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49

RESULTS OF A 1990 SURVEY OF US MILLWORK INDUSTRY CHARACTERISTICS AND ATTITUDES

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January 1995

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CINTRAFOR WORKING PAPER 49

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EXECUTIVE SUMMARY

A national survey of US millwork producers was conducted during late 1991. Exactly 500 respondents, an 18.2% response rate, provided data on 1990 characteristics of their establishments. The survey differs from the US Department of Commerce Census of Manufacturers by including all producers of millwork, not just those for which millwork is the *principal* activity.

- ***Establishments are relatively small.***
  - 19.9% had 1990 sales of less than $250,000, 51.0% had sales less than $1 million, and only 6.6% had sales exceeding $15 million.
  - 60.5% had less than 20 employees, only 7.9% had 100 or more employees.
- ***The typical respondent***
  - *Total sales* — $4.5 million millwork plus non-millwork products; $3.7 million millwork only (82.2% of total)
  - *Ownership* — Private corporations (68.7%) and sole proprietorships (24.3%) predominate. Private corporations accounted for at least 70% of respondents in each size class except the smallest (< $250,000), which were 62.6% sole proprietorships.
  - *Employment* — 36.2 total, of which 76.5% were direct labor; 3.3 direct employees per administrative employee
  - *Utilization of capacity* — 68.8%
  - *Replacement cost* — $1.5 million; $41,000 per employee; $2.99 sales per dollar of replacement cost
  - *Costs* — 36.7% wood raw materials; 11.1% other materials; 31.7% labor; 17.1% administrative overhead; 4.3% research & development
  - *Market geography* — 92.2% participate in local markets; 64.6% participate in regional markets; 25.8% participate in national markets; 10.8% participate in international markets
- ***Projections from responses to estimates of national totals for all millwork producers***

	Survey (1990)	*US Dept of Commerce (1990)*
Number of establishments	3324-3683	2829
Total sales		
All products	$12.3 billion	$9.5 billion
Millwork only	$ 9.9 billion	$9.4 billion
Employment	103,000	90,500

- ***Product mix***
  - 55.8% of respondents were involved in manufacturing a non-millwork product, either as the principal or as a secondary product. Cabinets were the most common non-millwork product.
  - 17.5% of respondents who produce millwork indicated that a non-millwork product was the main or principal business.
  - Non-millwork products represent about 17.8% of total sales of all respondents.
  - Of the millwork products,
    - *Moldings*: Moldings were dominant in terms of frequency of being listed as a product (Table 26), frequency of being listed as the principal product line of a respondent (Table 25), and as a percent of total sales (Table 33). This contrasts with the US Department of Commerce Census, which lists moldings as only 11.8% of millwork industry sales. Part of this difference may be that many molding producers reached by the survey may be classified as sawmills and planing mills by the Census.
    - *Doors*: Doors ranked second in product frequency, principal product line, and share of sales.
    - *Windows and Stairs*: Windows and stairs were essentially tied for third place in share of sales, but stairs were much less frequently listed as the principal product line.
- ***Product attributes***
  - 97.1% of respondents produce custom products, 84.6% produce specialty products, and 41.6% produce commodity products.
  - Large establishments are more likely to produce commodity products.
  - When asked to rank the importance of 25 factors that could influence product success, the 11 factors rated very to extremely important. Several of these can be summarized as the ability and willingness to work with the customer and produce and deliver what is needed when it is needed. Other important factors involve various aspects of product quality (accurate dimensions, attractiveness, *etc.*). All of these combine to affect the company reputation, which received the top ranking. Factors such as gathering market information, advertising, brand name, *etc.*, were in the bottom half of the 25 factors.
- ***Investment***
  - Product development is typically done on an occasional basis (45% of respondents); 32% have continuous product development (most commonly among larger establishments); and 23% do not engage in product development.
  - Compared to 1990 levels of spending, 26% plant to increase spending on plant capacity during the next five years, 30% plan to increase spending on used equipment, and 36% plan to increase spending on new equipment.

- ***Exports***
  - 10.8% of respondents exported in 1990; exports averaged 5.2% of total sales of these exporters.
  - In terms of total sales of all respondents, exports were 1.2%.
  - Extrapolation suggests 1990 total millwork exports were about $120 million. This is in reasonable agreement with US Department of Commerce trade statistics, which indicate $143 million exports of millwork products in 1990.
  - Moldings and doors are the most commonly exported products. This agrees with US Department of Commerce trade statistics: 51.3% of 1990 export sales were moldings and 19.5% were doors.
  - Larger establishments are much more involved in exporting.
  - Both exporters and non-exporters were asked to rank a list of factors that affect export success. Those who do not export cite their domestic marketing focus, small size, and inability to contact foreign customers as leading factors for not exporting. In contrast, the exporters rated competition in foreign markets, financing terms, and inability to contact foreign customers as the top factors affecting success.
  - When respondents were asked how export sales contacts originate, the leading methods cited were reactive (foreign customer or agent contacted the establishment). Pro-active methods, such as traveling to foreign countries to seek customers or participating in international trade shows, are not commonly used.
- ***Factors affecting business operations***
  - Of 17 factors rated by respondents, labor skill and education, environmental regulations (pollution), labor costs, availability of capital, and cost of capital were the top five overall.
  - Distance from the source of raw material was of higher concern than distance to product markets. This seems consistent with the tendency of millwork producers to locate near population centers and focus on local/regional markets.
  - Supply of raw material ranked eighth overall. However, concern with this factor increased with size of establishment and it was the top concern of the largest.
  - When asked to respond to statements regarding the effect of reduced harvesting on federal lands, respondents indicated that it will be more difficult to obtain wood of the quality needed and that they would shift to substitute species. They were less inclined to agree that they would increase use of non-wood materials or change manufacturing methods.
  - Respondents agreed that competition from non-wood materials will greatly increase. Interestingly, responses to other questions suggest that they are not inclined to adopt use of these materials, hence they may lose market share to outside competitors.
  - Respondents disagreed with the suggestion that reduced demand for tropical hardwoods (boycotts, *etc.*) will improve demand for their products. This may reflect the very low incidence of use of tropical hardwoods by respondents.

- ***Raw material consumption***
  - Extrapolation suggests production of millwork products consumed
    - 24 million board feet of roundwood
    - 2.6 billion board feet of softwood lumber
    - 0.9 billion board feet of hardwood lumber
    - 173 million square feet of veneer
    - 96 million square feet of plywood
    - 133 million square feet of particleboard
    - 68 million square feet of medium density fiberboard
    - 45 million square feet of hardboard
    - 19 million square feet of OSB/waferboard
    - 3 million square feet of miscellaneous reconstituted panel products
  - The relative proportions of these volumes are in reasonable agreement with expenditure data in US Department of Commerce Census of Manufacturers reports.
  - When asked to indicate anticipated use of wood raw materials over the next five years, all materials received average scores, suggesting some increase. However, five western softwoods and one western hardwood (alder), all affected by reduced federal harvests, received the lowest average growth ratings.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

A survey questionnaire, following procedures of the total design method (Dillman, 1978), was mailed to a sample of the US millwork producers in September, 1991, with the objective of gathering data for the 1990 calendar year. US millwork producers were identified from a purchased listing of SIC 2431 establishments.[1] The list of 7229 establishments was screened to eliminate duplicates and those lacking complete mailing information. The questionnaire was mailed first class to half (3425) of the remainder, chosen at random. For further details on survey methodology and questionnaire content, see Bialozynski (1993). After two follow-up mailings, a total of 1179 questionnaires were returned, of which 277 were returned as not deliverable and 902 were returned by a respondent. Of these 902 responses, 402 were from establishments that were not producing millwork products. Apparently, some of these are only incidental producers of millwork who did not manufacture these products in 1990. Others appear to be either suppliers to the millwork industry or wholesalers/retailers which handle but do not manufacture these products. The resulting 500 usable questionnaires yielded a response rate of 18.2% (Bialozynski, 1993); a reasonable level for industrial surveys (Aaker and Day, 1980). Response rate (R) was calculated as follows:

$$R = U/(M - ND - NMW)$$

where

U = number of correctly-completed surveys returned by 1990 millwork producers

M = number of surveys mailed

ND = number of surveys that could not be delivered

NMW = number of surveys returned from establishments that did not produce millwork in 1990

Response rates according to sales size class were

Size class $000 Sales	Response rate %
<1000	17.2
1000-4999	21.5
5000-14999	14.3
≥15000	16.8

Figure 1a compares the frequency distribution, according to employment size class, of respondents with the distributions of all members of the purchased mailing list, those who were

[1]List purchased from American Business Information, Inc., Omaha NE.

