

C I N T R A F O R

Working Paper

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**Wood Products in Washington State:
The Secondary Manufacturing Industries**

1991

John M. Dirks

David G. Briggs



CENTER FOR INTERNATIONAL TRADE IN FOREST PRODUCTS
UNIVERSITY OF WASHINGTON
COLLEGE OF FOREST RESOURCES AR-10
SEATTLE, WASHINGTON 98195

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EXECUTIVE SUMMARY

This report provides a descriptive account of the secondary wood products manufacturing industries in Washington State. Secondary industries are defined as those adding value to standardized commodity wood or wood-based materials through the production of specialty finished or semi-finished products. This study focuses upon six major product groupings--engineered building components, millwork, remanufactured lumber products, pallets, cabinets, and furniture--based upon the number and types of firms responding to the questionnaire. Primary data for this study were collected using a mail questionnaire, administered during the summer of 1989. Questionnaires were returned by 33% of the firms receiving them. Additional employment and business income information used in this report was obtained through published state agency data.

THE SECONDARY INDUSTRIES

The industries assessed in this study contribute significantly to Washington State's economy, employing 13,200 people in the state and providing \$1.2 billion in gross business income to the over 630 firms operating in this sector in 1988. Approximately one in five jobs in wood products and associated industries in Washington, including the paper and paper sector, are found in the secondary solid wood products industries, while about 1 in 8 gross business dollars are generated by this sector. Excluding the pulp and paper and logging industries, 39% of the employment and 28% of the income in wood products processing was generated by the secondary manufacturing industries in 1988. This collection of industries produced nearly the same amount of business income as the logging sector during that year, but directly employed nearly 25% more people.

The firms in these industries are diverse, from small shops of highly skilled woodworkers crafting custom furniture or cabinetry, to larger facilities remanufacturing lumber into cutstock, resembling sawmills both in productive capacity and in size. Almost all of the secondary manufacturing firms produce specialty rather than standardized commodity products. Small business activity is critical in this sector. None of the firms returning questionnaires employed more than 500 people, and 86% of the business establishments in this sector have fewer than 50 employees. The secondary manufacturing industries are fragmented in terms of products manufactured and company size. Washington firms tend to be geographically concentrated, however, in or around the state's urban areas. Ninety percent of the 150 largest secondary manufacturing companies are located in Washington's manufacturing and finance counties.

RAW MATERIALS

An evaluation was made of each manufacturing group's use of wood raw materials produced from Pacific Northwest tree species versus materials imported from other areas. Groups seemingly most dependent upon Pacific Northwest raw materials include, in decreasing order: pallet and container manufacturers, structural component manufacturers, remanufacturers, and millwork producers. Regional raw material supply problems were evident in the survey responses; of the 58 manufacturers responding from these four categories, one half of them (29 of 58) cited raw material supply or cost as a serious problem.

The other two groups delineated in the study, cabinet and furniture manufacturers, were more dependent on exogenous wood sources, including composite materials such as particleboard as well as eastern hardwood veneers and hardwood component stock. Less than one fifth (13 of 67) of firms in these two groups regarded raw material supply or cost as a serious problem affecting their business. Regional wood supply problems may not be affecting these groups as much as they do other manufacturers. The price premiums paid for higher value added products such as furniture and cabinetry may also result in raw materials being a lower relative variable cost compared to labor costs incurred in manufacture, and thus partially explain why raw material supply or cost is generally considered a lesser problem in the cabinet and furniture industries. The furniture and cabinet producers reported the two lowest relative average monthly raw material costs of all manufacturing groups, while reporting the two highest relative labor costs.

TECHNOLOGY

Technology was perceived to be changing at a moderate rate by 70% of the survey respondents. Major constraints to new investment were the availability or cost of capital, the high risk of capital investment, and the availability or cost of skilled labor. Over 70 percent of the respondents listed at least one important piece of equipment they were planning to purchase over the next two years. A surprisingly large amount of used equipment is bought and sold by firms in the secondary manufacturing industries; used equipment comprised over 33% of the equipment purchased during the two years preceding the survey.

MARKETING

The customers targeted for sales by secondary wood products manufacturers vary across the delineated groups. Remanufacturers of specialty lumber products tend to sell their products directly to other industrial manufacturers and to wholesalers or distributors who do not stock their products. Millwork manufacturers sell primarily to stocking wholesalers or distributors, and to a lesser extent to building contractors. The cabinet industry, in contrast, relies upon direct sales to building contractors for most of its sales volume, and also upon direct sales to retail customers. Furniture manufacturers sell through wholesalers or distributors who do not stock their products, and also directly to retail customers. Pallet and container sales are primarily to retail customers and to other industrial manufacturers, while manufacturers of wood structural components sell directly to building contractors and to non-stocking wholesalers or distributors.

The secondary manufacturing industries in Washington can be described as relatively under-promoted; personal selling efforts by sales staff and distribution channel members may be perceived as more important to manufacturers than direct promotional efforts, evidenced by the frequent use of business cards and word-of-mouth promotional tools. Product brochures, trade shows, and the efforts of industry associations are lesser used means of promotion. Only about one-fifth of the respondents reported using media advertising, advertising in trade journals, or direct customer mailings.

INTERNATIONAL TRADE

Fifty percent of the firms surveyed (81 firms) considered their principal target markets to be within the Pacific Northwest; 41% (67 firms) consider domestic US markets outside of the Northwest region to be important to them. International trade does not appear to be a key activity for many of the responding companies. While 38% of the survey respondents reported using imported wood raw materials and 24% exported products in 1988, only 14 firms, or 8%, considered export markets principal markets. No company exported more than half of its sales volume. Japan was the country purchasing products from the greatest number of companies in the sample; export volume and value levels were not measured in this study. Forty-seven firms (28%) purchased Canadian wood for production of their products, while only 12 firms (7%) reported 1988 exports to Canada.

PROBLEMS AND CONCERNs

Problems and concerns facing the secondary wood products industries in Washington were evaluated through survey responses and open-ended questions. Problems rated as the most serious include government taxation, raw material supply or cost, the high cost or limited availability of capital, labor supply or cost, and government regulations or policies. These problems may all be characterized as business environment factors, existing outside of any one firm's control. Several company-internal factors such as quality control problems, financial difficulties, the high cost of new product development, and possessing an outdated production facility, and sales and marketing problems were also rated relatively important, but by fewer respondents. Other company-internal problems rated as relatively unimportant by the majority of respondent companies include a lack of computer skills, distribution problems, difficult labor relations, limited wood processing expertise, and being located too far from major markets.

BACKGROUND

Washington State is well known for its coniferous trees and forests, its tradition of logging and harvesting operations, and its solid wood and fiber-based mills. The state's early economic development centered around the extraction and processing of timber from its seemingly endless forests (Dolbeare et al., 1983). The forest products industry--along with aerospace and food processing--remains one of the top three manufacturing industries in the state today, employing about 60,000 people and spending some \$1.6 billion in wages in 1988 (WA St Employment Security Department, 1988).

Washington's forest resources were the backbone of the state's economy during the latter half of the nineteenth century, providing a source of timber to be exploited initially for Californian and then for Eastern U.S. markets, as railroads joined the continent in 1888 (Ficken, 1987). Early national preservation efforts and subsequent legislation passed during this period resulted in federal and state reserves of forested and wilderness areas in Washington state. Forestry management and sustained yield management, relatively new concepts with origins in Germany, were adopted in the United States during the late 1800's (Dana and Fairfax, 1980); most early forestry efforts in Washington state, however, were aimed exclusively at the control of forest fires (Ficken, 1987). Reforestation and long-term forest management on private lands became economically feasible with changes in federal and state tax laws during the 1920's and 1930's (Ficken, 1987; Anon, 1974), and in 1941 Weyerhaeuser Company established the nation's first tree farm near Montesano, Washington (Anon, 1974). The practices of reforestation and sustained yield management in Washington were to some extent a recognition by the timber industry, government, and other forest land owners that existing forests in the state were finite, and that the long-term raw material supply for a competitive forest products industry in the state would depend upon forest regeneration.

Important questions about forest resource use, availability, and management arose as Washington's economy grew. Recreation, wildlife, and wilderness values developed into multiple-use management mandates on federal and state forests during the post World War II period, as new policies were adopted manifesting the accumulation of scientific knowledge and environmental values (Dana and Fairfax, 1980). Forest products companies and private landowners, meanwhile, began to confront a host of constraints relating to the size and location of harvesting operations, pollution from woods-based operations and mill facilities, and the increasing safety and compensation requirements of the labor force (Ficken, 1987). Forest Service timber holdings in Western Washington became increasingly important as private holdings were depleted and regenerated stands remained too young to harvest (Ficken, 1987). Some companies invested in technologies enabling them to use smaller second-growth logs, reducing their reliance on the old-growth timber resource (Briggs, 1989). Other companies began harvesting and processing Northwest hardwood species, previously considered weed species, which often accompanied softwoods in naturally regenerated stands (Buhler and Briggs, 1988).

The Pacific Northwest's strategic position as a low-cost supplier of softwood lumber and plywood to domestic US markets eroded considerably between 1960 and 1980 with escalating production and hauling costs (Adams and Haynes, 1989). Substantial stumpage, labor, and transportation cost increases and competition from other supply regions of the US and Canada caused a loss in the market share held by Washington wood products producers during the 1970's (Campbell, 1983). However, even as a high-cost producer, overall demand for the state's wood products in domestic housing and construction markets remained strong throughout the 1970's (Campbell, 1983); sawtimber harvests from Douglas-fir region forests reached historical highs during the building boom period of the early 1970's (Adams and Haynes, 1989).

Increased demand for Pacific Northwest softwood products in Asia and Europe, coupled with a declining market share of domestic US softwood lumber and plywood markets throughout the 1970's and 1980's, directed Washington producers to explore and capitalize upon export trade opportunities. The industry in the Northwest shifted toward a strategy of supplying primarily West Coast construction markets and Pacific Rim export markets for logs and finished lumber (Dolbeare et al., 1983; Corlett, 1982). Douglas-fir (*Psuedotsuga menziesii*) and hemlock (*Tsuga heterophylla*) were the primary softwoods exported to Japan from Washington State, mostly in unprocessed log form (Anon, 1989). The Japanese typically paid a premium for the highest quality sawlogs and peeler logs (Warren, 1989; Adams and Haynes, 1989); other countries, such as China and

Korea, were primarily interested in obtaining relatively low-cost sawlogs, peeler logs, and pulpwood to meet growing domestic demand for these products and to replace or complement domestic timber supplies (Campbell, 1983; Schreuder et al., 1987). Demand for Washington State forest products, from old-growth logs to pulp to select and finish Douglas-fir boards, has remained fairly strong throughout most of the past two decades. Wood products producers in the state have firmly established trade links, exporting \$3 billion in products and raw material in 1988 (Bingham, 1989).

Today the state's forests and forest-based industries are the subject of scientific debate, legal conflict, and economic uncertainty. Forest issues are front-page news in virtually all local newspapers, as arguments rage over the preservation of wildlife species which inhabit old-growth forests. Loggers and communities dependent upon commercial timber values, often lacking apparent economic alternatives to timber harvest and/or processing, struggle to maintain traditional extractive use of the forests. Biologists and ecologists question the health of entire forest ecosystems. Federal and state forest management agencies have reduced the level of allowable timber harvests, severely impacting local economies. Independent mills, or those which are primarily dependent upon public fee timber rather than their own sources of supply, organize and rally for log export bans, arguing that logs kept within the state for processing will protect jobs and prompt overseas customers to accept more finished wood products from northwest forests into their markets. In the present arena of conflict, the forest no longer seems endless.

THE RESEARCH PROBLEM

Just as changes in the way forests are managed have arisen over the past few decades, so have alternatives been suggested and realized in the way forest resources are manufactured into products. Some critics of the present forest products industry in the state argue that by emphasizing the production and sale of primary wood products (logs, lumber, plywood, etc), much of the potential to add value to the wood raw materials through manufacture is exported to other regions of the US and abroad. Developing and promoting value-added wood products manufacturing in Washington and other states has been proposed by policy analysts, state agencies, the press, and others as a means of maintaining employment and productivity in rural areas traditionally dependent upon logging and primary wood products manufacture (Anderson, 1987; Grimes and Associates, 1987; Sommers and Leinbach, 1989). Many of these areas have suffered recently and in the past from mill closures and the elimination of jobs, especially in those counties where the resource base has been changed from old-growth coniferous forests to second-growth or plantation conifers and hardwoods.

Logs, lumber, plywood, chips and pulp are the primary commodities typically produced by Washington State's forest products companies. Primary wood products are those manufactured using logs or cants as raw materials, which are cut or broken down through various processes and manufactured into standardized products, usually differentiated by manufacturer and not by major differences in the products themselves. Wood materials which can be classified as primary products include most sizes and grades of softwood and hardwood lumber, plywood, shakes, shingles, composite products such as waferboard and oriented strandboard, and others. Also frequently included in this grouping are logs themselves, when considered end products to be sold and shipped outside of the state for further manufacture.

While primary wood products are often the most obvious wood materials produced from Washington's forests, among wood products producers are a group often referred to collectively as secondary manufacturers. Secondary manufacturers produce semi-finished or finished goods made wholly or partially of wood. Secondary wood products are generally differentiated items, manufactured using other semi-finished wood products, rather than logs, as raw materials (Woodbridge et al., 1984). Examples of secondary wood products are roof and floor trusses, millwork, cabinets, furniture, and wood pallets.

Data and information about primary forest products manufacturing, manufacturers, and material types is readily available from a variety of sources, including government agencies and trade associations (Warren, 1989; CINTRAFOR, 1989; WWPA, 1988). This is perhaps due to the relative ease with which data can be collected about this manufacturing group, given its size, the volume of material flows, and the nature of the products themselves. Primary wood products are most often produced in large processing facilities and shipped or transported in bulk. Standardized measures have evolved to determine the volumes, dimensions, and weights of primary forest products for payment and inventory purposes; this same information can be generalized and reported in aggregate.

In contrast, there is a scarcity of research and published information regarding the secondary wood products industry in the state of Washington. This is due in part to the non-commodity nature of the products, and perhaps due to the fact that the manufacturing operations involved in this industry are somewhat less conspicuous than large primary manufacturing establishments. Activities and policies designed to stimulate value-added, or secondary, wood products manufacture may be misdirected if questions relating to the existing extent and nature of the industry are not first addressed. Knowledge about the structure, status, and characteristics of existing industries should be developed to gain insights for planning and promoting more value-added wood processing activity in the state, if this activity is needed.

SCOPE OF RESEARCH

This research examined business establishments classified as secondary wood products manufacturers operating within the state of Washington in 1988. Primary data was collected through the use of an industrial mail survey.

Industrial firms can be segmented by the products they produce and by the production processes they employ (Hutt and Speh, 1989). Statistical information on business activity is generally reported by government sources using the Standard Industrial Classification (SIC) system. The SIC coding system begins with two-digit major industry groups (such as Wood and Wood Products, SIC 24) and extends to seven-digit specific product codes. Each business establishment within a single physical location is assigned a four-digit specific industry code, according to the principal product produced, sold or exchanged in that facility.

The forest products industry is diverse, made up of many different types of companies producing a wide range of products. A starting point for the present study was to determine those industries which should be included under the classification of secondary manufacturers. The industries were chosen following a review of the literature, expert consultation, an examination of the products contained within each SIC industry, and an attempt to organize the processing relationships involved in manufacture to determine what constituted a "secondary" product. Table 1 presents the secondary wood products industries as defined in this study by four-digit SIC codes. Included in this table is the number of manufacturing establishments classified in each four-digit code operating in the state of Washington in 1988; also shown is the state employment level within each industry. Appendix A contains a listing of the specific products classified within each SIC four-digit specific industry group.

One limitation of the way the SIC system is currently used is that information reported in government publications about the manufacture and shipment of specific products may be clouded as data is aggregated into four-digit SIC codes, which often include several products (Hutt and Speh, 1989). The SIC coding system is a very useful means of obtaining general information about an industry, but falls short of fully representing the complexity and diversity of most industries. Several primary wood products industries in the SIC coding system contain some products which are better classified as secondary products, but the cost and difficulty of identifying primary manufacturers incorporating secondary processing in their mills prevented their inclusion in this study. For example, softwood furniture dimension stock is a remanufactured secondary wood product, but is classified under sawmills and planing mills (SIC 2421). Several other specialty remanufactured products are classified under special product sawmills (SIC 2429), but because this industry group in Washington State is dominated by cedar shake and shingle manufacturers, it was excluded from the industries under consideration. Among primary manufacturing industries, only the hardwood dimension and flooring mills industry (SIC 2426) was originally included within the scope of the study, due to several secondary products, such as wooden furniture frames for upholstered furniture, produced by this industry.

Certain industry groups within the population of secondary manufacturers identified for this research produce some items which are not wood products, such as automobile seats, included within the public building and related furniture industry (SIC 2531). Because the majority of products produced by this industry are manufactured with wood, companies listed under 2531 were included in the sample frame. Only manufacturing firms were considered within the scope of this study. Wholesalers, distributors and retail outlets were not included, unless the company, classified first under the secondary manufacturing SIC codes, incorporated these activities into their business. Companies marketing specialty products collected from the forest, such as cones, nuts, ornamental grasses, and mushrooms, were not included within the scope of this research.

Although at least one survey (Heit and Bohning, 1988) of secondary wood products industries included secondary pulp and paper products such as envelopes and corrugated boxes in their definition of secondary forest products, only solid or wood-based industries will be assessed here. The fundamental division of the industry between solid wood products and pulp and paper products, with the accompanying differences in processing technologies, lends itself to examining these industries separately.

Table 1. Secondary Manufacturing Standard Industrial Classification Codes and Washington State Firms and Employment Within Each in 1988.

SIC Code	Description	Number of firms	Number of Employees
2426	Hardwood Dimension and Flooring Mills	25	763
2431	Millwork	118	3733
2434	Wood Kitchen Cabinets	105	1544
2439	Structural Wood Members	32	820
2441	Wood Boxes and Shook	12	141
2448	Wood Pallets and Skids	27	508
2449	Misc. Wood Containers	5	*
2451	Manufactured Housing	5	395
2452	Prefabricated Wood Housing and Components	24	419
2491	Wood Preserving	20	571
2499	Misc. Wood Products	100	1062
2511	Wood Household Furniture	87	709
2512	Upholstered Wood Household Furniture	17	650
2517	Wood TV and Radio Cabinets	*	*
2521	Wood Office Furniture	25	573
2531	Public Building Furniture	9	252
2541	Wood Partitions and Store Fixtures	39	449
2599	Misc. Furniture and Fixtures	8	113

Source: Washington State Employment Security Department

*not available

STUDY OBJECTIVES

The overall objective of this research was to collect a broad range of information about secondary manufacturing in the state to serve as a foundation for further study and research. Specific objectives were as follows:

- 1) Identify existing secondary wood products manufacturers in the state of Washington and stratify companies by product(s) manufactured, firm size and location.
- 2) Among groups of firms producing similar products, evaluate each industry group's dependency on wood raw materials produced from Northwestern US tree species.
- 3) Measure production variables such as raw materials, employment and manufacturing technologies utilized.
- 4) Measure marketing variables of product promotion and distribution used by secondary manufacturers and describe differences encountered between industries.
- 5) Measure the extent of this sector's involvement in international trade and identify current target markets.
- 6) Evaluate problems and concerns facing the secondary wood products industries.

RESEARCH METHODOLOGY

Primary data for this study were collected during the summer of 1989 using a survey questionnaire, administered by mail. The population of interest was all secondary wood products manufacturers operating in Washington State in the year 1988. *For purposes of this study, a secondary wood products manufacturer is a business establishment that manufactures or assembles specialty or non-commodity wood products, using previously-processed wood products as one or more of the major raw material components in those products.* Industries included in the study were presented in Table 1; specific products produced by each industry are listed in Appendix A.

SAMPLING FRAME DEVELOPMENT

Secondary wood products companies operating within the state were identified using a list of primary and secondary wood products manufacturers provided acquired by the Center for International Trade in Forest Products (CINTRAFOR). Companies classified under secondary product SIC codes were sorted from the original list; these companies formed the foundation of the sample frame for the current research. Additional company names and addresses were added to the sample frame by cross referencing directories of Washington State manufacturers (Washington State Department of Trade and Economic Development, 1989; CINTRAFOR, 1989). All companies, regardless of size, were considered members of the sample frame. A total of 634 companies were identified as manufacturers of secondary wood products in Washington in 1988. Basic information regarding firm location and employment, compiled from the sample frame, is presented in a later section.

The secondary producers included in this study manufacture products ranging from custom hardwood furniture to roof trusses; the products produced are diverse and the processes employed to produce them vary considerably. The secondary manufacturing "industry" is, in fact, a collection of smaller, diverse industries, differing in raw material requirements, manufacturing, and marketing methods employed. The difficulty in addressing such a collection of firms is to ask common questions which provide measurable results.

SAMPLE DESIGN

This study was intended to be a broad analysis of a collection of industries commonly referred to as secondary manufacturers. The operating objective was to collect as much information about these manufacturers as possible. Previous studies of this industry in Washington State simply did not exist, or were limited in scope to a small set of manufacturers or a small geographic area. This lack of secondary data supported the conclusion that some type of survey was appropriate; a mail survey was determined to be the best low-cost alternative for data collection.

The population of interest was all secondary manufacturers operating in the state in 1988; the 634 companies identified in the sample frame were felt to represent much of the state's secondary wood products production, excluding secondary processing occurring in the primary wood products sector. A survey canvass of all 634 firms was selected over a smaller random sample due to the small population size and to ensure that the variability among the secondary manufacturing groups would be captured. The 634 companies in the sample frame also represented a manageable number of survey forms and mailing packets to prepare and handle. This attempt to sample all of the companies in the sample frame is not uncommon in industrial mail surveys where the total number in the population is moderately sized (Walker et al., 1987).

QUESTIONNAIRE DEVELOPMENT

The survey questionnaire for this study was designed following a review of literature pertaining to survey research methodology and value added wood products manufacturing. Five general topics were covered in the six-page questionnaire, shown in Appendix B. Topics included: 1) demographic information about the firm, 2) source, type, and quantity of wood raw materials used, 3) processing technologies utilized, 4) marketing methods, and 5) problems or concerns facing the firm.

The questionnaire was designed to allow for both anonymous and identified response. A space was provided for respondents to include their company name and address on the questionnaire to receive additional information about seminars or current research efforts sponsored by CINTRAFOR. All respondents were promised confidentiality. They were also offered a summary of the survey results, when available. Cost limitations prohibited the inclusion of monetary incentives, which have been shown to increase survey response rates (Dillman, 1978).

MAILING PROCEDURE

Three "waves" of mailings were employed during this study. The first mailing was a packet containing: a cover letter explaining the purpose of the study and an appeal to respond, a copy of the survey, and a business reply return envelope. The second mailing was a postcard, following the original mailing by about 10 days, which again asked study participants to respond to the questionnaire. The third mailing followed the postcard by several weeks, and included a more strongly worded cover letter asking for cooperation, a replacement questionnaire, and another business reply return envelope.

The desire to keep costs low required that the first two mailings were sent to companies bulk rate. However, the third mailing included a request for an address correction from the post office on the envelope, which provided a more accurate list of addresses for future company contact, and also a determination of the number of companies which never received the questionnaire packet. The number of companies which were not contacted affects response rate calculations, and thus was an important piece of information to obtain.

DATA ANALYSIS AND INTERPRETATION

Each questionnaire was inspected for completeness, after which data were entered into a database and organized for analysis. Data analysis methods employed include: analysis of frequency distributions and mean scores, crosstabulations of responses, stratification of respondents into meaningful groups, chi-square analysis and analysis of variance (ANOVA). Much of the information from the questionnaire will be imparted through frequency distributions, organized into tables. Statistical information will be presented only where statistically significant conclusions were made.

SURVEY RESPONSE

Useable questionnaires were returned by 165 companies, or 33 percent of the establishments which received them. A response rate of 33% is comparable to response rates reported by several industrial market researchers (Jobber, 1986; Walker *et al.*, 1987). The calculation for the response rate is based on a formula given by Dillman (1978), and is shown in Appendix D.

Non-response bias. An attempt was made to measure non-response bias, as this is a major source of error in survey research (Gentry and Hailey, 1981). Assuming that later respondents are similar to non-respondents, as it takes more effort to gain their cooperation, showing little or no difference existing between answers given by early and late respondents supports the hypothesis that values and opinions do not change along the continuum of early respondents to non-respondents. Answers given by the 105 early respondents to the first mailing were compared to answers given by the 60 late respondents returning questionnaires following the second survey mailing, using the chi-square goodness-of-fit test. Answers to three key questions--one concerning opportunities to pursue new markets with current products, one concerning taxes as a problem facing the firm, and another concerning raw material supply or cost as a problem facing the firm--were analyzed and evaluated (Table 2). The proportion of early to late respondents answering the questions in each way was not significantly different at the .95 probability level. Thus the two groups of respondents were judged to originate from the same population of information providers.

Another method of testing non-response bias as reported by Gentry and Hailey (1981) is to compare the proportion of the population exhibiting certain demographic characteristics to the proportion of sample respondents exhibiting the same characteristics. The number of respondents from three industry groups,

millwork manufacturers, cabinet manufacturers, and wooden household furniture manufacturers, was compared using the chi-square goodness of fit test with the number of firms from each segment in the population; no significant difference was found between the proportion of firms responding versus the proportion of firms in the population. In other words, the response rate to the questionnaire was the same for the three largest subgroups within the population, again supporting the hypothesis that little or no non-response bias exists. Additional mailings and/or follow-up phone or telephone interviews may also be employed to test non-response bias (Gentry and Hailey, 1981); time and budget limitations did not allow their use in this research.

Evidence available from the two tests carried out indicates that non-response bias is probably not a serious problem in this study, but absolute certainty is impossible. Therefore, the reader should be aware that information presented in this study is based upon questionnaire returns from only 33% of potential respondents; the results may in fact be biased by those establishments which did not respond.

Table 2. Chi-square Tests for Goodness of Fit between Early and Late Respondents

Test 1: Opportunities existing to pursue new markets with current products.

	<u>yes</u>	<u>no, or don't know</u>
Early	95	10
Late	46	11

chi-square value: 3.15; do not reject null hypothesis of no association at .05 alpha level

Test 2: Taxes as a problem facing the firm.

