end of 2010. *MeadWestvaco.* 2008.
> •. . . company energy efficiency objective is designed to help us decrease carbon emissions from our manufacturing facilities. *Kimberly-Clark Corporation*. 2003.
> •. . . continue to focus on reducing overall greenhouse gas emissions with the goal of becoming a carbon-neutral enterprise. *AbitibiBowater, Inc*. 2008.

Goals and strategies . . .

> •. . . establish clearly stated and achievable environmental goals, strategies and performance standards that are aligned with company business objectives . . . have plans and procedures in place to properly respond, manage, minimize and report the impact of any environmental crisis, incident or emergency. *Cenveo, Inc*. 2008.
> •. . . work pro-actively with legislators, regulators, concerned groups, and industry peers to develop and advance effective goals and approaches to human health and safety and environmental protection. *Georgia-Pacific Corporation*. 2008.

Corporate governance . . .

> •. . . create a sustainability management structure that is fully integrated into our corporate governance . . . senior management team develops corporate policy and directs strategy in all areas of corporate sustainability, from fiber procurement and product development to environmental, health and safety matters and social responsibility. *Verso Paper Company*. 2008.
> •. . . company operational units will report environmental compliance and status quarterly to senior management. *Pope and Talbot, Inc*. 2008.
> •. . . hold line management accountable for environmental performance and manage environmental matters as any other critical business activity. *Cenveo, Inc*. 2008.
> •. . . corporate sustainability committee to provide oversight, guidance and direction on environmental issues that have potential impact on the reputation and long-term economic viability of the company and our stakeholders . . . committee is sponsored by company chairman, president and CEO. *Sonoco Products Company. 2008.*

Forest and Forest Practice Certification

The wood-based industry is an active participant in programs that certify the sustainable management of forests. Such programs are designed to improve the performance of forest management activities and strengthen the credibility and public acceptance of forestry in general. In 1999, there were more than 25 nongovernmental certification programs worldwide plus a number of governmental efforts to develop criteria and indicators of sustainable forest management In the United States, the wood-based industry has participated primarily in three major nongovernmental certification programs, namely (Society of American Foresters 1999):

Sustainable Forestry Initiative (SFI). Sponsor: American Forest and Paper Association (AF&PA). Mission: Promote commitment to sustainable forestry and the measures by which the public can measure this commitment. Eligible Parties: AF&PA members. Forest Practices Principles: Use responsible forest practices, protect forest health and productivity, protect special forest sites, continuously improve practice of forest management Forest Practice Audits: Voluntary verification or second and third party audits

Forest Stewardship Council (FSC). Sponsor: Forest Stewardship Council (FSC). Mission: Improve forest practices through market-based mechanisms. Eligible Parties: Interested forest landowners. Forest Practices Principles: Comply with laws, establish clear tenure to land, respect indigenous peoples' rights, enhance well-being of workers and communities, ensure wide range of environmental & social benefits, conserve biological diversity, develop forest management plans,

monitor forestry activities, conserve natural forests, and plan environmentally for plantations. Forest Practice Audits: Third party audits.

Tree Farm Program (TFP). Sponsor: American Forest Foundation. Mission: Ensure sustainable forests by providing landowners with information & voluntary verification of sustainable forest practices. Eligible Parties: Owners of 10 or more acres of forest land. Forest Practices Principles: Broaden practice of sustainable forestry; communicate to and involve public; prudently use chemicals; reforest harvested lands; manage for quality water, wildlife, aesthetics, special sites, and biodiversity Forest Practice Audits: Third party audits.

The Sustainable Forestry Initiative certified more than 35.5 million acres of company-owned forest land in the United States in 2008, although some of these companies do not own manufacturing facilities (for example, Forest Capital Partners, Hancock Timber Resource Group) (Sustainable Forestry Initiative, Inc. 2008). Of the 43 companies with certified forest properties, seven account for 62 percent of the total certified area. The largest area of certified forest owned by individual companies with manufacturing facilities was Plum Creek Timber Company, Weyerhaeuser Company, Sierra Pacific Industries and MeadWestvaco

AbitibiBowater – 192,234 acres
Anthony Forest Products – 91,218
Bayroot, LLC – 578,486
Bennett Forest Industries – 77,027
Black Bear Forest, Inc. – 1,006,259
Deltic Timber Corp. – 438,000
Domtar Industries – 17,000
Finch Paper Holdings, LLC – 185,423
Forest Capital Partners, LLC – 2,117,185
Forest Investment Associates – 550,000
Glatfelter (P.H.) Co. – 80,928
GMO Threshold Timber Corp. – 766,580
Green Diamond Resource Co. – 854,321
Hampton Resources, Inc. – 167,084
Hancock Timber Resource Group – 2,362,223
Harden Furniture Co. – 10,021
J. D. Irving Co. – 1,218,000
Lyme Adirondack Forest Co. – 275,000
MeadWestvaco – 1,219,843
Merriweather, LLC – 283,996
NewPage Corp – 5,411
Packaging Corp of America – 109,236
Pacific Lumber Co. – 210,119 acres
PB Lumber, LLC – 5,770
Penguin Forest, LLC – 5,770
Pingree Associates, Inc. – 806,500
Plum Creek Timber Co. – 8,217,356
Port Blakely Tree Farms, LP – 139,000
Rayonier, Inc. – 2,140,892
Resource Management Services, LLC – 2,642,279
Robbins Lumber Co. – 27,200
Seefeld Corp. – 5,387
Sierra Pacific Industries – 1,721,771
Stinson Lumber Co. – 496,094
TC&I Timber Co. – 87,110
Temple-Inland, Inc. – 1,968,707
Timber Products Co. – 117,900
TimberStar, LLC – 900,137
Typhoon, LLC – 401,751
UPM-Kymmene – 158,172
Westervelt Co. – 441,654
Weyerhaeuser Co. – 6,373,260
Yankee Forest, LLC – 33,445

Company forests certified by the Forest Stewardship Council in 2008 approached 6.8 million acres (Forest Stewardship Council 2008). Again, many of these companies did not have company-owned manufacturing facilities and were engaged primarily in the business of growing of timber for

the open market (for example, Atlantic Timber Group, Wagner Forest Management, LTD, The Forestland Group, LLC). Of the 31 companies with certified forest properties, two accounted for 49 percent of the total certified area. The largest area of certified forest owned by individual companies with manufacturing facilities was Potlatch Corporation, Roy O. Martin Lumber Co., and Anderson-Tully Company.

Anderson-Tully Company – 345,854 acres
Baskahegan Company – 101,000
Biencowe and Associates – 16,072
Big Creek Lumber Company – 7,290
Collins Companies – 297,896
Columbia Forest Products – 30,801
Digger Mountain, LLC – 490
Dwight Lewis Lumber Company – 17,476
Edward F. Kocjancic, Inc. – 11,461
Essex Timber Company – 86,499
Finch Pruyn and Company – 185,522
Fountain Forestry, Inc. – 109,997
Hancock Land Company – 33,518
Hickman Timber-Lumber Co. – 6,812
Hull Forestlands, LP – 8,042
Meadowsend Timberlands Co. – 18,695
McCloud Tree Farm – 39,537 acres
Mendocino Redwood Co. – 232,024
Northwest Natural Resources Group – 2,770
Potlatch Corporation – 1,467,713
Red River Forests Partnership – 124,000
Mid-Atrlantic Timber Group – 20,963
Redtree Properties, LP – 7,079
RMC Pacific Materials, Inc. – 8,327
Roseburg Forest Products – 174,936
Roy O. Martin Lumber Co. – 582,530
Shasta Forests – 139,000
Stora Enso North America – 5,471
The Forestland Group, LLC – 1,847,614
Wagner Forest Management, LTD – 854,679
Wylatti Timber Management Co. – 21, 080

The American Tree Farm Program certified 24 million acres of forest land in 2008. Although the certified forest properties include company-owned forest land, the vast majority of the certified forests are owned by 90,000 family forest landowners located in 46 states. Information describing the extent and type individual owners is not readily available (American Forest Foundation 2008).

Pollution and Waste Abatement

The abatement of various types of pollutants is an important focus of wood-based manufacturing enterprises (National Council for Air and Stream Improvement 2009). Often in response to federal, state, or local regulations or voluntary initiatives, abatement activities are undertaken for purposes of treating, capturing, reducing, or eliminating substances (pollutants)that prevent the functioning of natural processes or produce undesirable environmental or human health effects. Such pollutants can be discharged into various media, including air, water and land (solid waste). The activities undertaken to address pollutants are typically grouped as follows: *treatment* (activities to change the physical, chemical, or biological character of pollutants prior to release into the environment), *prevention* (activities to reduce the amount of pollution generated during the production process), *recycling* (on-site or off-site post-production processing of waste for an alternative uses) and *disposal* (activities involving final placement, destruction, or disposition of

waste after the occurrence of pollution treatment or recycling). Although often difficult to identify and subsequently evaluate, the nationwide cost of pollution abatement to manufacturing enterprises has been assessed in some form nearly every year since 1973 (Pollution Abatement and Abatement Costs and Expenditure Survey) (U. S. Census Bureau 2008d, U.S. Environmental Protection Agency 2009a, Morgenstern and others 2001).

The wood-based manufacturing industry spent $731.9 million on capital improvements (installation or retrofitting of structures or equipment) focused on pollution abatement in 2005, about $10 million more than in 1999 (about $722.4 million) (Tables 49, 50, 51) (U. S. Census Bureau 2002, 2008). The 2005 interments were about 12 percent of the total for all U.S. manufacturing industries in 2005 ($5,907.8 million). Only two manufacturing industries exceeded the pollution abatement capital investments by the wood-based industry in 2005, namely the petroleum and coal products industry ($$1,743.0 million) and the chemical manufacturing industry ($1,271.6 million). Capital investments in pollution abatement by the wood-based industry were focused primarily on treatment activities, namely $385.1 million or 53 percent of industry total. Important but lesser amounts were focused on pollution prevention ($270.3 million, 37 percent), recycling ($44.2 percent, 6 percent) and disposal of manufacturing wastes ($32.3 million, 4 percent). As for the media focus of the industry's investments, 68 percent ($494.5 million) were focused on concerns over air quality. Combined, water quality and solid waste disposal were only 32 percent of industry-wide totals.

The wood products manufacturing group invested nearly $135 million in pollution abating capital expenditures in 2005 (65 percent more than occurred in 1999) (Table 49). Sixty-five percent of this total involved activities to change the character of pollutants before their release into the environment; 73 percent of the total focused on needed improvements in air quality. Within the group, the reconstituted wood products industry lead in 2005 with capital investments of $86.5 million (64 percent of group's total), followed at some distance by the sawmills and wood preservation industry ($17.1 million, 13 percent) and the millwork industry ($16.3 million, 12 percent). As for the cost of operating pollution abatement facilities and equipment, the wood products group spent more than $549 million in 2005 (55 percent on treatment activities, 68 percent focused on air quality), 58 percent of which occurred in the reconstituted wood products industry. As with the group generally, air quality was of major concern as were treatment and prevention activities. The paper manufacturing group spent a significant sum on operating costs in 2005.

Table 49. Pollution Abatement Expenditures of the Wood Products Manufacturing Group of the U.S. Wood-Based Manufacturing Industry, by Type of Expenditure. 2005.

Industry	Total	Activity				Media		
		Treatment	Prevention	Recycling	Disposal	Air	Water	Solid Waste
				Capital Expenditures ($ million)				
Sawmills and Wood Preservation	17.1	7.2	6.9	2.5	0.5	12.6	1.8	2.8
Veneer and Plywood	9.4	5.7	1.6	1.5	0.6	7.0	0.9	1.4
Engineered Wood Products	1.9	1.8	0.1	0.0	0.0	1.8	*	*
Reconstituted Wood Products	86.5	60.2	7.6	17.9	0.8	67.3	1.8	17.4
Millwork	16.3	6.2	3.3	0.8	6.0	7.5	0.7	8.1
Wood Containers and Pallets	2.2	1.4	0.2	0.5	0.1	1.6	*	0.6
Prefabricated Wood Buildings	1.2	*	*	0.4	0.8	0.1	*	1.0
Total	134.6	82.5	19.7	23.6	8.8	97.9	5.2	31.3
				Operating Costs ($ million)				
Sawmills and Wood Preservation	60.6	23.4	18.6	6.5	12.1	28.0	12.7	19.8
Veneer and Plywood	60.0	37.6	10.2	4.0	8.2	42.5	6.3	11.1
Engineered Wood Products	8.1	4.6	0.7	0.1	2.7	5.2	0.2	2.7
Reconstituted Wood Products	319.7	192.6	85.9	9.8	31.4	259.6	21.4	38.7
Millwork	77.3	38.8	7.6	5.3	25.6	36.0	4.7	36.5
Wood Containers and Pallets	7.6	3.9	1.0	1.1	1.6	4.3	0.1	3.2
Manufactured Homes (mobile)	13.4	0.2	0.1	1.0	12.1	0.6	0.4	12.5
Prefabricated Wood Buildings	2.4	0.1	*	0.9	1.4	0.1	*	2.3
Total	549.1	301.2	124.1	28.7	95.1	376.3	45.8	126.8

Note: Asterisk indicates less than $0.1 million. Totals may not agree due to rounding.
Source: U. S. Census Bureau 2008d.

Table 50. Pollution Abatement Expenditures of the Paper Manufacturing Group of the U.S. Wood-Based Manufacturing Industry, by Type of Expenditure. 2005.

Industry	Total	Activity				Media		
		Treatment	Prevention	Recycling	Disposal	Air	Water	Solid Waste
				Capital Expenditures ($ million)				
Pulp Mills	50.8	15.4	32.7	1.8	0.9	35.2	14.6	1.1
Paper and Newsprint Mills	309.3	135.7	157.5	7.4	8.7	182.4	99.1	27.8
Paperboard Mills	180.8	123.0	43.5	6.8	7.5	142.0	28.0	10.8
Paperboard Containers	6.8	3.6	0.7	0.7	1.8	1.4	2.7	2.7
Paper Bag and Coated and Treated Paper	15.4	10.8	2.7	1.5	0.4	13.4	0.9	1.2
Stationary Products	1.1	0.7	0.0	0.2	0.2	0.9	0.1	0.2
Sanitary Products	8.1	5.3	1.0	1.5	0.3	4.4	0.7	3.1
Total	572.3	294.5	238.1	19.9	19.8	379.7	146.1	46.9
				Operating Costs ($ million)				
Pulp Mills	156.3	108.8	15.3	7.4	24.8	48.1	77.2	31.2
Paper and Newsprint Mills	878.7	545.8	79.7	46.2	207.0	267.4	410.2	201.2
Paperboard Mills	540.9	313.5	74.3	31.0	122.1	173.0	212.5	155.3
Paperboard Containers	53.2	24.3	2.2	9.4	17.3	12.9	29.4	29.0
Paper Bag and Coated and Treated Paper	106.0	60.2	7.7	11.3	26.8	61.8	12.3	31.8
Stationary Products	5.6	0.9	0.3	1.5	2.9	1.0	0.7	3.8
Sanitary Products	27.3	11.5	4.2	6.8	4.8	5.8	10.3	11.1
Total	1,768.0	1,065.0	183.7	113.6	405.7	570.0	752.6	463.4

Note: Asterisk indicates less than $0.1 million. Totals may not agree due to rounding.
Source: U. S. Census Bureau 2008d.