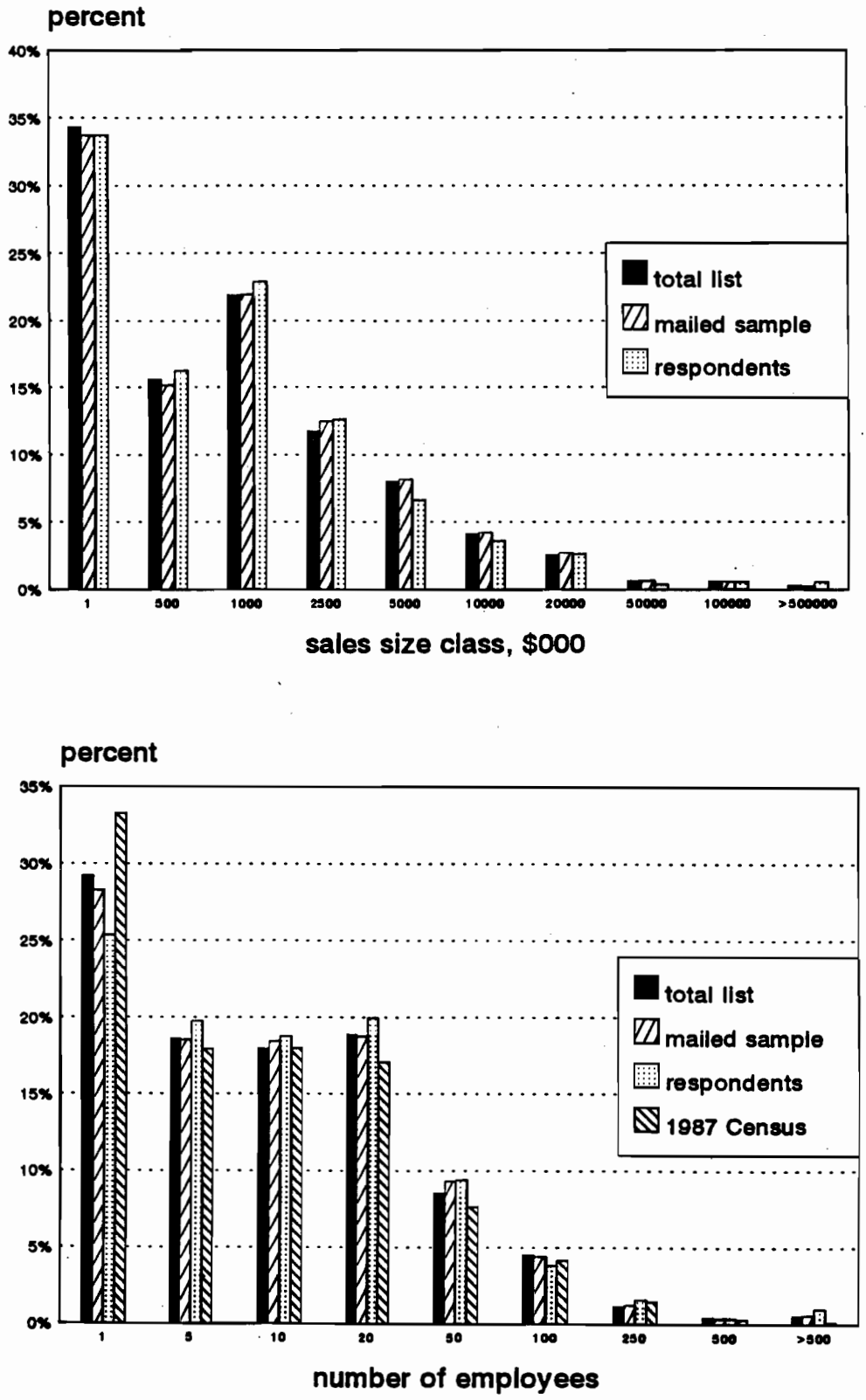


Figure 1. Size Class Distribution of the Millwork Industry, Survey Mailing, and Respondents

mailed a survey, and the 1987 Census of Manufacturers. Figure 1b is a similar frequency distribution based on sales size class; it does not include data from the 1987 Census which does not provide frequencies by sales classes. In general, there is excellent agreement between the respondent distributions and these sources.

In presenting results of the survey, respondents smaller than $1 million sales have been segregated into those with sales less than $250,000 and those from $250,000 to $1 million. This differs from the Figure 1b classification, obtained with the original mailing list, which split those with sales less than $500,000 from those from $500,000 to $1 million. This change was made to isolate very small producers which, unlike other classes, were dominated by single proprietorships. It was thought that these very small establishments might have very different characteristics and perceptions than larger establishments.

Respondents were distributed by region (Figure 2) as follows:

Region	Percent
Northeast	22.6
North Central	26.6
Southeast	15.8
South Central	12.2
West	22.8
Total	100.0

A search of the literature revealed few studies concerning millwork industry structure and markets, a fact noted by Sinclair (1992). Most published information is derived from US Department of Census data (Briggs, *et al.*, 1994; Kingslien and Greber, 1993). Anderson and McKeaver (1988) provide data on use of millwork products in new residential construction.

This report provides an 1990 overview of the US millwork industry based on responses to the survey. Chapter 1 summarizes respondents in terms of establishment size, ownership, replacement cost, capacity utilization, cost structure, employment, and investment funding. It also presents respondent concerns with respect to a number of internal and external business issues. Chapter 2 examines patterns of raw material consumption in terms of quantity and species. It also summarizes respondents' views of short-term (next five years) trends in raw material consumption and their views on raw materials issues. Chapter 3 summarizes product mix, 1990 sales, degree of product specialization, markets, ratings of product success factors, and level of new product development. Chapter 4 focuses on exporting and contrasts exporter and non-exporter views toward factors that contribute to successful exporting. Chapter 5 summarizes major findings, makes some projections from respondents to the entire millwork industry, and compares results with data from other sources.

While the primary objective of the survey was to obtain a national overview and perspective, there are many opportunities for examining the respondent data in more detail. Examples would be to focus on the respondents who produce a specific product such as hardwood moldings or

users of ponderosa pine. Due to limitations of time, small sample sizes which would weaken such analyses, and to maintain the national focus, such analyses were not conducted in developing this report.

Gathering data via a mail survey has a number of limitations and difficulties. The question of response bias, that respondents are not representative of the industry as a whole, must be addressed. Figure 1 suggests that there was little difference between the size distribution of respondents and size distribution of the millwork industry as a whole. Thus, there should be little overall bias toward a particular size segment. While agreement for overall size distribution is excellent, there is no data to compare size distributions of, say, producers of softwood molding, users of hardwood lumber, *etc.* It is possible that there may be some unknown degree of size bias at these levels of disaggregation, hence results should be treated with caution. Another form of bias could occur between respondents to the survey and non-respondents. Assuming that late respondents are more like the non-respondents, early versus late respondents were compared to determine if there were significant differences which could be viewed as evidence of non-respondent bias. A number of tests were performed to compare early and late respondents that revealed no overall evidence of bias (Bialozynski, 1993). In some categories of data gathered, particularly use of materials and species, there is no way to test whether the respondent mix of raw materials is truly the same as the overall industry. This would particularly be true of some of the lesser-used species. By chance, the survey may have obtained a response from the only user of virola but no response from any user of some other species. Consequently, the data in Chapter 2 on species and type of raw materials used should be viewed as only indicative.

There were instances when information submitted by certain respondents was obviously in error. For example, one respondent indicated use of 150 *million* board feet of alder, or roughly half of the total output of the alder sawmilling industry. This would have made alder the most heavily used hardwood species among respondents. In these rare cases, we have taken the liberty of omitting the particular value from our statistics. We believe that such respondents were careless with respect to units of measure requested in the questionnaire.

Finally, one note of caution in interpreting the results. Respondents sometimes elected to skip certain questions. Consequently, the sample size underlying different tables and figures varies and this occasionally leads to some unavoidable differences and inconsistencies that are generally minor in nature.

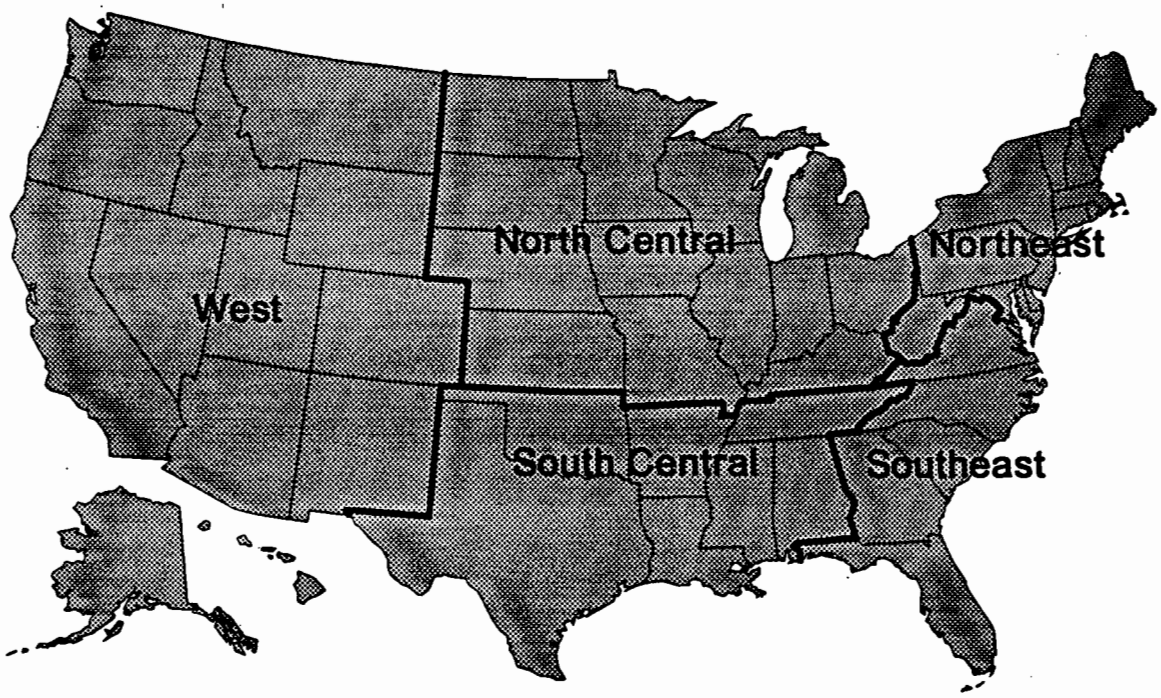


Figure 2 Regions of the US.