	<u>serious problem</u>	<u>some concern</u>	<u>not a problem</u>
Early	41	46	12
Late	22	24	7

chi-square value: 0.27; do not reject null hypothesis of no association at .05 alpha level

Test 3: Raw material supply or cost as a problem facing the firm.

	<u>serious problem</u>	<u>some concern</u>	<u>not a problem</u>
Early	31	59	11
Late	23	26	3

chi-square value: 3.21 do not reject null hypothesis of no association at .05 alpha level

Test 4: Population versus Respondent Proportions:

	<u>Millwork</u>	<u>Cabinets</u>	<u>Wood Household Furniture</u>
Recipients of questionnaire	108	84	56
Respondents to questionnaire	27	18	12

chi-square value: .27 do not reject null hypothesis of no association at .05 alpha level

SECONDARY WOOD PRODUCTS LITERATURE

This section will review literature which contributed to the present assessment of the secondary wood products industries in Washington State.

Despite the frequency with which the term secondary wood products is used, few definitions exist in the literature. Two references of terminology used by forest scientists and the forest products industry contain no definition of secondary manufacturing at all (Dean, 1984; Ford-Robertson, 1983). Spencer and Luy (1975) defined secondary wood products as follows:

Secondary wood products are those which are manufactured from raw materials such as wood or wood based materials. They are termed "secondary" because they are composed of a wood-based material which has already been processed in some form (i.e. lumber, plywood, or wood composition board) and has been reprocessed or fabricated to create a new product.

Primary wood products are usually manufactured using logs or cants as raw materials. While representatives of the forest products industry may argue with a blanket classification of primary products as standardized commodities (Wiewel, 1987; Vlosky, 1989), primary wood products generally conform to the assumptions implicit in commodity product trading (Deloitte et al., 1988). Some of these assumptions are: 1) the product is graded by a standard set of rules, 2) the product is distributed in mass or large volumes, 3) price lists of the commodity products are widely circulated, 4) competitive advantage is gained through production efficiencies or distribution methods, and 5) minimal customer/producer interface occurs.

The British Columbia Ministry of Forests prepared an analysis of secondary solid wood product manufacturing as part of its 1984 resource analysis (Woodbridge et al., 1984). Secondary solid wood manufacturing is defined in this volume as "any activity that is outside the normal framework of a primary sawmill." This definition did little to delineate secondary manufacturing from primary processing, but suggested a conceptual framework recognizing secondary processing as an activity which can take part in any of three areas: 1) by primary sawmills manufacturing specialty products; 2) by remanufacturers taking lumber in one form and processing it into another; and 3) by secondary manufacturers themselves, producing specialty products such as trusses, windows, or cabinets.

Deloitte et al. (1988) outlined the product and process relationships between primary, remanufacturing and secondary processes in a value strategy prepared for the British Columbia solid wood products sector. These manufacturing processes were shown to be occasionally linked to one another, as vertically integrated firms construct production lines or assembly areas where multiple processes are used to produce specific end products. For example, a pallet manufacturer may add a remanufacturing operation to reprocess economy lumber (raw material), sawing and sorting cut stock suitable for high, medium, and low-grade pallets. This remanufacturing is the first phase in the manufacturer's secondary *processing*, while the pallets are the secondary *products*. If the company also operated a sawmill from which it obtained its economy lumber, it would be fully integrated in production from primary to secondary products.

Secondary wood products can also be differentiated from primary products by certain marketing methods employed. Consultants to the British Columbia forest products sector argue that specialty product manufacture: 1) requires better communication between the producer and the end-user than primary commodity processing; 2) demands a high degree of service between the producer and the end-user; 3) requires a different form of selling than that used for a commodity product (Deloitte et al., 1988). The differences in marketing methods are not always clear, however. For example, a primary forest products producer targeting the repair and remodel market through home center sales may benefit by similarly emphasizing marketing over selling (Vlosky, 1989).

VALUE ADDED STRATEGIES

There is a trend in those states and provinces which have traditionally relied upon the production and sale of primary products to study and support the development of higher value added wood products. Studies by

consulting firms have been commissioned in British Columbia, Alberta, Oregon, and Montana, and several others (Deloitte et al., 1988; Woodbridge et al., 1984; Mater Engineering, Ltd., 1989; Grimes and Associates, 1987). The objective of many of these studies is to identify opportunities for the manufacture and marketing of secondary or value added wood products. While some studies emphasize improvements in marketing as a means to achieve more "value added" within the area's manufacturing sector (University of Minnesota, 1987), others emphasize the need to transfer improved technologies to the current manufacturing base to produce some desired economic impact:

The basic assumption is that by employing higher-level technologies to that resource base (resulting in production of a higher value-added product) there would be an improvement in the economic health of the targeted region (Grimes and Associates, 1987).

Value added is a concept used in accounting to measure the contribution of a firm or an industry to the Gross Domestic Product. Value added in manufacturing is the difference between the delivered cost of raw material inputs and the total (F.O.B. plant) value of all the products obtained from them (Ringe and Hoover, 1987). This difference comprises the rent, depreciation, total salaries and wages, and total profit incurred by a firm or industry at any stage of the production process (Ford-Robertson, 1983). Thus while a strict definition of value added falls within the realm of national and business accounting, it can also be thought of in general economic welfare terms as a measure of the amount of return available to cover production costs, including profit (Ringe and Hoover, 1987).

Value added concepts are also used in strategic business marketing, by which firms (or countries) decide how far along the value chain from raw material to finished product they can competitively manufacture and market their products (Hutt and Speh, 1989). The potential "capture" of value added was the impetus driving the Southeast Asian countries of Indonesia, Malaysia, and the Philippines to curtail or restrict raw log exports of tropical hardwoods in the 1980's to further develop primary processing industries (plywood, veneer, and lumber) of their own (Laarman, 1984). The governments of these countries felt that employment and value-added profits were being exported along with raw logs. They reasoned that because their countries dominated world production of tropical logs and timber, they could also dominate the production of processed tropical timber products in the long term, if strategic policies were implemented.

Ringe and Hoover (1987) discussed three alternatives for primary manufacturing companies facing declining returns to extract greater value from logs in production:

- 1) Alter the product mix to include more custom, higher margin noncommodity products.
- 2) Incorporate technologies that improve yield and productivity.
- 3) Adopt technologies that enable substitute products to be made from a less expensive resource.

Ringe and Hoover reasoned that a major factor forcing technological change in the industry is a decrease in the raw material supply, and developed the idea of value added assessment, where "marginal log grades" can be identified for the production of specific products. This concept was found particularly applicable to individual producers having access to their own raw material input, product output, and financial data; independent researchers, usually dealing with this type of information in aggregate, may have a more difficult time applying this concept.

Examining various stages along the value chain, from unprocessed logs to finished products, states and provinces are also engaged in a discussion of value added strategies for wood products production. Justification for the development and manufacture of higher value added secondary products in specific North American states and provinces is generally based on one or more of the following assumptions:

- 1) The regional primary wood products industry is over-dependent upon traditional commodity markets, where demand, derived from the demand for new construction, fluctuates with the national economy. Development of secondary processing provides production stability and opportunities for industrial growth (Woodbridge et al., 1984).
- 2) The production of specialty or secondary wood products will improve the profitability of the regional wood products industry (Deloitte et al., 1988).
- 3) Increasing secondary wood processing will enhance employment levels in the region and stabilize forest resource-dependent areas (McCoy and Chang, 1983; Mater Engineering, 1989).

WOOD PRODUCTS IN WASHINGTON

Dolbeare et al. (1983) outlined the development of forest products as the state's first major cash-crop industry. Wood harvested in Washington in the 1800's was shipped or sent by rail to distant domestic markets--San Francisco, the East Coast, and the Midwest--as a response to rapid industrialization elsewhere in the US. Dolbeare et al. characterized territorial Washington as a colony to more developed parts of the country, due to the extractive nature of its resource-based industries and the investment and governing influences by those living in developed financial centers outside of the state. Today's forest products industry in the state was depicted as increasingly dependent upon Pacific Rim export markets. Future successes of the industry would rely upon "developing new markets for finished lumber in Japan and other Pacific Rim countries, and on maintaining and expanding markets for raw logs in the same region."

Several sources of information exist regarding the primary forest products sector in Washington State. Larson and Beardon (1986) report comprehensive statistics about mill characteristics, wood flows, and raw material usage by sawmills, veneer and plywood mills, pulp mills, post, pole and piling mills, shake and shingle mills, and log export operations in their biennial mill survey. Data for the 1986 report was collected via a mail and telephone survey of 394 operations, and is reported for each of five economic areas: the Puget Sound, Olympic Peninsula, Lower Columbia, Central Washington, and the Inland Empire.

Warren (1989) reports current information provided by state and federal agencies and industry associations on lumber and plywood production and prices; timber harvest; employment in forest products industries; international trade in log, pulpwood, chips, lumber, and plywood; log prices in the Pacific Northwest; log volume and stumpage prices from public lands; and other items. This information is broken down by state and, for some items, by port and customs district. Information specific to the secondary wood products sector is not included in this quarterly report.

International trade of Washington and Pacific Northwest forest products has been well documented. A competitive analysis of the industry in terms of its national and international markets was undertaken by Campbell (1983), in which he reported that high transportation and labor costs in the Northwest, coupled with competition from other regions, would result in a continuing erosion of market share in US markets. Labor costs in wood products manufacture, for example, have been approximately 85 percent higher in Washington than in some forest products producing southern states; manufacturing labor costs in Washington State are about 30 percent above the national average (Campbell, 1983). International trade was identified as a key area of opportunity to offset losses in domestic market share.

A broad overview of international trade in forest products from Washington as it existed in the early 1980's was prepared by Bagger and Waggener (1985). The expanding role of northwest hardwoods in international trade was examined by Buhler and Briggs (1988). Red alder (*Alnus rubra*) was the hardwood

species of chief importance, where demand for logs, chips, rough and finished lumber, furniture components, and veneer in overseas markets was shown to be driving exports.

Anderson (1988) stressed the importance of international trade in forest products to the state's economic health and discussed joint efforts undertaken by state agencies, trade associations, industry, and educational institutions to promote and expand trade. "Team Washington" was introduced as a working partnership with the goal of "expanding the state's forest products exports to which value has been added, through processing or remanufacturing--to maximize job creation in the state."

An analysis of the forest products industry in the context of the broader state economy as it existed in 1982 was written by Dolbeare et al. (1983). The difference between a "basic" and a "secondary" industry was discussed, as were the problems inherent in applying such terminology to something as dynamic and interrelated as a state economy. Nevertheless, the author identified four basic industries influential in shaping the state's economy--aerospace, agriculture, forest products, and tourism--and the multiplier effects that these sectors have on secondary and service-related employment.

Dolbeare artificially divided the Washington economy into three geographical sectors: 1) the manufacturing and finance sector, comprising 9 counties; 2) the agricultural sector, comprising 14 counties; and 3) the timber-recreation sector, comprising 16 counties. Employment and revenue tables show employment in basic and service industries within each sector and the share of total state activity in each area. Despite the location of the source of resource-based commodities such as timber and agricultural products in their respective county sectors, the author reported that roughly 60 percent of the processing of these products takes place in the manufacturing and finance sector counties. The major urban centers of Seattle-Tacoma-Everett-Bremerton, for Western Washington counties; Spokane, for the Inland Empire; the Tri-Cities, for the central counties; and Vancouver-Portland, for the southwestern counties; provide a link for the financing and equipping of agricultural and timber-based enterprises, for processing wood or agricultural products, and for the sale and transportation of goods to local or external markets. Profits from these activities tend to flow away from the source of raw materials along these sectorial linkages.

Dolbeare et al. (1983) discussed economic development issues and the role state agencies in Washington or other states may adopt to foster economic growth. Important business locational factors such as the existence of a skilled labor force and energy cost and availability were analyzed. Half of all new jobs in the US are created by new or expanding small businesses, yet these types of firms are particularly hard pressed to find financing and capital for business development and expansion (Dolbeare et al., 1983). A peculiar situation in Washington is its lack of a state income tax and the resulting high business and occupation ("B & O") tax, which may have a particularly deleterious effect on new small businesses because it is based on a business' gross receipts rather than net profits after repayment of loans or other start-up expenses (Dolbeare et al., 1983).

Bourque (1987) presents a more technical analysis of Washington State's economy via an input-output study. This periodic report measures the value of productive inputs used by industry groups in the state combined with a measurement of the industry's outputs by market. For example, a furniture manufacturer may purchase inputs from sawmills, textile manufacturers and utility companies, and find markets for its outputs in construction fields and wholesale trade. In this way, estimates are made of sales to other industries within the state versus personal expenditures, government expenditures and sales to the rest of the US or the world. On the input side, estimates are made of raw materials originating from Washington versus imports from other states and countries. Linkages and structural interdependencies between industries are shown, and multipliers of jobs, earnings, and value added are derived from this work and presented in tables. A major limitation of this publication with respect to secondary wood products is its examination of large industry groups, not specific product types such as cabinets, wooden office furniture, or engineered wood products.

Sommers and Leinbach (1989) proposed initiating a more concentrated economic development strategy for Washington's wood products sector in their work on flexible manufacturing networks. Based upon a model developed by analysts of successful manufacturing and marketing systems in Denmark, Italy, and West Germany, Sommers and Leinbach discussed the potential application of flexible manufacturing networks in

Washington, the strengths and shortcomings of the state's current economic development strategies concerning wood products, barriers to flexible network implementation, and policy recommendations for their development. Secondary wood products manufacturing was suggested as an area of high potential for the establishment of flexible networks, either horizontally with firms producing similar products, or vertically with primary manufacturers and/or construction firms. An application of the flexible network model would require a shift toward a greater sector-specific extension role on the part of state agencies, with trained field agents working closely with both manufacturers and state agencies to establish the initial networks; the basic framework is already in place. Common needs of manufacturers or manufacturing networks would require the establishment of regional service centers (Sommers and Leinbach, 1989). In addition to a review of secondary literature, telephone interviews were conducted with several industry associations and with primary and secondary wood products manufacturers located in three counties (Grays Harbor, Lewis, and Spokane); these findings were interpreted in light of the theoretical constructs of the flexible manufacturing network model.

Another regional study related to secondary wood products manufacture provided an assessment of the factory-built housing industry in Washington State (Kolar, 1988). The industry was broken down into its component manufacturing types: panelized homes, pre-cut homes, log homes, geodesic homes, and manufactured homes (mobile homes). Thirty-three companies were found to be manufacturing these types of structures in this industry in the state in 1988, directly employing an estimated 1200 people. Topics covered included general industry characteristics, relevant housing codes, differences found between manufacturing segments, technologies utilized by the industry, wood raw material types used, markets targeted by each group, distribution channels and general trends and issues facing manufacturers. Several of the companies interviewed were active in export markets, due to strong foreign market demand for their products and the relative ease and low cost of packing certain home types into containers for shipment (Kolar, 1988).

At least one county economic development board in Washington has become active in the promotion of its secondary wood products industry by producing a directory of local manufacturers (Economic Development Board for Tacoma-Pierce County, 1989). The directory lists both manufacturers and distributors of secondary wood products by type of business, provides contact names, lists products manufactured or distributed, and also contains a section devoted to general information compiled from a survey of the local industry, as well as tentative recommendations about the appropriate role the Economic Development Board could play in assisting the manufacturers operating within its jurisdiction. Of the 187 wood products firms identified in Pierce County, 54%, or 101 companies, were manufacturers. The largest number of companies were involved in the manufacture or distribution of cabinets, millwork, and furniture.

WASHINGTON SECONDARY INDUSTRIES PROFILE

LOCATION AND EMPLOYMENT

Examining the population sample frame of manufacturers and secondary data provides information about firm location, employment, products produced, and the recent economic history of the secondary wood products sector. Dolbeare et al. (1983) demonstrated that while most of the natural resources supporting the lumber and wood products sector are found growing in the 16 timber-recreational counties, only 48 percent of the state's total employment in wood products is found there, primarily in the form of timber harvesting and primary processing operations. But timber-recreational counties and their communities are often described as "timber dependent" because few economic alternatives currently exist in rural forested areas. A sizable portion of state employment in lumber and wood products, 43 percent, exists in the 9 heavily-populated manufacturing and finance counties; however, this activity comprises only 1.5% of the total employment in these counties, which have diverse economies supported by many other types of industries.

An even lower level of activity in secondary wood products manufacture exists in the timber-recreational counties. The location of secondary manufacturing firms in 1988 is shown by county in Figure 1. These companies are heavily concentrated in the Puget Sound region and along the state's major interstate highways, I-5 and I-90. Location near population centers is predominate; over 80 percent of the firms are located within the 10 most highly populated of Washington's 39 counties. King county alone is host to 28 percent of the secondary manufacturing firms in the state. Most of the larger secondary manufacturing firms are located in or near population centers; over 90 percent of the companies employing 25 persons or more are located in the 9 manufacturing and finance counties.

Information regarding the number of employees in each secondary manufacturing establishment was available for the 634 companies in the population. Figure 2 shows the percentage of companies within each of five employment ranges. Almost all of the businesses in the population are small businesses as defined by the Small Business Administration, which defines a small manufacturing business in most industries as one with fewer than 500 employees (Brigham, 1983), and the majority are very small, with fewer than ten employees. Only about 4% of the companies in the population were categorized as having more than 100 employees.

There were a total of 13,202 employees in the secondary wood products sector in 1988. At the same time, 20,549 people were employed in the primary processing industries, 10,650 employed in logging, and 16,730 employed in manufacturing paper and allied products (WA St. Employment Security Dept., 1989). Thus about one in every five wood products jobs are found in secondary solid wood processing.

INDUSTRY SEGMENTS

The secondary manufacturing industry is a collection of smaller, diverse industries. Eighteen four-digit SIC industry numbers were included in the definition of the population for this study; the number of Washington State manufacturers classified in each was displayed in Table 1 with 1988 employment levels. Manufacturers of millwork employed the most people (3733 persons) among Washington's secondary manufacturing industries in 1988, followed by kitchen cabinet manufacturers, employing 1544, and wood partition and fixture producers, employing 941.

Figures C.1-C.15 in Appendix C present employment trends and the number of firms active in Washington during the period 1975-1989 for most of the secondary manufacturing SIC industries. These figures reflect annual average employment, except for the year 1989, which is averaged from the first six months of activity. Wood boxes and shook (SIC 2441), wood pallets and skids (SIC 2448), and miscellaneous wood containers (SIC 2449), employing about 620 persons in 1988, were grouped together in Figure C.5 due to similarities in products manufactured.

Figures C.1-C.15 reveal that many of the secondary processing industries suffered losses in both the number of firms and employment during the 1980-82 recession, and that the entire sector, presented in Figure 3

as a combination of all of the secondary industries, reduced employment by 3900 jobs, or about one fourth. Some secondary industries, such as office furniture manufacturing (Figure C.12), experienced growth in Washington State over this recessionary period, however, and the employment level in the secondary sector as a whole has recovered to a point comparable to the late 1970's. The growth in Western Washington during the latter half of the 1980's probably contributed to the recovery of most of the secondary manufacturing segments, as the Puget Sound market is often targeted by companies in these industries.

Figures 4 and 5 show comparable data for the logging and primary wood products sectors. Employment in logging and primary wood products manufacture peaked in the late 1970's, and never recovered to previous levels throughout the 1980's. The recession of the early 1980's struck the forest products industry in Washington State particularly hard, causing a loss of some 20,000 woods-based and manufacturing jobs (Anderson, 1987). Several reasons have been cited for plant closures and the initial decrease and sustained reduced level of employment and in the Pacific Northwest primary forest products sector during the late 1970's and early 1980's. Many plant closures and layoffs were simply the result of short-term reduced demand for wood products brought on by the recession (Brunelle, 1986). Speculative bidding on public timber sales during the inflationary late 1970's increased the price of timber and forced some companies to curtail operations during the recession when they could no longer meet timber contract obligations (Brunelle, 1986). Several of the larger national companies shifted key operations to the Southeastern US during this period, where lower labor costs and a more stable timber supply would contribute higher average returns on investment (Brunelle, 1986). Perhaps most important to the sustained decreased employment levels in the Northwest primary products sector, however, was the impact of changing from an old-growth to a second-growth resource. Plant modernization and investment in automated technologies enabling the more efficient utilization of second-growth logs increased company profits but reduced the need for workers in the woods, in sawmills, and in other manufacturing plants (Brunelle, 1986).

A comparison of the gross business income of the pulp and paper, primary sawmill, logging, secondary wood products, and plywood manufacturing sectors for the period 1981-1988 also indicates the transition of the wood products sector from recession in the early part of the decade to overall growth through 1988 (Figure 6). Gross business income includes total receipts, proceeds of sales, or the value of products without any deductions for cost of inputs or taxes (WA ST Dept. of Revenue, 1989). In real terms, or income adjusted by the producers price index to 1982 dollars, the gross business income of Washington's forest products industries grew at average annual rate of 4.3% between 1981 and 1988, from total gross business income of \$6.4 billion received in all sectors in 1981, to gross business income of \$8.6 billion in 1988. The logging sector grew the fastest during this period, from \$691 million in 1981 to \$1284 million in 1988, an average growth rate of 9.3%. The secondary manufacturing sector grew at 7.5% per year, from \$677 million in 1981 to \$1125 million in 1988. The gross business income received in the pulp and paper sector grew at an average annual rate of 3.3%, from \$2643 million in 1981 to \$3307 million in 1988, while the primary sawmills and planing mills grew at 4.2%, from \$1933 million to \$2582 million. Both of these sectors suffered setbacks in 1985, as shown in Figure 4.6. Negative growth occurred in the plywood manufacturing sector at an average annual rate of -6.5%, from 1981 gross business income of \$472 million to \$295 million in 1988; plant closures and substitute reconstituted products competing in the national structural panel market affected the economic health of this manufacturing sector.

Contributions to revenues and employment by secondary processing activities occurring within the primary wood products sector are not known. Future knowledge of these contributions would help in assessing the actual levels of secondary manufacturing activity in the state.

SECONDARY MANUFACTURERS BY COUNTY, 1988

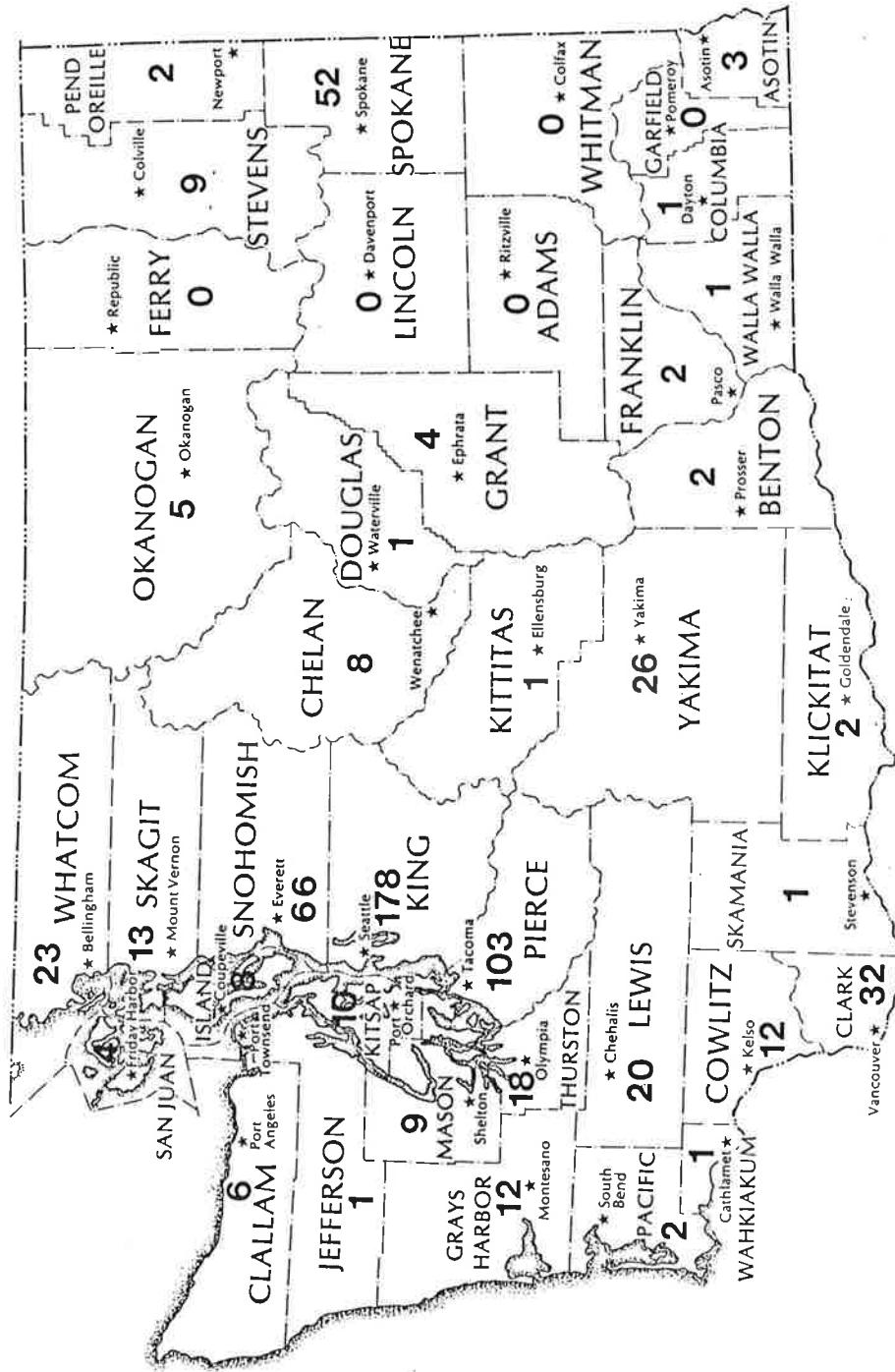
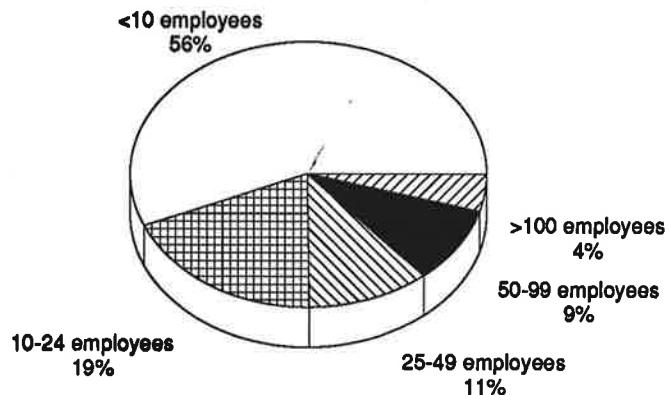


Figure 1. The Distribution of Washington State Secondary Wood Products Manufacturing Firms by County in 1988.