Table 51. Pollution Abatement Expenditures of the Wood Furniture Manufacturing Group of the U.S. Wood-Based Manufacturing Industry, by Type of Expenditure. 2005.

Industry	Total	Activity				Media		
		Treatment	Prevention	Recycling	Disposal	Air	Water	Solid Waste
				Capital Expenditures ($ million)				
Wood Kitchen Cabinets and Countertops	12.2	6.9	2.5	0.6	2.2	9.1	0.0	3.1
Nonupholstered Wood Household Furniture	9.7	0.7	8.9	*	0.1	6.9	*	2.8
Wood Office Furniture	1.9	0.1	0.9	0.1	0.8	0.2	0.7	1.0
Custom Architectural Wood and Millwork	1.2	0.4	0.2	*	0.6	0.6	0.0	0.6
Total	25.0	8.1	12.5	0.7	3.7	16.8	0.7	7.5
				Operating Costs ($ million)				
Wood Kitchen Cabinets and Countertops	39.8	21.0	4.5	3.3	11.0	24.4	0.5	14.8
Nonupholstered Wood Household Furniture	34.1	11.6	10.6	1.8	10.1	22.5	2.1	9.5
Wood Office Furniture	15.5	5.9	3.5	1.2	4.9	8.8	0.8	5.8
Showcases, Partitions, Shelves and Lockers	13	4.6	1.4	0.6	6.4	3.1	3.7	6.1
Total	102.4	43.1	20.0	6.9	32.4	58.8	7.1	36.2

Note: Asterisk indicates less than $0.1 million. Totals may not agree due to rounding.
Source: U. S. Census Bureau 2008d.

The paper manufacturing group accounted for well-over three-fourths ($527.3 million, 78 percent) of the wood-based industry's 2005 capital expenditures focused on pollution abatement (7 percent less than occurred in 1999)(Table 50). With a combined total of $532.6 million, the equipment portion of these investments concentrated on treatments activities and the prevention of pollutants generated during production processes, namely $294.5 million and $238.1 million, respectively. In terms of pollution abatement, air quality was the leading focus for the group in 2005 ($397.7 million, 66 percent of total). Of the group's seven major industries, the paper and newsprint mills industry and the paperboard mills industry lead in capital investments with a combined total of $490.1 million – 86 percent of the group's total. With annual operating costs of $1,768.0 million, the group was amongst the nation's largest in such expenditures in 2005, only exceeded by the chemical manufacturing industry ($5,217.2 million), petroleum and coal products industry ($3,746.1 million) and the primary metal manufacturing industry ($2,291.1 million). Most of these operating expenditures focused on facilities and equipment designed to improve water quality ($752.6, 43 percent).

The wood furniture manufacturing group invested $25.0 million in capital improvements required to enhance pollution abatement facilities in 2005 (about 12 percent less than occurred in 1999) (Table 51). Nearly half ($12.5 million) of this total focused on the prevention of pollutants; over two-thirds ($12.5 million) was concentrated on the construction of new or improved facilities needed to meet air quality standards. Of the group's four industries for which information is available, nearly half ($12.2 million, 49 percent) the groups' capital expenditures were made by the wood kitchen cabinets and countertops industry, most of which (57 percent) focused on new treatment facilities and equipment. The 2005 annual cost of operating pollution abatement facilities within the group was roughly four times ($102.4 million) the capital investments made by the group in the same year. Operation of treatment facilities and the disposal of waste material accounted for a sizable portion of pollution abatement operational costs (combined $75.5 million).

The wood-based industry's pollution abatement investments are better understood when placed in the context the size of the industry as measured value of shipments. In general, the wood-based industry overall invests a higher portion of shipment values in pollution abating capital investments than U. S. manufacturing industries generally and also expends a larger portion of shipment values on pollution abatement operations than occurs for all U.S. industries. A more detailed accounting of capital investments and operating costs is as follows.

• Capital Investments in pollution abatement facilities and equipment as a percent of shipment values in 2005 . . .

All U. S. manufacturing industries — 0.1 percent
Wood-based manufacturing industry — 0.2 percent
Wood products group — 0.1 percent
Paper products group — 0.4 percent
Wood furniture group — less than 0.1 percent

• Annual cost of operating pollution abatement facilities and equipment as a percent of shipment values in 2005 . . .

All U. S. manufacturing industries — 0.4 percent
Wood-based manufacturing industry — 0.8 percent
Wood products group — 0.5 percent
Paper products group — 1.1 percent
Wood furniture group — less than 0.2 percent

Investment in pollution abatement activities can be quite significant for individual establishments operating in the wood-based manufacturing industry. In 2005, the industry invested about $3,500 more in capital expenditures for pollution abatement than was invested by U.S. manufacturing establishments in general. Furthermore, the industry's paper manufacturing group invested nearly six times the former's level of investment per establishment. As for operational costs associated with pollution abatement facilities and equipment, the cost per wood-based establishment in general was only modestly more (about $7,100) than for all U.S. manufacturing establishments in 2005. As with capital investments per establishments, the paper manufacturing group experienced more than six times the operational costs experienced by all U.S. manufacturing establishments and five and one-half times the level for all establishments operating within the wood-based industry. For certain wood-based industries, capital investment in pollution abatement facilities and their subsequent operation can be very high as the following examples illustrate: pulp mills – $1.2 million and $3.6 million per establishment, respectively; paper and newsprint mills – $0.9 million and $2.5 million per establishment; paperboard mills – $0.9 million and $2.6 million per establishment; and reconstituted wood products – $0.3 million and $1.3 million per establishment. A more detailed accounting of capital investments and operating costs per establishment is as follows.

• Capital Investments in pollution abatement facilities and equipment per establishment in 2005 . . .

All U. S. manufacturing industries — $17,717
Wood-based manufacturing industry — $21,250
Wood products group — $9,295
Paper products group — $124,305
Wood furniture group — $1,628

• Annual cost of operating pollution abatement facilities and equipment per establishment in 2005 . . .

All U. S. manufacturing industries — $62,009
Wood-based manufacturing industry — $69,136
Wood products group — $36,912
Paper products group — $384,014
Wood furniture group — $6,600

Investments in pollution abatement activities by the wood-based manufacturing industry differ from state to state, depending on the magnitude of the industry's operations and the nature of federal, state, or local regulations. Important wood product and paper product industries operate within the following states, which are ranked according to the annual cost ($ millions) that such industries incurred in 2005 in order to operate pollution abatement equipment and facilities (wood products and paper products, respectively).

Wisconsin – $188.6 ($22.5 , $166.1)
South Carolina – $187.5 ($86.4 , $101.1)
Georgia – $180.2 ($37.2 , $143.0)
North Carolina – $128.6 ($38.4 , $90.2)
Louisiana – $125.4 ($11.3 , $114.1)
Washington – $119.2 ($18.6 , $100.6)
Virginia – $106.2 ($25.2 , $81.0)
Alabama - $104.9 ($29.4 , $75.5)
Arkansas – $100.8 ($33.3 , 67.5)
Ohio – $98.6 ($18.0 , $80.6)
***Cumulative percent of national total*: 59 percent**
Oregon – $88.9 ($32.6 , $56.3)
Minnesota – $86.7 ($46.6 , $40.1)
Michigan – $81.8 ($14.3 , $67.5)
California – $79.8 ($20.6 , $59.2)
Florida – $78.6 ($2.1 , $76.5)
Pennsylvania – $65.7 ($11.1 , $54.6)
Maine –$64.3 ($7.4 , $56.9)
Oklahoma – $46.6 ($5.9 , $40.7)
New York – $45.6 ($3.3 , $42.3)
Massachusetts – $38.7 (paper products $38.7)
***Cumulative percent of national total*: 89 percent**

Kentucky – $32.3 ($6.3 , $26.0)
Indiana – $30.4 ($12.2 , $8.2)
New Jersey – $29.4 (paper products $29.4)
Idaho – $28.6 ($3.7 , $244.9)
Texas – $28.5 ($17.1 , $11.4)
Illinois – $22.4 ($13.4 , $$9.0)
Tennessee – $17.1 ($5.6 , $11.5)
West Virginia – $13.3 ($9.8 , $3.5)
Mississippi – $12.6 ($7.2 , $5.4)
Iowa – $8.9 ($4.7 , $4.2)
***Cumulative percent of national total*: 99 percent**
Montana – $7.9 ($2.5 , $5.4)
Connecticut – $7.0 (paper products – $7.0)
Vermont – $6.1 ($2.7 , $3.4)
Utah – $4.8 ($2.5 , $2.3)
Missouri – $2.9 ($1.4 , $1.5)
Arizona – $2.6 (wood products – $2.6)
Kansas – $2.4 (paper products $2.4)
New Hampshire – $1.8 ($1.7 , $0.1)
New Mexico – $1.8 (paper products $1.8)
Maryland – $1.7 (wood products $1.7)
***Cumulative percent of national total*: 99+ percent**
Colorado – $1.2 (wood products – $1.2)
Rhode Island – $0.3 (paper products $0.3)
Nevada – $0.1 (paper products $0.1)
***Cumulative percent of national total*: 100 percent**

In addition to capital investments in pollution abatement facilities and equipment and the subsequent cost of operating such installations, the wood-based industry has also invested in a number of other activities involving pollution abatement. For example, in 2005 the wood products group invested $11.4 million in site cleanup activities ($2.9 million capital expenditures, $8.5

million in operating costs) and paid $11.1 million for permits and related fees as required in order to build and operate new or remodeled facilities. The paper products segment of the industry also incurred costs for these activities, namely $28 million for site cleanup ($3.7 million capital expenditures, $24.2 million in operating costs) and $45.4 for permits and related fees. Within the paper manufacturing group, the pulp, paper and paperboard mills industries accounted for more than 80 percent of these costs (U. S. Census Bureau 2008d).

Energy Consumption and Conservation

The wood-based manufacturing industry consumed nearly 2,850 trillion Btu of energy in 2006 (fuel and nonfuel), about 14 percent of the energy consumed by all manufacturing industries in the United States. Although using energy from a wide variety of sources, the industry's major sources are natural gas (20 percent of total), electricity (13 percent), and coal (8 percent). The remaining 59 percent of industry's energy comes from sources such as residual fuel oil, distillate fuel, liquid propane, and coke and breeze account. Nearly all of the coal used by the industry is consumed by the paperboard mills and the paper mills and newsprint mills industries. As indicated by the following, the paper group of the industry was by far the largest consumer of energy in 2006, namely 82 percent of the industry's total, of which three-fourths was consumed by the paper mills and the paperboard mills industries (U.S. Department of Energy 2009) (trillion Btu):

Industry	2002	2006
Wood Products	377	451
Sawmills	127	139
Veneer, Plywood and Engineered Wood Products	167	169
Other Wood Products	83	243
Paper	2,363	2,354
Pulp Mills	224	200
Paper Mills	1,002	939
Newsprint Mills	94	72
Paperboard Mills	908	827
Other Paper Products	135	316
Furniture and Related Products	64	61
Total Wood-based Manufacturing	2,804	2,866
All U.S. Manufacturing Industries	22,666	21,098

The 2006 energy consumption of the following industries provides a context for energy consumed by the wood-based industry: petroleum and coal product industry – 6,864 trillion Btu, chemical industry – 5,149, primary metal industry – 1,736, and the food industry – 1,186 (U.S. Department of Energy 2009).

Wood and wood-related products are an important source of energy (fuel) used by the wood-based industry, most notably when used to generate heat, power, and electricity. In 2006, the industry used such products to produce 1,438 trillion Btu of energy, consumed by the industry's major groups as follows: wood products – 15 percent, paper – 84 percent, and furniture and related products – 1 percent. Within the paper group, the largest consumers of wood for fuel were the paperboard mills (39 percent) and the paper mills industries (38 percent). More than 59 percent of the wood and wood-related material used as fuel was pulping liquor or black liquor (850 trillion Btu), while the remainder (41percent) was some form of biomass (588 trillion Btu). Overwhelmingly, the latter's major sources were wood residues and byproducts from mill processing – 89 percent of the total. Considerably less important as a source of biomass fuel was harvested trees (7 percent), wood-related and paper-related refuse (3 percent), and agricultural waste (less than 1 percent)(U.S. Department of Energy 2009).

The ratio of fuel used by the wood-based industry per employee, dollar of value added, and dollar of shipment value provides a more focused view of the industry's energy efficiency (U.S. Department of Energy 2009). Using employee numbers as a measure, the paper group is clearly the dominate consumer of fuel per employee, especially the paper mills and the paperboard mills industries (Table 52). The wood products group was but 15 percent of the paper group's fuel consumption per employee ratio in 2006. In nearly all cases, the ratio declined from 1998 to 2002, but rose again in 2006. Except for the furniture industry, the ratios for 1998, 2002 and 2006 were greater that the ratio for all manufacturing industries in the United States.

The 2006 fuel consumption per dollar of value added and per dollar of shipment values are similar in relative position to the employee ratios across all the industry's major groups and industries within each group (Table 52). However, in nearly all cases the ratios have declined over the period 1998 through 2006. Especially notable is the decline in fuel consumption per dollar of value added and dollar per shipment value of the pulp mill industry (72 percent and 71 percent, respectively). Fuel consumed per dollar of value added for the industry and its segments is above the national average (except for the furniture industry), although the wood product group's consumption per dollar of shipment value is in some cases equal to or less than the national average for the period 1998 through 2006 (mixed in 1998, below in 2002, above in 2006).