CHAPTER 1

ESTABLISHMENT CHARACTERISTICS

This chapter summarizes data on location, form of ownership, capacity utilization, replacement cost, and employment of respondents. It also summarizes their outlook for funding plant expansion and equipment purchases and concerns with a number of business issues.

These results will be presented for all respondents combined, as well as by establishment size class. Respondents classified by size could be grouped according to either total employment or sales. A total of 460 respondents provided sales data. Sales data from three respondents, which together represent 71.9% of the total sales of all respondents, are excluded. It is believed that these were large integrated forest products corporations which gave data on total corporate sales rather than millwork sales.

1990 Sales $000	No. of Respondents	Percent	Cumulative Percent
≤249	91	19.9	19.9
250-999	142	31.1	51.0
1000-4999	138	30.2	81.2
5000-14999	56	12.3	93.5
≥15000	30	6.6	100.0
Total	457	100.0	

About one-fifth of the respondents are very small with annual sales of less than $250,000, one-half have sales less than $1 million per year, and 80% have annual sales less than $5 million.

Responses could also be organized by size classes according to number of employees. A total of 453 respondents provided employment data with the following distribution:

Number of Employees	No. of Respondents	Percent	Cumulative Percent
1-19	274	60.5	60.5
20-99	143	31.6	92.1
≥100	36	7.9	100.0
Total	453	100.0	

There is a very strong relationship between number of employees and sales of respondents as will be seen in sections 1.6 and 3.8.2. We elected to use sales as the classification method, since slightly more respondents provided sales data and for consistency with previous research on secondary wood industries (Dirks and Briggs, 1991). In the tables and figures presented in this and later chapters, small inconsistencies may appear, since not all respondents who answered a particular question also provided sales data. Consequently, the number of observations under the

"all respondents" column of a table often exceeds the sum of the numbers of respondents in the sales size class breakdown of a question.

1.1 Respondent Location by Region

Table 1 presents the regional distribution of the 500 respondents and the initial mailing. These distributions are in reasonably good agreement with the South Central and Western regions showing the greatest differences. More respondents are in the North Central region, 133 (26.6%), than any other. Historically, this region has led the nation's millwork industry (Briggs, *et al.*, 1994).

Table 1. Number of Respondents by Region.

Region	Number of Respondents	Percentage of Total Respondents	Percentage of Surveys Mailed
Northeast	113	22.6	23.1
Southeast	79	15.8	16.8
South Central	61	12.2	15.8
North Central	133	26.6	26.6
West	114	22.8	17.7
Total	500	100.0	100.0

Tables 2 and 3 present regional distribution of respondents according to sales size class for the 457 respondents who provided 1990 sales data. The overall distribution of these respondents is very similar to Table 1. Table 2 shows that the South Central region has the lowest percentage of respondents in each size class except for the largest. The North Central and Western regions have the highest percentage of respondents in the three largest size classes. The Northeast has the highest percentage of respondents in the smallest size class.

Table 2. Number of Respondents by Region and Sales Size Class.

Region	Sales Size Class ($000) (1) ≤249		(2) 250-999		(3) 1000-4999		(4) 5000-14999		(5) ≥15000		Total	
	n	%	n	%	n	%	n	%	n	%	N	%
Northeast	26	28.6	32	22.5	25	18.1	8	14.3	3	10.0	94	20.6
Southeast	16	17.6	24	16.9	23	16.7	10	17.9	2	6.7	75	16.4
South Central	8	8.8	20	14.1	17	12.3	6	10.7	4	13.3	55	12.0
North Central	23	25.3	31	21.8	42	30.4	18	32.1	10	33.3	124	27.1
West	18	19.8	35	24.7	31	22.5	14	25.0	11	36.7	109	23.8
Total	91	100.0	142	100.0	138	100.0	56	100.0	30	100.0	457	100.0
	19.8%		30.9%		30.0%		12.2%		7.1%			

Table 3 re-expresses Table 2 to show percentage distributions within each region and all regions combined. The Northeast and Southeast tend to be skewed toward smaller sizes while the other regions are skewed toward larger sizes.

Table 3. Percentage Distribution of Respondents within Each Region by Sales Size Class

Region	Sales Size Class ($000) (1) ≤249	(2) 250-999	(3) 1000-4999	(4) 5000-14999	(5) ≥15000	Total
Northeast	27.7%	34.0%	26.6%	8.5%	3.2%	100.0%
Southeast	21.3%	32.0%	30.7%	13.3%	2.7%	100.0%
South Central	14.3%	35.7%	30.4%	10.7%	8.9%	100.0%
North Central	18.4%	24.8%	33.6%	14.4%	8.8%	100.0%
West	16.4%	31.8%	28.2%	12.7%	10.9%	100.0%
Combined	19.8%	30.9%	30.0%	12.2%	7.1%	100.0%

1.2 Forms of Ownership

Table 4 summarizes the forms of ownership of respondents. Of the 497 respondents identifying the legal organization, 341 (68.7%) were organized as a private corporation. The second most common type of ownership (24.3%) is a proprietorship. Only 5.0% operate under a partnership agreement and 2.0% are organized as public corporations.

Table 4. Forms of Respondent Ownership.

Ownership	Sales Size Class ($000) (1) ≤249	(2) 250-999	(3) 1000-4999	(4) 5000-14999	(5) ≥15000	(6) All Respondents %	N
Single Proprietorship	62.6%	22.7%	8.0%	7.1%	9.1%	24.3%	121
Regular/Limited Partnership	8.8%	7.1%	1.5%	3.6%	6.1%	5.0%	25
Private Corporation	27.5%	70.2%	89.0%	85.7%	69.7%	68.7%	341
Public Corporation	1.1%	0.0%	1.5%	3.6%	15.2%	2.0%	10
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	497
N	91	141	137	56	33		

The smallest (less than $250,000) size class is unique in that the most common form of ownership (62.6%) is a single proprietorship. In all other size classes, private corporations were the dominant form. The second most common ownership among the smallest establishments is a private corporation (27.5%), followed by regular/limited partnerships which comprise 8.8%. Only one respondent in the smallest size class is a public corporation.

In contrast, the majority (70.2%) of respondents in the $250,000-999,000 sales class are organized as private corporations. Single proprietorships account for only 22.7%. Only 7.1% are organized as a regular/limited partnership and none are public corporations.

The $1.0-4.9 million and $5.0-14.9 million sales classes have similar ownership patterns. Most (89.0% and 85.7%, respectively) are organized as private corporations. Single proprietorships are the second most common type of ownership, representing 8.0%, and 7.1% of respondents respectively. Public corporations and partnerships represent small percentages of both size classes.

The largest size class (> $15.0 million sales) has the greatest percentage (15.2%) of public corporations, but the majority, 69.7%, are private corporations. Single proprietorships and regular/limited partnerships comprise 9.1% and 6.1%, respectively.

1.3 Replacement Cost

To gain insight into capital investment levels in the millwork industry, respondents were asked "What is the estimated replacement cost of your facility and machinery if you had to purchase components of similar age and quality?"

Four respondents provided answers to this question that appear to be extremely unlikely and are omitted from the summary statistics. One establishment in the smallest size class reported a replacement cost of $50.0 million. It is extremely unlikely that a $50.0 million millwork establishment would be generating less than $250,000 in sales. This replacement cost was more than 10 times larger than the next largest respondent in this category. Three extremely large replacement cost values are excluded from the largest size class. It is suspected that these are large multiple-establishment firms that reported the combined value of all facilities rather than individual millwork plant data. Since this question is intended to evaluate replacement cost per establishment, these values are also omitted.

Table 5. Establishment Replacement Cost

	Sales Size Class ($000)					
Statistical Measure	**(1) ≤249**	**(2) 250-999**	**(3) 1000-4999**	**(4) 5000-14999**	**(5) ≥15000**	**All Respondents**
Mean $000	228	370	1,282	2,984	9,353	1,486
Std Dev $000	456	424	1,581	2,448	13,643	14,884
Mode $000	100	200	1,000	1,500	2,000	100
N of Mode	15	15	19	7	3	35
Minimum $000	10	10	35	150	250	10
Maximum $000	4,000	2,943	15,000	13,000	70,000	70,000
N	86	140	135	53	27	442

Excluding these four respondents, Table 5 indicates that the mean replacement cost of all establishments is $1.5 million. The mode, or most frequently cited replacement cost, $100,000,

is indicated by 35 respondents. As would be expected, there is a trend for the average replacement cost to increase as the size of establishment increases.