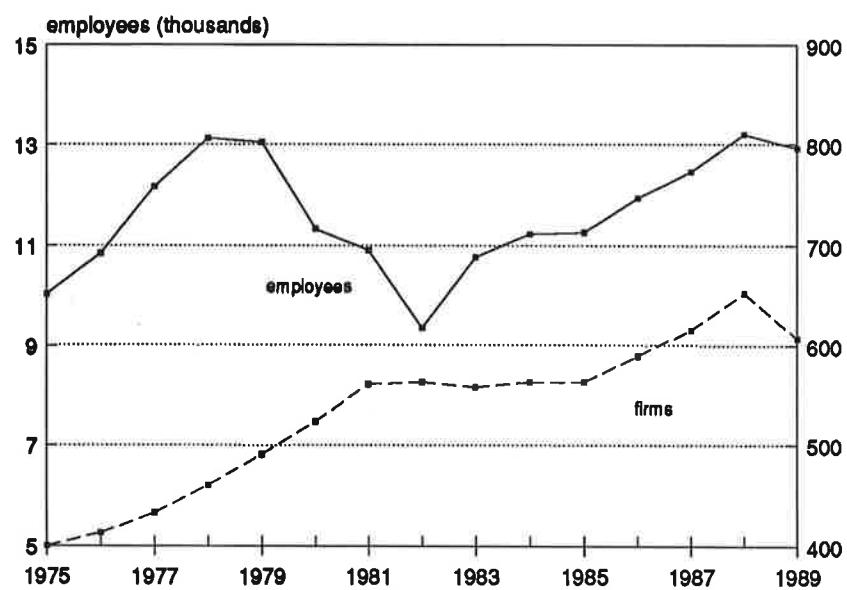
Secondary Wood Products Company Size



Source: WA St Employment Security Dept

Figure 2. Secondary Wood Products Company Size as Found in the Survey Sampling Frame.

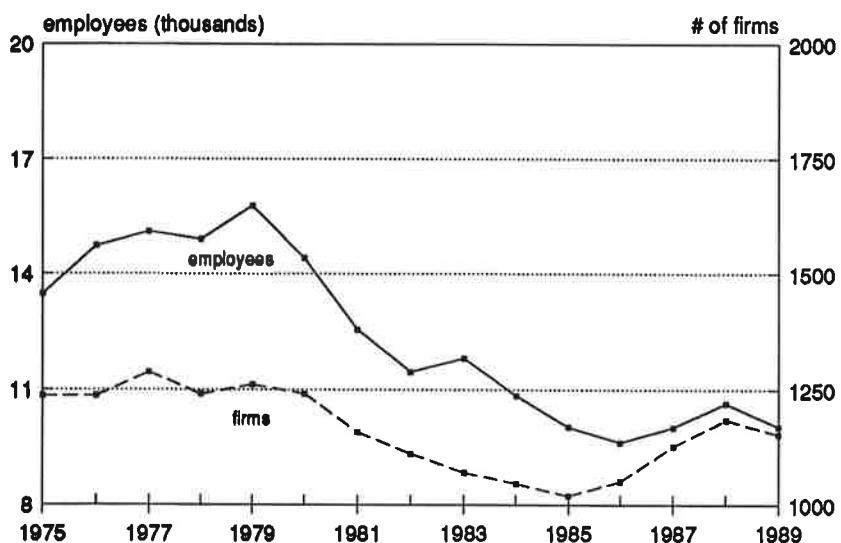
Secondary Wood Product Industries



Source: WA St Employment Security Dept.

Figure 3. Total Employment and the Number of Washington State Manufacturers Combining All Industries in the Secondary Wood Products Sector, 1975-1989.

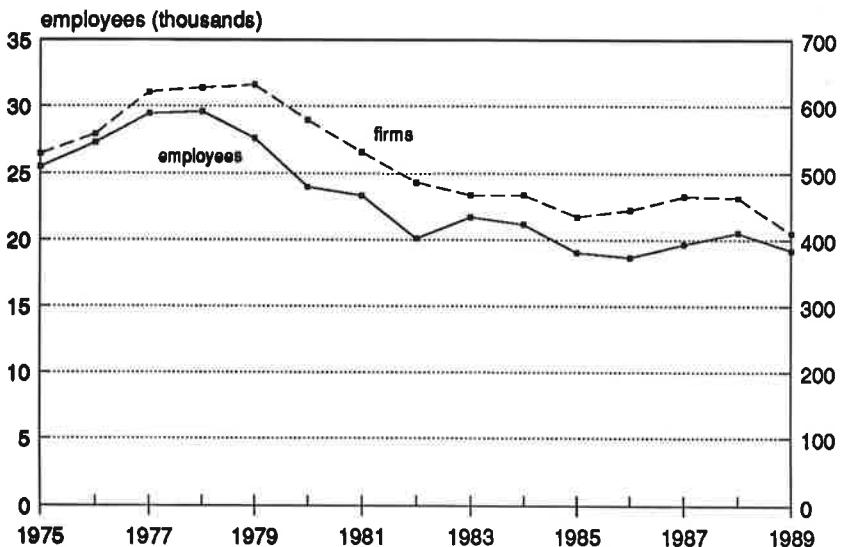
Logging SIC 2411



Source: WA St Employment Security Dept.

Figure 4. Employment and the Number of Washington State Firms in the Logging Industry, 1975-1989.

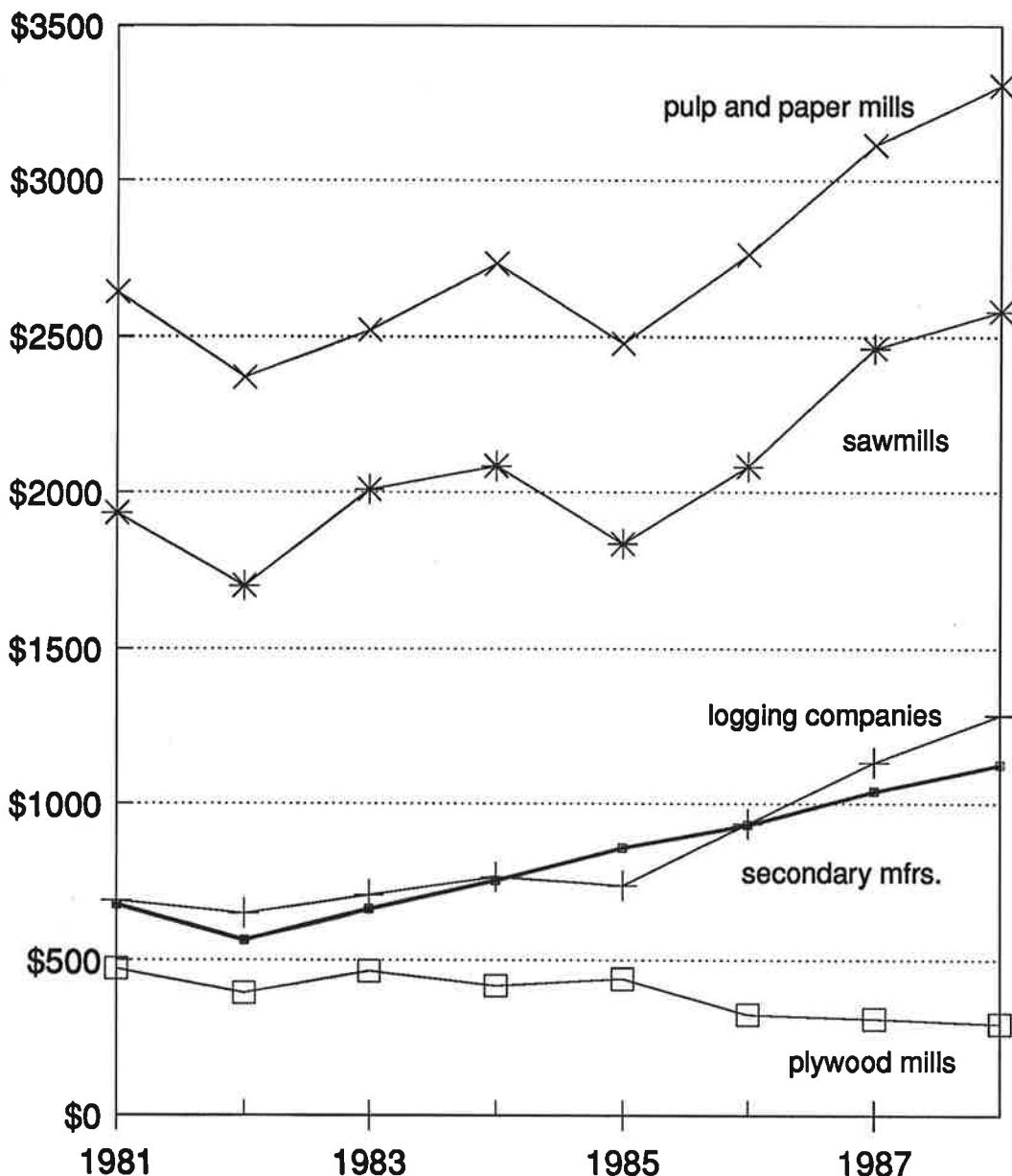
Primary Wood Product Industries SIC 2421, 2429, 2435, 2436



Source: WA St Employment Security Dept.

Figure 5. Total Employment and the Number of Washington State Manufacturers Combining All Industries in the Primary Wood Products Sector, 1975-1989.

Wood Industries Gross Business Income Washington State, 1981-88 (In 1982 Dollars)



Source: WA State Department of Revenue

Figure 6. Gross Business Income in the Washington State Pulp and Paper, Primary Sawmill, Logging, Secondary Wood Products, and Plywood Manufacturing Sectors in 1982 Dollars, 1981-1988.

SURVEY RESPONDENTS

Position. The position of survey respondents is shown in Figure 7. Two-thirds of the questionnaires reached and were completed by company presidents or owners. The small size of many of the companies in the sample undoubtedly helped in reaching the top management level.

Survey Respondent Title or Position

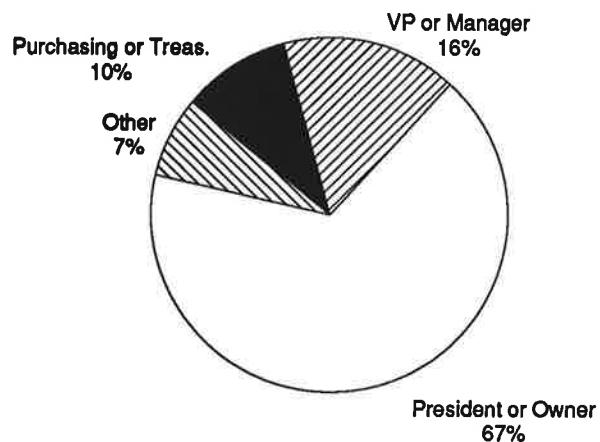
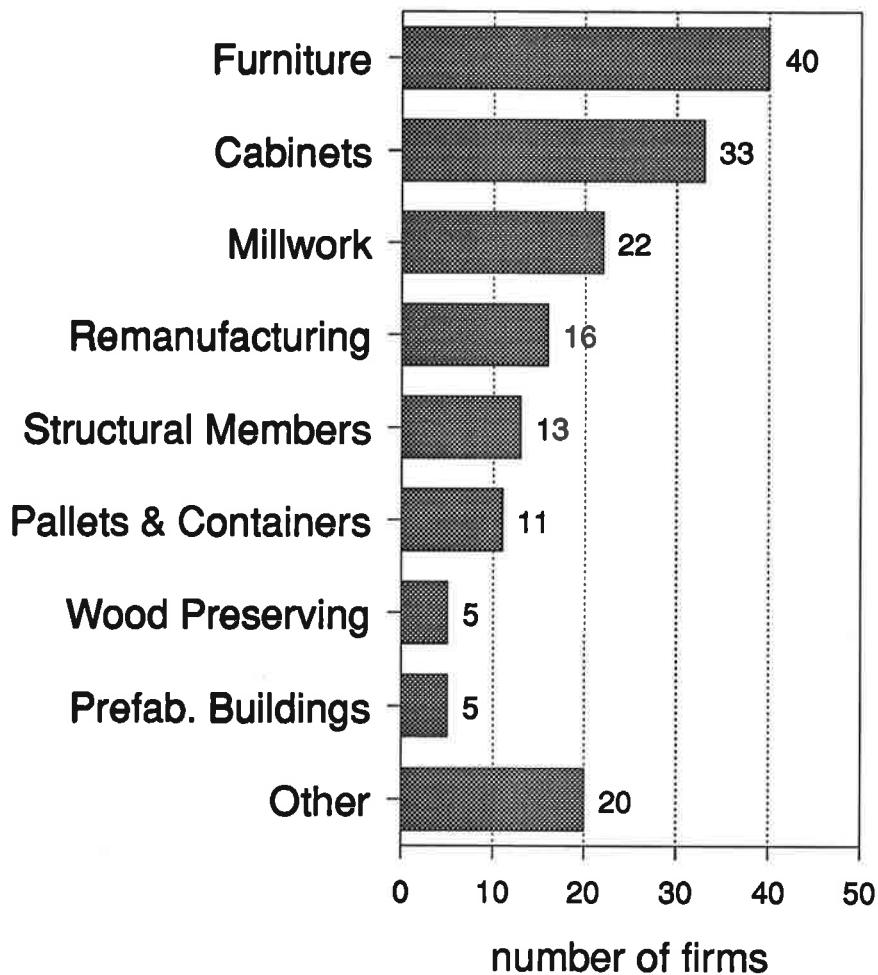


Figure 7. Title or Position of Survey Respondents.

Business type. Companies were identified as manufacturers in one of ten general categories (Figure 8). Forty furniture manufacturers returned survey forms, followed by 33 cabinet shops, 22 millwork producers, 16 remanufacturers, 13 structural component companies, 11 pallet and container operations, 5 wood treating plants, 5 prefabricated building producers, and 20 "others", ranging from compressed fire-log companies to a loom and weaving accessory manufacturer.

The creation of groups, or manufacturing segments, allows a comparison of information provided by categories with a sufficient number of members, and also facilitates the discussion of similarities and differences between firms. Developing a classification system for the secondary wood products sector is difficult, and the one developed for use here is not ideal. Several respondent companies produce more than one general type of secondary wood product, and could probably be categorized under in two or even three of the groups listed. Many firms defy classification altogether; thus the creation of the "other" category. Survey responses were sorted and firms were categorized by the top selling product type named by the respondent. Thus a current major product based classification scheme was used.

Survey Respondents by Primary Business Type

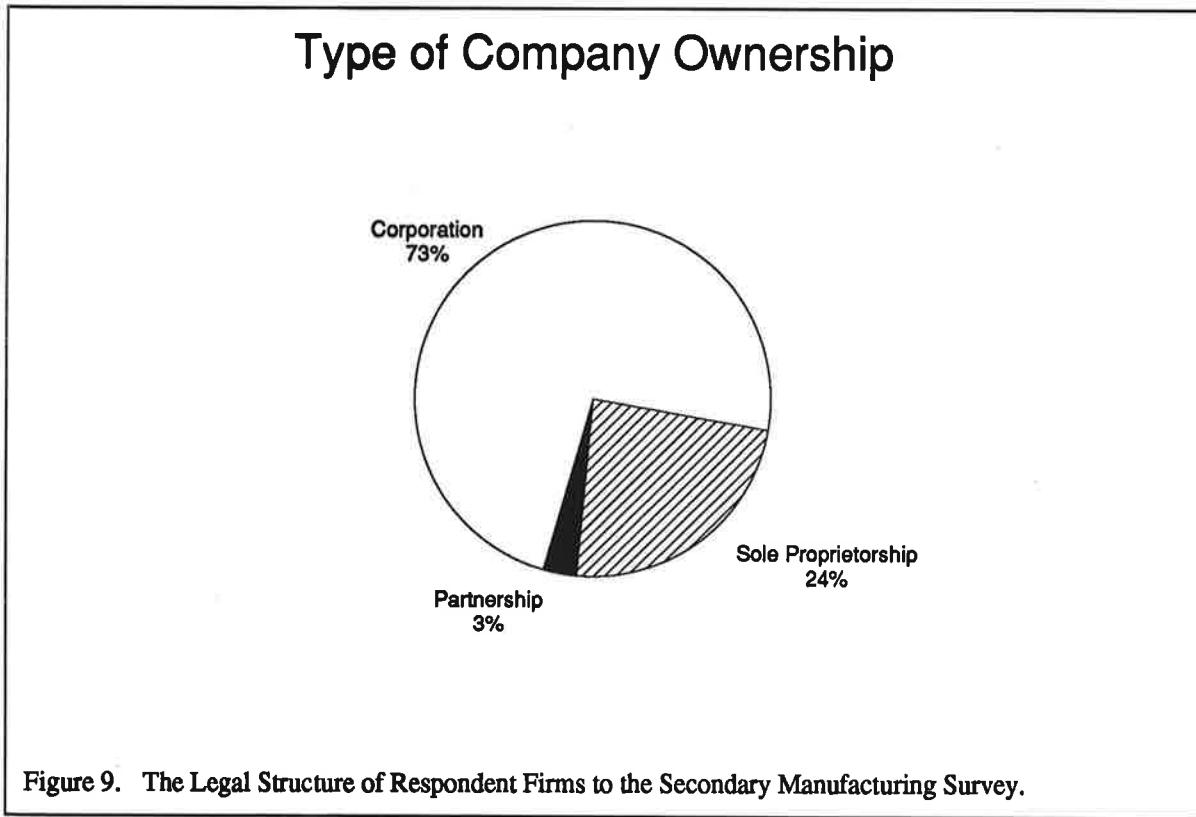


data from 165 respondents

Figure 8. Survey Respondents Classified According to the Principal Product Type Manufactured.

The segment labelled "remanufacturers" was created in this analysis to better describe a process by which firms purchase certain commodity or specialty grades of lumber and process them into more specialized or higher grade products. The remanufacturing segment draws its members primarily from the SIC millwork (SIC 2431) industry and the miscellaneous wood products (SIC 2499) industry. Hardwood dimension mill (SIC 2426) respondents were separated into two groups: those which produce primary commodity wood products using logs as raw materials were excluded from the analysis; those which manufacture secondary products employing remanufacturing processes were included within the remanufacturing sector.

Legal Structure. The majority of respondent companies, 92%, are independent, while the balance, 8%, are subsidiaries of another company. Four millwork companies, three remanufacturers, and two cabinet shops were subsidiaries of other companies, as were one prefabricated building company, one furniture manufacturer, and one structural wood member firm. Most of the firms, 73%, are corporations (Figure 9); only 3% are partnerships, and 24% are sole proprietorships. The relatively large number of proprietorships in the secondary processing industries may be partially explained by the system of taxation in Washington. Proprietorships can be an effective legal structure in small companies with business income contributions of less than \$65,000 per year, whereby business and occupation taxes may be avoided (Dolbeare et al., 1983).



Year established. Nearly two-thirds of respondent companies from the secondary wood products industries are less than two decades old; nearly one-third were established during the 1980's (Figure 10). On balance there were 200 more firms in 1989 than in 1975, but employment levels have not increased proportionally. This is perhaps due to the fact that some of the growth industries in the sector--millwork, structural members, and wood office furniture, for example--tend to have fewer employees per firm than some of the industries experiencing decline, such as mobile homes and institutional furniture. The mobile home industry, for example, averaged 79 employees per firm in 1988, while the wood office furniture industry averaged only 24 employees per firm. The result is a gain of new entrant firms over exits, even though employment, on balance, remains at about the same level as in the mid-1970's.

Annual sales. Annual sales categories and the number of companies within each, according to respondents' 1988 sales levels, is shown in Figure 11. Eighty-five percent of the firms have annual sales of less than \$5 million; 46 firms sell less than \$250,000 worth of their products annually. Total sales of survey respondents were \$449,798,027 in 1988. Washington State Department of Revenue data indicate that gross business income--approximately equivalent to total sales--for the secondary wood products sector was about \$1.2 billion in 1988 (WA State Dept of Revenue, 1988), meaning that survey respondents represent just over one-third of the total sales volume for this collection of industries. This is consistent with the expectation that

Year Company Established

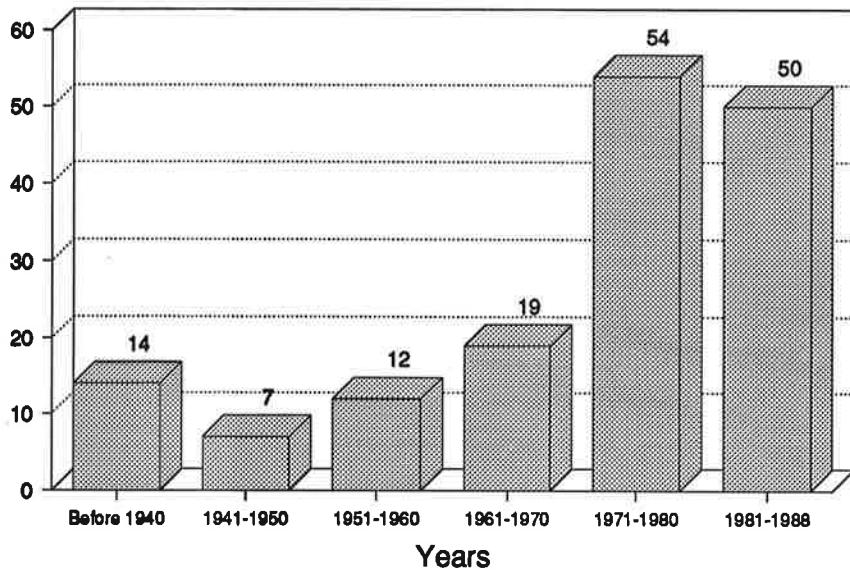


Figure 10. Year of Respondent Company Establishment.

Gross Sales in 1988

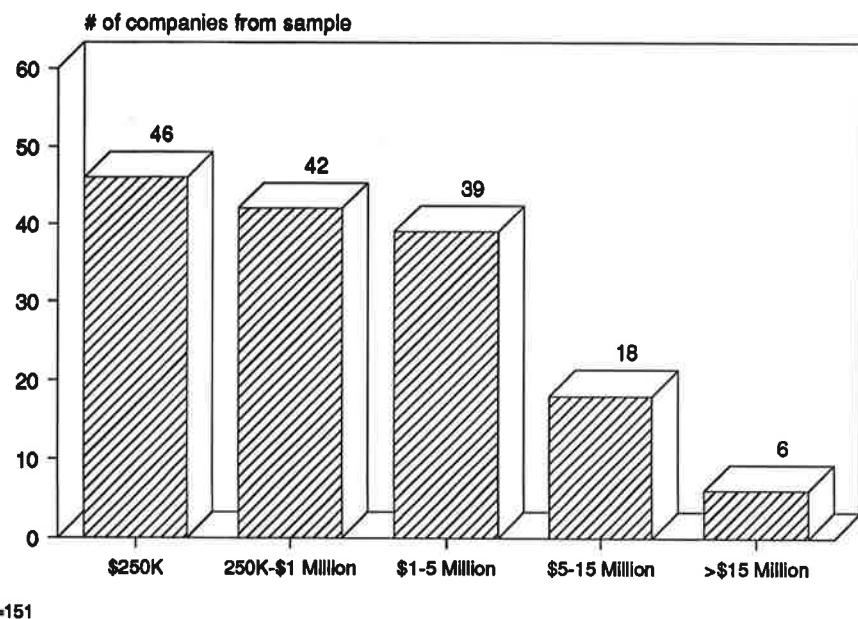


Figure 11. Annual Sales Categories and the Number of Respondent Companies within Each Category.

one-third of potential respondents in the sector should produce about one-third of the total gross business income, and lends further support to the earlier conclusion of minimal non-response bias. Table 3 provides a breakdown of 1988 sales volume categories by the number of firms in each business type, showing that the largest companies are found in the millwork industry, followed by the remanufacturing, furniture, structural wood member, and cabinet industries.

Table 3. Comparison of Respondent 1988 Gross Sales by Industry Group

Industry	NUMBER OF COMPANIES		
	Less than <u>\$1 million</u>	\$1-\$5 million	Over <u>\$5 million</u>
Millwork	11	7	7
Remanufacturers	4	8	6
Furniture	26	6	4
Structural Members	4	5	3
Cabinets	23	5	2
Pallets & Containers	5	2	1
Prefabricated Buildings	1	2	1
Wood Preserving	1	2	0
Others	13	2	0

Operating costs. Monthly operating costs, as annual sales volumes, vary widely across and within industry subgroups. Table 4 shows each subgroup of respondents and raw material, labor, and overhead costs as average percentages for the industry. No attempt was made to measure actual monthly costs incurred by each firm or industry, but general comparisons can be made using the relative information presented. For example, it appears that the major monthly cost of a remanufacturing operation will be incurred through the purchase of raw materials. This seems logical, as remanufacturers typically have fixed machine centers and rely on a relative high volume of high quality wood raw material running through the plant for the production of specialty wood products. Labor and overhead are significant but lesser costs to the firm, which spends the bulk of its money obtaining the high quality wood it needs to operate.

Employment and union membership. Industry employment by SIC codes was discussed in the previous section. Respondents to the survey employed a total of 5,576 people in 1988, or 42% of the number reported by the Washington State Employment Security Department (1988). Table 5 presents information on employment by business category.

Only 11 of 165 respondent companies, or 7%, employed union work forces. Four cabinet producers, three millwork plants, two furniture makers, one remanufacturer and one pallet manufacturer were union shops. The small number of union firms in secondary manufacturing industries is surprising given the preponderance of union plants in the primary wood products sector. The percentage of the labor force which is unionized is regularly rated as one of the three most important factors leading to a company's location decision; a high degree of unionization is perceived as a negative factor by locating firms (Dolbeare et al., 1983). A Canadian study reported that plant and crew flexibility is essential to specialty wood products manufacture, and that a non-union environment is felt by many to be advantageous in terms of lower costs and flexibility (Deloitte, Haskins & Sells Associates, 1988). It appears that Washington's secondary manufacturing industry is not highly unionized, which may be an important consideration for expanding or start-up businesses which value a non-union environment.