In comparison to wood-based industries, the energy consumption ratios of some nonwood-based industries are substantial. Notable in this regard are the ratios of consumption per dollar of value shipped for the organic fiber industry, alkalies and chlorine industry, and the lime industry and the, 38.8 thousand Btu, 32.0 thousand Btu, and 75.8 thousand Btu, respectively. In contrast, some

Table 52. Energy-Consumption Ratios of Fuel Used by the U.S. Wood-based Manufacturing Industry, by Industry, Employee, Value Added and Shipment Value. 1998, 2002 and 2006.

Industry	1998	2002	2006
Fuel Consumption per Employee (million Btu)			
Wood Products	979.3	741.7	881.1
Sawmills	1,537.9	1,383.0	1,481.1
Veneer, Plywood and Engineered Wood	2,163.9	1,574.9	1,496.1
Paper	5,150.4	5,038.0	5,885.7
Pulp Mills	26,670.2	24,711.6	31,819.8
Paper Mills	10,415.1	10,401.1	12,263.6
Newsprint Mills	14,104.5	13,933.8	17,250.1
Paperboard Mills	18,855.4	18,603.0	20,470.2
Furniture and Related Products	141.1	113.7	110.7
All U.S. Manufacturing Industries	1,101.1	1,172.2	1,278.4
Fuel Consumption per Dollar of Value Added (thousand Btu)			
Wood Products	15.5	10.6	10.4
Sawmills	23.7	20.3	15.1
Veneer, Plywood and Engineered Wood	16.0	19.1	17.6
Paper	39.7	31.1	28.9
Pulp Mills	158.2	116.6	113.2
Paper Mills	58.3	40.4	35.3
Newsprint Mills	58.2	62.1	40.8
Paperboard Mills	103.1	82.1	64.4
Furniture and Related Products	2.2	1.6	1.1
All U.S. Manufacturing Industries	9.4	8.9	6.9
Fuel Consumption per Dollar of Shipment Value (thousand Btu)			
Wood Products	5.9	4.2	4.0
Sawmills	7.4	6.5	5.0
Veneer, Plywood and Engineered Wood	3.0	7.2	6.8
Paper	18.7	15.2	13.7
Pulp Mills	70.0	56.0	49.9
Paper Mills	30.4	22.5	19.6
Newsprint Mills	30.1	29.1	20.9
Paperboard Mills	48.1	42.1	32.3
Furniture and Related Products	1.2	0.9	0.6
All U.S. Manufacturing Industries	4.6	8.9	3.1

Note: Furniture and related products industry includes manufacture of nonwood-based products.
Source: U.S. Department of Energy 2009.

nonwood-based industries are very low in such measures, namely the apparel industry (0.5), pharmaceuticals and medicine industry (0.5), and the beverage industry (1.1). Not be ignored, however, is the reality that 18 of 21 industries for which information is available (three digit NACIS level) have lower per dollar of shipment value ratios than four of the major industries operating within the wood-based industry's paper manufacturing group (pulp mills, paper mills, newsprint mills, paperboard mills) (U.S. Department of Energy 2009).

The wood-based manufacturing industry has a modest record of participation in energy management programs and activities that are advocated as means of reducing an establishment's use of energy in performing normal operations. In 2002, an estimated 20 percent of the combined establishments operating in the wood product and the paper groups engaged in some form of energy management activity (19 percent and 22 percent, respectively) (such compare favorably with the 11 percent participation rate for all U.S. manufacturing industries). The financial support for participation in these activities came primarily from internal company sources – 62 percent internal, 38 percent from non-company sources (for example, governments, company consortiums, industrial associations). Such was especially true for investments in energy saving equipment and systems (67 percent internal sources). Examples of equipment and systems installed to improve energy efficiency are adjustable-speed drives, motors and pumps; properly sized boilers, burners, insulation and piping; and more efficient heating, ventilation and air-conditioning systems. In a more focused sense, the industry's participation in specific activities promoting energy efficiency in 2002 was reported as follows (14,743 establishments; multiple program participation possible)(U.S. Department of Energy 2009).

Energy-Management Activity	Wood Products Group (percent)	Paper Group (percent)
Energy audits	16	23
Direct electricity load control	14	20
Special rate schedules (time of use)	7	17
Standby rate generation programs	6	4
Energy-efficient equipment rebates	2	4
Power factor correction	12	16
Interval metering–real time pricing	1	8
EPA Energy Star Program	1	2
EPA Green Lights Program	*	1
Energy efficient equipment installation (using an existing energy source)	12	17
Energy efficient equipment installation (using an alternative energy source)	6	5
Full-time energy manager	1	3

* less than 1 percent of establishments

Hazardous and Toxic Wastes

Manufacturing processes can result in the occurrence of a variety of hazardous wastes, including corrosive and ignitable wastes, various types of resins, tars, polymer solvents and sludges, and a broad array of toxic chemicals and related agents (more than 650 different toxic chemicals inventoried in 2008). Manufacturers of these wastes are required to report the type, quantity and location of such materials to the U. S. Environmental Protection Agency which has the legal authority to regulate the manner in which they will be disposed (Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA or Superfund] [1980], Resource Conservation and Recovery Act [RCRA] [1986], and the Small Business Liability Relief and Brownfields Revitalization Act [2001]). Properties on which hazardous and toxic wastes are known to exist are of significant environmental concern and can severely limit a property's potential for redevelopment and economic expansion. In 2007, more than 450,000 such properties (brownfields) were located in the United States (U.S. Environmental Protection Agency 2009b).

In 2007, the U.S. Environmental Protection Agency reported the regulation of nearly 250 wood-based manufacturing sites that contained some form of hazardous waste. The wastes of concern were both on and off-site and were distributed among the industry's major groups as follows: wood products – 7 percent (18 sites), paper – 19 percent (47 sites), and wood furniture – 74 percent (183 sites). Company-specific examples of hazardous waste managed on-site (not shipped elsewhere) at company manufacturing facilities in 2007 are (U.S. Environmental Protection Agency 2009b):

> Adorn, LLC (Elkhart, IN): 4.0 tons of paint thinner resulting from product processing and considered ignitable waste.
>
> Graphic Packaging, Inc. (Portland, OR): 8.0 tons of paint and ink from distillation and recovery processes involving solvents considered ignitable waste.
>
> International Paper Company (Savannah, GA): 161.9 tons managed (80.9 tons generated) of aqueous waste generated from product processing and considered ignitable waste.
>
> MasterBrand Cabinets, Inc. (Littlestown, PA): 9.4 tons of paint and ink from distillation and recovery processes involving solvents considered ignitable waste.
>
> Nevamar Laminates, Inc. (Oshkosh, WI): 3.6 tons of nonhalogen solvent used as cleaning equipment and considered ignitable waste.
>
> Weyerhaeuser Company (Longview, WA): 1.4 tons of paint thinner resulting from product processing and considered ignitable waste; 0.6 tons of nonhalogen solvent resulting from painting and coating and considered ignitable waste.

In many cases, a single company was responsible for the management of more than one site. For example, American Wood Mark Corporation – six sites, Ethan Allen Interiors, Inc., – three sites, MasterBrands Cabinets Corporation – 11 sites, Roseburg Forest Products Company – four sites, Stanley Furniture Company – four sites, and Weyerhaeuser Company – three sites.

The wood-based industry is sensitive to the many toxic chemical wastes that can result from manufacturing processes involving wood. In 2008, the industry managed (via treatment, recycling, energy recovery) more than 207.3 million pounds of toxic waste, about 5 percent of all toxic waste produced by U.S. manufacturing industries generally (nearly 22,000 industry and federal facilities). Although an important source of toxic wastes, the industry pales in comparison to toxic waste produced by industries such as the metal mining industry (1,157,709 thousand pounds), electric utilities industry (904,757 thousand pounds) and the chemicals industry (467,950 thousand pounds). The industry's major means of managing toxic wastes in 2008 was via some form of air emission system (stack, vent, ducts, pipes) (78 percent of total), followed by treated discharges into surface waters (streams, rivers, lakes) (8 percent) and placement of treated material in landfills (8 percent). A more detailed accounting is as follows (thousand pounds of toxic material)(U.S. Environmental Protection Agency 2009c):

Manner of Disposal	Wood Products	Paper	Furniture and Related Products*
Onsite Disposal			
Wells	0.0	0.0	0.0
Landfills	231.5	17,169.6	0.0
Air Emissions	13,090.0	139,354.2	6,671.3
Surface Water Discharge	15.4	17,398.0	<0.1
Land Treatments	13.0	879.1	0.6
Surface Impoundments	4.1	3,698.2	0.0
Other Land Disposal	6.4	253.8	0.3
Offsite Disposal	1,006.7	7,355.1	187.9
Total Wood-based Manufacturing	14,367.1	186,108.0	6,860.1

* Includes manufacture of nonwood products.

The largest source of toxic waste in 2008 was the industry's paper group, namely 90 percent of industry generated toxic waste material – 75 percent of which was managed via air emission systems. As for the type of toxic wastes generated by the industry, the industry was responsible for 15.5 million pounds of carcinogenic material in 2008 (20 percent of total produced by all U.S. manufactured facilities), 0.6 million pounds of material containing lead and lead compounds (1 percent of U.S. total), 5,000 pounds of material containing mercury and mercury compounds(less than 1 percent of U.S. total), and 935 grams of material containing dioxin and dioxin-like compounds (3 percent of U.S. total). Only with regards to the latter type of toxic waste did wood-

based companies appear on the U.S. Environmental Protection Agency's 2008 list of 50 largest establishments (facilities) engaged in the management of one or more of these toxic wastes: Cahaba Pressure Treated Forest Products, Inc. (Alabama), Weyerhaeuser Company (two facilities, Washington), AbitibiBowater (two facilities, Alabama), Imco Recycling of Ohio, Inc. (Ohio), and Simpson Tacoma Kraft Company, LLC (Washington). All five companies treat and subsequently dispose of their dioxin wastes in landfills. Although the toxic wastes originating from wood-based manufacturing activities are substantial, the information about them does not necessarily imply that the public has been exposed to such wastes (or to what degree)(U.S. Environmental Protection Agency 2009c).

SUMMARY AND OBSERVATIONS

The U.S. wood-based industry is an important part of the nation's economic and social fabric. In 2006, the industry was responsible for contributing more than $331 billion in shipment values to the nation's economy and was the workplace for more than 1.3 million persons. Although the industry in general may rely on forests as a common source of raw material, the industry's many segments are extremely diverse in the products they produce and in their often unique need for timber, labor and manufacturing facilities. At the risk of overgeneralizing, suggested here is that the wood-based industry is composed of four major segments or groups, namely the timber growing segment, timber management support segment, timber harvesting and transport segment, and the wood product manufacturing segment. Although important segments of the industry, the wholesale and retail trade sectors of the industry were not considered by this review.

The timber growing segment of the wood-based industry is engaged in the operation of timber tracts for purposes of growing and selling standing timber which can subsequently be harvested and manufactured into wood products. Included within the segment are 260 million acres of small and medium forest properties which in 2006 were owned by more than 10 million private persons (or entities). In addition, some forestland owning manufacturing firms often grow and subsequently sell timber on the open market timber. Although unknown in the aggregate, the amount sold is usually surplus to their immediate manufacturing needs. Also part of the industry's timber growing segment are tax-advantaged entities such as real estate investment trusts (REITs) and institutional timberland investors such as timber investment management organizations (TIMOs). The latter two entities have gained recent prominence. In 2007, real estate investment trusts owned 10 to 15 million acres of forest land valued at $10 to $12 billion, while timber investment management organizations have acquired (since the mid 1980s) an estimated 15 million acres of timberland valued at about $15 billion. The REIT portion of the timber growing industry is dominated by relatively few companies (five), while more than 20 major TIMOs were active in the industry in 2007. Favorable tax treatment of income from the properties has been the major incentive for their formation. Nearly all REIT and TIMO properties were once owned by vertically integrated forest products companies.

The timber harvesting segment of the wood-based industry is engaged in the cutting and assembling of timber in ways that enable it to be further processed by wood-based manufacturing entities. Exceeding 9,800 in number, establishments operating in the industry engage the work efforts of nearly 59,600 employees which in 2007 received a payroll of slightly more than $2 billion. Ten states (all but one located in the South or West) account for over half (55 percent) the industry's establishments and 64 percent of its employees. Thirty-nine timber harvesting companies each

reported revenues of $5 million or more in 2007, the largest of which reported $20 million in revenue. In addition to timber harvesting, timber harvesting companies often pursue a wide variety of other businesses. Such include sawmill and planing mill operations, trucking and freight hauling and highway, street and bridge construction.

The timber management supporting segment of the wood-based industry provides technical and managerial support necessary for the production and harvesting of timber. With an annual payroll of $452 million, more than 1,700 establishments employing more than 13,700 persons were active in the timber management supporting industry in 2007. Over the ten-year period 1997 through 2006, the number of establishments in the industry grew nearly 21 percent. Forty-one companies operating in the industry each reported $2 million or more in revenue in 2007, the largest three of which had annual revenue of $20 to $22 million each. In contrast to the timber harvesting segment of the industry, companies in the timber support segment are very focused on timber management services as a primary business interest. Although infrequent, other businesses include timber harvesting and nursery and landscape services.

The manufacturing segment of the wood-based industry is an integral part of the nation's manufacturing sector in general. In 2007, the industry's more than 39,000 establishments employed nearly 1.3 million persons and were the sources of shipment values that exceeded $322 billion. The 20 largest companies engaged in wood-based manufacturing activities contributed nearly $115 billion in revenue to industry-wide manufacturing sales or about 36 percent of industry-wide shipment values. The manufacturing segment of the wood-based industry is composed of three major groups, namely the wood product manufacturing group (engaged in the cutting, shaping and assembling of wood into a variety of products), paper manufacturing group (engaged in the making of pulp, paper, and converted paper products) and wood furniture manufacturing (engaged in cutting, bending, molding, laminating and assembling wood into furniture and related products). In respective order, the groups' shipment values in 2007 were $102 billion, $176 billion and $45 billion; establishments were 16,800, 5,000 and 17,500; and employees were 514,200, 417,400 and 315,400.

The wood-based manufacturing segment of the industry has many characteristics that are worthy of note, of which the following are summarized examples:

- Industry shipment values originate primarily in the eastern portion of the United States (85 percent); except for the paper manufacturing group, the industry is among the nation's least concentrated in terms of shipment values.

•Wood-based manufacturing companies operate in many different segments of the industry and often operate in many nonwood-based industries; corporate and individual proprietorships are the most common ownership arrangements in the industry.

•Foreign ownership of establishments operating within the industry is modest in number (less than 5 percent) as is the number of persons employed by such establishments; white males dominate gender and racial ownership groups within the industry (70 percent or more).