1.4 Utilization of Production Capacity

Respondents were asked to check the ten percent category that most closely corresponded to their 1990 use of capacity. Of the 484 respondents answering this question, only 14.7% exceeded 90% of capacity, 33.7% exceeded 80%, and 53.7% exceeded 70% use of capacity (Figure 3). The mode, or most frequent response, of 70-79% utilization of production capacity was indicated by 97 respondents. Several respondents mentioned that capacity utilization was low in 1990 due to the recessionary conditions.

Table 6 summarizes capacity utilization by size class and shows that the average of all respondents was 68.8%. Establishments in the smallest size class had the lowest (62.5%) utilization of capacity, the three middle size classes have very similar capacity utilization (69.4-71.5%), and the largest had the highest capacity utilization (75%). Standard deviation of capacity utilization decreases as the size class increases. This may suggest that larger establishments are more consistently able to keep the plant operating at higher levels.

Table 6. Utilization of Production Capacity.

	Sales Size Class ($000)					
Statistical Measure	**(1) ≤249**	**(2) 250-999**	**(3) 1000-4999**	**(4) 5000-14999**	**(5) ≥15000**	**(6) All Respondents**
Mean	62.5%	69.4%	71.5%	70.9%	75.0%	68.8%
Std Dev	24.4	20.3	18.0	14.9	14.0	19.6
Mode	60-69%	90-100%	70-79%	80-89%	70-79%	70-74%
Minimum	0-9%	0-9%	10-19%	30-39%	30-39%	0-9%
Maximum	90-100%	90-100%	90-100%	90-100%	90-100%	90-100%
N	88	140	135	56	33	484

1.5 Cost Structure

Respondents were asked to estimate the percentage distribution of the cost items listed in Table 7. The number of respondents varies by item, since some provided incomplete data. Since the number of respondents varies among the cost items, the item means do no necessarily add to exactly 100%. The high standard deviations may reflect the diversity of products made by the millwork industry and consequently a varied mix of production factors used.

Together, wood raw materials and direct labor expenses comprise slightly more than two-thirds of the total costs of the typical respondent. These data represent all respondents and include those who manufacture non-millwork items either as the primary or as a secondary product. Table 8 presents the cost structure for the subset of respondents who manufacture millwork exclusively and have no other product, such as cabinets, as the primary or secondary business activity.

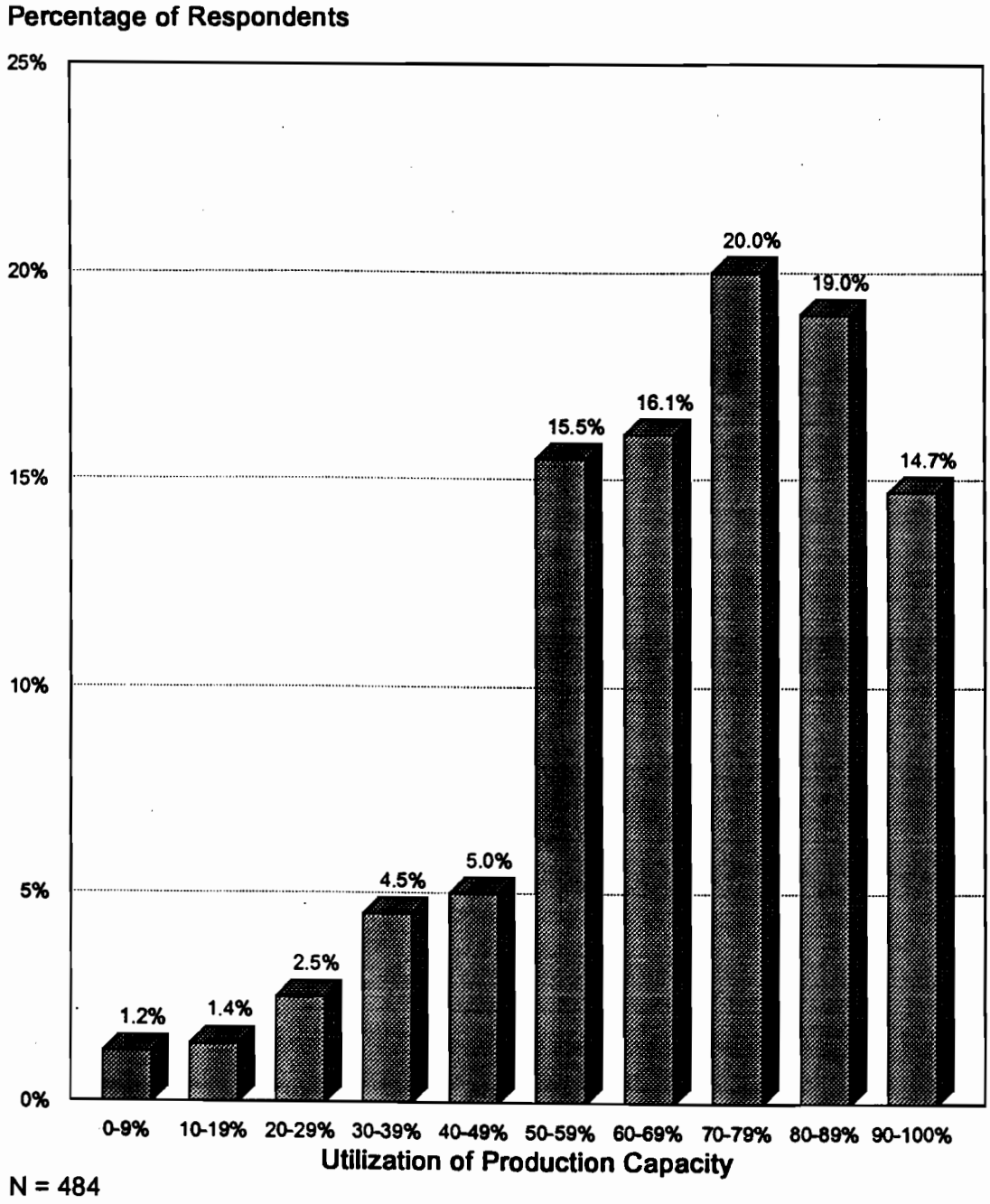


Figure 3. Utilization of Production Capacity: All Respondents

Table 7. Distribution of Costs: All Respondents.

Cost Item	Mean	Standard Deviation	Min	Max	n
Wood Raw Materials	36.7	18.15	2	99	454
Direct Labor	31.7	15.37	0	90	460
Administration/Overhead	17.1	10.46	0	65	438
Other Raw Materials	11.1	9.75	0	85	379
Marketing Research/Development	4.3	4.58	0	40	318
Total	100.9				

Table 8. Distribution of Costs: Respondents Who Exclusively Manufacture Millwork Products.

Cost Item	Mean	Standard Deviation	Min	Max	Frequency
Wood Raw Materials	43.2	19.36	10	80	37
Direct Labor	28.6	19.08	3	85	39
Administration/Overhead	13.8	19.08	0	35	36
Other Raw Materials	10.1	7.19	0	30	35
Marketing Research/Development	5.0	7.58	0	40	29
Total	100.3				

Together, labor and wood raw materials rose slightly from 68.4% for all respondents (Table 7) to 71.8% for exclusive millwork manufacturers (Table 8). Although this change is slight, comparing Tables 7 and 8 reveals that wood raw materials represent a higher cost share and labor a somewhat lower share for those exclusively manufacturing millwork products.

The cost structure for all respondents according to sales size class is presented in Table 9.

Table 9. Distribution of Costs by Sales Size Class: All Respondents.

Statistical Measure	Sales Size Class ($000) (1) ≤249	(2) 250-999	(3) 1000-4999	(4) 5000-14999	(5) ≥15000
Wood Raw Materials	33.3%	32.9%	34.6%	49.1%	50.9%
Direct Labor	34.4%	37.6%	31.0%	22.9%	21.3%
Administration/ Overhead	16.5%	20.0%	18.2%	14.2%	12.7%
Other Raw Materials	10.4%	11.0%	11.8%	10.5%	11.0%
Marketing R&D	5.4%	4.4%	4.4%	3.4%	3.7%
Total	103.7%	99.2%	100.8%	100.0%	99.7%

Larger establishments have a higher percent of costs related to wood raw materials and a lower percent of labor costs. Whereas wood raw materials represent approximately a third of the total

expenditures incurred by establishments smaller than $5 million sales, wood raw materials comprise half of the expenditures for larger establishments. This difference may have some influence on the higher ranking of raw materials as a business concern by larger respondents (see section 1.8). We speculate that labor costs may be relatively lower among larger establishments because of differences in product lines between large *vs* small establishments, a tendency for large establishments to be more involved in producing commodity products, and greater use of newer, automated and computerized equipment. Indications of these differences between size classes are presented in Chapter 3.

1.6 Employment

Using full time equivalents (FTE's) as a measure, Table 10 reveals that a typical respondent employs 36.2 persons, of whom 27.7 (76.5%) are direct labor and 8.5 (23.5%) are administrative. The ratio of administration to direct labor is 1:3.3. These employment statistics exclude the employment data submitted by two of the largest respondents. These were apparently large, integrated forest products corporations that gave total corporate employment rather than employment in their millwork activity.