Table 4. Comparison of Respondent Monthly Operating Costs by Industry Group

INDUSTRY AVERAGES*			
<u>Industry</u>	<u>Raw Materials</u>	<u>Labor</u>	<u>Overhead</u>
Millwork	45%	34%	20%
Remanufacturers	57	22	20
Furniture	38	35	24
Structural Members	49	24	25
Cabinets	37	35	26
Pallets & Containers	52	26	21
Prefabricated Buildings	55	21	23
Wood Preserving	55	25	20
Others	34	36	28

*rows may not add up to 100 percent due to rounding

Table 5. Employment Within Respondent Firms by Business Category.

<u>Industry</u>	Number of Employees
Millwork	1440
Furniture	1133
Cabinets	947
Remanufacturers	800
Structural Members	526
Pallets & Containers	242
Prefabricated. Bldgs.	232
Wood Preserving	80
Others	176
Total:	5576

MANUFACTURING PROFILE

END PRODUCTS

The products manufactured by Washington's secondary wood products manufacturing industries are varied, serving many consumer needs, from wood bases for mouse and rat traps to custom office furniture to manufactured housing. Appendix E contains a list of the products manufactured by respondent companies, including the number of respondent companies producing each.

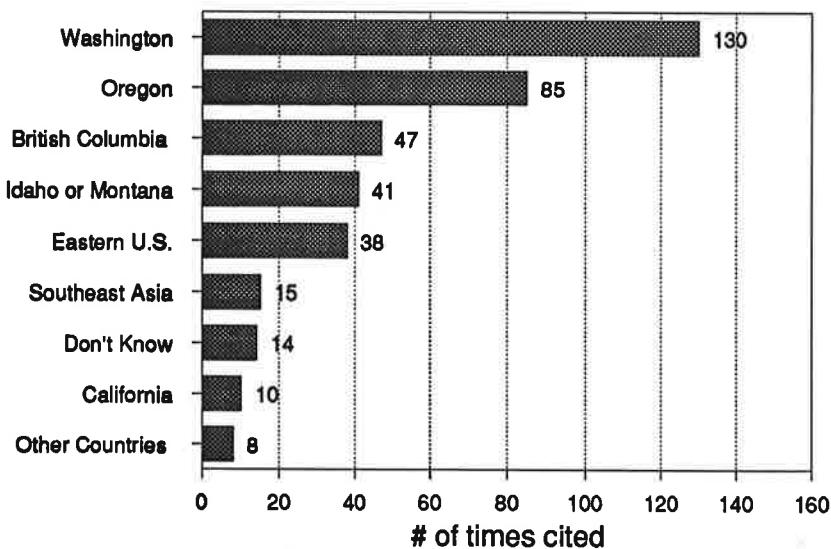
WOOD RAW MATERIALS

Source of supply. The wood raw materials used for secondary manufacture in Washington State are grown and processed all over the US and in several other countries. Figure 12 shows the source states and regions for wood raw materials and the number of companies purchasing raw materials originating in each; thus firms sourcing materials from more than one region are represented in the figure more than once. Volume data is not presented.

Washington was the state from which the most firms met their raw material requirements, followed by other Northwest states and British Columbia. Many of the responding companies purchase wood raw materials made from Eastern US hardwoods and species from other countries. Thirty-eight firms, about one fourth of the respondents, indicated that at least 10 percent of the wood used by their company for manufacture in 1988 originated in the Eastern US, and 63 firms, nearly 40 percent of the respondents, indicated that they used wood originating in other countries, including Canada. Secondary manufacturing companies located in Washington State do not necessarily rely upon locally grown and processed wood raw materials. Specific wood raw materials imported by 41 survey respondents are listed in Table 6 by the country of origin.

Origin of Wood Used in Manufacture

location:



data from 153 companies

Figure 12. Source States and Regions for Wood Raw Materials and the Number of Companies Purchasing Raw Materials Originating in Each Area.

Table 6. Wood Raw Material Imports to Washington for Secondary Manufacture as Reported by Survey Respondents

<u>Raw Material</u>	<u>Country of Origin</u>	<u>Number of Firms, if more than one</u>
hardwood doorskins	Brazil	
Alaska yellow-cedar lumber	Canada	
cedar lumber	Canada	6
hemlock and/or fir lumber	Canada	8
cedar float material	Canada	
jambs & door slabs	Canada	
pine lumber	Canada	
lumber, unspecified	Canada	7
spruce lumber	Canada	
turning squares (hemlock)	Canada	2
spruce-pine-fir lumber	Canada	1
hardwood doorskins	Chile	
kapur wood	Indonesia	
millwork	Indonesia	2
lumber, unspecified	Indonesia	
plywood	Indonesia	
plywood doorskins	Indonesia	
veneer	Italy	
plywood	Japan	
hardwoods	Malaysia	
millwork	Malaysia	
plywood	Malaysia	2
millwork	Philippines	2
plywood	Philippines	
plywood doorskins	Singapore	
plywood doorskins	Taiwan	
plywood	Taiwan	
drawer sides	Taiwan	
hardwoods	unspecified	
mahogany	"	
hardwood veneers	"	
teak	"	2
plywood	"	
lumber	"	
Total number of companies identifying themselves as wood raw materials <u>importers</u> in 1988: 41 firms		
Total number of companies identifying themselves as imported wood raw materials <u>users</u> in 1988: 63 firms		

Wood purchases. Wood raw materials used by respondent companies are purchased via several different distribution pathways; the most common procedure is to buy materials through a broker or wholesaler. One-hundred and eleven of the respondent companies use the services of brokers and/or wholesalers to meet their wood requirements, as seen in Table 7. This table shows the number of companies purchasing through any of five supply mechanisms: wood purchased directly from a logging company, a primary mill, or from another secondary manufacturer, through a broker or wholesaler, or through other means. It also indicates a breakdown

of companies by relative volumes purchased. For example, of the total 38 companies purchasing materials directly from another secondary manufacturer, 12 firms relied on this method for over 75% of their wood raw material needs. Respondents who mentioned "other" identified only logging themselves and purchasing from retail outlets as alternative supply sources; other supply mechanisms, not mentioned by respondents, undoubtedly exist. There is a strong interaction between companies in the secondary manufacturing industries with primary manufacturers, logging companies, and other secondary manufacturing firms. Distributors play a key role in sourcing and providing materials which meet the specific needs of this collection of industries.

Table 7. Wood Raw Material Purchases as Reported by Survey Respondents

From Whom Purchased	PERCENT VOLUME				Total Number of Firms
	0-25%	26-50%	51-75%	75-100%	
Logging Co.	1	1	2	5	9
Primary Mill	13	14	10	25	62
Other Secondary Manufacturer	15	8	3	12	38
Wholesaler or Broker	23	7	11	70	111
Other	7	3	1	9	20

purchase data provided by 160 companies

Material types and species. The raw materials required by each company or operation in the secondary manufacturing sector vary by type, size, species, grade and volume. Similarities between company raw material requirements, however, appear as patterns of usage when examining respondents from an industry group in aggregate. Tables 8-13 show the wood raw material types and species used by the remanufacturing, millwork, cabinet, furniture, structural component and pallet and container industries, as identified by survey respondents. The number of companies within each industry using a particular raw material type or species is noted in the right hand column. The number of companies providing information for raw material type varied from the number providing information on species use; the latter was tabulated from all responding companies producing a specific end product in the industry group rather than just those companies classified in the industry group as their primary business type.

Remanufacturers, as presented in Table 8, primarily use softwood factory lumber in the production of lumber specialty products and wood components for other industries. The state's remanufacturers also use hardwood and softwood dimension lumber of all grades. The softwood species used most often were western hemlock (*Tsuga heterophylla*) and Douglas-fir (*Pseudotsuga menziesii*); red alder (*Alnus rubra*) and oak (*Quercus* spp.) were the hardwoods used most often.

The millwork industry, shown in Table 9, is similar to remanufacturing in its use of softwood and hardwood factory and dimension lumber, but the lumber used appears to be of higher grades, on average. Much of the specialty cut stock produced in the remanufacturing sector is used by this industry. In addition, millwork producers use more hardwood and softwood plywood, veneer, and composites in the production of its

Table 8. Wood Raw Material Types and Principal Species Used by the Washington State Remanufacturing Industry.

<u>Raw Material Type</u>	<u>Number of Firms Using</u>
softwood logs	1
timbers or RR ties	1
softwood factory lumber, boards and cut stock	10
hardwood factory lumber, boards and cut stock	2
softwood dimension lumber & boards:	
high grades (e.g. selects)	1
medium grades (e.g. #2 & better)	2
low grades (e.g. #3, stud, economy)	2
hardwood dimension lumber & boards:	
high grades (e.g. #1 & better)	2
med. grades (e.g. #2 shop or common)	4
low grades (e.g. #3 shop or common)	4
softwood plywood	2
Other raw materials listed:	
Moulded handrails, turned banisters & posts	1

Raw material data from 16 company responses

Wood Species

Cut Stock:

hemlock	14
Douglas-fir	10
ponderosa pine	10
alder	8
oak	8
maple	5
spruce	4

Species data from 25 company responses

products. The principal species used are: oak, Douglas-fir, hemlock, and red alder by general millwork and door manufacturers; and ponderosa pine (*Pinus ponderosa*) and Douglas-fir by window manufacturers.

Table 10 presents information about the raw material requirements of the cabinet industry in Washington State. Here the emphasis shifts to hardwood factory lumber, boards and cut stock, although softwood products of the same type are also used. Both hardwood and softwood plywood are used in production, as well as the composite materials particleboard and medium density fiberboard, used by well over one-half of the cabinet manufacturers. These composite materials are used in the European style 32mm design cabinetry and in some more traditional designs. Decorative hardwood veneers such as walnut (*Juglans* spp.) and cherry (*Prunus serotina*), among others, are used for cabinet facing. The most commonly used species in this fashion-oriented industry is oak, but also frequently used are red alder, Douglas-fir, maple (*Acer* spp.) and hemlock. Softwood species, with some exceptions, are used primarily for hidden parts and for use as substrate materials.

Table 9. Wood Raw Material Types and Principal Species Used by the Washington State Millwork Industry.

<u>Raw Material Type</u>	<u>Number of Firms Using</u>
softwood factory lumber, boards and cut stock	11
hardwood factory lumber, boards and cut stock	5
softwood dimension lumber & boards:	
high grades (e.g. selects)	8
medium grades (e.g. #2 & better)	1
low grades (e.g. #3, stud, economy)	-
hardwood dimension lumber & boards:	
high grades (e.g. #1 & better)	4
med. grades (e.g. #2 shop or common)	-
low grades (e.g. #3 shop or common)	-
softwood plywood	2
hardwood plywood	4
particleboard	2
medium density fiberboard (MDF)	3
softwood veneer	1
Other raw materials listed:	
pine louver bifold blanks for door assembly	1
imported millwork	1
redwood glue lams for sign panels	1
mouldings	1

Raw material data from 22 company responses

Wood Species

General millwork:

oak	14
Douglas-fir	12
hemlock	11
alder	8
maple	8
birch	6

Species data from 21 company responses

Doors:

Douglas-fir	10
oak	9
hemlock	5
maple	4

Species data from 13 company responses

Windows:

ponderosa pine	4
Douglas-fir	3

Species data from 7 company responses

Table 10. Wood Raw Material Types and Principal Species Used by the Washington State Cabinet Industry.

<u>Raw Material Type</u>	<u>Number of Firms Using</u>
hardwood logs	1
softwood factory lumber, boards and cut stock	9
hardwood factory lumber, boards and cut stock	17
softwood dimension lumber & boards:	
high grades (e.g. selects)	7
medium grades (e.g. #2 & better)	4
low grades (e.g. #3, stud, economy)	1
hardwood dimension lumber & boards:	
high grades (e.g. #1 & better)	7
med. grades (e.g. #2 shop or common)	2
low grades (e.g. #3 shop or common)	-
softwood plywood	10
hardwood plywood	13
structural composite boards (OSB, etc)	2
particleboard	20
medium density fiberboard (MDF)	10
hardwood veneer	10
softwood veneer	3
Other wood raw materials listed:	
imported luan plywood	1

Raw material data from 33 company responses

Wood Species

Cabinets, Casework, and Countertops:

oak	30
alder	21
Douglas-fir	15
maple	12
hemlock	7
ponderosa pine	6
walnut	5
cherry	4

Species data from 40 company responses

The raw material types used by the furniture and cabinet industries are very similar. Table 11 depicts the furniture group, showing that oak, alder, and walnut are the top three most commonly used species. A wide variety of materials are used by the furniture industry, reflecting the diversity of products produced in that segment.

Most of the firms producing structural wood components such as trusses and laminated beams require high grades of softwood lumber, often machine stress rated (MSR), for the production of their engineered products. But medium to lower grades are also used in areas where stresses and forces acting against the wood

Table 11. Wood Raw Material Types and Principal Species Used by the Washington State Furniture Industry.

<u>Raw Material Type</u>	<u>Number of Firms Using</u>
softwood logs	1
hardwood logs	1
timbers or RR ties	2
softwood factory lumber, boards and cut stock	8
hardwood factory lumber, boards and cut stock	14
softwood dimension lumber & boards:	
high grades (e.g. selects)	7
medium grades (e.g. #2 & better)	7
low grades (e.g. #3, stud, economy)	2
hardwood dimension lumber & boards:	
high grades (e.g. #1 & better)	13
med. grades (e.g. #2 shop or common)	4
low grades (e.g. #3 shop or common)	2
softwood plywood	12
hardwood plywood	15
structural composite boards (OSB, etc)	7
particleboard	19
medium density fiberboard (MDF)	8
hardwood veneer	9
softwood veneer	2
Other wood raw materials listed:	
logs and poles 3/4" to 7" in diameter	1
hemlock full rounds	1
masonite	1
wood dowels, buttons, and knobs	1

Raw material data from 40 company responses

Wood Species

Furniture:

oak	26
alder	12
walnut	11
Douglas-fir	11
maple	8
mahogany	8
hemlock	6
ponderosa pine	6
cherry	5

Species data from 48 company responses

Table 12. Wood Raw Material Types and Principal Species Used by the Washington State Structural Wood Component Industry.

<u>Raw Material Type</u>	<u>Number of Firms Using</u>
softwood factory lumber, boards and cut stock	1
softwood dimension lumber & boards:	
high grades (e.g. selects)	10
medium grades (e.g. #2 & better)	5
low grades (e.g. #3, stud, economy)	6
hardwood dimension lumber & boards:	
high grades (e.g. #1 & better)	3
med. grades (e.g. #2 shop or common)	1
low grades (e.g. #3 shop or common)	-
softwood plywood	2
structural composite boards (OSB, etc)	1
particleboard	1
Other wood raw materials listed:	
Machine stress-graded lumber only	1
glue laminated beams	1

Raw material data from 13 company responses

Wood Species

Structural Components:

Douglas-fir	14
hemlock	10
spruce	2
spruce-pine-fir (SPF)	2
western redcedar	2

Species data from 14 company responses

are not as severe. These raw material requirements are reflected in Table 12, which shows the structural wood component industry. Species most frequently used by Washington State companies in this industry are Douglas-fir, hemlock, and spruce (*Picea* spp.).

The pallet and container industry is the other group described in terms of its raw material types and species required, in Table 13. This industry appears to purchase much of its materials at the low end of the wood quality continuum, remanufacturing and re-grading wood to use in pallets and skids. Many reusable pallets and bins, however, are made from higher quality materials to ensure a long life. Pallet and container manufacturers appear to be using Douglas-fir, spruce, larch (*Larix occidentalis*), true-fir (*Abies* spp.) and red alder. Red alder is used primarily in grocery pallets, where hardwood species are preferred by large grocery chains over softwood species.

Table 13. Wood Raw Material Types and Principal Species Used by the Washington State Pallet and Container Industry.

<u>Raw Material Type</u>	<u>Number of Firms Using</u>
timbers or RR ties	1
softwood factory lumber, boards and cut stock	4
hardwood factory lumber, boards and cut stock	1
softwood dimension lumber & boards:	
high grades (e.g. selects)	3
medium grades (e.g. #2 & better)	1
low grades (e.g. #3, stud, economy)	4
hardwood dimension lumber & boards:	
high grades (e.g. #1 & better)	-
med. grades (e.g. #2 shop or common)	-
low grades (e.g. #3 shop or common)	3
softwood plywood	1

Raw Material data from 11 company responses

Wood Species

Pallets and Pallet Stock:

Douglas-fir	6
spruce	6
larch	5
true fir	5
hemlock	5
alder	4

Species data from 7 company responses

Bins, boxes, etc:

Douglas-fir	5
ponderosa pine	5
spruce	5
lodgepole pine	4
true fir	3

Species data from 12 company responses

MANUFACTURING TECHNOLOGY

Equipment. Differences among the six manufacturing groups examined in this chapter are readily apparent when a comparison is made of the processing technologies and equipment utilized by each. Tables 14-19 present the technologies used by each group, showing the number of firms reporting using each equipment type. The remanufacturing segment (Table 14) uses technologies common to some primary manufacturing plants, but also uses technologies similar to those employed by millwork manufacturers (Table 15), re-working the wood, cutting it into smaller dimensions and specialty sizes. Technologies in the millwork

industry are geared to a more finished product, hence the appearance of sanding and painting and finishing among the top listed methods of woodworking used.

Table 14. Processing Technologies Utilized by the Remanufacturing Sector in Washington State.

<u>Technology</u>	<u>Number of Firms Using</u>	<u>Technology</u>	<u>Number of Firms Using</u>
rip sawing	16	sorting	7
chop sawing	15	sanding	6
resawing	14	shaping	5
bundling or packaging	10	edging	4
edge gluing	10	kiln drying	4
finger-jointing	10	scanning or optimizing	4
profiling	9	finishing or painting	3
trimming	9	machine-nailing	1
grading or regrading	8	turning	1
gang sawing	7	wood preserving	1
planing or matching	7		

Other technologies mentioned:

bandsawing	1	laminating	1
bending	1	molding	1
drilling or boring	1	routing	1
face gluing	1		

n=16

Bundling and packaging are commonly used by remanufacturers, millwork manufacturers, structural wood component companies, and pallet and container firms, which have in common products moved en masse to a place of use, whether a construction site or a warehouse. More finished products such as cabinetry (Table 16) and furniture (Table 17) are less likely to be bundled or packaged for mass shipment, especially if a manufacturer is small and serving primarily local markets. The furniture and cabinet industries are remarkably similar in the processing technologies employed and in the raw material types and species used.

The structural component industry (Table 18) employs processes primarily geared at ensuring the proper structural grades of wood materials in their products, and then assembling them. Automated processes such as machine nailing and plate nailing are used. In addition, several of these companies appear to be utilizing a remanufacturing function. Most companies in the pallet and container industry (Table 19), in contrast, employ remanufacturing processes as a major function, creating the pallet and container stock that fits their product specifications. This may be a result of few primary manufacturers adding a remanufacturing operation to re-work lower grades into pallet stock. While both assemble their products, pallet manufacturers are more inclined than truss manufacturers to employ remanufacturing processes to meet their product requirements.

Table 15. Processing Technologies Utilized by the Millwork Manufacturing Sector in Washington State.

<u>Technology</u>	<u>Number of Firms Using</u>	<u>Technology</u>	<u>Number of Firms Using</u>
sanding	16	sorting	7
planing or matching	14	edging	6
profiling	14	grading or regrading	6
chop sawing	13	machine-nailing	6
rip sawing	13	gang sawing	5
shaping	10	kiln drying	3
finishing or painting	9	turning	3
resawing	9	wood preserving	3
trimming	9	finger-jointing	1
bundling or packaging	8	notching	1
edge gluing	7	scanning or optimizing	1

Other technologies mentioned:

molding	2	drilling	1
assembly	1	edge coating	1
band sawing	1	joinery	1
bending	1	routing	1
carving	1	sandblasting	1
door machining	1	veneer wrapping	1

n=22

Table 16. Processing Technologies Utilized by the Cabinet Manufacturing Sector in Washington State.

<u>Technology</u>	<u>Number of Firms Using</u>	<u>Technology</u>	<u>Number of Firms Using</u>
sanding	31	resawing	6
shaping	28	scanning or optimizing	5
edging	26	grading or regrading	4
edge gluing	24	notching	4
rip sawing	22	finger-jointing	3
trimming	22	turning	3
planing or matching	20	bundling or packaging	2
chop sawing	18	gang sawing	2
finishing or painting	18	sorting	2
profiling	13	wood preserving	2
machine-nailing	10		

Other technologies mentioned:

Cad-cam design	1	prefinishing	1
Laminating	1		

n=33

Table 17. Processing Technologies Utilized by the Furniture Manufacturing Sector in Washington State.

<u>Technology</u>	<u>Number of Firms Using</u>	<u>Technology</u>	<u>Number of Firms Using</u>
sanding	29	resawing	10
shaping	26	gang sawing	8
rip sawing	25	bundling or packaging	6
edge gluing	24	turning	6
finishing or painting	24	grading or regrading	5
trimming	20	finger-jointing	4
chop sawing	18	notching	4
edging	16	sorting	3
planing or matching	13	scanning or optimizing	1
profiling	13	veneer slicing	1
machine-nailing	11		

Other technologies mentioned:

boring or drilling	8	installing t-hold edge	1
mortise-tennon	2	overhead pattern machining	1
plastic laminating	2	panel sawing	1
routing	2	radio frequency gluing	1
donelling	1	veneer application	1
incising	1	vinyl film overlay	1

n=40

Table 18. Processing Technologies Utilized by the Wood Structural Component Sector in Washington State.

<u>Technology</u>	<u>Number of Firms Using</u>	<u>Technology</u>	<u>Number of Firms Using</u>
bundling or packaging	5	resawing	2
grading or regrading	4	shaping	2
machine-nailing	4	edging	1
trimming	4	finishing or painting	1
chop sawing	3	sanding	1
profiling	3	scanning or optimizing	1
rip sawing	3	sorting	1
finger-jointing	2	turning	1
gang sawing	2	unnailing or stripping	1
notching	2		

Other Technologies Mentioned:

assembly	1	routing	1
band sawing	1	multicut component cutting	1
plate nailing	1		

n=13

Table 19. Processing Technologies Utilized by the Pallet and Container Sector in Washington State.

<u>Technology</u>	<u>Number of Firms Using</u>	<u>Technology</u>	<u>Number of Firms Using</u>
rip sawing	10	gang sawing	2
chop sawing	9	planing or matching	2
bundling or packaging	7	finger-jointing	1
machine-nailing	7	finishing or painting	1
resawing	7	sanding	1
grading or regrading	6	shaping	1
notching	6	unnailing or stripping	1
sorting	3	wood preserving	1
trimming	3		
<u>Other technologies mentioned:</u>			
specialized cutting and assembly	1		
n=11			

Equipment purchases. Respondents were asked to identify the two most important equipment purchases made by their company over the past five years. The diversity of the companies is reflected well in their response of 277 pieces of equipment, ranging from radial arm saws to personal computers to large delivery trucks. Of the 277 equipment purchases named, 96 purchases, over one-third, were of used machinery. There appears to be a strong exchange of used equipment between manufacturers, or sales of used or rebuilt machinery from dealers to the manufacturers. Respondents also identified what would be their most important purchases over the next two years; of the 176 pieces of equipment mentioned, respondents indicated that they would like to buy 120 of them new and the other 56 used. Important new and used equipment purchases made over the past five years and equipment purchase plans for the next two years for each of the six manufacturing segments are summarized in Table 20 and Table 21. These tables provide information about demand changes taking place in each sector. For instance, cabinet and furniture makers said that edge banders and panel saws were the most important purchases made over the past five years (Table 20), most likely due to the increased popularity of European style laminated cabinetry and furniture designs. Finger-jointing equipment has become more important in the remanufacturing sector, as companies strive to make use of smaller clear wood pieces.

Equipment purchase plans (Table 21) also reflect current trends and more immediate needs. Over 70 percent of the respondents listed at least one important piece of equipment they were planning to purchase over the next two years, indicating that the industries examined are undergoing some degree of technological change, or are at least having to replace or modify existing equipment.

Technological change. Survey participants were asked to rate the level of technological change in their business from an unchanging static state to an environment of rapid change. This question was designed to provide clues as to what areas of the secondary wood products sector, if any, were undergoing the most change, and if companies were keeping abreast of advances in technology. Responses were approximately normally distributed along a 10-point scale, with 25 companies indicating little or no change in technology, 114 companies indicating moderate change, and 24 companies indicating rapid technological change in their business; the mean response was just about in the middle (5.36 on a 10-point scale). An analysis of variance was undertaken in two ways to measure possible differences existing between groups: 1) firms in the six

Table 20. Top Three Most Important Equipment Purchases over the Past Five Years as Reported by Survey Respondents by Manufacturing Sector.

<u>Manufacturing Sector</u>	<u>Equipment Type</u>	<u>New Purchases</u>	<u>Used Purchases</u>
Remanufacturers (n=16)	EDGE GLUER	4	1
	FINGER JOINTER	2	2
	MOULDER	2	2
Millwork Manufacturers (n=22)	MOULDER	3	2
	PLANER	1	3
	RIP SAW	1	3
Cabinet Makers (n=33)	EDGE BANDER	14	1
	PANEL SAW	11	2
	COMPUTER	3	-
Furniture Makers (n=40)	SANDING EQUIPMENT	6	1
	PANEL SAW	5	2
	EDGE BANDER	4	3
Structural Component Manufacturers (n=13)	TRUCK W/CRANE OR BOOM	4	1
	COMPONENT CUTTING SAW	3	1
	COMPUTER	2	-
Pallet and Container Manufacturers (n=11)	FORKLIFT	1	2
	TRUCK	1	2
	NAILING MACHINE	1	2

different manufacturing segments, and 2) firms within the five annual sales categories. No statistically significant differences were found between any of the groups, meaning that the perception of technological change is, on average, about the same for companies of different sizes or within different manufacturing groups. However, 15% of the secondary manufacturers in the state feel that technology is changing quickly; current state technology development efforts in the wood products sector may be enhanced by determining and addressing the specific needs of these manufacturers.