•Merger and acquisition activities have been very common within the industry (nearly 600 from 1997 through 2006), with very few large companies operating in the early 1900s being recognizable as wood-based companies in 2006.

•Strategies for securing a reliable source of timber are diverse and frequently include fee-owned timberland (43 manufacturing companies own more than 18.1 million acres of timberland), although few companies recognizable as timberland owners in 1969 were timberland owners in 2006.

•Industry labor productivity has consistently increased over the years (43 percent greater than in 1987) and utilization of production capacity has kept pace with national averages for all manufacturing industries. Over the years, industry-wide profits have been somewhat less than occurs for other manufacturing industries.

•Average wages paid production workers have consistently been below the national average, especially in the wood furniture manufacturing industry. Industry employees tend to experience higher rates of occupational injury and illness.

•Company-sponsored research and development programs are important strategic concerns within the industry(exceed $2 billion annually), especially within the paper manufacturing group.

•Commitment to environmental and resource stewardship is extensive, including certification of more than 35 million acres of forest land meeting sustainable forestry standards established by the industry; and extensive investment in the abatement of various types of pollutants, especially water pollutants ($732 million in capital improvements in 2005).

The diversity and complexity of the U.S. wood-based industry poses severe challenges to properly describing its structure and operation. Among the more significant challenges is the lack of consistent, reliable and comprehensive statistical evidence. Government data sources are readily available, yet often lack consistency from one data-gathering organization to another and recently have been beset by major changes made in the definition of various segments of the industry.

Compounding these challenges are non-disclosure requirements imposed on information gathering by agencies and the three to four-year time lags between data gathering and subsequent presentation for public us. While private information sources are useful (for example, specific company names), there is little opportunity to make meaningful comparisons among such sources. The methods they use to gather information, the units of measure used to present it, and the time periods the information supposedly reflects are simply too diverse. Adding to the information problem is the reluctance – often with just cause – of most wood-based companies to publically acknowledge a range of detailed information about their operations. Given such challenges, a comprehensive and entirely accurate portrait of the wood-based industry may be out of the question. However, what can be hoped for is a reasonably untarnished picture of a rapidly changing industrial scene, a picture that can be used to make more informed judgements about the economic structure and business activities of one of the nation's leading industries.

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APPENDIX TABLES

Appendix Table 1. Classification of U.S. Wood-based Industry: 2007.

A. TIMBER GROWING INDUSTRIES

Timber Tract Operations (1131)

B. TIMBER HARVESTING AND TRANSPORTING INDUSTRIES

Logging (1133)

C. TIMBER MANAGEMENT SUPPORTING INDUSTRY

Support Activities for Forestry (1153)

D. MANUFACTURING

WOOD PRODUCTS MANUFACTURING (321)

Sawmills and Wood Preservation (3211)
Veneer And Plywood (321211, 321212)
Engineered Wood Products (321213, 321214)
Reconstituted Wood Products (321219)
Millwork (32191)
Wood Container and Pallets (32192)
Manufactured Homes (mobile) (321991)
Prefabricated Wood Buildings (321992)
Other Wood Products (32199)

PAPER MANUFACTURING (322)

Pulp Mills (32211)
Paper Mills (32212
Paperboard Mills (32213)
Paperboard Containers (32221)
Paper Bag and Coated and Treated Paper (32222)
Stationary Products (32223)
Sanitary Paper Products (322291)
Other Converted Paper Products (322299)

WOOD FURNITURE AND RELATED PRODUCT MANUFACTURING (337)

Wood Kitchen Cabinet and Countertop Manufacturing (33711)
Nonupholstered Wood Household Furniture Manufacturing (337122)
Wood Television, Radio, and Sewing machine Cabinet Manufacturing (337129)
Wood Office Furniture Manufacturing (337211)
Custom Architectural Woodwork and Millwork Manufacturing (337212)
Showcases, Partitions, Shelves and Lockers (337215)

E. WHOLESALE TRADE

Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers (42331)
Furniture and Home Furnishing Merchant Wholesalers (4232)
Paper and Paper Product Wholesalers (4241)

F. RETAIL

Furniture Stores (4421)
Building Material Home Centers (44411)
Book Stores and News Dealers (45121)
Office Supplies, stationery, Gift Stores (45321)

G. PUBLISHING INDUSTRIES

Newspapers, Periodicals, Books and Directories (5111)

Source: U.S. Census Bureau 2008a

Appendix Table 2. Establishments and Employees in the Timber Tract Operation, Logging, and Forestry Support Groups of the U.S. Wood-based Industry. 1997-2007.

	Timber Tract Operations		Logging		Forestry Support	
Year	Establishments	Employees	Establishments	Employees	Establishments	Employees
2007	450	2,632	9,810	59,597	1,755	13,740
2006	454	2,806	10,038	61,400	1,682	13,491
2005	472	4,524	10,357	63,226	1,701	14,260
2004	521	5,023	10,926	69,007	1,786	15,157
2003	621	5,515	10,977	68,020	1,762	14,969
2002	680	4,203	11,447	68,962	1,797	14,679
2001	441	3,203	12,098	72,732	1,553	15,173
2000	469	3,337	12,620	78,129	1,547	14,650
1999	431	3,258	13,011	79,195	1,493	14,148
1998	418	3,426	13,606	79,357	1,451	13,042
1997	NA	NA	13,533	83,204	NA	NA

Note: NA indicates information not available.

Source: U.S. Census Bureau 2001b, 2006a, 2009a and 2009b.

Appendix Table 3. Establishments and Employees in Wood Products Manufacturing Group of the U.S. Wood-based Manufacturing Industry.1997-2007.

Year	Sawmills and Wood Preservation	Veneer, Plywood and Engineered Wood Products	Millwork	Wood Containers and Pallets	Manufact-ured Homes (mobile)	Prefabricated Wood Buildings	Miscellaneous Wood Products
Establishments							
2007	4,094	1,696	4,713	2,909	376	811	1,964
2006	4,223	1,956	4,667	2,839	395	796	1,859
2005	4,271	1,903	4,628	2,837	384	758	1,926
2004	4,244	1,915	4,659	2,924	388	736	1,917
2003	4,229	1,906	4,740	2,914	414	720	1,885
2002	4,368	1,844	4,887	2,921	404	771	1,857
2001	4,594	1,944	4,631	2,915	397	741	2,067
2000	4,695	1,904	4,485	2,947	387	738	2,172
1999	4,839	1,886	4,399	2,968	389	730	2,262
1998	4,857	1,892	4,439	3,021	364	725	2,342
1997	4,852	1,849	4,266	2,996	319	709	2,407
Employees							
2007	92,805	86,422	153,739	58,467	40,905	24,774	36,674
2006	103,989	114,713	159,744	51,642	43,857	26,009	36,139
2005	105,323	115,467	158,434	50,152	46,750	25,672	37,305
2004	105,538	110,839	157,781	50,170	47,483	24,731	38,704
2003	103,705	110,269	147,690	46,528	42,764	23,075	37,400
2002	108,014	114,184	150,902	51,028	50,270	25,217	40,487
2001	124,432	115,373	145,904	49,157	52,058	26,166	42,810
2000	128,517	120,163	151,648	51,311	62,104	26,363	44,931
1999	132,828	115,877	153,555	49,455	71,690	25,540	40,284
1998	132,594	114,968	146,134	52,835	71,576	23,423	44,859
1997	131,016	114,165	142,426	51,403	67,847	23,010	43,749

Source: U.S. Census Bureau 2001b, 2006a, 2009a and 2009b

Appendix Table 4. Establishments and Employees in Paper Manufacturing Group of the U.S. Wood-based Manufacturing Industry.1997-2006.

Year	Pulp Mills	Paper and Newsprint Mills	Paperboard Mills	Paperboard Containers	Paper Bag and Coated and Treated Paper	Stationary Products	Sanitary Products	Other Converted Paper products
Establishments								
2007	39	262	187	2,402	891	549	146	508
2006	44	348	205	2,440	884	554	129	535
2005	43	368	210	2,487	913	565	138	549
2004	43	385	221	2,561	914	589	147	562
2003	38	376	221	2,617	910	600	147	547
2002	44	353	231	2,699	929	644	131	515
2001	51	308	247	2,766	964	714	129	560
2000	48	311	238	2,809	955	741	131	557
1999	45	314	233	2,828	972	775	150	566
1998	44	305	232	2,846	977	774	142	607
1997	39	293	217	2,838	957	800	141	601
Employees								
2007	7,268	80,838	36,641	165,839	60,373	31,628	17,198	17,582
2006	6,736	85,091	36,029	161,822	56,488	31,542	15,701	20,639
2005	7,153	91,079	37,358	162,816	61,828	33,369	16,064	19,913
2004	7,686	89,712	39,646	169,327	61,057	35,647	16,450	20,464
2003	8,059	92,036	44,715	176,450	64,161	39,036	19,260	20,608
2002	8,043	102,781	48,220	184,457	66,296	38,937	20,053	23,045
2001	7,218	114,670	48,773	205,004	70,599	45,137	15,489	23,356
2000	7,337	123,663	50,918	212,537	70,614	46,831	15,431	24,230
1999	7,311	128,046	51,162	211,719	72,925	47,911	15,827	25,260
1998	9,891	129,888	53,642	213,453	76,779	48,492	20,806	23,163
1997	10,247	135,356	54,424	208,541	75,697	47,825	20,191	23,854

Source: U.S. Census Bureau 2001b, 2006a, 2009a and 2009b

Appendix Table 5. Establishments and Employees in Wood Furniture Manufacturing Group of the U.S. Wood-based Manufacturing Industry. 1997-2006.

Year	Wood Kitchen Cabinets and Countertops	Nonupholstered Wood Household Furniture	Wood Television, Radio, and Sewing Machine Cabinets	Wood Office Furniture	Custom Architectural Wood and Millwork	Showcases, Partitions, Shelves and Lockers
Establishments						
2007	9,683	3,428	270	457	2,228	1,377
2006	9,608	3,673	240	502	1,574	1,733
2005	9,473	3,771	239	502	1,554	1,789
2004	9,339	3,916	239	523	1,520	1,829
2003	9,126	4,003	223	541	1,553	1,830
2002	9,670	4,112	189	610	1,233	1,882
2001	8,176	3,913	152	603	1,165	2,028
2000	7,585	3,826	100	596	1,035	2,076
1999	7,749	3,839	107	632	1,054	2,105
1998	7,891	3,888	105	658	1,069	2,116
1997	7,962	3,678	98	676	1,100	2,156
Employees						
2007	138,379	63,066	2,333	19,237	46,417	45,920
2006	145,013	71,544	2,865	20,568	32,033	54,382
2005	139,433	80,844	1,961	21,813	31,756	55,315
2004	136,790	95,337	2,507	21,679	33,141	59,818
2003	128,113	95,502	3,023	22,787	32,369	62,306
2002	126,626	111,984	2,762	25,597	34,116	70,301
2001	115,803	122,744	3,291	30,823	24,579	71,800
2000	115,356	135,488	3,469	32,229	26,546	75,924
1999	106,666	133,414	4,006	30,116	25,609	74,874
1998	106,589	133,155	4,364	31,502	25,534	75,022
1997	99,322	128,248	4,273	30,641	24,376	75,413

Source: U.S. Census Bureau 2001b, 2006a, 2009a and 2009b

Appendix Table 6. Location of Corporate Home Office of Major U.S. Wood-based Manufacturing Companies, by State. 2008.

Company	Corporate Home Office	Company	Corporate Home Office
AbitibiBowater, Inc. (US)	Canada	Columbia Forest Products, Inc.	OR
Advanced Environmental Recycling Technologies, Inc.	AR	Cox Industries, Inc.	SC
Altivity Packaging, LLC	IL	DURO Bag Manufacturing Co.	KY
American Greetings Corporation	OH	Ethan Allen Interiors, Inc.	CT
American Woodmark Corporation	VA	Flexsteel Industries, Inc.	IA
Andersen Corporation	MN	Furniture Brands International, Inc. (US)	MO
Anderson-Tully Co	MS	Georgia-Pacific Corporation (Koch Industries)	KS
Appleton Paper, Inc. (Paperweight Development	WI	Graphic Packaging Corporation	IL
Corporation)	WI	Green Bay Packaging, Inc.	WI
Ashley Furniture Industries, Inc.	CA	Greif, Inc.	OH
Avery Dennison Corporation	VA	Hampton Affiliates	OR
Bassett Furniture Industries, Inc.	WI	Haworth, Inc.	MI
Bemis Company	IA	Herman Miller, Inc.	MI
Bertch Cabinet Manufacturing	ID	Hood Industries, Inc.	MS
Boise Cascade Holdings	TN	Hooker Furniture Corporation	VA
Buckeye Technologies, Inc.	NY	IFCO Systems North America, Inc. (IFCO Systems)	TX
Bush Industries, Inc.	GA	International Forest Products Limited (INTERFOR)	WA
Caraustar Industries, Inc. (US)	TX	International Paper Company	TN
Cardell Cabinetry, Inc.	AL	Interstate Resources (Merlands Netherlands, BV)	VA
Cavalier Homes, Inc.	AZ	JELD-WEN, Inc.	OR
Cavco Industries, Inc.	CT	Kimball International, Inc.	IN
Cenveo, Inc.	MI	Kimberly-Clark Corporation	TX
Champion Enterprises, Inc. (US)	VA	Klaussner Furniture Industries	NC
Chesapeake Corporation	IN	Koppers, Inc. (Koppers Holdings, Inc.)	PA
Chromcraft Revington, Inc.	TN	La-Z-Boy, Inc.	MI
Clayton Homes, Inc. (Berkshire Hathaway, Inc.)			

Note: AbitibiBowater, Inc., Montreal, Canada.
Source: Mergent, Inc. 2008, and individual corporate annual reports.

Appendix Table 6 (continued).