Table 10 also presents employment by sales size class. The smallest establishments tend to have a higher percentage (29.8%) of administrative employees than other size classes (22.7-23.9%) which reduces the ratio of administrative to direct labor for the smallest establishments.

Table 10. Average Employment by Respondents.

Region	Sales Size Class ($000) (1) ≤249	(2) 250-999	(3) 1000-4999	(4) 5000-14999	(5) ≥15000	(6) All Respondents
Total Employees	4.6	9.3	27.3	68.5	239.4	36.2
Administrative Employees	1.4	2.2	6.2	16.4	54.3	8.5
Direct Labor Employees	3.3	7.1	21.1	52.1	185.1	27.7
Administrative Employees (%)	29.8	23.9	22.8	23.9	22.7	23.5
Direct Labor Employees (%)	70.2	76.1	77.2	76.1	77.3	76.5
Admin:Direct Labor Ratio	1:2.4	1:3.2	1:3.4	1:3.2	1:3.4	1:3.3

1.7 Investment Funding During the Next Five Years

Respondents were asked to indicate if they expected to increase, decrease, or not change from current levels of investment in plant expansion, new equipment and used equipment during the next 5 years. Figure 4 indicates that between 40-45% will keep investment at current levels in these three areas. About 26% of respondents plan to increase spending on plant expansion while

29% plan decreased spending in this area. Respondents are more likely to increase spending on new (36%) or used (30%) equipment. About 23% and 26% plan to decrease spending on new and used equipment respectively.

Table 11 summarizes anticipated increases in spending according to sales size class. Spending on increased plant expansion ranges from 25.0% to 28.9% with no apparent trend with size. Similarly, plans for increased spending on new equipment ranges from 32.9% to 39.3% with no apparent trend with size. Plans to increase spending on used equipment spending is highest among the smallest respondents and tends to decrease with increasing size. Small respondents are the only group that indicated a greater tendency to increase spending on used rather than new equipment. Interestingly, they rated availability and cost of capital as higher business concerns than larger respondents (Section 1.8) and the apparent difficulty with financing may underlie this tendency to invest more often in used equipment.

Table 11. Percentage of Respondents Planning to Increase Investments.

	Sales Size Class ($000)					
	(1)	(2)	(3)	(4)	(5)	(6)
Investment Area	**≤249**	**250-999**	**1000-4999**	**5000-14999**	**≥15000**	**All Respondents**
Plant Expansion	27.7%	25.2%	28.9%	26.8%	25.0%	26%
Used Equipment	35.7%	32.1%	31.1%	19.6%	26.7%	30%
New Equipment	32.9%	38.1%	39.3%	33.9%	34.4%	36%

1.8 Ranking of Business Concerns

Respondents were asked to express their degree of concern with each of 17 issues using a five-point Likert scale, where a score of 1 meant the issue was not a problem and 5 indicated it was a serious problem. Figure 5 lists the issues, the overall rankings, and number of respondents who rated each issue. Of the 17 topics listed, only three, labor skill/education, environmental (pollution) regulations, and labor costs, elicit an average rating of 3.0 or greater. Of the ten issues receiving the highest overall ratings, three (labor costs, disposal of other residues, and disposal of wood scraps) could be regarded as internal to the firm's operation. The remaining seven reflect government regulations and general economic conditions that are external to the firm's operation.

Analysis revealed no statistically significant differences due to size class. This may be the result of two factors may have weakened statistical tests:

- The highly skewed distribution of numbers of respondents clusters most respondents into the two smallest size classes, which often had similar ratings of the issues. In contrast, the largest size classes, which often had very different ratings, contained relatively few respondents.