Factors limiting investment. Respondents were asked to evaluate each of several factors potentially limiting or preventing their company from investing in new equipment and technology; each factor was rated as limiting, neutral, or not limiting. This information is presented in Tables 22-28, where each manufacturing group is shown with the frequency of companies responding in each way to the various factors. A mean index was computed for each group within each table by assigning a value of -2 for each respondent rating a factor as limiting and 2 for a rating of not limiting. The sum of these numbers was then divided by the number of respondents in the group.

Table 21. Top Three Most Important Equipment Purchase Plans over the Next Two Years as Reported by Survey Respondents by Manufacturing Sector.

<u>Manufacturing Sector</u>	<u>Equipment Type</u>	<u>New Purchases</u>	<u>Used Purchases</u>
Remanufacturers (n=16)	FINGER JOINTER	2	1
	MOULDER	2	1
	EDGE GLUER	2	-
Millwork Manufacturers (n=22)	MOULDER	4	4
	DUST COLLECTOR	3	-
	COMPUTER	2	-
Cabinet Makers (n=33)	EDGE BANDER	4	1
	PANEL SAW	4	1
	BORING EQUIPMENT	3	-
Furniture Makers (n=40)	SANDING EQUIPMENT	5	2
	EDGE BANDER	4	1
	FINISHING EQUIPMENT	3	-
Structural Component Manufacturers (n=13)	TRUCK W/CRANE OR BOOM	1	4
	SAWS	1	1
	RESAW	-	2
Pallet and Container Manufacturers (n=11)	NOTCHING MACHINE	1	1
	TRUCK	1	1

Two factors addressed the general question: do secondary manufacturing firms perceive the need to invest in new equipment and technology at all? When given the statement "new equipment or technology not needed," those who expressed an opinion stated 3 to 1 (Table 22) that this was not a factor limiting them from investing in their plant or shop. When asked if satisfaction with their current operation limited them from investing, results were less convincing, but tended toward the conclusion that this was not a limiting factor (Table 23). Although the relationship appears to exist, the large number of "neutral" respondents to both questions indicates that many companies do not feel strongly either way on this issue. It was already shown, however, that over 70% of the respondents had important equipment purchase plans for the next two years, which supports the conclusion that secondary manufacturers do perceive the need to invest in new equipment or technology.

What are some of the constraints to investment or technological improvement? The largest constraint appears to be the availability or cost of capital. Ninety-five of the companies, about two-thirds of the respondents, rated this lack of financial resources as a limiting factor, compared with only 17, less than 10%, who said it was not limiting (Table 24). Two companies wrote that their expansion plans could not be carried

Table 22. Evaluation of Respondent Perception of Need to Invest in New Equipment or Technology.

New Equipment or Technology Not Needed:

Business Type:	limiting factor (-2)	neutral (0)	not a limiting factor (2)	Total	Mean Index
Pallets and Containers	2	6	1	9	-.22
All Others	6	15	9	30	.20
Furniture Manufacturer	8	14	17	39	.46
Cabinet Manufacturer	4	14	14	32	.63
Structural Components	0	9	4	13	.89
Millwork Manufacturer	1	7	11	19	1.05
Remanufacturers	1	5	10	16	1.13
	22	70	66	158	.56

Table 23. Evaluation of Respondent Satisfaction Level with Status of Current Manufacturing Operation.

Satisfied with Current Operation:

Business Type:	limiting factor (-2)	neutral (0)	not a limiting factor (2)	Total	Mean Index
All Others	10	14	6	30	-.27
Furniture Manufacturer	15	12	12	39	.05
Cabinet Manufacturer	8	15	9	32	.06
Remanufacturers	3	9	4	16	.13
Structural Components	3	6	4	13	.15
Pallets and Containers	0	8	1	9	.22
Millwork Manufacturer	3	3	13	19	1.05
	42	67	49	158	.09

out due to a lack of capital. The furniture and millwork groups seem to hold the most consistent opinion on this issue, although it was found to be limiting across all groups, as evidenced by a negative index for all segments. The next most frequently stated constraint was the perceived high risk of capital investment. Many firms appear reluctant about investments in their operation, citing "ups and downs in the industry", "a constantly fluctuating market", and other risks as holding them back. Small differences exist between the groups in their response to this question (Table 25).

The next most frequently cited limiting factor for the industries in aggregate was the availability or cost of skilled labor. This problem does not seem to be consistent across all of the industry groups, and rated most limiting by the cabinet, structural components, and pallets and containers segments (Table 26). Government restrictions were not considered to be limiting when compared to other factors, although 30% of the companies responding said that they were a constraint (Table 27). Respondents from the wood preserving segment, included within the "other" category, were an exception, nearly unanimous in their opinion that government restrictions were limiting their ability to invest in new equipment or technology. This is probably due to strict federal and state restrictions regarding the use and safety of certain wood treating chemicals and processes, and also due to the high costs associated with monitoring waste and cleaning up treating sites.

Table 24. Evaluation of Availability or Cost of Capital as a Factor Limiting Investment in New Equipment or Technology.

Availability or Cost of Capital:

Business Type:	limiting factor (-2)	neutral (0)	not a limiting factor (2)	Total	Mean Index
Furniture Manufacturer	29	6	4	39	-1.28
Millwork Manufacturer	14	3	2	19	-1.26
Structural Components	8	4	1	13	-1.08
Cabinet Manufacturer	19	11	3	33	-0.97
Remanufacturers	8	6	2	16	.75
Pallets and Containers	4	4	1	9	.67
All Others	13	13	4	30	.60
	95	47	17	159	-.98

Table 25. Evaluation of High Risk of Capital Investment as a Factor Limiting Investment in New Equipment or Technology.

High Risk of Capital Investment:

Business Type:	limiting factor (-2)	neutral (0)	not a limiting factor (2)	Total	Mean Index
Millwork Manufacturer	10	7	2	19	.84
Cabinet Manufacturer	16	12	4	32	.75
Structural Components	4	8	1	13	.46
Pallets and Containers	2	6	1	9	.22
Remanufacturers	6	5	5	16	.13
Furniture Manufacturer	11	19	9	39	.10
All Others	11	8	10	29	.07
	60	65	32	157	.36

Raw material availability or quality was rated as a limiting factor by only 30 percent of the respondent companies, but differences appear to exist in the opinions expressed by the various industries assessed (Table 28). Industry groups using a significant volume of hardwoods and composites as raw materials in manufacture, such as cabinets and furniture, were more likely to state that raw material availability or quality was not a factor limiting investment than those groups using large volumes of regional softwoods, such as remanufacturing companies, structural component companies, and pallet and container manufacturers. This issue is critical to many companies; most of the comments made by companies at the end of the questionnaire dealt with difficulties companies were facing in raw material supply, quality, or cost.

Table 26. Evaluation of Availability or Cost of Skilled Labor as a Factor Limiting Investment in New Equipment or Technology.

Availability or Cost of Skilled Labor:

Business Type:	limiting factor (-2)	neutral (0)	not a limiting factor (2)	Total	Mean Index
Cabinet Manufacturers	17	9	7	33	.61
Structural Components	6	4	3	13	.46
Pallets and Containers	3	5	1	9	.44
Furniture Manufacturers	13	16	10	39	.15
All Others	10	12	8	30	.13
Millwork Manufacturers	3	10	6	19	.32
Remanufacturers	4	5	7	16	.38
	56	61	42	159	.18

Table 27. Evaluation of Government Restrictions as a Factor Limiting Investment in New Equipment or Technology.

Government Restrictions:

Business Type:	limiting factor (-2)	neutral (0)	not a limiting factor (2)	Total	Mean Index
Structural Components	5	4	4	13	.15
All Others	11	6	12	29	.07
Cabinet Manufacturer	10	10	12	32	.13
Millwork Manufacturer	5	7	7	19	.21
Furniture Manufacturer	8	16	15	39	.36
Pallets and Containers	3	1	5	9	.44
Remanufacturers	4	4	8	16	.50
	46	48	63	157	.22

Table 28. Evaluation of Raw Material Availability or Quality as a Factor Limiting Investment in New Equipment or Technology.

Raw Material Availability or Quality:

Business Type:	limiting factor (-2)	neutral (0)	not a limiting factor (2)	Total	Mean Index
Pallets and Containers	5	3	1	9	.89
Remanufacturers	9	4	3	16	.75
Structural Components	5	6	2	13	.46
All Others	11	12	5	28	.43
Millwork Manufacturer	6	6	7	19	.11
Furniture Manufacturer	7	18	14	39	.36
Cabinet Manufacturer	3	18	10	31	.45
	46	67	42	155	.05

MARKETING PRACTICES

Marketing has been defined as "the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational objectives" (Park and Zaltman, 1987). Broad questions directed at three elements of the marketing mix--target markets, distribution, and promotion--were briefly addressed in this study.

TARGET MARKETS

The proportion of secondary manufacturers in the state relying upon regional markets for product sales versus those focusing upon more distant national and international markets was previously unknown. Marketing wood products in external markets does not *necessarily* require more expertise or skill; local niche markets demanding highly differentiated, quality wood products and components undoubtedly exist, and serving these market demands may be as great a challenge to companies as manufacturing for distant markets (i.e. the Japanese market). Nevertheless, external markets offer additional opportunities to local manufacturers. Companies with an outward market focus may develop different competitive advantages in processing, raw material access, or marketing skills than those targeting local markets; determining the extent of these differences and their transferability to other companies may help some of the state's secondary processing companies capitalize on market opportunities existing outside of the state.

Domestic markets. Respondents were asked to identify the principal geographic area(s) in which their company sold products in 1988. Domestic US markets and the frequency of companies serving each are shown in Table 29 with percentages of total response. Companies targeting more than one market are represented more than once in the table. Western Washington was identified as a major market by two-thirds of responding firms. Given the concentration of the state's population in this region and the preponderance of companies west of the Cascade Mountains, this is not surprising. Other Pacific Northwest states of Oregon, Idaho, and Montana represent a principal market for 61 of the companies. Forty-eight companies, or 31% of the respondents to this question, consider Eastern Washington a principal market. Forty-three companies targeted California and its large population centers for product sales in 1988, while 37 firms market their products all over the United States. No information is available from the survey on volumes or values of product shipments to these markets.

Table 29. Principal Domestic Markets as Reported by Survey Respondents.

<u>Location</u>	<u>Number of Companies</u>	<u>Percentage of Respondents</u>
Western Washington	104	67%
Eastern Washington	48	31%
Pacific Northwest	61	39%
California	43	28%
Western U.S.	39	25%
Entire U.S.	37	24%
Alaska or Hawaii	13	8%

Domestic market data provided by 156 companies

Another way of looking at the markets targeted by manufacturing firms is to delineate the total geographical area where each company sells its products and to place firms into groups according to their marketing area. For instance, 55 companies, 34%, consider their principal market area within Washington State's borders only. These companies identify and serve primarily local market needs, and are dependent upon

local growth, repeat purchases of their products, or new product development to sustain business. Another 26 companies, or 16%, market their products within a larger region, the Pacific Northwest; these companies may sell in Washington, but they also rely on customers in Oregon, Idaho, or Montana for product sales. Twenty-six other firms consider the Western half of the US their principal market area, while 41 companies, or 25%, market their products all over the United States and/or Canada.

The number of companies marketing within each geographical area is shown in Table 30, with average annual company sales for each group. Annual sales increase, on average, with the geographical market area covered by firms; for instance, the 55 companies marketing only within Washington had average annual sales of \$943,033, while the 41 companies indicating the entire US and/or Canada as principal markets reported average annual sales of \$5,300,253. The 14 companies marketing internationally reported average annual sales of \$7,142,083. A firm's marketing area seems to reflect economies of scale; firms in this study that rely on external markets in addition to those close to their manufacturing site tend to be larger than firms serving local markets exclusively.

Table 30. Marketing Areas as Reported by Survey Respondents.

<u>Marketing Area</u>	<u>Number of Companies</u>	<u>Percent</u>	<u>Average Annual Sales</u>
Washington only	55	34%	\$ 943,033
Pacific Northwest	26	16%	\$1,243,063
Western U.S.	26	16%	\$3,435,682
Entire U.S. and/or Canada	41	25%	\$5,300,253
International	14	<u>9%</u>	\$7,142,083
		100%	

Note: groups are downward inclusive

Market data provided by 162 companies

Exports. Only 14 companies, or about 9% of the survey respondents, considered international markets among their principal markets in 1988, even though 40 firms, or just under 25%, actually exported products during the year. This 9% figure for active exporters is very close to that reported by Mancuso (1988), who stated that only 10 percent of the more than 300,000 US companies with export capabilities *actively* sell their products overseas. Table 31 shows the export markets reported by survey respondents and the number of companies selling products in each. The Japanese market represented the largest target export market in terms of the number of Washington manufacturers involved, although no volume or value data exists from the survey to indicate this market's magnitude. The secondary wood products exported to Japan in 1988 are listed in Table 32. Canada, while serving as a source of raw materials for 47 companies (see Figure 12), was a target export market for only 12 companies. Table 33 lists the exports to Canada from Washington State as reported by respondents to the secondary manufacturers survey. Secondary wood product exports to England are listed in Table 34; only four respondent firms exported products to that market. Other countries that bought secondary wood products from Washington companies were Korea, Germany, Australia, Mexico, Israel, Singapore, Saudi Arabia, Iraq, and Hong Kong.

Of the 14 companies reporting overseas countries among their principal markets, three were from the millwork sector, two each from the cabinet, manufactured building and structural component sectors, and one each from the furniture, remanufacturing, treated wood, and "other" sectors.

Table 31. Secondary Wood Products Export Markets as Reported by Survey Respondents by Country.

<u>Country</u>	# of Companies Reporting Exports
Japan	20
Canada	12
England	4
Korea	2
Germany	1
Australia	1
Mexico	1
Israel	1
Singapore	1
Saudi Arabia	1
Iraq	1
Hong Kong	1

Export market data provided by 40 companies

Table 32. Secondary Wood Products Exports to Japan from Washington State.

cut stock	moulding
doors	windows
finish lumber	paneling
glue laminated beams	stair components
home packages	pallets
kitchen cabinets	pallet stock
mantels	play equipment
millwork	roof trusses

Product data from 20 respondent companies reporting exports to Japan in 1988.

Table 33. Secondary Wood Products Exports to Canada from Washington State.

bar stools	shelving
bedroom suites	treated poles
dining room tables	turnings
fan decks for paint samples	upholstered furniture
furniture accessories	wedding props
paneling	

Product data from 12 respondent companies reporting exports to Canada in 1988.

Table 34. Secondary Wood Products Exports to England from Washington State.

clear hemlock	millwork
cut stock	moulding
lumber	paneling

Product data from 4 respondent companies reporting exports to England in 1988.

DISTRIBUTION

The state's secondary wood products manufacturers sell or distribute their products through a variety of channels, from selling directly to retail customers to using the services of brokers or agents to reach less immediate markets. An understanding the various mechanisms used by manufacturers to bring their products to market helps explain both the dynamics of the secondary manufacturing segments with their customers and the role intermediaries play in product distribution. The use of distribution alternatives by all respondents is presented in Table 35, where the number of companies selling products and the percentage sales volume sold by individual companies through each channel is shown. For example, a total of 96 companies sell their products directly to retail customers (without the use of intermediaries); of these companies, 48 sold between 1-25% of their sales volume directly to retail customers in 1988; 21 companies sold between 26-50%, 9 companies sold between 51-75%, and 18 companies sold more than 75% of their sales volume directly to retail customers. This table provides a relative measure of the use of each type of distribution channel in terms of the number of companies using each, and shows the overall range of use within each distribution channel. For example, of the 14 companies using export brokers, none of them rely on these brokers for sales of more than 50% of total sales volume, and most rely upon export brokers for selling less than 25% of their volume. Most companies use some combination of distribution channels, although 92 companies out of 155 responding to this question, or about 60%, sell more than 75% of their total sales volume through a single channel.

Table 35. Secondary Wood Products Sales and Distribution Channels as Reported by All Survey Respondents

To Whom Products Sold	PERCENT SALES VOLUME				Number of Firms Using
	<u>1-25%</u>	<u>26-50%</u>	<u>51-75%</u>	<u>76-100%</u>	
To Retail Customer	48	21	9	18	96
To Other Industrial Manufacturer	14	8	3	13	48
To Building Contractor	19	12	10	25	66
To Home Center or Retail Outlet	16	4	2	12	34
To Stocking Wholesaler or Distributor	15	8	3	10	36
To Non-Stocking Wholesaler or Distributor	19	7	8	14	48
To Export Wholesaler or Agent	12	2	0	0	14

Distribution data provided by 155 companies

Table 36. Remanufacturing Sales through Distribution Channels as Reported by Survey Respondents

<u>To Whom Products Sold</u>	PERCENT VOLUME		Total Sales/ (# of Firms)	Percent Sales
	<u>1-50%</u>	<u>51-100%</u>		
To Retail Customer	\$10,725,000 (5)	\$39,420,000 (0)	\$10,725,000 (5)	11%
To Other Industrial Manufacturer	\$6,787,700 (7)	\$46,207,700 (6)	\$46,207,700 (13)	46%
To Building Contractor	\$10,000 (1)	\$10,000 (0)	\$10,000 (1)	
To Home Center or Retail Outlet	\$300,000 (1)	\$300,000 (0)	\$300,000 (1)	
To Stocking Wholesaler or Distributor	\$1,290,500 (5)	\$1,689,800 (1)	\$2,980,300 (6)	3%
To Non-Stocking Wholesaler or Distributor	\$10,575,000 (6)	\$21,600,000 (2)	\$32,175,000 (7)	32%
To Export Wholesaler or Agent	\$7,100,000 (5)	\$7,100,000 (0)	\$7,100,000 (5)	7%
Other	\$40,000 (1)	\$40,000 (0)	\$40,000 (1)	
Total Segment Sales: \$99,538,000				=100%

sales and distribution data provided by 15 remanufacturing companies

Table 37. Pallet and Container Sales through Distribution Channels as Reported by Survey Respondents.

<u>To Whom Products Sold</u>	PERCENT VOLUME		Total Sales/ (# of Firms)	Percent Sales
	<u>1-50%</u>	<u>51-100%</u>		
To Retail Customer	\$1,939,000 (5)	\$5,200,000 (2)	\$7,139,000 (7)	38%
To Other Industrial Manufacturer	\$4,700,000 (3)	\$2,331,000 (5)	\$7,031,000 (8)	38%
To Building Contractor	(0)	(0)	(0)	
To Home Center or Retail Outlet	\$18,300 (2)	\$18,300 (0)	\$18,300 (2)	
To Stocking Wholesaler or Distributor	\$725,000 (3)	\$164,700 (1)	\$889,700 (4)	5%
To Non-Stocking Wholesaler or Distributor	\$125,000 (1)	(0)	\$125,000 (1)	1%
To Export Wholesaler or Agent	\$1,400,000 (1)	(0)	\$1,400,000 (1)	7%
Other	NA (1)	\$2,100,000 (1)	\$2,100,000 (1)	11%
Total Segment Sales: \$18,703,000				= 100%

sales and distribution data provided by 15 pallet and container companies

Table 38. Millwork Sales through Distribution Channels as Reported by Survey Respondents.

To Whom <u>Products Sold</u>	PERCENT VOLUME		Total Sales/ (# of Firms)	Percent <u>Sales</u>
	<u>1-50%</u>	<u>51-100%</u>		
To Retail Customer	\$1,544,480 (11)	\$300,000 (1)	\$1,844,480 (12)	2%
To Other Industrial Manufacturer	\$1,432,000 (4)	\$1,100,300 (3)	\$2,532,300 (7)	3%
To Building Contractor	\$770,800 (7)	\$13,978,000 (5)	\$14,748,800 (12)	17%
To Home Center or Retail Outlet	\$3,002,000 (3)	(0)	\$3,002,000 (2)	4%
To Stocking Wholesaler or Distributor	\$200,000 (1)	\$54,951,800 (6)	\$55,151,800 (7)	65%
To Non-Stocking Wholesaler or Distributor	\$5,492,860 (6)	\$880,500 (2)	\$6,373,360 (8)	7%
To Export Wholesaler or Agent	\$1,594,200 (4)	(0)	\$1,594,200 (4)	2%
Other	\$57,000 (1)	NA (1)	\$57,000 (1)	
Total Segment Sales: \$85,303,940				= 100%

sales and distribution data provided by 22 millwork companies

Table 39. Cabinet Sales through Distribution Channels as Reported by Survey Respondents.

To Whom <u>Products Sold</u>	PERCENT VOLUME		Total Sales/ (# of Firms)	Percent <u>Sales</u>
	<u>1-50%</u>	<u>51-100%</u>		
To Retail Customer	\$4,754,170 (19)	\$6,162,470 (7)	\$10,916,640 (26)	21%
To Other Industrial Manufacturer	\$520,000 (0)	\$520,000 (1)	(1)	1%
To Building Contractor	\$1,180,320 (9)	\$28,658,800 (19)	\$29,839,120 (28)	57%
To Home Center or Retail Outlet	\$2,500,000 (1)	\$1,700,000 (1)	\$4,200,000 (2)	8%
To Stocking Wholesaler or Distributor	\$2,537,510 (2)	(0)	\$2,537,510 (2)	5%
To Non-Stocking Wholesaler or Distributor	\$2,777,500 (3)	\$1,520,000 (1)	\$4,247,500 (4)	8%
To Export Wholesaler or Agent	(0)	(0)	(0)	
Other	(0)	(0)	(0)	
Total Segment Sales: \$52,260,770				= 100%

sales and distribution data provided by 33 cabinet companies

Table 40. Furniture Sales through Distribution Channels as Reported by Survey Respondents.

To Whom <u>Products Sold</u>	PERCENT VOLUME		Total Sales/ (# of Firms)	Percent Sales
	1-50%	51-100%		
To Retail Customer	\$4,024,820 (15)	\$13,947,050 (10)	\$17,971,870 (25)	27%
To Other Industrial Manufacturer	\$976,470 (4)	(0)	\$976,470 (4)	1%
To Building Contractor	\$342,460 (6)	\$540,000 (3)	\$882,460 (9)	1%
To Home Center or Retail Outlet	\$256,120 (5)	\$1,999,000 (7)	\$2,255,120 (12)	3%
To Stocking Wholesaler or Distributor	\$4,450,900 (6)	\$2,210,830 (3)	\$5,277,116 (9)	8%
To Non-Stocking Wholesaler or Distributor	\$666,400 (5)	\$39,091,150 (12)	\$39,757,550 (17)	59%
To Export Wholesaler or Agent	(0)	(0)	(0)	
Other	\$77,201 (3)	\$213,274 (1)	\$290,475 (4)	
Total Segment Sales: \$67,411,061				= 99%

sales and distribution data provided by 40 furniture companies

Table 41. Structural Component Sales through Distribution Channels as Reported by Survey Respondents.

To Whom <u>Products Sold</u>	PERCENT VOLUME		Total Sales/ (# of Firms)	Percent Sales
	1-50%	51-100%		
To Retail Customer	\$1,398,250 (9)	(0)	\$1,398,250 (9)	3%
To Other Industrial Manufacturer	\$150,000 (1)	(0)	\$150,000 (1)	
To Building Contractor	\$2,366,750 (3)	\$23,834,000 (8)	\$26,200,750 (11)	56%
To Home Center or Retail Outlet	\$2,542,500 (5)	\$2,880,000 (1)	\$5,422,500 (6)	12%
To Stocking Wholesaler or Distributor	\$2,400,000 (2)	(0)	\$2,400,000 (2)	5%
To Non-Stocking Wholesaler or Distributor	\$81,750 (1)	\$8,920,000 (3)	\$9,001,750 (4)	19%
To Export Wholesaler or Agent	\$2,000,000 (1)	(0)	\$2,000,000 (1)	4%
Other	(0)	(0)	(0)	
Total Segment Sales: \$46,573,250				= 99%

sales and distribution data provided by 40 structural component manufacturing firms.

Tables 36-41 show the 1988 sales volumes within each of the various distribution channels used by the six manufacturing segments evaluated in earlier chapters: remanufacturers and manufacturers of pallets and containers, millwork, cabinets, furniture, and structural wood members. These tables help to differentiate the type of distribution channel intermediaries used within each manufacturing segment, by showing the relative dollar flows from each type of distribution mechanism back to manufacturers. It should be noted that the amounts shown are those reported by respondents to this survey only, and do not represent the total amount of business activity occurring in the state for each segment. Also, some industrial segments--namely the premanufactured housing and buildings segment and the wood treating segment--were excluded from analysis due to too few survey respondents from that industry.

The remanufacturing segment (Table 36) is clearly dependent upon other industrial manufacturers to drive the demand for their products, as evidenced by 46% of the sales volume in the segment flowing through that channel. Other industrial manufacturers use the cutstock and components produced by the remanufacturing sector in the production of other products. Also important in this segment are non-stocking wholesalers and distributors, or those who do not take physical possession of the products, who match industrial and retail orders with manufacturers who can provide the product.

The pallet and container industry (Table 37) is relatively more dependent upon sales directly to their retail customers, which may be grocery chains, agricultural companies, warehouses, or other industries; 38% of the sales reported by the pallet and container industry were to the retail customer. The role of wholesalers and distributors appears to be minimal in the state's pallet and container group, as evidenced by relatively low sales volumes through these channels.

Millwork companies (Table 38), while reliant on a variety of distribution channels, appear to sell the greatest value of their products through wholesalers and distributors which actually take possession of their products at some point before they sell them to end users. Also relatively important in this sector are direct sales to building contractors; these contractors use millwork products such as doors, windows, and moldings in new construction and in repair and remodel work.

Cabinet manufacturers (Table 39) rely most heavily upon direct sales to building contractors and to retail customers. Furniture manufacturers (Table 40) similarly focus on their retail customers, but are apparently much more dependent on non-stocking wholesalers or distributors, which accounted for 59% of the 1988 sales reported by furniture manufacturers.

Structural component manufacturers (Table 41) are almost exclusively dependent upon the construction market and sales to building contractors for their livelihood. Sales to home centers or retail outlets appear to be heaviest in the structural component, cabinet, millwork, and furniture segments, although this distribution alternative did not comprise more than 15% of total sales in any one segment. Sales through export brokers or agents were substantial only in the remanufacturing and the structural component sectors. Three of the six groups--cabinets, structural components, and millwork manufacturers--are quite dependent on building contractors, and hence upon the construction market, for product sales. This fact may help to explain the fluctuations in these industries described earlier, where sharp job losses occurred during the recessionary period of the early 1980's.