Company	Corporate Home Office	Company	Corporate Home Office
Liberty Homes, Inc.	IN	Roseburg Forest Products Company (RLC Industries)	OR
McFarland Cascade Holdings	WA	Rush Industries, Inc.	NC
Louisiana-Pacific Corporation	TN	Sappi Fine Paper North America (S D Warren Co)	MA
Marvin Windows and Doors	MN	Sauder Woodworking Company	OH
Masco Corporation	MI	Schnadig Corporation	IL
MasterBrands Cabinets, Inc. (Fortune Brands, Inc.)	IL	Schweitzer-Mauduit International, Inc.	GA
MeadWestvaco Corporation	CT	Sierra Pacific Industries	CA
Menasha Corporation	WI	Simpson Timber Company (Kamilche Company)	WA
Nashua Corporation	NH	Skyline Corporation	IN
National Envelope Corporation	NY	Smurfit-Stone Container Corporation	IL
Neenah Paper, Inc.	GA	Sonoco Products Company	SC
Newpage Corporation (Cerberus Capital Management)	OH	Stanley Furniture Company	VA
P. H. Glatfelter Company	PA	States Industries, Inc.	OR
Packaging Corporation of America	IL	Stimson Lumber Company	OR
PALCO (Maxxam, Inc.)	TX	Temple-Inland, Inc.	TX
Palm Harbor Homes, Inc.	TX	The Newark Group, Inc.	NJ
Pella Corporation	IA	Timber Products Company	OR
Plum Creek Timber Company, Inc.	WA	Universal Furniture Corporation	NC
Pope and Talbot, Inc.	OR	Universal Forest Products	MI
Potlatch Corporation	WA	Vaughan-Bassett Furniture Co	VA
Pratt Industries, Inc. (Visy Industries)	GA	Verso Paper Corp (Verso Paper Holdings)	TN
Rayonier, Inc.	FL	Wausau Paper Corporation	WI
Rex Lumber Company	MA	Weyerhaeuser Company	WA
Rock-Tenn Company	GA	Wood-Mode, Inc.	PA

Appendix Table 7. Shipment Value Concentration in the U. S. Wood Manufacturing Industry, by Major Industry Segments. 1954 to 2002.

Year	Percent of Value of Shipments Accounted for by the Largest . . . Companies											
	Logging				Sawmills				Wood Preservation			
	Four	Eight	Twenty	Fifty	Four	Eight	Twenty	Fifty	Four	Eight	Twenty	Fifty
2002	NA	NA	NA	NA	18	24	34	45	26	35	52	75
1997	NA	NA	NA	NA	17	23	36	48	20	31	50	74
1992	19	26	36	41	14	20	31	44	17	28	47	70
1987	18	24	33	39	15	21	31	44	16	26	44	66
1982	30	37	47	52	17	23	34	46	27	37	52	71
1977	29	36	45	50	17	23	36	49	33	42	59	76
1972	18	25	35	41	18	23	33	45	36	45	61	80
1970	19	27	NA	NA	16	20	NA	NA	34	NA	NA	NA
1967	14	22	30	35	11	15	22	31	35	44	63	84
1966	14	23	NA	NA	11	15	NA	NA	37	47	NA	NA
1963	11	19	25	31	11	14	20	29	34	44	84	87
1958	13	19	25	32	NA	NA	NA	NA	32	43	87	NA
1954	8	13	20	NA	NA	NA	NA	NA	30	42	NA	NA
Year	Veneer and Plywood				Millwork				Manufactured Homes and Prefabricated Wood Buildings			
2002	45	58	75	88	17	26	36	47	34	46	61	76
1997	40	54	71	86	16	24	35	46	30	42	64	75
1992	37	53	70	85	20	26	38	51	24	36	54	74
1987	30	46	66	84	20	27	37	52	20	32	50	70
1982	33	48	66	83	15	20	30	44	21	33	54	72
1977	32	46	66	84	14	20	31	46	24	36	54	71
1972	36	46	64	82	10	15	25	41	61	38	54	74
Year	Wood Kitchen Cabinets and Wood Household Furniture				Wood Office Furniture				Wood Television, Radio and Sewing Machine Cabinets			
2002	26	35	46	56	34	43	56	72	64	75	85	93
1997	22	31	43	54	35	42	55	70	46	63	86	97
1992	21	30	44	58	26	34	51	70	55	68	86	97
1987	20	29	42	56	26	37	50	68	53	72	91	99
1982	15	22	35	50	22	32	50	71	57	77	92	99
1977	14	22	36	51	32	44	62	81	45	75	88	98
1972	13	21	36	53	25	38	60	80	42	64	86	98
1970	NA	NA	NA	NA	34	52	NA	NA	NA	NA	NA	NA
1967	NA	NA	NA	NA	29	48	71	88	NA	NA	NA	NA
1966	NA	NA	NA	NA	30	50	NA	NA	NA	NA	NA	NA
1963	NA	NA	NA	NA	29	47	74	92	NA	NA	NA	NA
1958	NA	NA	NA	NA	27	42	68	87	NA	NA	NA	NA
1954	NA	NA	NA	NA	25	41	69	NA	NA	NA	NA	NA

Note: NA indicates information not available.
Source: U. S. Census Bureau 2006b.

Appendix Table 7 (continued).

Year	Percent of Value of Shipments Accounted for by the Largest . . . Companies							
	Pulp Mills				Paper Mills			
	Four	Eight	Twenty	Fifty	Four	Eight	Twenty	Fifty
2002	61	88	99	100	50	66	81	94
1997	59	86	81	100	34	55	80	94
1992	48	75	98	100	29	49	77	94
1987	44	69	99	100	33	50	78	94
1982	45	70	99	100	22	40	71	93
1977	48	76	99	100	23	42	70	92
1972	59	83	99	100	24	40	66	88
1970	48	76	NA	100	26	43	NA	NA
1967	45	70	97	100	26	43	65	86
1966	48	75	NA	100	24	40	NA	NA
1963	48	72	97	100	26	42	63	85
1958	46	68	97	100	NA	NA	NA	NA
Year	Paperboard Mills				Paperboard Containers			
2002	48	68	88	99	29	43	59	70
1997	34	53	82	98	19	33	50	65
1992	31	52	80	97	35	47	65	81
1987	32	51	77	97	35	47	64	79
1982	28	45	75	96	32	45	63	78
1977	27	42	70	95	28	42	60	76
1972	29	44	69	93	28	40	57	73
1970	28	44	NA	NA	29	52	NA	NA
1967	27	42	67	92	27	40	59	74
1966	27	42	NA	NA	28	42	NA	NA
1963	27	43	67	90	30	42	62	73

Appendix Table 8. Major Companies Operating in the U.S. Wood-based Manufacturing Industry, by Product and Service Provided. 2008.

Bassett Furniture Industries, Inc.

Furniture:
Bedroom furniture
Chairs and ottomans
Dining room furniture
Home office furniture
Living room tables
Sectionals and Sofas
Storage systems
Home accents:
Pillows and mirrors
Lighting:
Chandelier
Floor and table lamps

Kimberly-Clark Corporation

Personal Care:
Baby wipes and diapers
Female hygiene products
Consumer Tissue:
Bathroom tissue
Facial tissue
Paper napkins and towels
Professional and Health Care:
Respiratory products
Gloves, face masks, gowns
Sterile wrap

Masco Corporation

Cabinets and related products:
Kitchen and bath cabinets
Home office workstations
Entertainment centers
Storage products, bookcases
Kitchen utility products
Plumbing products:
Faucets and showerheads
Plumbing fittings and valves
Bathtubs-shower enclosures
Installation services:
Insulation
Cabinetry and fireplaces
Gutters and garage doors
Bath accessories
Shelving and windows
Architectural products:
Paints, stains and varnishes
Waterproof coatings
Specialty products:
Window frame components
Patio doors
Electronic locksets
Staple gun tackers

MeadWestvaco Corporation

Packaging:
Bleached paperboard
Kraft paperboard
Linerboard
Saturating kraft
Multi-pack cartons
Packaging systems
Printed plastic packaging
Injection-molded products
Consumer and office products:
Envelope products
Paper promotional products
Home and school products
Specialty chemicals:
Asphalt innovations
Carbon products
Paper and pine chemicals
Publication ink resins
Specialty dispersants
Specialty Papers:
Protective wear layers
Decorative products
Automotive products
Tape and medical products
Flame retardants

Potlatch Corporation

Resources:
Logs and pulpwood
Wood Products:
Lumber, plywood and particleboard
Paperboard Products:
Paperboard
Kraft market pulp
Folding cartons and paperboard
Consumer Products:
Bathroom and facial tissue
Towels and napkins
Land and resources:
Land sales and development
Recreation and hunting leases
Conservation easements

Smurfit-Stone Container Corporation

Products:
Containerboard
Kraft paper
Market pulp
Solid bleached sulphate
*Service*s:
Corrugated services
Display services
Pulp and paper services
Recycling solutions

Appendix Table 8 (continued).

Sonoco Products Corporation

Agricultural cores
Automotive components
Bags and pouches
Beverage insulators
Caulk tubes and cartridges
Printing cartridges
Composite reels
Concrete forms
Core plugs and end walls
Electrical tubes and cores
Fiber mining tubes
Filtration products
Flexible packaging
Folding cartons
Glass and paper covers
Molded and extruded plastic
In-store displays
Paper and labels
Paper and plastic carriers
Paper and plastic tubes
Paper mill packaging
Peelable membrane closures
Plastic bags and plastic closures
Plastic reels and spools
Print solutions
Protective packaging
Recovered paper
Residential construction products
Rigid paper and plastic containers

Temple-Inland Corporation

Corrugated packaging:
Corrugated containers
Containerboard
Consumer packaging and displays
Linerboard products
Forest products:
Timberland
Gypsum wallboard
Engineered wood trim and siding
Fiberboard products
Lumber and studs
Industrial materials:
Particleboard
Medium density fiberboard
Real estate operations:
Recreational leases
Land buying and selling
Community development
Commercial properties
Financial services:
Consumer and business loans
Checking and deposit accounts
Asset-based lending
Treasury management
International trade services

Universal Forest Products

Decking, railing and fencing
Trusses, joists, and wall panels
Pressure treated wood
Lumber and panels
Trim and mounding
Manufactured housing
Engineered wood products
Packaging

UPM-Kymmene Corporation

Paper products:
Printing and office papers
Newsprint
Label and envelope papers
Bag and sack papers
Technical papers
Fine and specialty papers
Converting products:
Self-adhesive labels
Siliconized paper
Industrial wrapping
Wood products:
Sawn timber and plywood

Weyerhaeuser Company

Timberlands:
Logs, chips and timber
Paper:
Newsprint
Publishing and converting papers
Wood products:
Composite panels
Engineered lumber
Oriented strand board
Plywood and veneer
Poles and piling
Softwood and hardwood lumber
Cellulose fibers:
Absorbent fibers
Paper grade fibers
Liquid packaging board
Packaging:
Containerboard
Corrugated packaging
Kraft paper bags
Real estate operations:
Residential development
Master-planned communities

Appendix Table 9. Primary Product Specialization in the U.S. Wood-based Manufacturing Industry, by Major Industry Segments. 1997-2007.

Industry	2007	2002	1997	1992	1987	1982	1977
	Primary Product Specialization Ratio (percent)						
Logging	100	100	100	98	98	96	97
Sawmills and Planing Mills	96	96	96	95	95	93	92
Millwork	95	91	90	96	95	93	94
Hardwood Veneer and Plywood	96	95	95	91	93	93	91
Softwood Veneer and Plywood	97	91	88	87	87	84	88
Wood Preserving	96	93	95	97	97	98	97
Reconstituted Wood Products	99	97	97	99	98	NA	NA
Mobile Homes	99	99	99	99	99	99	99
Prefabricated Wood Buildings	96	95	95	98	95	97	98
Pulp Mills	95	95	85	81	87	85	86
Paper Mills	93	95	95	90	91	92	92
Paperboard Mills	95	93	89	92	91	89	84
Setup Paperboard Boxes	87	94	87	97	96	96	93
Corrugated and Solid Fiber Boxes	98	98	97	99	99	99	99
Fiber Cans and Drums	97	96	96	95	92	95	93
Folding Paperboard Boxes	95	96	96	96	95	NA	NA
Coated and Laminated Packaging Paper	90	89	87	87	85	NA	NA
Sanitary Paper Products	92	92	94	96	96	94	93
Envelopes	98	98	96	96	98	98	97
Nonupholstered Wood Household Furniture	90	96	93	94	95	95	94
Wood Kitchen Cabinets and Countertops	97	96	94	96	96	96	96
Wood Television, Radio and Similar Cabinets	93	90	79	92	87	91	92
Wood Office Furniture	91	89	92	93	93	91	85

Note: Included are only industries considered comparable in definition over the period 1997 through 2007. Includes estimates where the U.S. Census Bureau withholds information to avoid disclosure of data for individual companies. NA indicates information not available.
Source: U. S. Census Bureau. 2009b (and earlier years of economic and manufacturing censuses).

Appendix Table 10. Institutional and Mutual Fund Ownership of Common Stock of Wood-based Manufacturing Companies Operating in the U.S. Wood-Based Manufacturing Industry, by Company. 2007.

Company	Common Stock Shares Outstanding (millions)	Stock Owned by Company's 10 Largest Institutional Investors (percent)	Stock Owned by Company's 10 Largest Mutual Fund Investors (percent)
American Greetings Corporation	52.1	67.4 [184]	18.3
American Woodmark Corporation	14.9	49.7 [119]	26.1
Avery Dennision Corporation	107.0	41.0 [426]	17.7
Bemis Company	107.3	29.1 [326]	10.3
Buckeye Technologies, Inc.	38.0	50.8 [131]	19.3
Champion Enterprises. Inc.	55.8	61.8 [162]	27.4
Caraustar Industries, Inc.	29.0	63.1 [96]	28.1
Cenveo, Inc.	53.6	44.6 [127]	19.4
Chesapeake Corporation	20.3	51.8 [103]	22.7
Ethan Allen Interiors, Inc.	34.3	61.4 [174]	28.2
Fortune Brands, Inc.[1]	153.4	31.4 [578]	9.3
Furniture Brands International, Inc.	56.5	63.3 [177]	36.7
Graphics Packaging Corporation	200.9	19.4 [88]	5.1
Greif, Inc.	46.6	45.7 [176]	13.8
International Paper Company	446.7	56.3 [485]	23.0
Kimberly-Clark Corporation	453.8	31.5 [839]	8.7
La-Z-Boy, Inc.	51.8	65.9 [136]	32.2
Louisiana-Pacific Corporation	94.2	56.0 [229]	15.7
Masco Corporation	391.3	57.2 [451]	14.0
MeadWestvaco Corporation	186.0	42.2 [328]	20.1
Neenah Paper, Inc.	15.4	52.4 [181]	22.5
Packaging Corporation of America	106.2	30.0 [221]	21.8
P. H. Glatfelter	45.3	45.6 [146]	16.0
Pope and Talbot	17.1	61.7 [64]	19.6
Potlatch Corporation[2]	20.4	50.1 [166]	32.7
Plum Creek Timber Company	303.0	24.3 [478]	9.7
Rayonier, Inc.	77.4	31.8 [275]	17.5
Rock-Tenn Company	40.4	38.0 [183]	11.7
Sappi Ltd.	214.5	7.7 [41]	1.6
Smurfit-Stone Container Corp	257.0	51.2 [221]	18.5
Sonoco Products Company	100.3	32.0 [277]	10.1
Temple-Inland, Inc.	110.8	39.5 [336]	12.9
Universal Forest Products, Inc.	19.6	43.9 [152]	18.2
Wausau Paper Corporation	52.7	55.4 [123]	16.6
Weyerhaeuser Company	236.8	45.3 [497]	23.4

Note: Numbers in brackets are number of institutional investors.