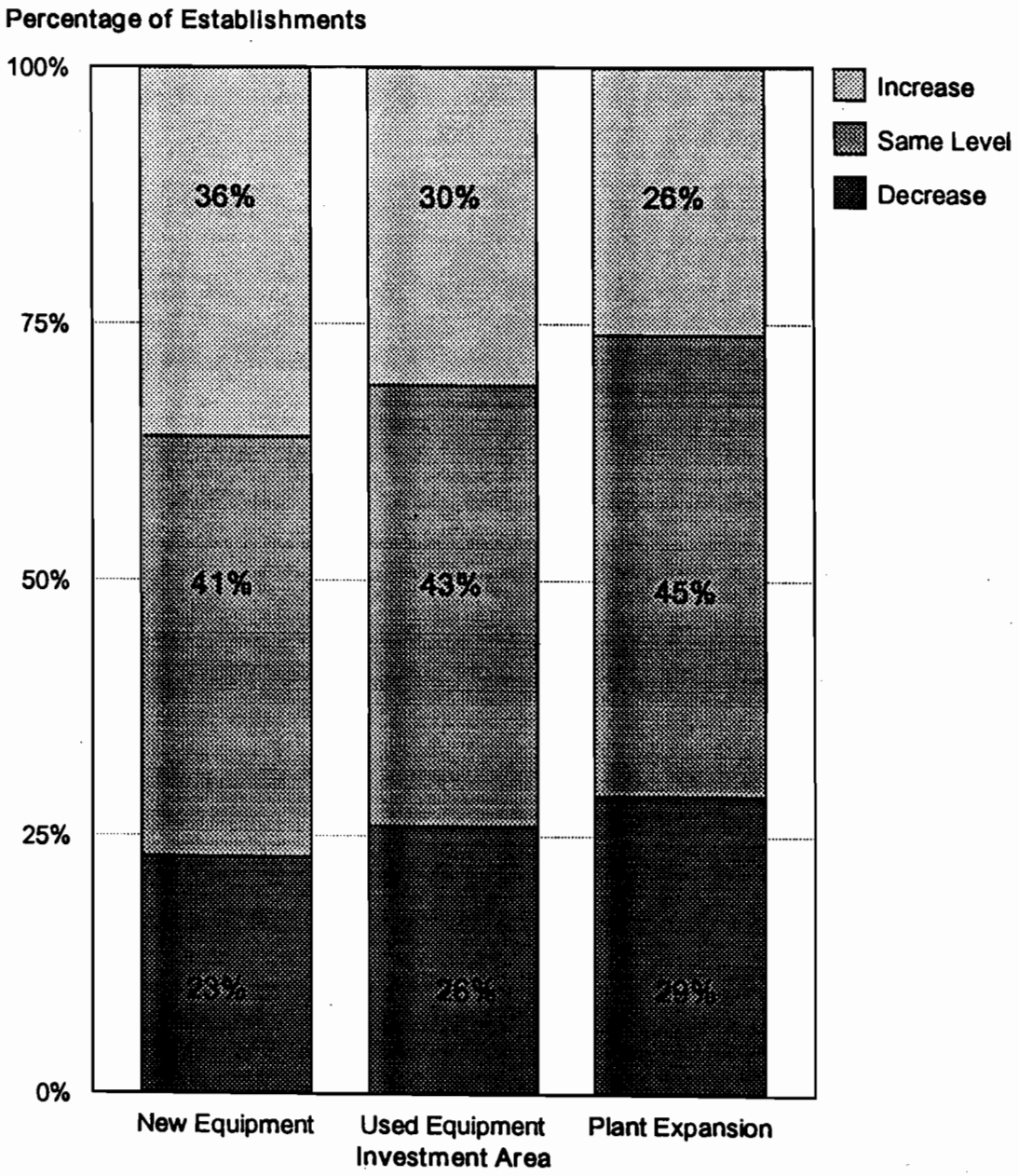


Figure 4. Investment Funding Plans for the Next 5 Years: All Respondents

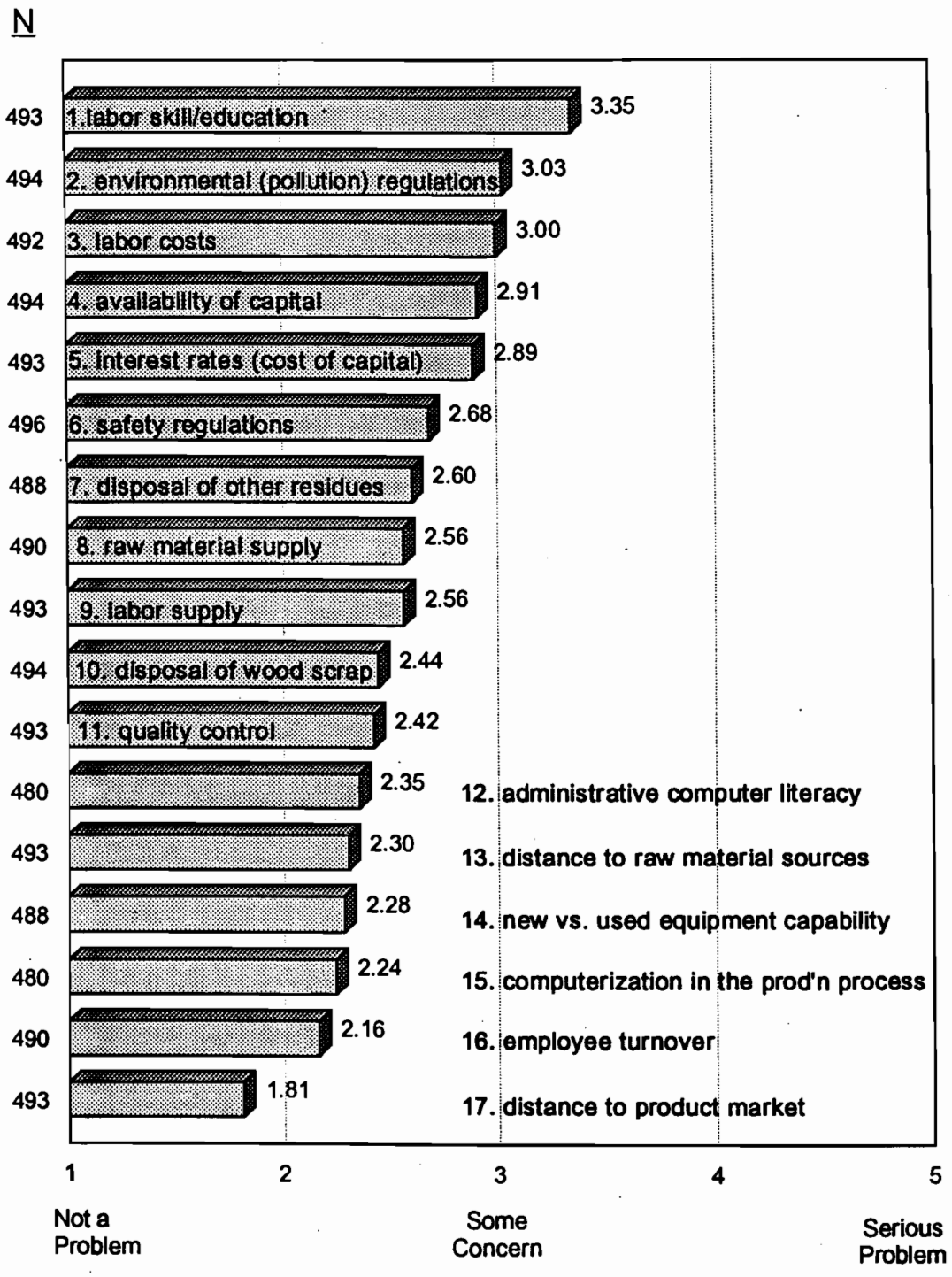


Figure 5. Ranking of Business Concerns: All Respondents

- There was very high variability within each size class in rating of each question. This may reflect the diversity of product lines of respondents which may influence their perspectives on the importance of different issues.

However, there are some interesting tendencies in how various issues are perceived between the different size classes. The following paragraphs present comments on the issues which are listed according to the overall ranking shown in Figure 5. Table 12 and Figure 6 summarize the Likert scores according to sales size class. Table 12 also lists the issues in order of concern within each size class.

#1. Labor skill/education received the highest overall concern score and there was no trend in scores with size. This issue was highest in all but the largest size class which rated it #3. More than 20% of respondents considered this to be their #1 problem; no other issue received as many #1 ratings.

#2. Environmental (pollution) regulations had Likert scores showing a trend toward greater concern with larger size. This was the #2 issue for the three larger size classes. It dropped to #5-6 among the smaller sizes.

#3. Labor cost showed little change in score with size class. This issue was in 3rd place for all except the largest and smallest sizes. As noted earlier, labor skill/education was #3 for the largest establishments and these gave labor cost a #6 rank. The smallest establishments rated labor cost #4.

#4, #5. Availability of capital and interest rates (cost of capital) had very similar patterns with smaller establishments expressing greater concern scores. These issues were ranked #2-#4 in establishments smaller than $1 million, #6-7 in the middle ($1.000-4.999 million) size class, and #9 or lower among the larger sizes. These apparent funding difficulties may partially explain why the smallest establishments indicated a greater tendency to have plans to invest in used rather than new equipment (see section 1.7). It may also help explain differences among the size classes in their ranking of computerization of the production process (see issue #15 below); small establishments may have few problems with computerized processes simply because they cannot obtain funding necessary to invest in these advanced technologies.

#6. Safety regulations varied from #4 to #8. Scores indicate that the smallest establishments have somewhat less concern.

#7. Disposal of other (*i.e.*, non-wood) residue scores indicated slightly greater concern in the larger establishments. This issue varied from #5-#8 with little trend with size. Concern regarding disposal of woody residue was less (see #10 below).

#8. Raw material supply scores indicated increased concern with size, especially for the largest establishments. Within the size classes this issue ranked #8-12 in establishments

smaller than $5.0 million but was #1 and #4 respectively for the largest and second largest. Distance from sources of raw materials (#13 overall) tended to parallel these raw material supply ratings. As will be seen in Chapter 3, small establishments tend to focus on local markets and emphasize custom products. Given these characteristics and their small size, they may have relatively little difficulty compared to larger establishments in obtaining materials to meet their production needs.

#9. Labor supply scores decreased slightly with increasing establishment size. Within the size classes the rank of this issue decreased from #4 to # 14 from the smallest to largest. As noted above, the large establishments also tended to have lower rankings of labor skill/education and labor cost.

#10. Disposal of wood scrap scores indicated increasing concern with size except for the largest establishments which showed the least concern. Within size classes the rank of this issue varied from #6-8 with no apparent trend with size. Apparently wood scrap is somewhat easier to manage that non-wood residue (#7). Uses for wood scrap may include process energy (*i.e.*, kiln drying), sales to other wood industries (*i.e.*, pulp, particleboard), or given to employees for household fuel.

#11. Quality control scores rose with size class. Within size classes the rank of this issue rose from #11-13 among the three smallest sizes to #5 in the largest. Possible reasons for this difference are

- Large establishments tend to be more involved in production of standardized commodity products (Chapter 3). A formal QC program may be a more important competitive factor in commodities than in production of custom/specialty products which predominate among small establishments.

- Large establishments have a much broader scope of geographic markets, including a greater tendency to be involved in exporting (Chapters 3-4). As distance from the customer increases, having a formal QC program may be a relatively more important system for preventing consumer complaints. Also, those involved in exporting may be encountering customers who require ISO 9000 certification or some other evidence of a formal QC system.

#12. Administrative computer literacy scores indicated slightly rising concern with larger size; perhaps larger establishments have invested in more sophisticated business computing systems. However, within size classes, this issue varied from #10-14 with no apparent trend with size.

#13. Distance to raw material sources scores indicated greater concern with larger size. Within size classes this issue increased in importance from #13-15 among the smallest to #7 in the largest size class. This generally parallels the rankings of raw material supply (#8 above).

#14. New vs used equipment capability had somewhat higher concern scores and within size class rankings in the smallest and largest size classes. As noted in Section 1.8, the smallest establishments were the only group that planned to increase investing relatively more in used than in new equipment, perhaps because of their difficulties with availability and cost of capital (see #4, #5 above). They may be concerned with a potential competitive disadvantage relative to larger establishments that can finance acquisition of new technology. In contrast, the largest establishments, which plan to invest relatively more in new equipment, may be expressing their awareness of the advantages of the latest technology as well as problems of adapting to it. Since state-of-the-art technology may involve computerized controls, this may also explain why the largest establishments also expressed greater concern with computerization of the production process (#15).

#15. Computerization in the production process scores indicated greater concern with larger size, especially the largest. Within size classes, this issue was ranked #14-15 by all but the largest establishments which rated it #11. It is possible that the largest establishments have invested more in computerized technology and have more experience with the advantages and problems associated with implementing it in their processes.

#16. Employee turnover scores and within size class rankings indicated no trend with size. Apparently labor issues are primarily associated with skill and education (#1), cost (#3), and supply (#9) rather than turnover.

#17. Distance to product market was rated last by all sizes. Concern scores were slightly higher in the smallest and largest size classes.

Table 12. Ranking of Business Concerns by Sales Size Class*

	Sales Size Class ($000)											
	(1) ≤249		(2) 250-999		(3) 1000-4999		(4) 5000-14999		(5) ≥15000		(6) All Sizes Combined	
Rank	Topic	Score	Topic	Score	Topic	Score	Topic	Score	Topic	Score	Topic	Score
1	L.	3.28	L.	3.45	L.	3.34	L.	3.44	F.	3.79	L.	3.35
2	A.	3.15	A.	3.23	P.	3.17	P.	3.38	P.	3.64	P.	3.03
3	B.	3.14	K.	3.06	K.	2.96	K.	3.05	L.	3.24	K.	3.00
4	K.	3.00	B.	3.05	Q.	2.79	F.	2.91	Q.	2.91	A.	2.91
5	J.	2.69	P.	2.94	O.	2.70	Q.	2.84	E.	2.91	B.	2.89
6	P.	2.62	Q.	2.84	A.	2.70	N.	2.84	K.	2.88	Q.	2.68
7	O.	2.45	J.	2.62	B.	2.68	O.	2.73	G.	2.78	O.	2.60
8	Q.	2.42	O.	2.52	F.	2.58	E.	2.68	O.	2.67	F.	2.56
9	F.	2.36	N.	2.45	J.	2.55	B.	2.64	B.	2.58	J.	2.56
10	C.	2.35	M.	2.40	N.	2.51	J.	2.60	D.	2.55	N.	2.44
11	E.	2.28	E.	2.38	M.	2.49	A.	2.57	C.	2.52	E.	2.42
12	N.	2.27	F.	2.37	G.	2.46	G.	2.41	A.	2.48	M.	2.35
13	G.	2.23	C.	2.36	E.	2.42	M.	2.39	M.	2.45	G.	2.30
14	M.	2.21	D.	2.26	D.	2.29	I.	2.36	J.	2.39	C.	2.28
15	D.	2.13	I.	2.21	C.	2.20	D.	2.25	N.	2.21	D.	2.24
16	I.	2.10	G.	2.09	I.	2.07	C.	2.23	I.	2.16	I.	2.16
17	H.	2.00	H.	1.79	H.	1.73	H.	1.77	H.	2.03	H.	1.81