PROMOTION

Of the promotional activities taking place in the secondary wood products sector, informal word-of-mouth promotion was the most frequently cited activity in all sectors. Promotional methods employed by 159 companies are listed in Table 42 by sector. The second most commonly employed promotional tool was the use of business cards. Product brochures were used by nearly half of the companies (47%) in 1988 as a means to promote their products, with the exception of the remanufacturing sector, where only one company out of 14 used them. About one-fifth of the firms use direct mailings to customers or potential customers to promote their business. The promotional activities conducted by industry associations were cited by 30% of the firms; this appears to be a relatively frequently used means of promotion in the structural wood component and pallet

and container segments. Participation in trade shows appears to be a common means of promotion in the millwork and furniture industries, where 52% and 35% of the companies, respectively, listed trade shows as a means of promotion employed. Relatively few companies use media advertising (18%), or advertising in trade journals (19%); the types of media advertising mentioned included the yellow pages (10 companies), newspapers (8 companies), magazines (6 companies), television commercials (3 companies), and radio advertisements (2 companies). Media advertising seems to be most prevalent in the furniture sector; furniture manufacturers may choose this means of promotion because they are closer along the value chain to consumers than other segments. Other means of promotion mentioned by companies included competitive bidding, the activities of sales representatives and brokers, showrooms, dealers, toll-free lines, and video tapes.

Table 42. Secondary Wood Products Promotional Practices by Manufacturing Segment.

<u>Promotion type:</u>	# OF COMPANIES USING								<u>Total</u> (n=159)	<u>Percent</u>
	Reman. (n=14)	Pallets (n=11)	Millwork (n=21)	Cabinet (n=31)	Furniture (n=40)	Struct. (n=13)	Others (n=29)			
Business cards	4	7	13	17	24	8	15	88	55%	
Brochures	1	4	13	9	24	6	18	75	47%	
Word-of-mouth	13	9	19	28	28	11	21	129	81%	
Direct mail	0	0	6	1	11	3	12	33	21%	
Media advertising	0	3	1	5	11	1	8	28	18%	
Industry associations	4	5	8	7	9	9	5	47	30%	
Trade shows	2	0	11	6	14	2	13	48	30%	
Trade journals	1	1	6	5	7	3	7	30	19%	
Other Promo. types	4	0	2	5	9	1	4	25	16%	

Promotional data provided by 164 survey respondents

OPPORTUNITIES

Survey participants were asked if opportunities exist to pursue new markets with their current products. Of the 163 respondents answering this question, 141, or 87%, responded that opportunities do exist; 11 firms answered that opportunities do not exist and 10 responded that they do not know. Figure 13 shows these results. It appears that the majority of manufacturers are optimistic that new market opportunities do at least exist, although no information is available on whether or not respondents feel that they can capitalize on these opportunities. The 22 companies stating either that opportunities did not exist or that they did not know were from all manufacturing sectors; no conclusions can be drawn from this data about whether greater opportunities exist in one secondary manufacturing sector over another.

New Market Opportunities for Current Products

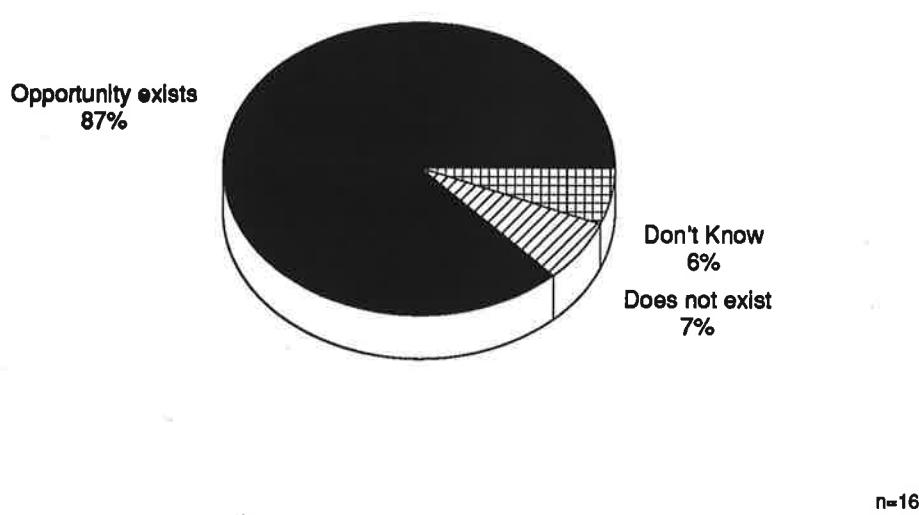


Figure 13. Survey Respondent Perception of Opportunity to Pursue New Markets with Current Products.

INDUSTRY ISSUES AND OUTLOOK

PROBLEMS

One objective of this study was to identify some of the problems and issues confronting secondary wood products manufacturing firms. Survey participants were asked to evaluate several potential problems, rating each as: 1--a serious problem, 2--of some concern, and 3--not a problem. The results of this evaluation are shown in Table 43, where problems are listed by decreasing average rating given by the group of all manufacturers. The number of companies giving a problem each rating is also shown. Tables 44-48 report the top five problems expressed--taxation, raw material supply or cost, cost of capital, labor supply or cost, and government regulations or policy--by results in each sector, providing a comparison of most of the major secondary wood products industries in the state.

Table 43. Problems Facing Secondary Manufacturing Firms Listed by Frequency of Response.

	serious problem (1)	some concern (2)	not a problem (3)	mean value	n=
<u>problem:</u>					
taxes	63	70	19	1.71	152
raw material supply or cost	54	85	14	1.74	153
cost of capital	41	82	27	1.91	150
labor supply or cost	38	91	27	1.93	156
gov. regulations or policies	48	66	38	1.93	152
financial problems	25	70	53	2.19	148
cost of new product development	29	57	60	2.21	146
quality control problems	18	76	52	2.23	147
outdated plant	18	76	54	2.24	148
limited marketing expertise	19	58	68	2.34	145
sales problems	16	63	67	2.35	146
lack of computer skills	13	58	74	2.42	145
lack of customers	12	45	89	2.53	146
distribution problems	12	38	93	2.57	143
labor relations	7	44	96	2.61	147
lmtd. wood processing expertise	2	39	99	2.69	140
located too far from markets	4	31	109	2.73	144

other problems mentioned:

A constantly fluctuating market	Trouble contacting customers
Availability of financing	Lumber grading slipping
Financial backing and sales	Money to expand
Can't find enough (good) help	Poor grade and quality of lumber
Cost of shop space	State regulations
Duty on laminated squares from Canada	Unrealistic environmental regulations
Excessive environmental regulations	Capital to operate during slow time
Disposal of waste by-products	Product liability costs
Health insurance costs	

Table 44. Ratings of Taxes as a Problem Facing Secondary Manufacturers, by Primary Business Type.

Business Type:	serious problem (1)	some concern (2)	not a problem (3)	n=	mean
Pallets and Containers	8	3	0	11	1.27
Millwork Manufacturer	10	8	1	19	1.42
Cabinet Manufacturer	12	14	4	30	1.73
Structural Components	5	5	2	12	1.75
Furniture Manufacturer	15	16	6	37	1.76
Remanufacturers	4	10	1	15	1.80
All Others	<u>9</u>	<u>14</u>	<u>5</u>	<u>28</u>	<u>1.86</u>
Total:	63	70	19	152	1.71

Government taxation (Table 44) was the problem rated as serious most frequently by secondary manufacturing firms. It is not known which taxes--federal, state, or local--are considered excessive, or whether rating taxes as a problem was instead a general statement by companies feeling burdened by the government. Few additional comments regarding taxation offered clues about the specific problems which may exist. Raw material supply or cost (Table 45) is a problem seriously affecting 54 companies and is of some concern to 85 others. The problem of raw material supply or cost appears to be particularly acute in the remanufacturing, millwork, and the pallet and container industries, as well as in companies classified as "other". Raw material concerns dominate additional comments written by firms on the back of the survey questionnaire. Several respondents wrote statements critical of log and lumber exports, stating that exports were driving up the prices they pay for raw materials. One respondent commented:

We ship too many logs out--we need to keep stock here for jobs in our state. Keeping the logs in our state would give the small companies a chance to purchase the stock, but now we can't get the opportunity to purchase the stock we need!

This was a common theme among the several respondents criticizing log and lumber exports; it should be noted, however, that other manufacturers, particularly those targeting export markets for product sales, may feel differently about limiting exports. Another manufacturer wrote of concerns regarding wood quality: "It is very disturbing to use the poor grade and quality of lumber we have to purchase to make a quality product..."

Table 45. Ratings of Raw Material Supply or Cost as a Problem Facing Secondary Manufacturers, by Primary Business Type.

Business Type:	serious problem (1)	some concern (2)	not a problem (3)	n=	mean
Pallets and Containers	11	4	0	15	1.27
Millwork Manufacturer	6	3	1	10	1.50
Cabinet Manufacturer	10	10	2	22	1.64
Structural Components	12	13	3	28	1.68
Furniture Manufacturer	5	21	3	29	1.79
Remanufacturers	2	9	0	11	1.82
All Others	<u>8</u>	<u>25</u>	<u>5</u>	<u>38</u>	<u>1.92</u>
Total:	54	85	14	153	1.74

The high cost or limited availability of capital was shown earlier to be the factor most limiting firms from investing in new equipment or technology. The high cost of capital was the third most frequently mentioned problem of at least some concern to secondary manufacturers overall. Table 46 shows the evaluation of this problem by industry. One manufacturer expressed his concern about interest rates:

Every time you turn around, someone in government is making it harder and more expensive.
Government regulating interest rates kills us!

Table 46. Ratings of Cost of Capital as a Problem Facing Secondary Manufacturers, by Primary Business Type.

Business Type:	serious problem (1)	some concern (2)	not a problem (3)	n=	mean
Millwork Manufacturer	9	6	4	19	1.74
Furniture Manufacturer	14	19	5	38	1.76
Structural Components	3	8	1	12	1.83
Remanufacturers	3	10	2	15	1.93
Cabinet Manufacturer	6	19	5	30	1.97
All Others	6	15	6	27	2.00
Pallets and Containers	0	5	4	9	2.44
	41	82	27	150	1.91

Labor supply or cost (Table 47) was cited as a serious problem by 38 of the survey respondents. The other problem affecting a large proportion of respondents was stated generally as government regulations and policies (Table 48). This problem, or this set of problems, was also evaluated as serious by 38 respondents. Environmental regulations were cited by manufacturers in the wood preserving business as being too restrictive. Other firms mentioned state and federal policies supporting raw log exports as negatively impacting their business. Government regulations concerning dust in the work place were cited by one firm as too restrictive and costly to comply with.

Table 47. Ratings of Labor Supply or Cost as a Problem Facing Secondary Manufacturers, by Primary Business Type.

Business Type:	serious problem (1)	some concern (2)	not a problem (3)	n=	mean
Pallets and Containers	4	6	0	10	1.60
Cabinet Manufacturer	12	16	4	32	1.63
Furniture Manufacturer	12	20	6	38	1.84
Structural Components	1	10	1	12	2.00
Millwork Manufacturer	3	13	4	20	2.05
Remanufacturers	3	8	4	15	2.07
All Others	3	16	8	27	2.19
Total:	38	89	27	154	1.93

Table 48. Ratings of Government Regulations or Policies as a Problem Facing Secondary Manufacturers, by Primary Business Type.

Business Type:	serious problem (1)	some concern (2)	not a problem (3)	n=	mean
Millwork Manufacturer	6	12	2	20	1.80
All Others	13	6	8	27	1.81
Cabinet Manufacturer	9	17	4	30	1.83
Structural Components	4	5	3	12	1.92
Furniture Manufacturer	11	16	11	38	2.00
Pallets and Containers	3	3	4	10	2.10
Remanufacturers	2	7	6	15	2.27
Total:	48	66	38	152	1.93

The five problems evaluated as the most serious, on average, by the group of all survey respondents--taxation, raw material supply or cost, cost of capital, labor supply or cost, and government regulations or policy--may be characterized as outside of the control of individual businesses; that is, they are conditions inherent in the business environment and not within the company. The potential business environment problem which was not considered serious or at least of some concern to the majority of respondents was a lack of customers, viewed as a serious problem by only 12 companies and of some concern to 45 others. Given this information and the fact that 87% of the respondents stated that additional market opportunities existed for their current products, it appears that at the time of this survey (Summer of 1989), there were enough customers for the majority of companies manufacturing secondary wood products in Washington State.

Some conditions internal to the firm such as quality control problems, financial difficulties, the cost of new product development, operating an outdated production facility, having limited marketing expertise, and experiencing sales problems were considered trouble points of at least some concern to many survey respondents. These problems can be chronic, and solving them and others inherent to small- and medium-sized businesses in the face of external challenges such as business cycles, increasing raw material costs, and changing consumer and industrial preferences is often a struggle.

Conditions which were not considered to be problems by the majority of respondents include a lack of computer skills, distribution problems, labor relations, having limited wood processing expertise, and being located too far away from markets.

ECONOMIC DEVELOPMENT ISSUES

Several broad economic development issues may be addressed through the findings of this research. It is a common assertion, and often a reason cited by analysts and state policy makers for promoting "value added" development programs, that the secondary processing industries are more stable than primary processing industries and less susceptible to national economic trends, including recession. On the contrary, although opportunities for growth in secondary wood products manufacture may exist, this sector is quite susceptible to fluctuations in construction markets and national economic trends. The overall employment effects of the 1979-1982 recession were presented earlier, and effects within each industry are shown in Appendix C. Data published by the Washington State Employment Security Department shows a net job loss in the secondary wood products industries between 1978 and 1982 of 3775 jobs, or 28.3% of the employment in these industries.

The volume of direct sales to building contractors by some of the industry groups in this study also indicates their reliance upon construction markets. As construction markets weaken in a sluggish economy, orders by building contractors for secondary wood products diminish. This same relationship may be expressed in sales through intermediaries such as brokers or wholesalers--the effect will be indirect, but no less damaging to secondary manufacturers dependent on construction markets. There may be secondary wood products markets which are "recession proof", such as specialty markets for less durable goods such as wooden toys or chopsticks (Mater Engineering, Ltd., 1989), but whether these markets represent a significant opportunity for intensive economic development efforts is uncertain.

On the positive side it may be argued that secondary wood products markets represent a greater degree of diversity for manufacturers, and that diversifying production to serve additional markets than those for standard commodity products will minimize risk. Furthermore, eighty-seven percent of the secondary manufacturers responding to the mail questionnaire indicated that opportunities exist to pursue new markets with their current products; only 8% of the respondents indicated that a lack of customers was a serious problem facing their business during the summer of 1989. The recovery of the secondary products industries as a whole has been dramatic in Washington State since the early 1980's, where the total number of jobs in the sector reached an all time high in 1988, to 13,202 jobs. In contrast, employment levels in the primary manufacturing sector never fully recovered to levels existing during the late 1970's. Policies and programs designed to encourage secondary manufacturing and "value added" production may offer promising alternatives to the development of additional primary wood products processing facilities, but it should be recognized that the secondary industries are by no means immune to general economic downturns.

Another economic development issue centers around efforts to encourage existing secondary wood products manufacturing firms or start-up businesses to locate in areas which are currently dependent on logging or the production of primary wood commodities such as softwood dimension lumber. Economic planners and others interested in transferring secondary wood products processing technologies to timber dependent areas should recognize that the majority of companies in the past have located in or nearby urban areas within the state's manufacturing and finance counties. Understanding economic and market factors contributing to this locational pattern will provide insight to those involved in rural development. Western Washington was shown to be the market targeted by two-thirds of the respondents to this survey. The majority of survey respondents feel that their current location provides them adequate access to target markets; 76% do not consider being located too far from markets to be a problem facing their firm at all. However, of the 22 companies who indicated distance from markets to be of at least some concern to their company, 11, or 50%, are located in the state's agricultural and timber counties as defined by Dolbeare et al. (1983). This number is disproportionately high when compared with the location of companies in the survey population; only 154, or 24%, of the original 634 firms in the population are located in agricultural or timber counties.

Possessing an economically viable means to access potential markets and obtaining timely market information may be critical to secondary manufacturing firms located in the state's rural areas. The relatively high cost of transporting goods to major markets, and the high cost of transporting raw materials to the manufacturing facility or shop if the products manufactured are not made with locally grown raw materials may barriers to locating secondary manufacturing firms in rural areas. It was shown in this study that many of the present firms rely upon the import of hardwood species from the Eastern US or other regions for at least some of their current products. Locating near shipping, rail, and trucking centers may reduce the cost of transporting raw materials from outside of the state, and reduce the cost of shipping finished products.

McCoy and Chang (1983) studied secondary wood products manufacturers in Kentucky which had gone out of business during the period 1970-1980, and reported that a major contributing factor leading to plant closures was the low productivity of the Kentucky work force in the wood products sector compared with surrounding states. No attempt was made to measure worker productivity in the present study, although it was found that labor supply or cost was of at least some concern to 82% of the survey respondents, and a serious problem for 25% of the firms. Fifty-six companies (35% of the respondents to that question) cited availability or cost of skilled labor as a factor limiting them from investing in new equipment or technology. It is difficult to determine *post hoc* whether labor cost or labor availability was the key element causing survey participants to

rate this as a problem, although additional comments provided by a few respondents spoke of the difficulty of finding good help. The availability of skilled and unskilled labor was found to be a primary consideration in choosing a particular location for expanding furniture companies in Virginia and North Carolina (Brock and Hilliard, 1977). The availability of experienced woodworkers may similarly be a prime consideration for new or expanding secondary manufacturing firms choosing between location alternatives in the state; rural timber-dependent communities must compete with other areas to meet the labor requirements of the secondary manufacturing industries. Given the barrier presented above, encouraging new or expanding secondary manufacturing firms to locate in timber and recreational counties with the objective of maintaining employment in wood processing industries in those areas will be a great challenge, and may require incentives if such an effort to succeed.

Respondents to the survey questionnaire, on average, believed that technology in their industries is changing at only a moderate rate. Most firms, however, perceive the need to invest in additional equipment or technology in the next two years. The availability of capital and the high risk of capital investment in the current business environment were seen as the two factors most limiting firms from making new investments in their facilities. The high cost of capital was shown to be the third most serious problem facing firms in this sector overall, just below taxes and raw material availability or cost. Economic development programs targeting "value added" industries may benefit those industries by incorporating an analysis of funding sources and capital available to firms operating in each sector.

Raw material supply problems currently plague the primary wood products sector in Washington State; these problems are also felt by the secondary manufacturing industries. Raw material supply or cost was the second most frequently indicated problem facing respondent firms, and was the predominant issue addressed in additional comments written by survey respondents. Those segments of the secondary wood processing sector relying heavily on softwoods harvested from Northwest forests--remanufacturers, millwork producers, and structural wood component manufacturers, among others--will increasingly feel the impact of a reduced timber supply, especially those companies which have used higher grade products often cut from old-growth logs as raw materials.

THE VALUE ADDED QUESTION

The dilemma of adding value through wood products manufacture can perhaps best be discussed through two different lines of reasoning. The first approach concerns itself with adding value to local forest resources, and promotes the concept of capturing the most value out of the resources available by producing those products which provide the greatest net return on investment. Heated discussions can easily arise over whether returns should be financial, social, biological, or some combination of the three, but assuming that wood is available from the forest for manufacture, the question becomes that of which products to produce to create the greatest net returns. This is a question whose answer has traditionally been left to the private sector; in the case of Washington's forests, often the highest net returns to property owners today are realized by selling unprocessed logs to overseas customers. If the objective is to capture more value from Washington's forests through secondary product manufacture, then the challenge will be to assure that the capital, skilled labor, product development expertise, and marketing information is available to manufacturers to ensure that a wide range of secondary products are produced from locally grown raw materials, products which provide greater returns to landowners and manufacturers than the primary commodities most often produced--dimension lumber, chips, and export logs.

The second element to the value added dilemma is that of how to add value to local communities or to the state's economy. It was shown in this research that secondary manufacturing does not necessitate the use of locally produced wood raw materials. Species in high demand locally for appearance products such as cabinetry or furniture are often Eastern US hardwoods, to which value is added by processing in Washington. These industries are often more fashion than utility oriented. Other "outside" wood raw materials used by the secondary manufacturing industries include particleboard, medium density fiberboard, and other composite products. If it is an economic development objective to add value from wood processing activities to local urban, suburban and rural communities in the state, then the challenge will be to encourage additional

investment and growth in secondary wood processing industries, regardless of whether or not companies base their product lines on locally grown raw materials.

FUTURE NEEDS

One effort to assess any group of industries as diverse and fragmented as those manufacturing secondary wood products in Washington will undoubtedly leave stones unturned; that is, questions remain which should be addressed in future work. One large remaining question is how much secondary processing activity is taking place in the primary sawmilling sector? Working within the existing Standard Industrial Classification coding system provides little information from published data about lumber remanufacturers classified as sawmills. No attempt was made to survey the primary wood products sector to determine the amount of secondary manufacturing occurring there.

Two changes in the existing SIC wood products classification scheme would be lend themselves to better industry analysis. The first would be the creation of a remanufacturing industry group, defined as those firms which primarily use lumber as a raw material and alter it through various processing technologies into cutstock or component stock. Another useful change would be to move the Wood Kitchen Cabinet industry (SIC 2434), currently classified under Wood and Wood Products (SIC 24) into the Furniture and Fixture (SIC 25) group. The attributes of cabinet manufacturers responding to this survey more closely resemble those of furniture makers than any other industry.

A better understanding of the business environment and locational factors influencing investment in and placement of new or expanding secondary manufacturing facilities may benefit policymakers and economic development agencies engaged in the promotion of "value-added" wood products industries in Washington. A competitive analysis of Washington State relative to other states and provinces would provide a better regional perspective; a competitive analysis of potential locations within the state would help to better explain the reasons behind the geographic concentration of firms in or near urban areas.

An examination of foreign markets and market developments, export marketing channels, and trade barriers to secondary wood products export may benefit Washington secondary manufacturers interested in exploring international trade opportunities. Design and engineering studies of potential new products to be manufactured from local species may benefit those interested in the "value added from local raw materials" approach. Further study of technologies which enable substitute products to be manufactured from less expensive resources, or those which "extend" resources, such as finger-jointing processes and laminated cabinetry systems, is needed.

The general assessment of Washington's secondary wood products manufacturers prepared through this research can perhaps best provide a basis for in-depth research of each manufacturing group and hypotheses for further study. An in-depth examination of each of the major secondary manufacturing industries may explain some of the comparative advantages and disadvantages found in the Pacific Northwest and in Washington.

An assessment of secondary manufacturing firms located in Alberta, Canada (Heit and Bohning, 1988) revealed similar company characteristics to Washington firms in terms of the size of firms and the value of sales. Authors of the Alberta study concluded that a secondary manufacturing industry association was needed in the province "to promote products, enhance communications within the industry and between the industry and government, and generally represent the interests of the industry." It is doubtful that a single secondary manufacturing industry association in Washington could meet the needs of this diverse group of manufacturers, but some form of manufacturer representation would be useful in policy planning and formulation. Given the current interest in this sector of the wood products economy, a forum for the discussion and presentation of issues facing manufacturers in the secondary industries would be a positive step toward better communication between industry and government.

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APPENDIX A SIC CODE AND PRODUCT DESCRIPTION

The following material is excerpted from the Standard Industrial Classification Manual, 1987 edition (National Technical Information Service, 1987). Each four-digit SIC industry included in this study is briefly described, followed by a list of the products manufactured by establishments classified within that industry. An establishment is at a single physical location and is engaged in one, or predominantly one, type of economic activity. An establishment is not necessarily identical to a company or enterprise.

MAJOR GROUP NUMBER 24: WOOD AND WOOD PRODUCTS

Industry Number

2426 Hardwood Dimension and Flooring Mills

Establishments primarily engaged in manufacturing hardwood dimension lumber and workings therefrom; and other hardwood dimension, semi-fabricated or ready for assembly; hardwood flooring; and wood frames for household furniture.

Blanks, wood: for bowling pins, handles, and textile machinery accessories
Blocks, wood: for bowling pins, handles, and textile machinery accessories
Bobbin blocks and blanks, wood
Brush blocks, wood: turned and shaped
Carvings, furniture: wood
Chair seats, hardwood
Dimension, hardwood
Flooring, hardwood
Frames for upholstered furniture, wood
Furniture dimension stock, hardwood
Furniture squares, hardwood
Furniture turnings and carvings, wood
Gun stocks, wood
Handle blanks, wood
Handle stock, sawed or planed
Lumber, hardwood dimension
Parquet flooring, hardwood
Picker stick blanks
Rounds or rungs, ladder and furniture: hardwood
Shuttle blocks: hardwood
Spool blocks and blanks, wood
Stock, chair: hardwood--turned, shaped, or carved
Table slides, for extension tables: wood
Turnings, furniture: wood
Vehicle stock, hardwood

2431 Millwork

Establishments primarily engaged in manufacturing fabricated wood millwork, including wood millwork covered with materials such as metal and plastics.

Awnings, wood
Blinds (shutters), wood
Brackets, wood
Door jambs, wood
Door trim, wood
Door units, prehung: wood and covered wood
Doors, combination screen-storm: wood
Doors, wood and covered wood
Floor baseboards, wood
Garage doors, overhead: wood
Jalousies, glass: wood frame
Louver windows and doors, glass with wood frame
Millwork products
Moldings, wood and covered wood: unfinished and prefinished
Newel posts, wood
Ornamental woodwork: e.g. cornices and mantels
Panel work, wood
Planing mills, millwork
Porch work, wood
Railings, stair: wood
Sash, door and window: wood and covered wood
Screens, door and window: wood and covered wood
Silo staves, wood
Staircases and stairs, wood
Trellises, wood
Trim, wood and covered wood
Venetian blind slats, wood
Wainscots, wood
Weather strip, wood
Window frames and sash, wood and covered wood
Window screens, wood
Window trim, wood and covered wood
Window units, wood and covered wood
Woodwork, interior and ornamental: e.g., windows, doors, sash, and mantels

2434 Wood Kitchen Cabinets

Establishments primarily engaged in manufacturing wood kitchen cabinets and wood bathroom vanities, generally for permanent installation.

Cabinets, wood: to be installed
Kitchen cabinets, wood: to be installed
Vanities, bathroom, wood: to be installed

2439 Structural Wood Members

Establishments primarily engaged in producing laminated or fabricated trusses, arches, and other structural members of lumber.