[1] MasterBrands Cabinets, Inc.

[2] Information for 2005 (prior to company conversion to a real estate investment trust).

Source: U.S. Securities and Exchange Commission 2007 and Yahoo Finance, Inc. 2007.

Appendix Table 11. Establishments and Employees of Foreign-owned Wood-based Manufacturing Companies in the U.S. Wood-based Manufacturing Industry, by Industry and Country. 2002.

Country	Wood-based Industry						Total
	Sawmills and Wood Preservation	Plywood and Engineered Wood Products	Other Wood Manufactured Products	Pulp, Paper and Paperboard Products	Converted Paper Products	Wood Household Furniture	
				Establishments			
Canada	8	14	32	15	17	2	88
France	1	0	2	1	11	3	18
Germany	2	4	3	1	5	7	22
Netherlands	0	0	32	0	3	1	36
Switzerland	0	2	2	1	1	1	7
United Kingdom	3	13	13	1	14	1	45
Latin American Countries	4	2	3	2	21	0	32
Middle East	0	0	0	2	5	0	7
Africa	0	0	0	3	1	0	4
Japan	3	2	1	1	11	4	22
Other Asia-Pacific Countries	0	1	1	2	32	0	36
				Employees			
Canada	878	2,091	3,908	7,500	1,750	60	16,187
France	175	0	60	60	1,750	375	2,420
Germany	60	566	60	175	750	4,687	6,298
Netherlands	0	0	1,541	0	345	375	2,261
Switzerland	0	375	60	375	60	375	1,245
United Kingdom	175	750	750	60	1,750	175	3,660
Latin American Countries	375	375	375	375	4,585	0	6,085
Middle East	0	0	0	375	375	0	750
Africa	0	0	0	1,750	60	0	1,810
Japan	375	175	60	10	1,750	750	3,120
Other Asia-Pacific Countries	375	175	60	175	3,750	750	5,285

Note: Employee information includes estimates (based on employment data ranges) for some industries and countries.
Source: U. S. Department of Commerce 2006.

Appendix Table 12. Foreign-owned Establishments in the U.S. Wood-based Manufacturing Industry, by State, Major Industry Group and Country of Parent Firm. 2002.

State and Industry	Country of Parent Firm and Number of Establishments Owned in U.S.							
	Canada	France	Germany	Nether-lands	Switzer-land	United Kingdom	Japan	Other Countries
Alabama								
Wood Product Manufacturing	5	0	0	0	0	0	0	*
Paper Manufacturing	1	0	0	0	0	0	0	3
Arizona								
Wood Product Manufacturing	0	0	0	0	0	0	0	*
Paper Manufacturing	1	0	0	0	0	0	0	3
Arkansas								
Wood Product Manufacturing	0	0	0	0	0	0	0	*
Paper Manufacturing	1	0	0	0	0	0	0	0
California								
Wood Product Manufacturing	3	0	0	0	0	0	0	*
Paper Manufacturing	3	1	0	0	0	0	2	15
Florida								
Wood Product Manufacturing	3	0	0	1	0	3	0	*
Paper Manufacturing	0	0	1	0	0	0	0	6
Georgia								
Wood Product Manufacturing	4	0	0	0	0	1	0	*
Paper Manufacturing	2	0	0	0	0	2	0	15
Indiana								
Wood Product Manufacturing	3	0	0	0	0	0	0	*
Paper Manufacturing	0	0	0	0	0	0	0	5
Louisiana								
Wood Product Manufacturing	0	0	0	0	0	0	0	*
Paper Manufacturing	1	0	0	0	0	0	0	6
Maine								
Wood Product Manufacturing	4	0	0	0	0	0	0	*
Paper Manufacturing	3	0	0	0	0	0	0	4
Massachusetts								
Wood Product Manufacturing	1	0	0	0	0	0	0	*
Paper Manufacturing	0	2	0	0	0	0	1	3
Michigan								
Wood Product Manufacturing	0	0	0	0	0	0	0	*
Paper Manufacturing	2	0	0	0	0	0	0	5
Minnesota								
Wood Product Manufacturing	2	0	0	0	0	0	0	*
Paper Manufacturing	0	1	0	0	0	0	0	3
Mississippi								
Wood Product Manufacturing	1	0	0	1	0	0	0	*
Paper Manufacturing	0	0	0	0	0	0	0	2
Nebraska								
Wood Product Manufacturing	1	0	0	0	0	0	0	*
Paper Manufacturing	0	0	0	0	0	0	0	0
New Hampshire								
Wood Product Manufacturing	0	0	0	0	0	1	0	*
Paper Manufacturing	0	0	0	0	0	0	0	0

Note: Asterisk indicates information not available. In addition to those identified, states also known to have foreign-owned paper manufacturing establishments are Alaska (1), Connecticut (2), Illinois (10), Iowa (1), Kansas (3), Kentucky (4), Maryland (1), and Missouri (2).
Source: U. S. Department of Commerce 2006.

Appendix Table 12. (continued).

State and Industry	Country of Parent Firm and Number of Establishments Owned in U.S.							
	Canada	France	Germany	Nether-lands	Switzer-land	United Kingdom	Japan	Other Countries
New Jersey								
Wood Product Manufacturing	0	1	0	0	0	0	0	*
Paper Manufacturing	0	0	0	0	0	1	1	4
New York								
Wood Product Manufacturing	2	0	0	0	0	0	0	*
Paper Manufacturing	0	1	1	0	0	0	0	8
North Carolina								
Wood Product Manufacturing	0	0	1	0	0	5	0	*
Paper Manufacturing	0	1	0	0	0	2	0	7
Ohio								
Wood Product Manufacturing	2	0	0	3	0	0	0	*
Paper Manufacturing	0	2	0	0	0	0	1	3
Oklahoma								
Wood Product Manufacturing	0	0	0	0	0	0	0	*
Paper Manufacturing	0	0	0	1	0	0	0	0
Oregon								
Wood Product Manufacturing	0	0	0	0	0	1	0	*
Paper Manufacturing	0	0	0	0	0	0	0	1
Pennsylvania								
Wood Product Manufacturing	1	0	0	1	2	0	0	*
Paper Manufacturing	0	0	1	0	0	0	0	7
Rhode Island								
Wood Product Manufacturing	0	0	0	0	0	0	0	*
Paper Manufacturing	1	0	0	0	0	1	0	1
South Carolina								
Wood Product Manufacturing	1	0	0	3	0	0	0	*
Paper Manufacturing	2	0	0	1	0	2	0	3
Tennessee								
Wood Product Manufacturing	2	0	0	0	0	0	0	*
Paper Manufacturing	0	0	0	0	0	0	0	4
Texas								
Wood Product Manufacturing	2	0	0	7	0	0	0	*
Paper Manufacturing	3	0	0	1	0	2	0	5
Utah								
Wood Product Manufacturing	0	0	0	0	0	4	0	*
Paper Manufacturing	0	0	0	0	0	0	0	0
Vermont								
Wood Product Manufacturing	0	0	0	0	0	0	0	*
Paper Manufacturing	0	0	0	0	1	0	0	1
Virginia								
Wood Product Manufacturing	5	0	0	0	0	0	0	*
Paper Manufacturing	1	0	0	0	0	1	1	3
Washington								
Wood Product Manufacturing	5	0	1	0	0	0	2	*
Paper Manufacturing	0	0	0	0	0	0	0	5
Wisconsin								
Wood Product Manufacturing	0	0	0	0	0	3	0	*
Paper Manufacturing	6	0	0	0	0	0	0	18

Appendix Table 13. Foreign-owned Subsidiaries of Companies Operating in the U.S. Wood-based Manufacturing Industry, by Country, Company and Subsidiary. 2006-2007.

AUSTRALIA

• Amcor, Ltd. ($11,099): Amcor Packaging USA, Inc. [Amcor Sunclipse North America Amcor PET Packaging, Inc.](paperboard containers, paper bag and coated and treated paper).
• PaperlinX, Ltd. ($4,311): Spicers Paper, Inc. (paper product wholesaler); Paperlinx North America (paper product wholesaler); Paper Products Marketing, Inc. (paper product wholesaler); Kelly Paper Company. (paper product wholesaler).

BRAZIL

• Aracruz Celulose S.A. ($1,923): Aracruz Celulose USA, Inc. (pulp mills, newsprint mills, paperboard mills).
• Suzano Paper and Cellulose SA (Suzano Group) ($1,421): Suzano America, Inc. (64 percent ownership) (pulp mills, paper mills).
• Duratex S.A. ($1,490): Duratex North America, Inc. (reconstituted wood products).

CANADA

• Ainsworth Lumber Company., Ltd. ($1,135): Ainsworth USA, LLC (reconstituted wood products).
• Abitibi-Consolidated, Inc. ($4,457): Abitibi Consolidated, Inc. (paper mills, newsprint mills, recycling); Abitibi Consolidated Sales (paper products wholesaler).
• Dorel Industries, Inc. ($1,761): Ameriwood Industries, Inc. (nonupholstered wood furniture).
• CANFOR Corporation ($1,618): CANFOR USA Corporation (millwork).
• Cascades, Inc. ($3,460): Dopaco, Inc. [Carthage Cup LP](50 percent ownership) (paper bag and coated and treated paper); Norampac (Cascades-Domtar joint venture) (paperboard mills); Cascades Tissue Group (sanitary paper products).
• Catalyst Paper Corporation ($167): Catalyst Paper USA, Inc. (paper product wholesaler).
• Domtar Corporation ($3,607): Norampac (Cascades-Domtar joint venture) (paperboard mills); Domtar Distribution Group (paper product wholesaler); Domtar Industries (forest nurseries); Domtar Industries - Ashdown Mill (pulp mills, paper mills); Domtar Industries - Woodland Mill; (paper mills, paper product wholesaler).
• Fraser Papers, Inc. ($918): Katahdin Paper Company. (paper mills), Masardis Sawmill (sawmills).
• Goodfellow, Inc. ($469): Goodfellow Distribution, Inc. (wood product wholesaler).
• International Forest Products, Ltd. (INTERFOR) ($767): Interfor Pacific, Inc. [Cedarprime, Inc., Helifor Industries, Ltd., CEDARPRIME, Inc., Helifor Industries, Ltd.] (sawmills, millwork).
• Masonite International Corporation (Kohlberg Kravis Roberts and Company.) ($2,200): Woodlands Millwork Il Ltd. (millwork); Masonite International (millwork).
• Norbord, Inc. ($1,252): Norboard Industries, Inc. (wood panel products).
• PRT Forest Regeneration Income Fund ($29): PRT Forest Regeneration Income Fund (Forest Nurseries).
• Shermag, Inc. ($173): Shermag Woodtek (sawmills, millwork).
• Stella-Jones, Inc. ($142): Stella-Jones Corporation USA [Webster Wood Preserving Company] (wood preservation).
• Tarkett, Inc. ($425): Tarkett, Inc. [Tarkett Wood Floors] (millwork, flooring).
• Tembec, Inc. ($2,626): Tembec USA LLC (pulp mills).
• Viceroy Homes, Ltd. ($95): Viceroy Homes, Inc. (prefabricated wood buildings).
• West Fraser Timber Company., Ltd. ($3,241): West Fraser South, Inc. (sawmills).

CHILE

• Celulosa Arauco y Constitucion S.A.(Antarchile SA) ($2,376): Aracuco Wood Products, Inc. (millwork).
• Empresas CMPC S.A. ($2,106): CMPC USA, Inc. (97 percent ownership) (paper products wholesaler).

DENMARK

• Bodilsen Holdings AS ($194): Bodilsen USA, Inc. (manufacturer-retailer nonupholstered wood furniture).
• Dalhoff Larsen and Horneman AS ($913): DLH Nordisk, Inc. [PW Hardwood, LLC] (hardwood veneer and plywood).
• Junkers (F.) Industrier AS ($181): Junkers Hardwood, Inc. (millwork, flooring wholesaler).

Note: Unless otherwise indicated, firms reporting to parent identified are 100 percent foreign owned. Only subsidiaries and affiliates (or higher organizations) are identified (not individual divisions, plants or general distribution centers). Sales-revenue (million dollars) of parent firm is presented in parentheses.

Source: U. S. Securities and Exchange Commission 2007, Uniworld Business Publications, Inc. 2006, corporate annual reports, and various industry directories.

Appendix Table 13 (continued).

ENGLAND, UK

• DS Smith Plc. ($2,640): DSS Rapak, Inc. (paper bag and coated and treated paper); David S. Smith America, Inc. (paper bag and coated and treated paper).
• Fountains Plc. ($69): Fountain Forestry Inc. (timber tracts, forestry services).
• James Cropper Plc. ($118): Technical Fibre Products, Ltd. [Technical Fibre Products, Ltd.] (paper product wholesaler).

FINLAND

• Huhtamaki Oy ($3,034): Huhtamaki Americas [Huhtamaki Company Manufacturing, Huhtamaki Consumer Packaging, Huhtamaki Holding Company.] (paper bag and coated and treated paper, pulp mills).
• M-Real Corporation (Metsaliitto Group) ($6,237): M-Real Finland [Price and Pierce International, Inc.] (paperboard containers).
• Myllykoski Corporation ($1,756): Myllykoski North America [Madison Paper Industries [[Myllykoski North America – New York Times joint venture]] (paper mills).
• Stora Enso Oyj ($18,450): Enso International, Inc. (paper product wholesaler); Stora Enso North America Corporation [Corenso North America Corporation, Stora Enso Duluth Recycled Paper](paper mills, paperboard mills, paper bag and coated and treated paper).
• UPM-Kymmene Corporation ($13,266): UPM Kymmene, Inc. (paper product wholesaler); Blandin Paper Company (paper mills, reconstituted wood products); Raflatac, Inc. (paper bag and coated and treated paper).