* Letters used to identify the 17 issues presented in this section correspond to the following list:

A. availability of capital
B. interest rates (cost of capital)
C. new *vs.* used equipment capability
D. computerization in the production process
E. quality control
F. raw material supply
G. distance to raw material sources
H. distance to product market
I. employee turnover
J. labor supply
K. labor cost
L. labor skill/education
M. administrative computer literacy
N. disposal of wood scrap
O. disposal of other residue
P. environmental (pollution) regulations
Q. safety regulations

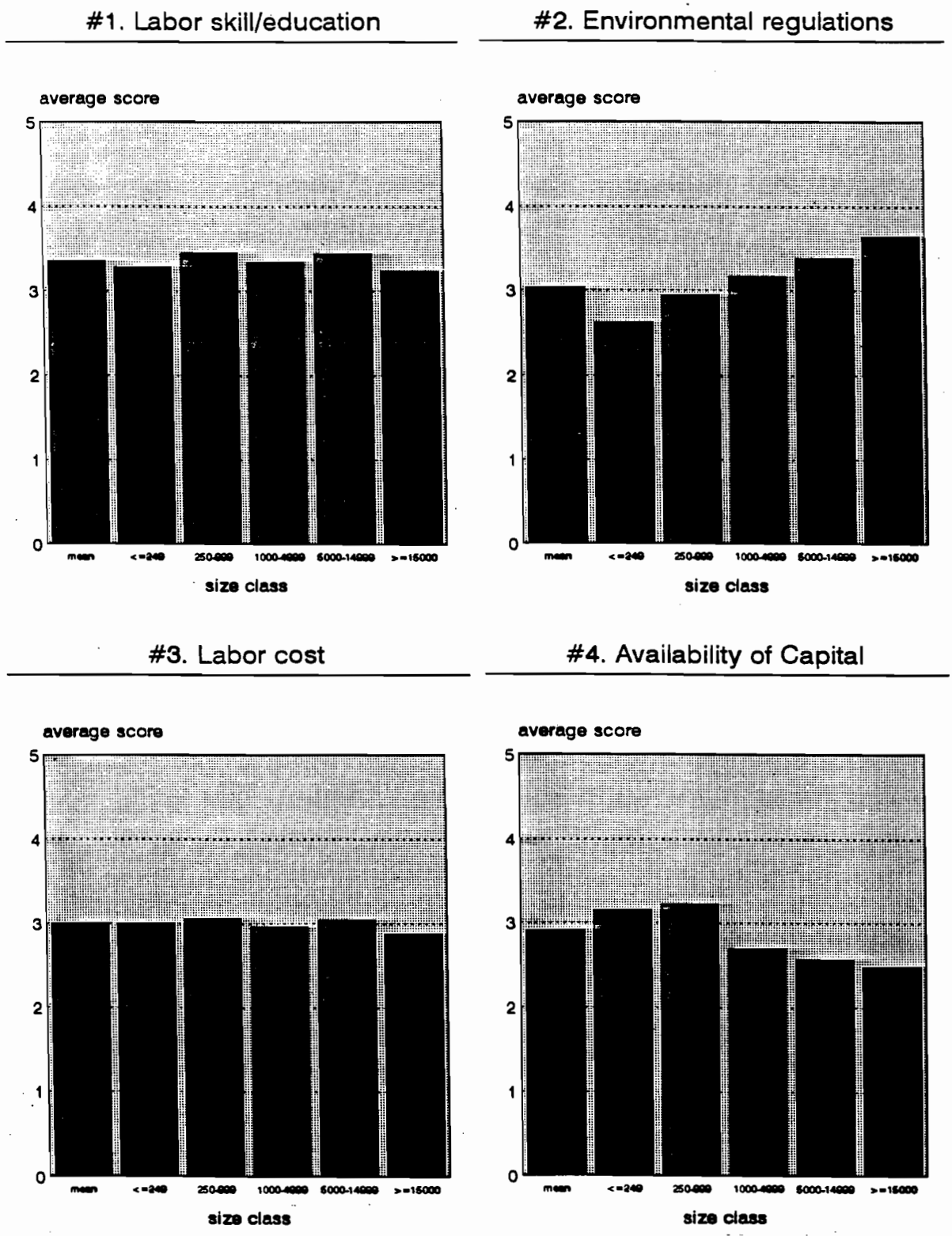
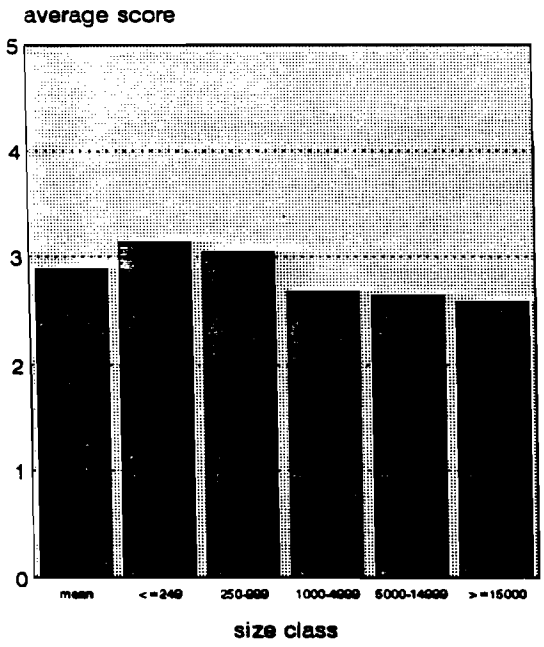
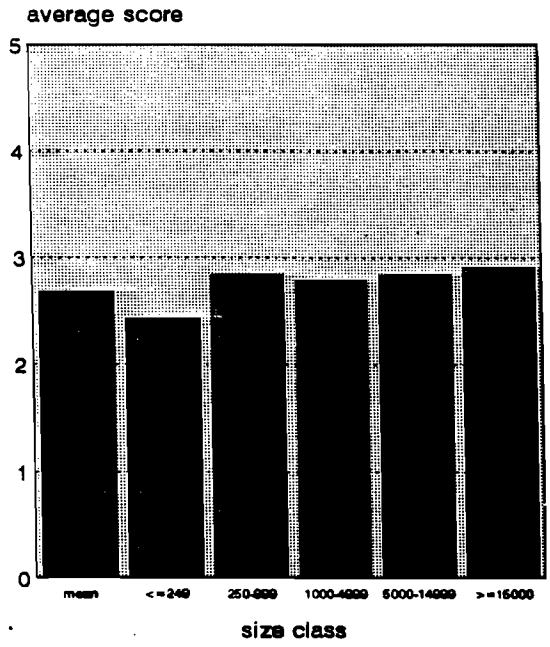


Figure 6. Ranking of Business Concerns by Sales Size Class

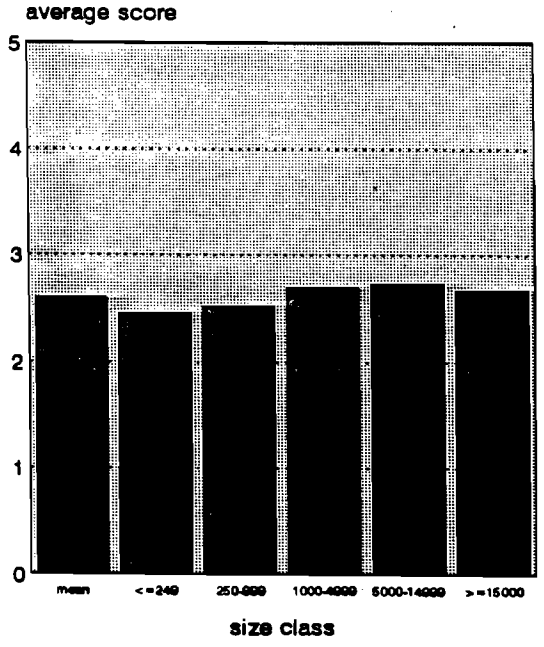
#5. Interest rates (cost of capital)