Structural members, laminated wood: arches, trusses, timbers, and parallel chord ceilings
Trusses, wood

2441 Nailed and Lock Corner Wood Boxes and Shook

Establishments primarily engaged in manufacturing nailed and lock corner wood boxes (lumber or plywood), and shook for nailed and lock corner boxes.

- Ammunition boxes, wood
- Box cleats, wood
- Boxes, wood: plain or fabric covered, nailed or lock corner
- Carrier trays, wood
- Chests for tools, wood
- Cigar boxes, wood and part wood
- Egg cases, wood
- Flats, wood: greenhouse
- Packing cases, wood: nailed or lock corner
- Shipping cases, wood: nailed or lock corner
- Shook, box
- Trunk slats, wood

2448 Wood Pallets and Skids

Establishments primarily engaged in manufacturing wood or wood and metal combination pallets and skids.

- Pallet containers, wood or wood and metal combination
- Pallets, wood or wood and metal combination

2449 Wood Containers, Not Elsewhere Classified

Establishments primarily engaged in manufacturing wood containers, not elsewhere classified, such as cooperage, wirebound boxes and crates, and other veneer and plywood containers.

- Barrels, wood: coopered
- Baskets, fruit and vegetable: e.g., till, berry, climax, round stave
- Berry cups, veneer and splint
- Boxes, wood: wirebound
- Buckets, wood: coopered
- Casks, wood: coopered
- Chicken coops (crates), wood: wirebound for shipping poultry
- Climax boxes
- Containers made of staves
- Containers, veneer and plywood: except nailed and lock corner boxes
- Cooperage
- Coopered tubs
- Crates: berry, butter, fruit, and vegetable--wood, wirebound
- Drums, plywood
- Drums, shipping: wood--wirebound
- Firkins and kits, wood: coopered
- Fruit baskets, veneer and splint
- Hampers, fruit and vegetable: veneer and splint
- Hogsheads, wood: coopered
- Hot tubs: coopered
- Kegs, wood: coopered
- Kits, wood: coopered
- Market baskets, fruit and vegetable: veneer and splint
- Pails, plywood
- Pails, wood: coopered
- Splint baskets, for fruits and vegetables
- Tanks, wood: coopered
- Tierces (cooperage)
- Till baskets, veneer and splint
- Tobacco hogsheads
- Tubs, wood: coopered
- Vats, wood: coopered

Vegetable baskets, veneer and splint

2451 Mobile Homes

Establishments primarily engaged in manufacturing mobile homes and non-residential mobile buildings. These units are generally more than 35 feet long, at least 8 feet wide, do not have facilities for storage of water or waste, and are equipped with wheels.

Buildings, mobile: commercial use
Mobile buildings for commercial use (e.g., offices, banks)
Mobile classrooms
Mobile dwellings
Mobile homes, except recreational

2452 Prefabricated Wood Buildings and Components

Establishments primarily engaged in manufacturing prefabricated wood buildings, sections, and panels.

Buildings, prefabricated and portable: wood
Chicken coops, prefabricated: wood
Corn cribs, prefabricated: wood
Farm buildings, prefabricated or portable: wood
Floors, prefabricated: wood
Geodesic domes, prefabricated: wood
Houses, portable: prefabricated wood--except mobile homes
Log cabins, prefabricated: wood
Marinas, prefabricated: wood
Panels for prefabricated wood buildings
Sauna rooms, prefabricated: wood
Sections for prefabricated wood buildings

2491 Wood Preserving

Establishments primarily engaged in treating wood, sawed or planed in other establishments, with creosote or other preservatives to prevent decay and to protect against fire and insects. This industry also includes the cutting, treating, and selling of poles, posts, and piling, but establishments primarily engaged in manufacturing other wood products, which they may also treat with preservatives, are not included.

Bridges and trestles, wood: treated
Creosoting of wood
Crossties, treated
Flooring, wood block: treated
Millwork, treated
Mine props, treated
Mine ties, wood: treated
Piles, foundation and marine construction: treated
Piling, wood: treated
Poles and pole crossarms, treated
Poles, cutting and preserving
Posts, wood: treated
Preserving of wood (creosoting)
Railroad cross bridge and switch ties, treated
Railway crossties, wood: treated
Structural lumber and timber, treated
Vehicle lumber, treated
Wood fence: pickets, poling, rails--treated
Wood products, creosoted

2499 Wood Products, Not Elsewhere Classified

Establishments primarily engaged in manufacturing miscellaneous wood products, not elsewhere classified, and products from rattan, reed, splint, straw, veneer strips, wicker, and willow.

Applicators, wood
Bakers' equipment, wood
Baskets, except fruit, vegetable, fish, and bait: (e.g., rattan, reed, straw)
Battery separators, wood
Bearings, wood
Beekeeping supplies, wood
Bentwood (steam bent) products, except furniture
Blocks, tackle; wood
Blocks, tailors' pressing; wood
Boards, bulletin: wood and cork
Boards: clip, ironing, meat, and pastry--wood
Boot and shoe lasts, regardless of material
Bowls, wood: turned and shaped
Briquets, sawdust or bagasse: nonpetroleum binder
Bungs, wood
Buoys, cork
Bushings, wood
Cane, chair: woven of reed or rattan
Carpets, cork
Cloth winding reels, wood
Clothes dryers (clothes horses), wood
Clothes drying frames, wood
Clothespins, wood
Clubs, police: wood
Cooling towers, wood or wood and sheet metal combination
Cork products
Corks, bottle
Covers, bottle and demijohn: willow, rattan, and reed
Curtain stretchers, wood
Dishes, wood
Display forms for boots and shoes, regardless of material
Dowels, wood
Extension planks, wood
Faucets, wood
Fellies, wood
Fencing, wood: except rough pickets, poles, and rails
Firewood and fuel wood containing fuel binder
Flour, wood
Frames: medallion, mirror, photograph, and picture--wood or metal
Furniture inlays (veneers)
Garment hangers, wood
Gavels, wood
Grain measures, wood: turned and shaped
Hammers, meat: wood
Hampers, laundry: rattan, reed, splint, veneer, and willow
Handles, wood: turned and shaped
Hubs, wood
Insulating materials, cork
Jacks, ladder: wood
Knobs, wood
Ladders, wood
Last sole patterns, regardless of material
Letters, wood
Life preservers, cork
Mallets, wood
Market baskets, except fruit and vegetable: veneer and splint
Marquetry, wood
Mashers, potato: wood
Masts, wood
Mauls, wood
Moldings, picture frame: finished
Novelties, wood fiber
Oars, wood
Pads, table: rattan, reed, and willow
Paint sticks, wood

Pencil slats
Plugs, wood
Poles, wood: e.g., clothesline, tent flag
Pressed logs of sawdust and other wood particles, nonpetroleum binder
Pulleys, wood
Racks, for drying clothes: wood
Rattan ware, except furniture
Reed ware, except furniture
Reels, cloth winding: wood
Reels, for drying clothes: wood
Reels, plywood
Rollers, wood
Rolling pins, wood
Rules and rulers: wood, except slide
Saddle trees, wood
Sawdust, reground
Scaffolds, wood
Scoops, wood
Seat covers, rattan
Seats, toilet: wood
Shoe stretchers, regardless of material
Shoe trees, regardless of material
Signboards, wood
Skewers, wood
Snow fence
Spars, wood
Spigots, wood
Spokes, wood
Spools, except for textile machinery: wood
Stakes, surveyors': wood
Stepladders, wood
Stoppers, cork
Tile, cork
Tool handles, wood: turned and shaped
Toothpicks, wood
Trays: wood, wicker, and bagasse
Trophy bases, wood
Vats, wood: except coopered
Washboards, wood and part wood
Webbing: cane, reed, and rattan
Willow ware, except furniture
Wood, except furniture: turned and carved
Woodenware, kitchen and household
Yardsticks, wood

MAJOR GROUP NUMBER 25: FURNITURE AND FIXTURES

2511 Wood Household Furniture, Except Upholstered

Establishments primarily engaged in manufacturing wood household furniture commonly used in dwellings. This industry also includes establishments manufacturing camp furniture.

Beds, including folding and cabinet beds: household--wood
Bookcases, household: wood
Breakfast sets (furniture), wood
Bridge sets (furniture), wood
Bufets (furniture)
Cedar chests
Chairs, bentwood
Chairs, household: except upholstered--wood
Chests, silverware: wood (floor standing)
Chiffoniers and chifforobes
China closets
Coffee tables, wood
Console tables, wood
Cots, household: wood
Cradles, wood
Cribs, wood

Desks, household: wood
Dining room furniture, wood
Dressers
Dressing tables
End tables, wood
Frames for box springs, bedsprings, or water beds: wood
Furniture, household, wood: porch, lawn, garden, and beach
Furniture, household, wood: unassembled or knock-down
Furniture, household, wood: unfinished
Furniture: household, clubroom, novelty--wood, except upholstered
Headboards, wood
High chairs, children's: wood
Juvenile furniture, wood: except upholstered
Magazine racks, wood
Nursery furniture, wood
Playpens, children's: wood
Rockers, wood: except upholstered
Room dividers, household: wood
Screens, privacy: wood
Secretaries, household: wood
Stands: telephone, bedside, and smoking--wood
Stools, household: wood
Storage chests, household: wood
Swings, porch: wood
Tables, household: wood
Tea wagons, wood
Vanity dressers
Wardrobes, household: wood
Whatnot shelves, wood

2512 Wood Household Furniture, Upholstered

Establishments primarily engaged in manufacturing upholstered furniture on wood frames.

Chairs, upholstered on wood frames, except convertible beds
Couches, upholstered on wood frames, except convertible beds
Furniture, household: upholstered on wood frames, except convertible beds
Juvenile furniture, upholstered on wood frames, except convertible beds
Living room furniture, upholstered on wood frames, except convertible beds
Recliners, upholstered on wood frames
Rockers, upholstered on wood frames
Sofas, upholstered on wood frames, except convertible beds

2517 Wood Television, Radio, Phonograph, and Sewing Machine Cabinets

Establishments primarily engaged in manufacturing wood cabinets for radios, television sets, phonographs, and sewing machines.

Audio cabinets, wood
Cabinets, wood: radio, television, phonograph, and sewing machines
Phonograph cabinets and cases, wood
Radio cabinets and cases, wood
Sewing machine cabinets and cases, wood
Television cabinets, wood

2521 Wood Office Furniture

Establishments primarily engaged in manufacturing office furniture, chiefly of wood.

Benches, office: wood
Bookcases, office: wood
Cabinets, office: wood
Chairs, office: wood
Desks, office: wood
Filing boxes, cabinets, and cases: wood

Furniture, office: wood
Modular furniture systems, office, wood
Panel furniture systems, office, wood
Partitions, office: not for floor attachment--wood
Stools, office: wood
Tables, office: wood

2531 Public Building and Related Furniture

Establishments primarily engaged in manufacturing furniture for schools, theaters, assembly halls, churches, and libraries. Establishments primarily engaged in manufacturing seats for public conveyances, as well as seats for automobiles and aircraft, are included in this industry.

Benches for public buildings
Blackboards, wood
Bleacher seating, portable
Chairs, portable folding
Church furniture, except stone or concrete
Furniture: church, library, school, theater, and other public buildings
Pews, church
School furniture, except stone and concrete
Seats: automobile, vans, aircraft, railroad, and other public conveyances
Stadium seating

2541 Wood Office and Store Fixtures, Partitions, Shelving, and Lockers

Establishments primarily engaged in manufacturing shelving, lockers, and office and store fixtures, plastics laminated fixture tops, and related fabricated products, chiefly of wood. Prefabricated partitions are included in this industry if designed to be attached to the floor and are classified in Industry 2521 if designed to be free-standing or part of an office furniture panel system.

Bar fixtures, wood
Butchers' store fixtures, wood
Cabinets, show, display, and storage: except refrigerated--wood
Display cases and fixtures, not refrigerated: wood
Drainboards, plastics laminated
Fixture tops, plastics laminated
Fixtures, display: office and store-- wood
Garment racks, wood
Lockers, not refrigerated: wood
Lunchroom fixtures, wood
Partitions, prefabricated: wood--for floor attachment
Pedestals, statuary: wood
Racks, merchandise display: wood
Shelving, office and store: wood
Showcases, not refrigerated: wood
Sink tops, plastics laminated
Store fronts, prefabricated: wood
Table or counter tops, plastics laminated
Telephone booths, wood
Window backs, store and lunchroom: prefabricated--wood

2599 Furniture and Fixtures, Not Elsewhere Classified

Establishments primarily engaged in manufacturing furniture and fixtures, not elsewhere classified, including hospital beds and furniture specially designed for use in restaurants, bars, cafeterias, bowling centers, and ships.

Bar furniture
Beds, hospital
Bowling center furniture
Cafeteria furniture
Carts, restaurant
Dish carts, restaurant
Factory furniture: stools, work benches, tool stands, and cabinets
Food trucks, restaurant
Restaurant furniture
Ship furniture
Stools, metal: with casters--not household or office
Work benches, industrial

APPENDIX B
SURVEY QUESTIONNAIRE

**Washington State Secondary Wood Products
Industry Questionnaire**

Check here if your company does not use wood products as raw materials in manufacture or is no longer in business. Include your company name so we can remove it from our mailing list:
Please return the survey in the envelope provided.
Otherwise, continue below.

1. Please indicate your position/title: _____

2. The company is a (select one):
 corporation partnership
 sole proprietorship

This company is (select one):

an independent company
 a subsidiary of another firm

3. Year company established: _____

If your company has more than one manufacturing facility, please answer this survey in terms of the facility at your location only.

4. General Type of Business (check one):

remanufacturer
 pallet or container manufacturer
 pressure treatment plant
 millwork manufacturer
 cabinet manufacturer
 furniture manufacturer
 factory-built homes or buildings
 wood structural components (e.g. trusses)
 primary mill with extensive remanufacturing
 other (please name) _____

5. Major Products Manufactured in 1988 (please list top three products in terms of dollar sales):

- 1) _____
 2) _____
 3) _____

6. What, if any, wood products did your firm export in 1988? (please list product(s) and destination countries) _____

7. What, if any, wood products did your firm import in 1988 for use in manufacture? (please list product(s) and countries of origin) _____

8. For statistical purposes, what were your company's total dollar sales in 1988? (please respond in terms of your production facility only):

Amount: \$ _____

9. How many people are employed at your facility? (enter number):

Staff: _____ Hourly, full-time: _____
 Hourly, part-time or seasonal: _____

10. Is your company: union non-union

11. Origin of wood used for manufacture in 1988:

Location	Percent Volume
Washington	%
Oregon	%
Idaho	%
British Columbia	%
Other states or provinces (please list):	%
_____	%
_____	%
_____	%
Other foreign countries:	%
_____	%
_____	%
_____	%
Unknown:	%
	Total=100%

12. Please indicate your firm's approximate monthly operating costs by percent:

Raw Materials	%
Labor	%
Overhead	%

Total=100%

Please answer questions 13 thru 17 regarding wood processing technology

13. What are the wood processing technologies employed in your plant? Please check all that apply from the following list and feel free to list others.

<input type="checkbox"/> gang sawing	<input type="checkbox"/> edge glueing
<input type="checkbox"/> rip sawing	<input type="checkbox"/> shaping
<input type="checkbox"/> profiling	<input type="checkbox"/> edging
<input type="checkbox"/> planing/matching	<input type="checkbox"/> trimming
<input type="checkbox"/> finger jointing	<input type="checkbox"/> scanning or optimizing
<input type="checkbox"/> sanding	<input type="checkbox"/> turning
<input type="checkbox"/> resawing	<input type="checkbox"/> sorting
<input type="checkbox"/> grading/re-grading	<input type="checkbox"/> bundling/packaging
<input type="checkbox"/> notching (notcher/chamferer)	<input type="checkbox"/> unnailing/stripping
<input type="checkbox"/> machine-nailing	<input type="checkbox"/> kiln drying
<input type="checkbox"/> veneer slicing	<input type="checkbox"/> chop sawing
<input type="checkbox"/> wood preserving	<input type="checkbox"/> finishing/painting
types:	

other technologies utilized: _____

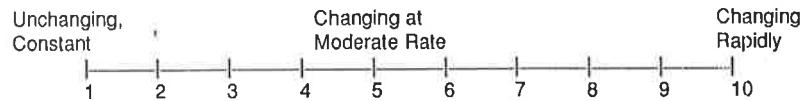
14. What are the two most important pieces of equipment that your company has purchased within the past 5 years? Was the equipment purchased new or used?

1. _____ New _____ Used _____
2. _____ New _____ Used _____

15. What are the two most important pieces of equipment that your firm plans to purchase within the next 2 years? Will you purchase the equipment new or used?

1. _____ New _____ Used _____
2. _____ New _____ Used _____

16. Is technology in your business (Please circle a number):



17. Do the following factors limit your firm from investing in new equipment or technology? Circle response of 1=yes, a limiting factor, 2=neutral, 3=no, not a limiting factor.

	yes	neutral	no
Availability or cost of capital	1	2	3
Availability or cost of skilled labor	1	2	3
New equipment or technology not needed	1	2	3
Government restrictions	1	2	3
High risk of capital investment	1	2	3
Parent company or partner too restrictive	1	2	3
Satisfied with current operation	1	2	3
Raw material availability or quality	1	2	3
Other reasons: _____			

Please answer questions 18 thru 20 regarding wood raw materials

18. Please indicate the approximate volumes of wood raw materials purchased by your firm for use in manufacture in 1988 (Leave blank if you did not use material type).

MBF=Thousand Board Feet MSF=Thousand Square Feet

	Volume
softwood logs:	____ MBF
hardwood logs:	____ MBF
timbers or RR ties:	____ MBF
<u>Factory Lumber</u>	
softwood factory lumber, boards and cut stock:	____ MBF
hardwood factory lumber, boards and cut stock:	____ MBF
<u>Dimension Lumber</u>	
softwood dimension lumber & boards high grades (e.g. selects):	____ MBF
medium grades (e.g. #2 & better):	____ MBF
low grades (e.g. #3,stud,economy):	____ MBF
hardwood dimension lumber & boards high grades (e.g. #1 & better):	____ MBF
med. grades (e.g. #2 shop or common):	____ MBF
low grades (e.g. #3 shop or common):	____ MBF
softwood plywood:	____ MSF
hardwood plywood:	____ MSF
structural composite boards (waferboard, OSB, etc):	____ MSF
particleboard:	____ MSF
medium density fiberboard:	____ MSF
hardwood veneer:	____ MSF
softwood veneer:	____ MSF

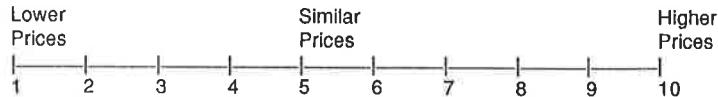
19. Other wood products purchased by your firm for further processing in 1988: _____

20. Wood Species Used in Manufacture in 1988 (please provide approximate volume data for any that apply):

Softwood Species	Volume	Hardwood Species	Volume
Douglas-fir:	____ MBF	Alder:	____ MBF
True Fir:	____ MBF	Maple:	____ MBF
Hemlock:	____ MBF	Cottonwood:	____ MBF
Western redcedar	____ MBF	Oak:	____ MBF
Ponderosa Pine:	____ MBF	Western Birch:	____ MBF
Idaho White Pine:	____ MBF	Aspen:	____ MBF
Lodgepole Pine:	____ MBF		
Larch:	____ MBF		
Spruce:	____ MBF		
Other softwood species used (please list up to 3):		Other hardwood species used (please list up to 3):	
1. _____	____ MBF	1. _____	____ MBF
2. _____	____ MBF	2. _____	____ MBF
3. _____	____ MBF	3. _____	____ MBF

Please answer questions 21 thru 26 regarding your company's marketing effort

21. On average, how do your products compare in price with your competitors' products? (Please indicate by circling the appropriate number)



22. How do you promote your products? (check any that apply):

- business cards
 - product brochures
 - word-of-mouth promotion
 - direct mail
 - media advertising (name type): _____
 - industry associations
 - trade shows
 - trade journals
 - other (please describe): _____

23. How do you sell or distribute your products? (Please label as an approximate percentage of dollar sales)

Sell direct to retail customer

%

Sell direct to other industrial manufacturer

—
%

Sell direct to building contractor

10
%

Sell direct to home center or other retail outlet

100%

Sell to wholesaler or distributor who stocks products

—%

Sell to non-stocking wholesaler

%

Sell to export wholesaler or agent _____ %

Others (list with percentages):

Total= 100%

25. Where were your company's principal markets in 1988? Check all that apply:

- Local area only Western Washington
 Eastern Washington Pacific Northwest
 California Western States
 British Columbia Other Canada
 Other U.S. (region): _____
 Asia (countries): _____
 Europe (countries): _____
 Other: _____
 Don't Know

26. Do opportunities exist to pursue new markets with your current products?

- yes
 no
 don't know

Please answer questions 27 and 28 concerning materials procurement and current problems in the secondary wood products sector

27. From whom do you purchase your wood raw materials? (Please provide approximate percentages purchased from each):

	Percent Volume
Logging company:	%
Direct from primary mill:	%
Direct from other	
secondary manufacturer:	%
Wholesaler or broker:	%
Other:	%
	Total=100%

28. What are some of the problems facing your firm today? Circle the appropriate number for each issue:
1=serious problem 2=cause for some concern 3=not a problem at all.

	<u>Serious Problem</u>	<u>Some Concern</u>	<u>Not a Problem</u>
Raw material supply or cost:	1	2	3
Labor supply or cost:	1	2	3
Labor relations:	1	2	3
Quality control problems:	1	2	3
Cost of capital:	1	2	3
Cost of developing new products:	1	2	3
Outdated production facility:	1	2	3
Located too far from markets:	1	2	3
Distribution problems:	1	2	3
Lack of customers:	1	2	3
Government regulations or policies:	1	2	3
Taxes:	1	2	3
Sales problems:	1	2	3
Financial problems:	1	2	3
Limited marketing expertise:	1	2	3
Lack of computer skills:	1	2	3
Limited wood processing expertise:	1	2	3
Others (please specify):	1	2	3
	<hr/>	<hr/>	<hr/>
	1	2	3

29. Please provide any additional comments you have regarding your particular business or the secondary wood products manufacturing sector of Washington's economy on the back side of this page.

Thank you very much for your cooperation in filling out this questionnaire. Please return it in the stamped/addressed envelope provided.

Check the following if:

You would like to be contacted about upcoming seminars or workshops at the University of Washington involving people in your industry.

You would like to receive the results of this study.

To receive this information please include your company's name and address below, or write them on the back of the return envelope.

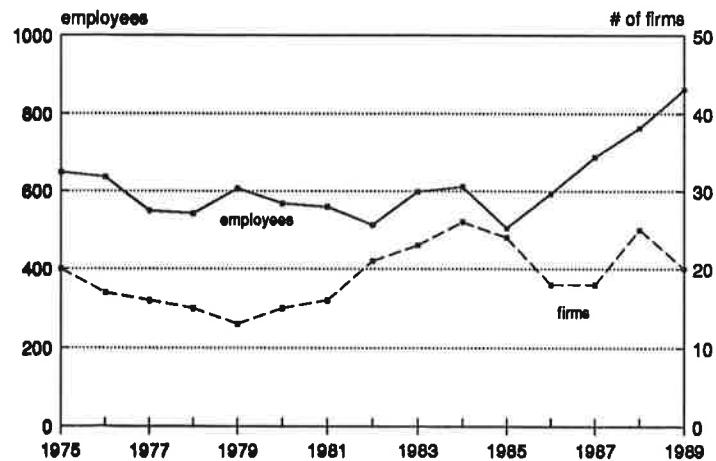
Company name: _____
Address: _____

Remember, all questionnaire responses are strictly confidential.

Additional Comments :

APPENDIX C
EMPLOYMENT TRENDS BY INDUSTRY

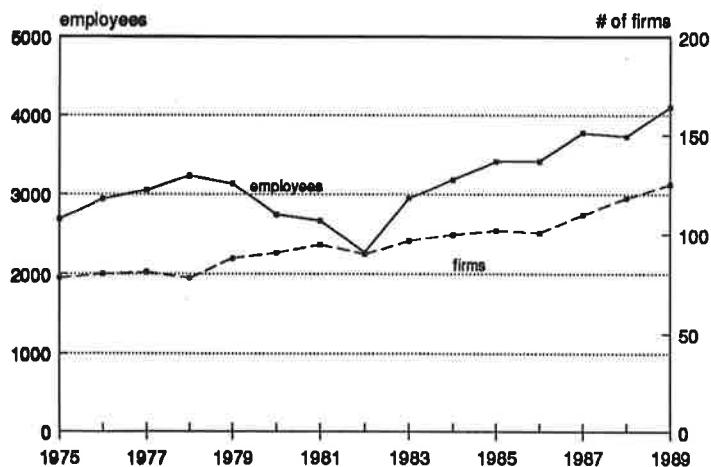
**Hardwood Dimension and Flooring Mills
SIC 2426**



Source: WA St Employment Security Dept.

Figure C.1. Employment and the Number of Washington State Firms in the Hardwood Dimension and Flooring Mill Industry, 1975-1989.

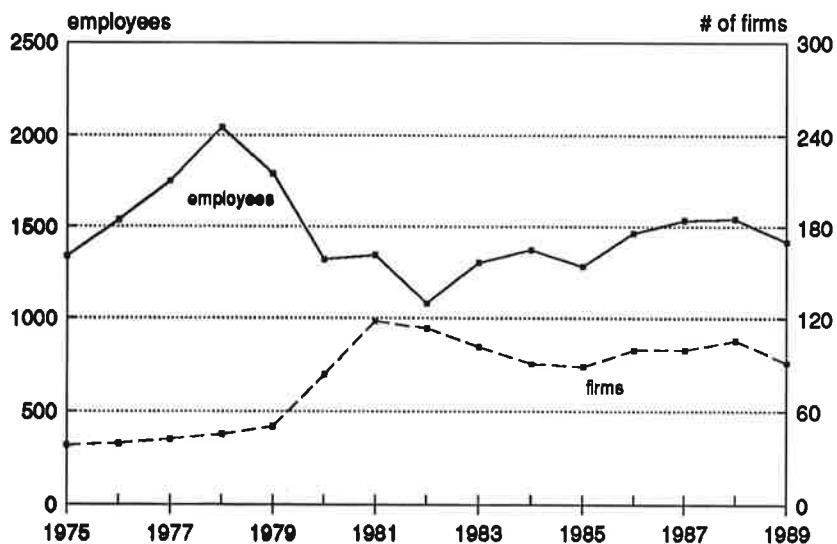
**Millwork
SIC 2431**



Source: WA St Employment Security Dept.