FRANCE

• ArjoWiggens SAS (Sequana Capital, SAS; Giovanni Agnelli e C.S. a.p.z.a. [Italy]) ($2,093): Canson, Inc. (paper product wholesaler).
• Exacompta Clairefontaine, S. A. ($725): Exaclair USA, Inc. (paper product wholesaler).
• Groupe Gascogne ($843): Gascogne Kraft Paper, Inc. (paper mills).
• Oeneo ($25): Midwest Stave Supply (cooperage); Oeneocork Finishing (cooperage, cork); Sabate SAS (cooperage); Seguim Moreau Napa Cooperage (cooperage); Oeneo Cloures USA (packaging).
• Sequana Capital SA (Giovannie Agnelli e C.S.a.p.az – Italy) ($5,105): Canson, Inc. [ArjiWiggens SAS] (converted paper products).
• Tonnellerie Francois Freres ($99): Demptos NAPA (95 percent owned) (cooperage); Francois, Inc. (cooperage); Francois Freres d'Oregon (cooperage).

GERMANY

• Felix Schoeller Holding Gmbh and Company. K.G: Felix Schoeller North America, Inc. (paper bag and coated and treated paper).
• Tarkett Sommer A.G. ($1,734): Tarkett, Inc. [Tarkett Wood Floors, Stuart Flooring Corporation] (millwork, wood flooring).
• Werzalit A.G. and Company. ($71): Werzalit of America, Inc. (sawmills, millwork, reconstituted wood products, nonupholstered wood furniture).
• Pfleiderer A.G. ($1,789): Pergo, Inc. (Pergo, AB Sweden) (wood flooring).
• Pfleiderer A.G. (Kunx Holding Company.) ($1,789): Uniboard Canada, Inc. [Uniboard Fostoria, Inc.] (reconstituted wood products).

HONG KONG

• Lee and Man Paper Manufacturing, Ltd. ($486): Evergreen Pulp Company. (pulp mills).

IRELAND

• Smurfit Kappa Group [Madison Dearborn Partners LLC] ($6,970): Smurfit-Stone Container (paperboard mills, newsprint mills, paperboard containers, paper bag and coated and treated paper).

ITALY

• Cartiere Burgo S.p.A. ($2,361): Burgo North America, Inc. (paper product wholesaler).

JAPAN

• Daishowa Paper Manufacturing Company. Ltd. ($2,648): Nippon Paper Industries Company. Limited (paper mills).
• Japan Pulp and Paper Company.., Ltd. ($3,988): Japan Pulp and Paper USA Corporation (newsprint mills), Safeshred Company.., Inc. (newsprint mills).
• Mitsubishi Paper Mills Ltd. ($2,234): Mitsubishi Imaging, Inc. (60 percent ownership) (imaging, speciality papers).

Appendix Table 13 (continued).

JAPAN (continued)

• Nippon Paper Industries Company. (Nippon Paper Group) ($5,843): North Pacific Paper Corporation (NORPAC) (50 percent ownership) (Nippon-Weyerhaeuser joint venture)(paper mills).
• Oji Paper Company., Ltd. ($11,174): Kanzaki Speciality Papers, Inc. (paper bag and coated and treated paper).
• Sumitomo Forestry Company., Ltd. ($6,724): Plum Creek Manufacturing (Sumitomo Forestry-Plumb Creek Timber joint venture) (timber tract operations); Pacific Wood Products (wood product wholesaler).
• Sumitomo Corporation of America [Sumitomo Corporation]: Summit Pulp and Paper (recyclable material wholesaler).
• Tomoku Company., Ltd. ($1,187): Southland Box Company (paperboard containers).
• Tomoegawa Company., Ltd. ($404): Tomoegawa USA, Inc. (speciality papers).

MEXICO

• Corporativo Copamex, S.A. de C.V. ($420): Copamex North America (paper product wholesalers).
• Corporacion Durango, S.A. de C.V. ($753): Durango-McKinley Paper Company. (paper mills, paperboard containers); Fiber Management of Texas (pulp mills).

MALAYSIA

• Berjaya Corporation Berhad ($743): Taiga Forest Products, Ltd. (lumber and millwork wholesaler).
• Golden Pahros Berhad ($39): Golden Pharos USA, Inc. (millwork wholesaler).

NETHERLANDS

• IFCO Systems N.V. ($495): IFCO Systems North America (wood pallets, lumber-plywood wholesaler); Reusable Container Company, LLC (wood pallets); Pallstone Company. (wood pallets); Pallet Company., Inc. (wood pallets); A-OK Pallet Recyclers (wood pallets); IFCO Systems (four subsidiaries same name); IFCO Systems Wood and Crating Division (wood pallets); IFCO Systems North America (wood pallets); Isaacson Lumber Company. (sawmills, wood pallets); Paltex Texas LO (wood pallets).

NEW ZEALAND

• Tenon, Ltd. [Rubicon, Ltd.] ($305): Tenon USA (forestry services); American Wood Mouldings LLC (50 percent ownership) (millwork); Koks Woodgoods, Inc. (67 percent ownership) (millwork).

NORWAY

• Norske Skogindustrier ASA ($4,180): Norske Skog USA, Inc. (paper product wholesaler).

PORTUGAL

• Corticeira Amorim S.G.P.S, S.A. ($587): Amorim Cork, Inc. (cooperage, cork); Portocorck America. Inc. (cooperage, cork).
• Portucel-Empresa Produtora de Pasta e Papel SA ($1,315): Sorporcel North America (paperboard mills, paper mills).

SINGAPORE

• Asia Pulp and Paper Company. Ltd. ($3,135): Asia Pulp and Paper Trading, Inc. (paper product wholesalers).
• Chuan Soon Haut Industrial Group, Ltd. (CSH) ($47): Intrapacific Sales Company., Inc. (millwork wholesaler).

SOUTH AFRICA

Sappi, Ltd. (S.D. Warren Company.) ($4,941): Sappi Fine Paper North America [Sappi Fine Paper Cloquet, U.S. Paper Corporation] (pulp mills, paper mills, paperboard containers).

SOUTH KOREA

•Dae Han Pulp Company., Ltd. ($452): Dae Han Pulp USA, Inc. (paper product wholesaler).

SWEDEN

• CellMark Holdings AB ($1,200): Cellmark, Inc. (paper product wholesaler); Amerisouth Holdings; Interamerica Forest Holdings; Central Kentucky Forest Holdings LLC; Pittsburg Recycling Services (recycling); Sunset Trading (paper product wholesaler); Triboro Fibers, Inc. (recycling); Northwest Fibers, Inc. (paper product wholesaler).
• Eolf Hansson, AB ($899): Elof Hansson, Inc. [Celfiber, Inc.; Elof Hansson Canada, Ltd.; Elof Hansson Export, Inc.; Elof Hansson Paper and Board, Inc.; Elof Hansson Pulp, Inc.; Torgun Corporation] (wholesaler, exporter-importer).
• Munksjo Holdings AB ($605) (EQT Partners AB): Munksjo Paper, Inc. (paper bag and coated and treated paper).
• Svenska Cellulosa Aktiebolget (SCA) ($13,603): SCA Americas (SCA Americas, SCA Packaging North America, SCA Tissue North America) (paper mills, sanitary paper products, paperboard containers).

SWITZERLAND

• Industrie Holding Cham AG ($352): Cham Paper Group USA, Inc. (paper product wholesaler).

TAIWAN (Republic of China)

• Cheng Loong Company., Ltd. ($768): Tzeng Long USA, Inc. (paper product wholesaler).

VENEZUELA

• Manufacturas de Papel CA ($179): SIMCO Recycling Corporation (recycled paper).

Appendix Table 14. Labor Productivity of the U.S. Wood-based Manufacturing Industry, by Industry. 1987-2006.

Year	Sawmills and Wood Preservation	Veneer and Plywood	Engineered Wood Products	Reconstituted Wood Products	Millwork	Wood Containers and Pallets	Manufac-tured Homes (mobile)
1987	77.6	115.2	84.3	86.9	112.0	89.7	91.0
1988	78.5	115.5	86.6	87.9	111.0	91.8	91.4
1989	77.4	116.8	87.6	87.1	110.6	99.6	90.0
1990	79.4	119.0	90.7	80.8	111.0	104.4	94.7
1991	81.3	121.3	93.1	86.6	108.8	105.4	95.5
1992	85.8	121.5	106.2	101.4	108.9	101.6	94.7
1993	82.3	116.6	95.5	101.3	107.3	94.2	95.8
1994	84.6	109.1	101.8	99.6	103.7	94.0	90.0
1995	90.4	105.4	102.4	92.6	103.2	100.2	91.8
1996	95.9	103.9	104.3	92.6	103.8	100.7	92.8
1997	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1998	100.3	104.0	105.5	110.0	100.9	100.6	97.7
1999	104.7	95.1	99.1	107.3	106.1	99.4	99.1
2000	105.4	99.8	96.8	103.0	108.0	100.4	94.0
2001	108.8	108.0	104.4	104.2	111.1	98.6	100.0
2002	114.4	110.3	110.2	112.5	118.0	118.6	98.6
2003	121.3	116.1	107.3	100.8	120.6	113.3	98.6
2004	118.2	115.2	101.2	99.7	126.7	124.4	94.8
2005	127.3	129.3	101.0	115.1	133.9	136.0	91.7
2006	129.7	134.5	106.4	130.1	141.6	140.9	77.9

Note: Labor productivity is ratio of manufacturing output and hour of labor required to generate that output. 1997=100. Information not available for the following industries: prefabricated wood buildings, and other miscellaneous wood products, sanitary paper products, other converted paper products, wood office furniture, custom architectural wood and millwork, and wood television, radio, and sewing machine cabinets.
Source: US Department of Labor. 2008b.

Appendix Table 14. (Continued).

Year	Pulp, Paper and Paper-board Mills	Paper-board Mills	Paperboard Containers	Paper Bag and Coated and Treated Paper	Stationary Products	Wood Kitchen Cabinets and Countertops	Non-upholstered Wood Household Furniture	Showcases, Partitions, Shelving and Lockers
1987	81.7	80.1	92.3	89.0	77.9	93.9	90.1	81.0
1988	85.2	85.2	91.4	93.0	78.1	91.7	90.7	78.5
1989	84.9	81.4	93.2	86.4	75.7	87.3	91.3	74.9
1990	84.0	80.4	92.8	84.0	79.2	90.2	93.2	78.3
1991	83.7	80.7	95.6	87.6	85.9	86.6	91.7	77.6
1992	87.8	84.4	97.7	88.2	88.9	96.0	96.7	84.8
1993	89.4	88.1	99.4	90.5	89.2	97.4	96.8	88.5
1994	94.1	91.3	99.4	93.2	88.2	96.9	96.2	82.2
1995	98.4	93.0	96.0	93.0	86.5	97.7	98.1	85.4
1996	95.4	92.8	100.0	96.0	87.0	96.2	100.6	83.2
1997	100.0	100.0	102.3	100.0	100.0	100.0	100.0	100.0
1998	102.5	100.3	103.7	98.8	100.2	99.8	103.7	103.0
1999	111.1	106.5	100.7	98.5	100.2	97.8	106.8	101.2
2000	116.3	108.4	102.1	98.2	106.9	99.6	104.3	104.8
2001	119.9	112.5	102.1	97.5	110.8	100.8	107.1	104.3
2002	133.1	121.2	101.4	102.3	117.8	115.5	109.2	122.0
2003	141.4	111.6	104.4	109.2	124.6	115.8	113.9	128.7
2004	148.0	114.4	110.2	109.3	119.5	119.6	114.3	136.2
2005	147.7	112.8	109.3	114.3	119.4	126.3	119.4	141.7
2006	151.1	116.5	111.6	111.9	130.0	128.3	123.8	148.7

Appendix Table 15. Production Worker Wage Rates in the U.S. Wood-based Manufacturing Industry, by Industry. 1997-2007.

Industry	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997
	Hourly Wage Rates of Production Workers (dollars)										
Wood Products	14.43	14.41	13.85	13.40	13.16	13.18	12.29	12.21	11.82	11.39	11.14
•Sawmills and Wood Preservation	15.31	15.38	15.09	14.37	14.26	14.28	12.20	12.34	12.09	11.84	11.78
•Veneer, Plywood and Engineered Wood Products	15.43	15.03	14.44	14.19	13.52	13.74	12.84	12.57	12.38	12.00	11.70
•Millwork	14.98	14.86	13.51	13.34	12.97	13.02	12.91	12.68	11.90	11.44	11.03
•Wood Container and Pallets	11.19	11.35	10.64	10.28	10.53	10.41	9.68	9.74	9.31	8.73	8.73
Paper Products	20.46	20.69	19.71	19.26	18.99	18.74	17.68	17.25	16.96	16.56	16.23
•Pulp, Paper and Newsprint Mills	27.39	27.41	26.07	25.92	25.64	25.21	24.21	20.66	22.93	24.03	21.72
•Paperboard Mills	28.18	27.74	25.47	25.20	23.99	24.67	22.28	22.37	22.25	21.41	20.56
•Paperboard Containers	17.55	14.70	16.42	15.87	15.61	15.40	14.48	14.37	14.00	13.84	13.40
•Paper Bag and Coated Paper	18.73	18.30	17.16	17.06	16.92	16.42	15.72	15.04	14.82	14.49	13.85
Wood Furniture	14.60	13.62	12.88	12.80	12.12	12.08	11.46	11.20	10.72	10.22	10.11
•Wood Kitchen Cabinets	14.68	14.10	13.67	13.45	12.59	12.89	12.11	12.04	11.27	10.76	10.86
•Nonupholstered Wood Furniture	14.54	13.14	12.10	12.14	11.64	11.27	10.62	10.37	10.17	9.68	9.66
All U.S. Manufacturing	18.63	18.33	17.70	17.26	16.65	16.47	15.29	15.17	14.70	14.20	13.99
	Index of Hourly Wage Rates of Production Workers (1997=100)										
Wood Products	129.5	129.4	124.3	120.3	118.1	118.3	110.3	109.6	106.1	102.2	100.0
•Sawmills and Wood Preservation	130.0	130.6	128.1	122.0	121.1	121.2	103.6	104.8	102.6	100.5	100.0
•Veneer, Plywood and Engineered Wood Products	131.9	128.5	123.4	121.3	115.6	117.4	109.7	107.4	105.8	102.6	100.0
•Millwork	135.8	134.7	122.5	120.9	117.6	118.0	117.0	115.0	107.9	103.7	100.0
•Wood Container and Pallets	128.2	130.0	121.9	117.8	120.6	119.2	110.9	111.6	106.6	100.0	100.0
Paper Products	126.1	127.5	121.4	118.7	117.0	115.5	108.9	106.3	104.5	102.0	100.0
•Pulp and Paper Mills	126.1	126.2	120.0	119.3	118.0	116.1	111.5	95.1	105.6	110.6	100.0
•Paperboard Mills	137.1	134.9	123.9	122.6	116.7	120.0	108.4	108.8	108.2	104.1	100.0
•Paperboard Containers	131.0	109.7	122.5	118.4	116.5	114.9	108.1	107.2	104.5	103.3	100.0
•Paper Bag and Coated Paper Products	135.2	132.1	123.9	123.2	122.2	118.6	113.5	108.6	107.0	104.6	100.0
Wood Furniture	144.4	134.7	127.4	126.6	119.8	119.5	112.4	110.9	106.0	101.1	100.0
•Wood Kitchen Cabinets	135.2	129.8	125.9	123.8	115.9	118.7	111.5	110.9	103.8	99.1	100.0
•Nonupholstered Wood Furniture	150.5	136.0	125.3	125.7	120.5	116.7	109.9	107.3	105.3	100.2	100.0
All U.S. Manufacturing	133.2	131.0	126.5	123.4	119.0	117.7	109.3	108.4	105.1	101.5	100.0

Source: U.S. Census Bureau. 2009b.

Appendix Table 16. Research and Development Programs of Companies Operating in the U. S. Wood-based Manufacturing Industry, by Company and Program Characteristics. 2008.

Advanced Environmental Recycling Technologies, Inc. *Program Intent*: ". . . research expenditures focus on product development and improvement." *Annual Investments*: 2007 – $266,000, 2006 – $286,000, 2005 – $110,000, 2004 – $97,000, 2003 – 78,000.

Avery Dennison Corporation. *Program Intent*: ". . . research, design and testing of new products and applications . . . [company] has access to unparalleled research and development resources." Among research areas are basic research into polymer physics and rheology; development of laboratory equipment and instrumentation for basic research in polymer synthesis; advanced analytical instrumentation and custom-designed equipment; development of materials performance testing methods; pilot plant testing of new solvents and hot melt adhesive film coatings. *Research Facilities*: California, China, Georgia, India, Ohio (roll material group). *Annual Investments*: 2007 – $95.5 million, 2006 – $87.9 million, 2005 – $85.4 million, 2004 – $81.8 million, 2003 – $74.3 million.

Bemis Company. *Program Intent*: "Company uses state-of-the-art research laboratories to produce innovative solutions and patented materials . . . work with a variety of polymer resins, adhesives, inks and solvents to create unique materials . . . experiment with different process technologies to reveal superior performance characteristics . . . our technological expertise differentiates us from our competitors and illustrates the substantial value that [out company] brings to customer relationships and the industry." *Annual Investments*: 2007 – $26.0 million, 2006 – $25.0 million , 2005 – $24 million , 2004 – $21 million, 2003 – $24 million. Investment by research area: 2007 – flexible packaging $20 million, pressure sensitive materials $6 million; 2006 – flexible packaging $20 million, pressure sensitive materials $5 million; 2005 – flexible packaging $19 million, pressure sensitive materials $5 million; and 2004 – flexible packaging $17 million, pressure sensitive materials $4 million.

Buckeye Technologies, Inc. *Program Intent:* ". . . focus on developing new products, improving existing products, and enhancing process technologies to further reduce costs and respond to environmental needs . . .focus on advanced products and new applications to drive future growth . . . pilot facilities allow us to produce , test and deliver break-through products to the market place on a cost-effective basis." *Research Facilities*: Tennessee. *Annual Expenditures*: 2007 – $8.2 million, 2006 – $8.3 million, 2005 – $9.2 million, 2004 – $9.4 million, 2003 – $9.3 million.

Flexsteel Industries, Inc. *Annual Expenditures*: 2007 – $3.3 million, 2006 – $3.3 million, 2005 – $3.0 million, 2004 – $2.9 million, 2003 – $2.7 million.

Furniture Brands International, Inc. *Program Intent*: ". . . product development, product engineering and process improvements." *Annual Expenditures*: 2007 – $80.7 million, 2006 – $72.7 million, 2005 – $65.9 million.

Georgia-Pacific (Koch Industries). *Program Intent*: "Perform research into tissue papermaking, tableware manufacturing and tissue and towel dispensing technology in order to improve consumer products in North America and Europe. . ."*Research Facilities*: Research centers in Wisconsin and France. *Annual Investments*: 2004 – $61 million, 2003 – $64 million, 2002 – $65 million.

P. H. Glatfelter Company. *Program Intent:* ". . . significant expenditures for . . . research and development to support our business strategies . . . invest in research and development activities efficiently."

Note: U.S. Securities and Exchange Commission 10-K filings (2007, 2006, 2005) searched for information about company research and development programs. Although such does not necessarily indicate research and development doe not exist within a company, the search was unable to clearly identify such programs for the following companies: Louisiana-Pacific, Champion Enterprise, Temple-Inland, Clayton-Homes, Plum Creek Timber, Potlatch, Skyline Corporation, Cavalier Homes, Cavco Industries, Liberty Homes, Inc., NewPage Holdings, Cenveo, Inc., Carustar Industries, AbbitiBowater, Inc., Furniture Brands International, American Woodmark, Ethan Allen Interiors, Hooker Furniture, Basset Furniture, Stanley Furniture and Chromcraft.
Source: Company annual reports and filings with U. S. Securities and Exchange Commission.

Graphic Packaging International Corporation. Program Intent: "Extending shelf life of customer products, reducing production costs, and refining packaging appearance . . . [company] designs, tests and manufactures prototype packaging for consumer product packaging applications . . . designs and tests packaging machinery and engages in product development employing full-size pilot lines . . . company has broad technical expertise in chemistry, paper science, engineering, physics and food science. *Research Facilities*: Colorado, Georgia, Wisconsin, New Hampshire , Louisiana, and Ontario, Canada. *Annual Investments*: 2007 – $9.2 million, 2006 – $11.4 million, 2005 – $9.9 million, 2004 – $9.6 million, 2003 – $7.4 million, 2002 – $5.2 million.

Herman Miller, Inc. *Program Intent*: ". . . design products, systems, and services." *Annual Expenditures:* 2007 – $38.8 million, 2006 – $42.1 million, 2005 – $36.7 million.

IFCO Systems North America, Inc. *Program Intent*: "Engaged in ongoing product improvement efforts (through parent company research programs, as such) do not have separate research and development expenditures. Research focused on improving supply chain planning and asset utilization, automatic warehousing systems, and logistics providers." *Annual Investments*: As of December 2007, capitalized $4.8 million in hardware and associated research and development.

International Forest Products Ltd. (INTERFOR). *Program Intent*: "Committed to applied research and development in the areas of environment, health and safety, forest management and product and market development . . . conduct product research on our own in Canada and the U.S."

International Paper Company. *Program Intent*: "Direct research and development activities to short and long-term technical assistance needs of customers and operating divisions, and to process, equipment and product innovations. Activities include studies on innovation and improvement of pulping, bleaching, chemical recovery, papermaking and coating processes; packaging design and materials development; reduction of environmental discharges; re-use of raw materials in manufacturing processes; recycling of consumer and packaging paper products; energy conservation; applications of computer controls to manufacturing operations; innovations and improvement of products; and development of various new products. Developments efforts specifically address product safety as well as the minimization of solid wastes." *Research Facilities*: Ohio and Georgia, plus several product laboratories at various locations. Company has a one-third interest in ArborGen, LLC, a joint research and development venture with other forest products and biotechnology companies. *Annual Investments*: 2007 – $24 million, 2006 – $45 million, 2005 – $63 million, 2004 – $67 million, 2003 – $71 million.

Kimball International, Inc. *Program Intent*: ". . . development of manufacturing processes, major process improvements, new product development and design, information technology, and wood related technologies." *Research Facilities*: Indiana. Annual Expenditures: 2007 – $16 million, 2006 – $17 million, 2005 – $15 million, 2004 – $16.7 million, 2003 – $17.6 million.

Kimberley-Clark Corporation. *Program Intent*: "directed toward new and improved personal care, tissue, wiping and health care products and nonwoven materials. Place a heavy emphasis on research and engineering disciplines . . . , in fact, [company] invests $800 million each year into the development of new technology and new processes, and are considered the foremost global leaders in each of our core technologies." *Annual Investments*: 2007 – $276.8 million, 2006 – $301.2 million, 2005 – $319.5 million, 2004 – $279.7 million.

Koppers, Inc. *Program Intent*: "Committed to R&D, which has yielded a number of promising products based on existing technology and work we have developed . . ." *Human Resources*: Twelve full-time employees in R&D. *Annual Investments*: 2007 – $2.8 million, 2006 – $2.5 million, 2005 – $2.8 million, 2004 – $2.2 million.

MeadWestvaco. *Program Intent*: Among company research initiatives is the South Carolina Center for Packaging Innovation which engages in research on emerging packaging technologies, material sciences, marketing, best business practices, and other packaging innovation resources for the company. R&D approach is to work extensively and cooperatively with customers to understand packaging needs and to develop customized solutions that are valuable in the marketplace. Company is also involved in collaborative activities with India's Council of Scientific and Industrial Research (CSIR), especially research which focuses on sustainable packaging solutions, process innovations related to biomass conversion and packaging innovations utilizing advanced materials. *Research Facilities*: South Carolina, North Carolina, Brazil, India, People's Republic of China. *Annual Investments*: 2007 – $62 million, 2006 – $65 million, 2005 – $50 million, 2004 – $74 million, 2003 – $80 million.

Nashua Corporation. *Program Intent*: "Direct research toward developing new products and processes and improving product performance, often in collaboration with customers. . . focus primarily on new thermal coating applications. *Annual Expenditures*: 2007 – $ 0.8 million, 2006 – $0.6 million, 2005 – $0.6 million 2003 – $2.1 million, 2003 – $2.5 million.

Neenah Paper, Inc. *Program Intent*: ". . . our research and development program gives us an advantage in customizing base papers to meet customer needs . . ." *Research Facilities*: Georgia, Michigan, Germany. *Annual Expenditures*: 2007 – $6.4 million, 2006 – $3.5 million, 2005 – $2.2 million, 2004 – $1.5 million, 2003 – $2.1 million.

NewPage Corporation. *Program Intent*: "We hold foreign and domestic patents as a result of our research and product development efforts."

Packaging Corporation of America. *Annual Investments*: 2007 – $7.6 million, 2006 – $6.9 million, 2005 – $6.8 million, 2004 – $6.1 million, 2003 – $6.1 million.

Palm Harbor Homes, Inc. *Program Intent*: "Factory built homes are designed after extensive field research and consumer feedback . . . research has developed engineering systems which permit customization of homes and assist product development and enhancement."

Rayonier, Inc. *Program Intent*: "R&D efforts in performance fiber business directed primarily at developing existing core products and technologies, improving the quality of cellulose fiber grades, absorbent materials; and improving manufacturing efficiency and environmental controls and reducing fossil fuel consumption. R&D in timber operations include genetic tree improvement and applied silvicultural programs to identify management practices that will improve financial returns from timber assets." *Research Facilities*: Georgia. *Annual Investments*: 2007 – $5 million, 2006 – $6 million, 2005 – $6 million, 2004 – $7 million, 2003 – $9 million.

Rock -Tenn Company. *Annual Investments* (estimated): 2007 – $0.7 million, 2006 – $0.8 million.

Schweitzer-Mauduit International, Inc. **Program Intent**: "Dedicated to developing paper product innovations and improvements to meet the needs of customers . . . believe that research and product development capabilities have played an important role in establishing reputation for high quality, superior products." *Research Facilities*: France, Brazil, Georgia. *Human Resources*: Employ about 50 research personnel. *Annual Expenditures*: 2007 – $8.0 million, 2006 – $7.3 million, 2005 – $9.0 Million, 2004 – $9.3 million, 2003 – $8.3 million.

Smurfit-Stone Container Corporation. *Program Intent*: "Technical staff conducts basic, applied and diagnostic research, develops processes and products, and provides a wide range of technical services to company operations. Research program has provided improvements in coatings and barriers, stiffeners, inks and printings. Advanced technology is used to assist all levels of manufacturing and sales processes, from raw material supply through finished packaging performance." *Research Facilities*: Illinois. *Annual Investments*: 2007 – $3 million, 2006 – $4 million, 2005 – $9 million, 2004 – $8 million, 2003 – $5 million.

Sonoco Products Company. *Program Intent*: "Significant research projects include efforts to design and develop new products for the construction industry and for the film and tape industries . . . enhance performance characteristics of tubes and cores in the textile, film and paper packaging areas . . . and research focused on cost reduction projects, high-value flexible packaging enhancements, rigid plastic container technology and next generation composite packaging." *Annual Investments*: 2007 – $15.6 million, 2006 – $12.7 million, 2005 – $14.7 million, 2004 – $14.4 million, 2003 – $14.2 million.

Universal Forest Products. *Annual Investments* (estimated): 2007 – $3.2 million, 2006 – $4.1 million.

Verso Paper Company. *Program Intent*: ". . . work with customers in developing and modifying products to accommodate their evolving needs and to identify cost saving opportunities within company operations . . . examples of research are high-bulk offset and rotogravure coated groundwood, lightweight grade Number Four coated groundwood, ultra-lightweight grade Number Five coated groundwood, and rotogravure coated freesheet."

Wausau Paper Corporation. *Program Intent*: ". . . research and development experience creates a foundation for successful new products . . . typical products are carrier liners, transfer liners and casting sheets used in advanced composites, labels, tapes, graphic arts and medical markets . . . development of a variety of new release liners, food-packaging/food service papers, and development of color and writing grade papers." *Annual Expenditures*: 2007 – $2.6 million, 2006 – $2.1 million, 2005 – $1.9 million, 2004 – $1.9 million, 2003 – $2.2 million.

Weyerhaeuser Company. *Program Intent*: "Research is a strategic business investment to help the company and its customers achieve sustainable competitive advantage by creating and preserving options in the face of uncertainty about the future competitive environment. The mission of our research and development is to deliver technology options and solutions that support corporate and business strategies and goals by providing new and improved processes and products; valid, relevant, and timely technical information; technical services to business and operations units; and by acquiring and communicating competitive technology intelligence. Research and development in [containerboard, packaging and recycling] is focused on recyclable products that would replace waxed corrugated package products, and radio-frequency identification for corrugated packages. *Annual Expenditures*: 2007 – $71 million, 2006 – $69 million, 2005 – $61 million, 2004 – $55 million, 2003 – $51 million, 2002 – $52 million.

LIST OF TABLES AND FIGURES

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Appendix Tables

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Figures