Figure C.2. Employment and the Number of Washington State Firms in the Millwork Industry, 1975-1989.

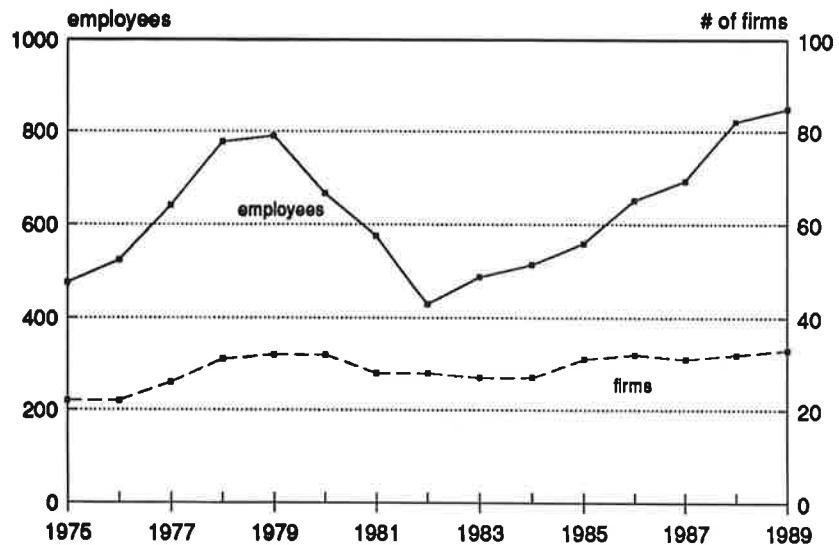
Wood Kitchen Cabinets SIC 2434



Source: WA St Employment Security Dept.

Figure C.3. Employment and the Number of Washington State Firms in the Wood Kitchen Cabinet Industry, 1975-1989.

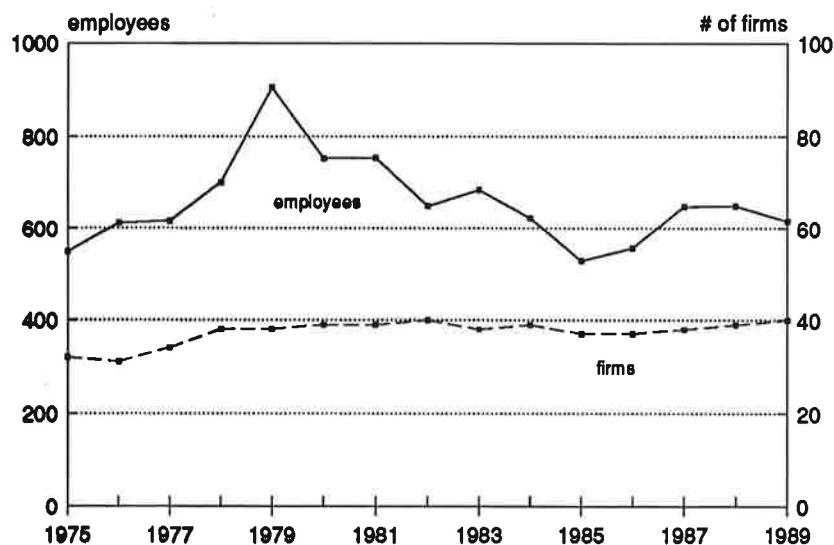
Structural Wood Members SIC 2439



Source: WA St Employment Security Dept.

Figure C.4. Employment and the Number of Washington State Firms in the Structural Wood Member Industry, 1975-1989.

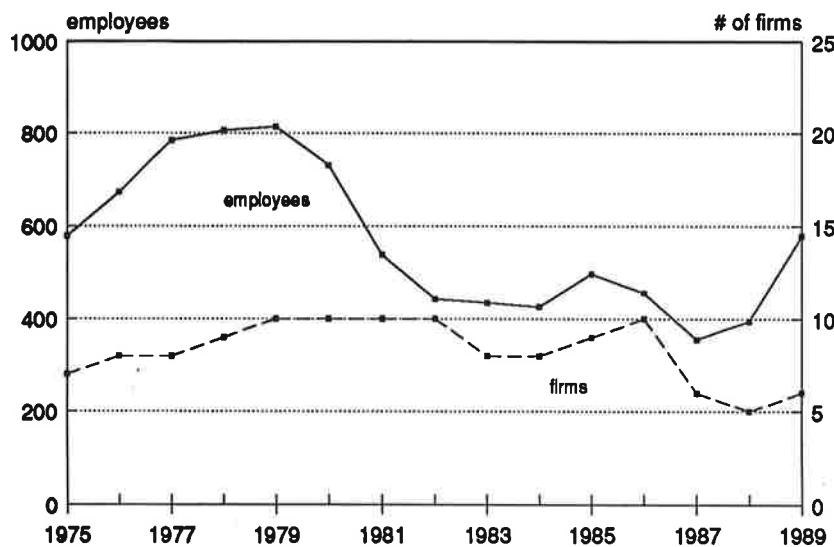
Wood Boxes, Pallets and Containers SIC 2441, 2448, & 2449



Source: WA St Employment Security Dept.

Figure C.5. Employment and the Number of Washington State Wooden Boxes, Pallets, and Containers Industries, 1975-1989.

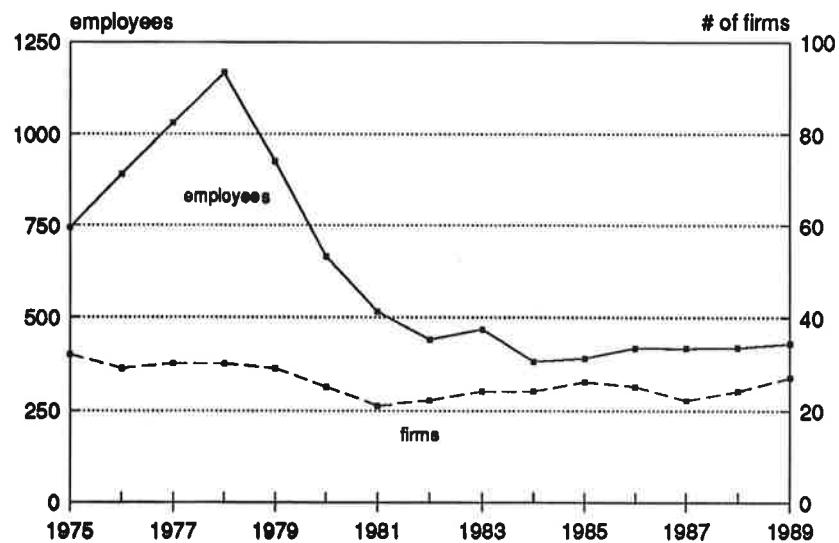
Manufactured Homes (Mobile Homes) SIC 2451



Source: WA St Employment Security Dept.

Figure C.6. Employment and the Number of Washington State Firms in the Manufactured Homes Industry, 1975-1989.

Prefabricated Wood Bldgs. and Components SIC 2452



Source: WA St Employment Security Dept.

Figure C.7. Employment and the Number of Washington State Firms in the Prefabricated Wooden Buildings and Components Industry, 1975-1989.

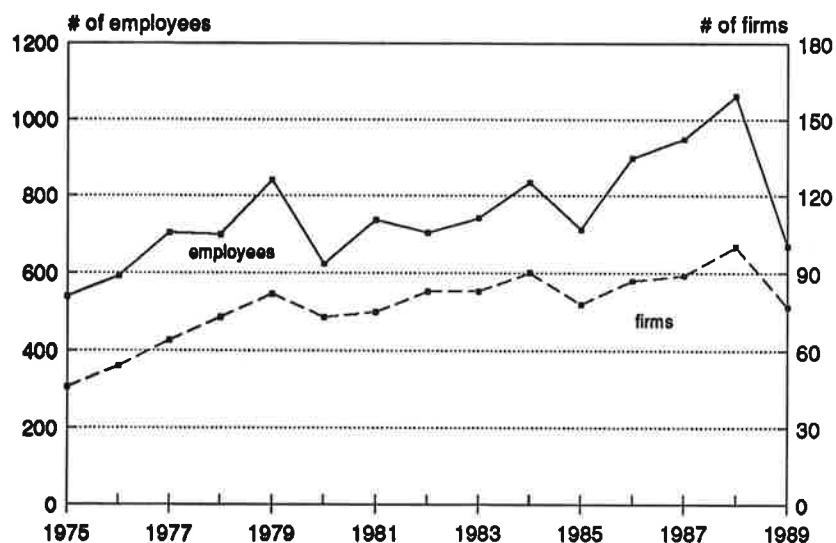
Wood Preserving SIC 2491



Source: WA St Employment Security Dept.

Figure C.8. Employment and the Number of Washington State Firms in the Wood Preserving Industry, 1975-1989.

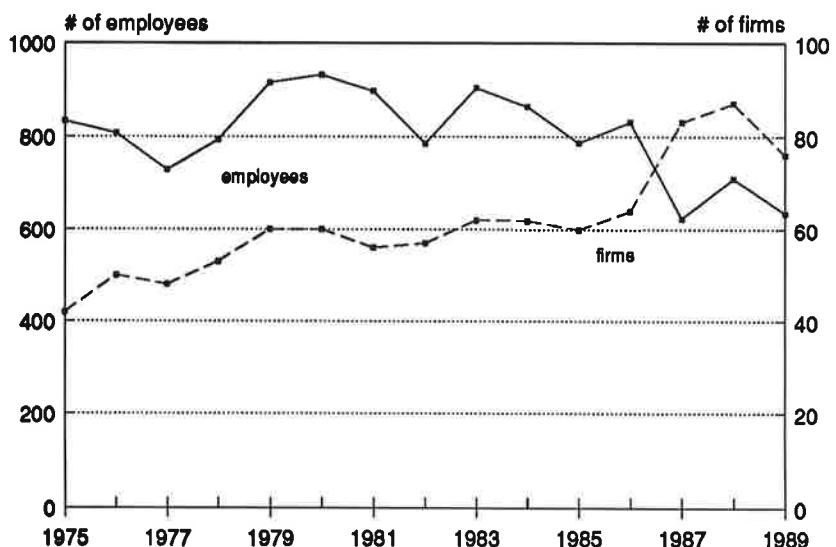
Miscellaneous Wood Products SIC 2499



Source: WA St Employment Security Dept.

Figure C.9. Employment and the Number of Washington State Firms in the Miscellaneous Wood Products Industry, 1975-1989.

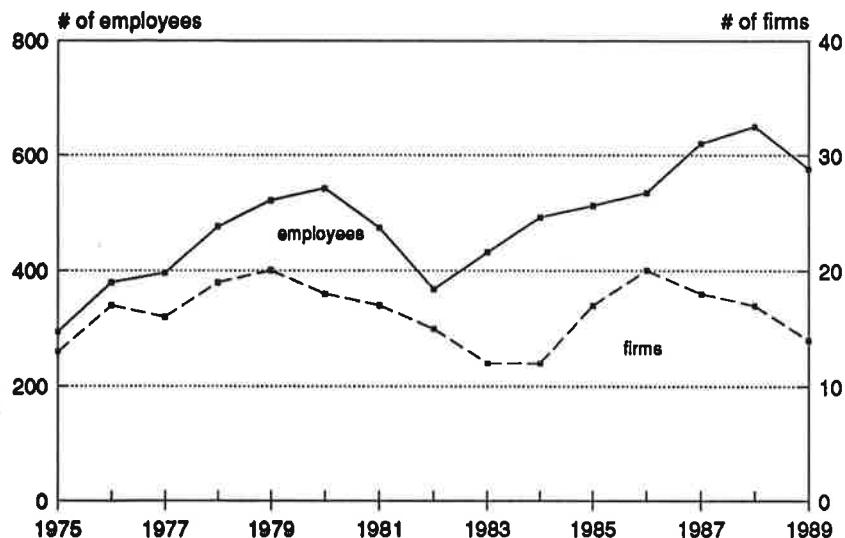
Wood Non-Upholstered Household Furniture SIC 2511



Source: WA St Employment Security Dept.

Figure C.10. Employment and the Number of Washington State Firms in the Wood Non-Upholstered Household Furniture Industry, 1975-1989.

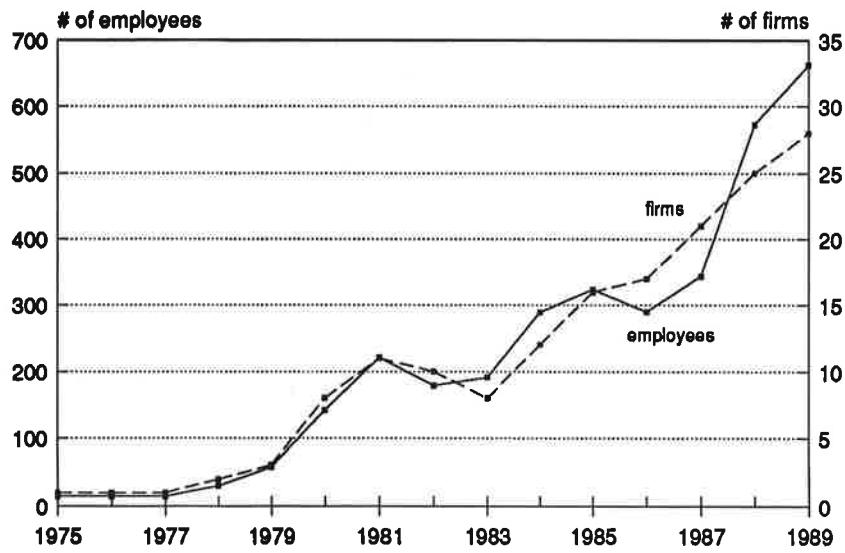
Wood Upholstered Household Furniture SIC 2512



Source: WA St Employment Security Dept.

Figure C.11. Employment and the Number of Washington State Firms in the Wood Upholstered Household Furniture Industry, 1975-1989.

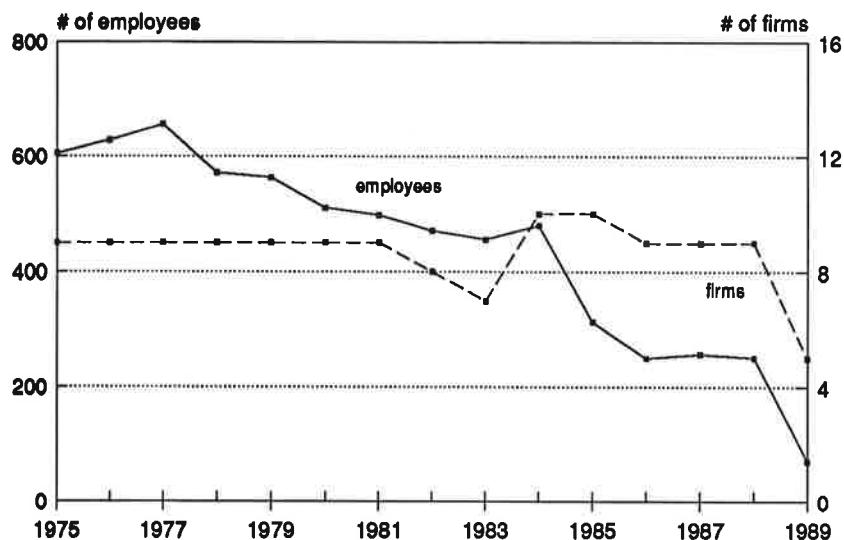
Wood Office Furniture SIC 2521



Source: WA St Employment Security Dept.

Figure C.12. Employment and the Number of Washington State Firms in the Wood Office Furniture Industry, 1975-1989.

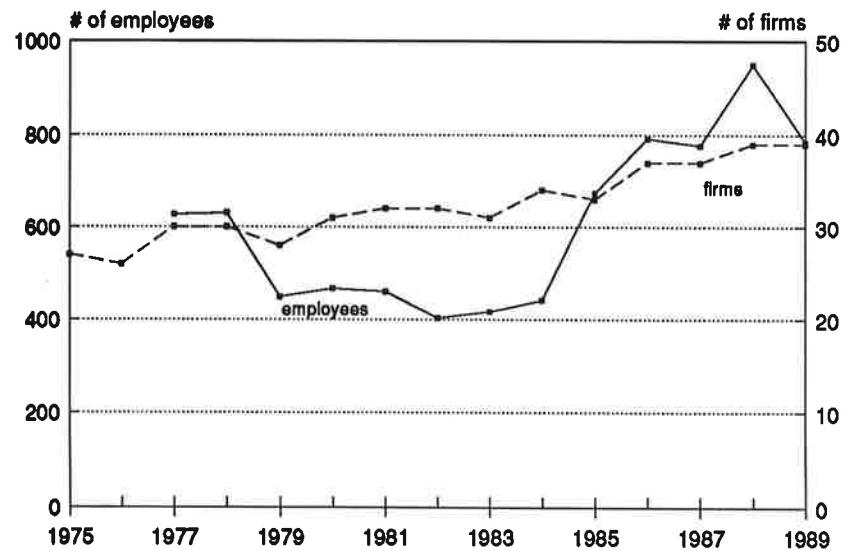
Public Building Furniture SIC 2531



Source: WA St Employment Security Dept.

Figure C.13. Employment and the Number of Washington State Firms in the Public Building Furniture Industry, 1975-1989.

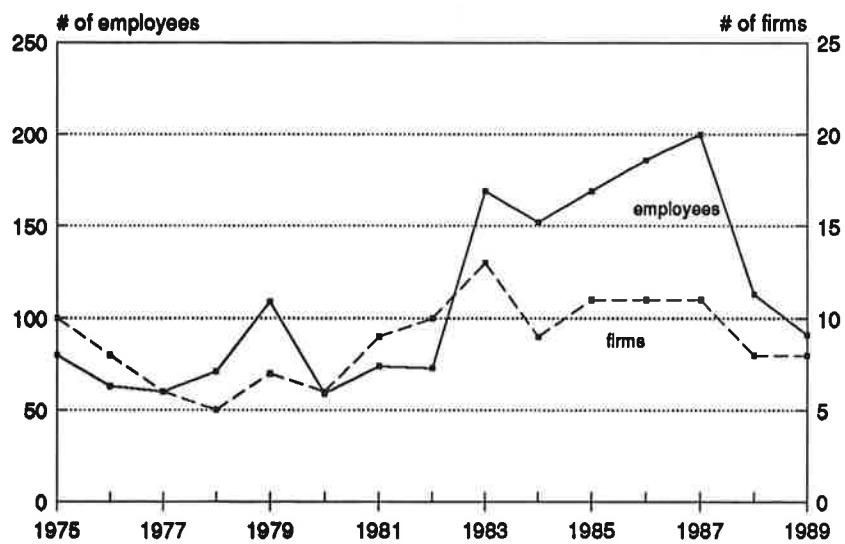
Wood Office and Store Fixtures SIC 2541



Source: WA St Employment Security Dept.

Figure C.14. Employment and the Number of Washington State Firms in the Wood Office and Store Fixtures Industry, 1975-1989.

Miscellaneous Furniture and Fixtures SIC 2599



Source: WA St Employment Security Dept.

Figure C.15. Employment and the Number of Washington State Firms in the Miscellaneous Furniture and Fixtures Industry, 1975-1989.

APPENDIX D RESPONSE RATE CALCULATION

The response rate of 33% reported for this survey was calculated using the following formula (Dillman, 1978):

$$\text{Response Rate} = \frac{\text{number of useable surveys returned}}{\# \text{ in sample} - (\text{noneligible} + \text{nonreachable})} \times 100$$

For this sample:

number of companies in sample	634
nonreachable companies	<u>107</u>
number of firms receiving questionnaires	527
number of surveys returned	197
noneligible companies	<u>32</u>
number of useable surveys returned	165

$$\text{Response Rate} = \frac{165}{634 - (32 + 107)} \times 100 = 33\%$$

APPENDIX E
PRODUCTS MANUFACTURED BY RESPONDENT FIRMS

Products Manufactured by 40 Furniture Manufacturers Responding to Questionnaire:

<u>PRODUCTS:</u>	<u>NUMBER of MANUFACTURERS, IF MORE THAN ONE</u>
accessories for home decor	
architectural paneling*	
armoire	
bed frames	
bedroom furniture	
beds	
benches	
bollards	
bookcases	3
bulk food store fixtures	
bunk beds	2
cabinets*	2
case goods	3
cedar bins and displays	
chairs	4
checkout counters	
china cabinets	
commercial wood furniture	
computer furniture	3
conference furniture	3
countertops	
custom furniture	5
custom office furniture	2
desks	4
digitizer support furniture	
dining room tables	
displays	2
dressers	
furniture accessories	
heavy duty play apparatus	
hotel seating	
ice box end tables	
louver doors*	
oak stands for plotters	
occasional tables	2
office furniture	5
open plan systems*	
panel system*	

*denotes product from another category also made by furniture manufacturer

Products Manufactured by 40 Furniture Manufacturers, Continued

<u>PRODUCTS:</u>	<u>NUMBER of MANUFACTURERS, IF MORE THAN ONE</u>
park benches	
picnic tables	
portable wedding props	
restaurant booths	
rolling furniture	
seating	
slotted panels*	
shelving	2
store fixtures	
table tops	
tables	3
partitions	
TV/VCR units	
under-bunk storage	
upholstered furniture	3
vanities*	
overlaid particleboard and plywood	

* denotes product from another category also made by furniture manufacturer

Products Manufactured by 33 Cabinet Manufacturers Responding to Questionnaire:

<u>PRODUCTS:</u>	<u>NUMBER of MANUFACTURERS, IF MORE THAN ONE</u>
bathroom cabinets or vanities	6
cabinets (unspecified)	18
commercial cabinets	6
commercial casework	2
commercial tenant improvement	
countertops	2
doors*	4
exterior millwork*	
fixtures*	
furniture*	4
institutional casework*	
interior millwork*	
kitchen cabinets	11
millwork*	5
plastic laminate cabinets	
plastic laminate fixtures*	
stereo cabinets	
store display fixtures*	
windows	

* denotes product from another category also made by cabinet company

Products Products Manufactured by 22 Millwork Manufacturers Responding to Questionnaire:

<u>PRODUCTS:</u>	<u>NUMBER of MANUFACTURERS, IF MORE THAN ONE</u>
arch top windows	
cabinets*	
casegoods*	
custom millwork	
cutstock*	
doors	5
finish	
fireplace mantels	
garage doors	
half round windows	
interior trim sets	
light fixture parts	2
millwork (unspecified)	3
moldings	6
paneling	
planing service*	
prefinished interior millwork	
prehung doors	3
radius millwork	
resawn products*	
signs*	
spiral and circular staircases	
stair components*	
stile and rail doors	
trusses*	
turnings	
windows	4

*denotes product from another category also made by millwork company

Products Produced by 16 Remanufacturers Responding to Questionnaire:

<u>PRODUCTS:</u>	<u>NUMBER of MANUFACTURERS, IF MORE THAN ONE</u>
alder blocks	
box cleat cut stock	
C & Better dimension lumber	
cabinet components	
catwalk material	
cedar remanufactured products	
clear dried hemlock	
clear green spruce	
components (unspecified)*	
compressed wood firelogs*	
cutstock (unspecified)	2
door parts	3
fire logs*	
furniture components	
garage door parts	4
insulation plugs	
interior window trim	
ladder parts	
millwork*	
molded squares	
mouldings*	
mouse trap bases	
mushroom tray stock	
pine fingerjoint cutstock	
pine sash cutstock	
pole sockets	
post (turnings)*	
shipping crates*	
stair cases*	
stair components*	
window frames*	
window parts*	5
wood pellets*	
wood shelving, brackets	
wood turnings	

*denotes product from another category also made by remanufacturing company.

Products Manufactured by 13 Structural Component Manufacturers Responding to Questionnaire:

<u>PRODUCTS:</u>	<u>NUMBER of MANUFACTURERS, IF MORE THAN ONE</u>
accessories--blocking, hanging bridges	
finished lumber*	
floats, camels	
floor trusses	5
glue-laminated beams	
joists	
laminated wood solid trusses	
roof trusses	7
trusses (unspecified)	4

*denotes product from another category also made by structural component manufacturer

Products Manufactured by 11 Pallet and/or Container Manufacturers Responding to Questionnaire:

<u>PRODUCTS:</u>	<u>NUMBER of MANUFACTURERS, IF MORE THAN ONE</u>
asparagus shook	
bins	
box shook	
box spring frames*	
boxes (new)	
containers	2
crating	
cutstock*	3
pallets (new)	7
pallets (used)	2
planter baskets	
pre-cut container lumber*	
remanufacturing services*	
specialty boxes	
western lugs	

*denotes product from another category also made by pallet and/or container company

Products Manufactured by 5 Wood Preserving Manufacturers Responding to Questionnaire:

<u>PRODUCTS:</u>	<u>NUMBER of MANUFACTURERS, IF MORE THAN ONE</u>
building logs	
fence posts, fencing	3
hardwood trailer flooring	
hop poles	
orchard trellising	
piling	
treated door parts	
utility poles	3

Products Manufactured by 5 Prefabricated Building Manufacturers Responding to Questionnaire:

<u>PRODUCTS:</u>	<u>NUMBER of MANUFACTURERS, IF MORE THAN ONE</u>
commercial building packages	
home packages	
knock-down house packages	
manufactured housing	
modular buildings	
modular homes	
modular multifamily dwellings	
modular offices	

Products Manufactured by 20 Manufacturers of Other Specialty Products Responding to Questionnaire:

<u>PRODUCTS:</u>	<u>NUMBER of MANUFACTURERS, IF MORE THAN ONE</u>
bathroom accessories	
bundled firewood	
cases for optical lenses	
cedar fencing	
cedar for pillows	
cedar oil	
cribbage boards	
densified fuel logs	2
densified fuel pellets	
display boards	2
docks (cedar float)	
fan decks	
furniture/fixtures*	2
ladders	
laminated wood products	
landscaping logs	
looms	
patterns for sand casting	
picture frames	
planters	
pot racks	
prefinished millwork*	
recipe boxes	
signs	
survey stakes	
toys	
trellises	
wall clocks	
weaving accessories*	
wood components*	

*denotes product from another category also made by specialty product manufacturer