#6. Safety regulations



#7. Disposal of other residue



#8. Raw material supply

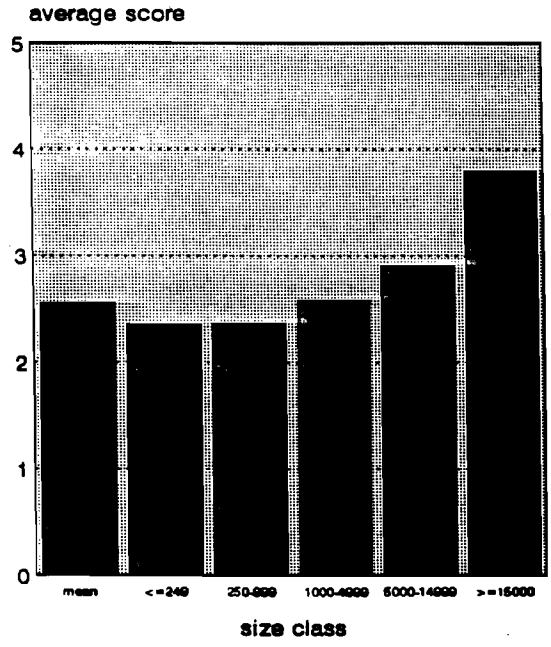
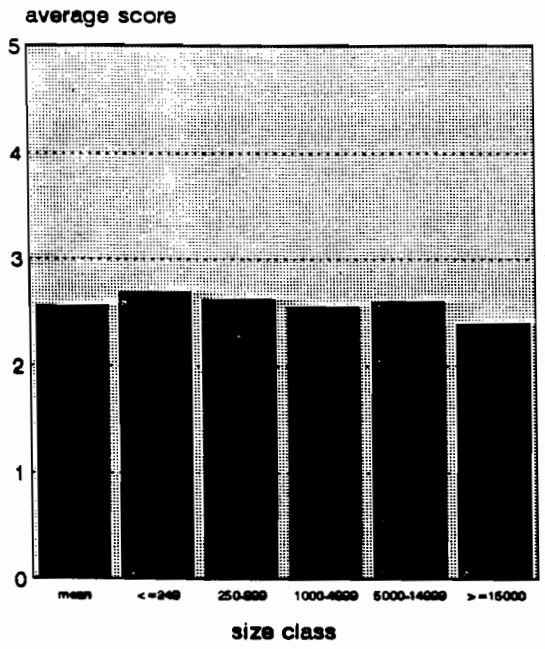
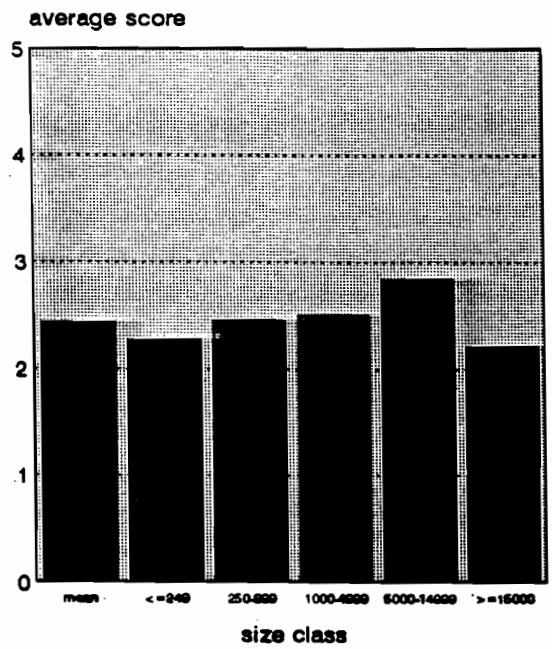


Figure 6. Cont.

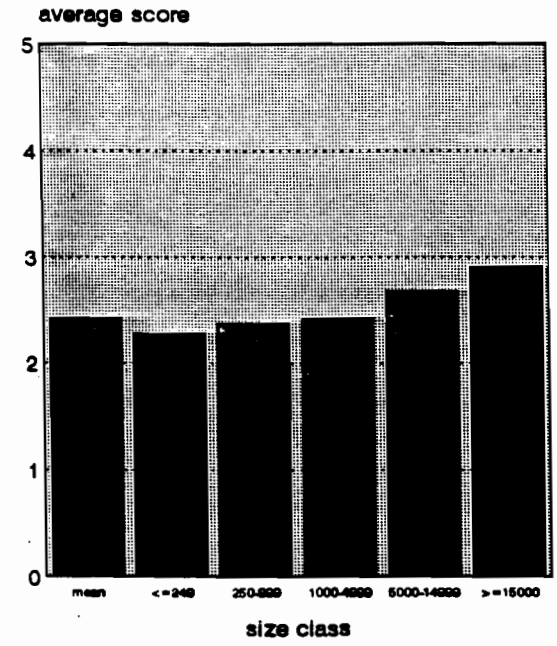
#9. Labor supply



#10. Disposal of wood scrap



#11. Quality control



#12. Administrative computer literacy

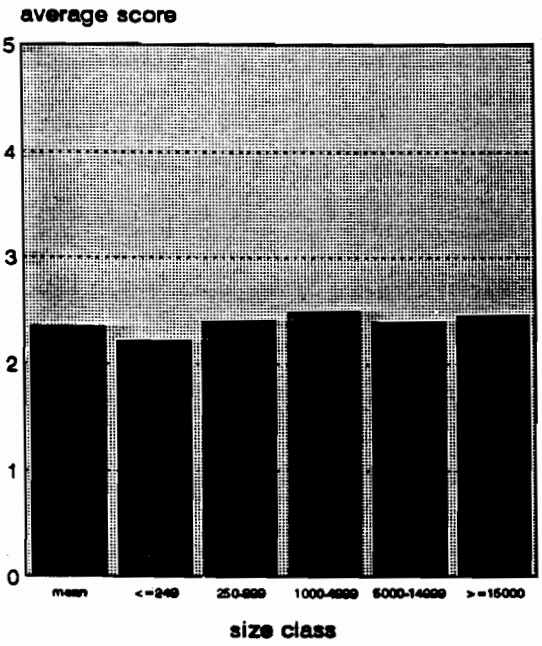
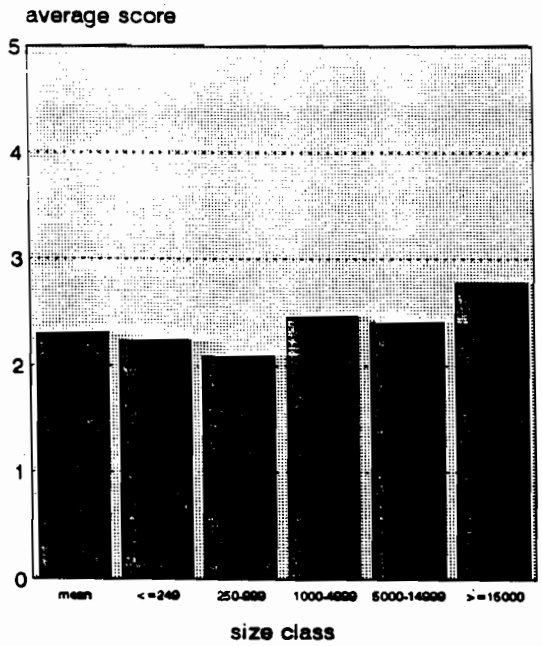
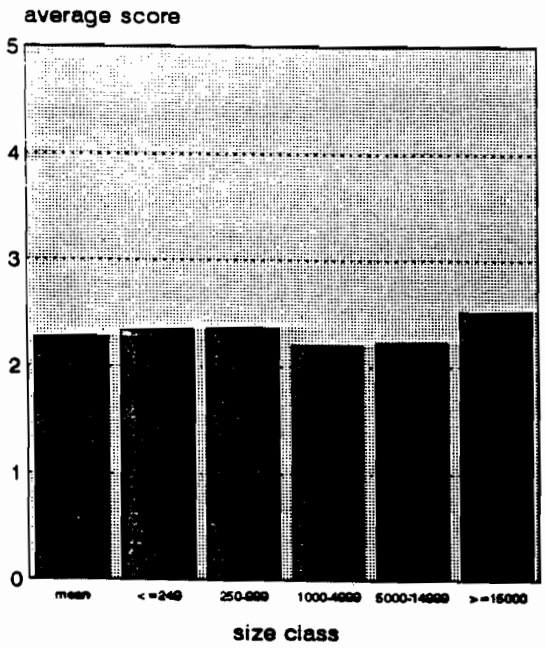


Figure 6. Cont.

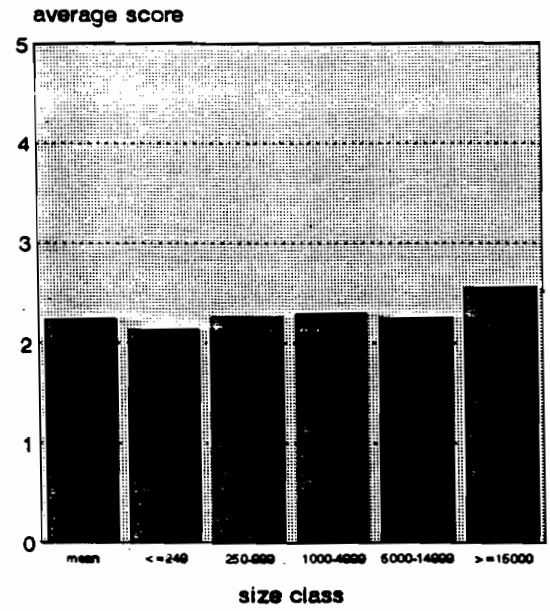
#13. Distance to raw material sources



#14. New vs. used equipment capability



#15. Computerization in the production process



#16. Employee turnover

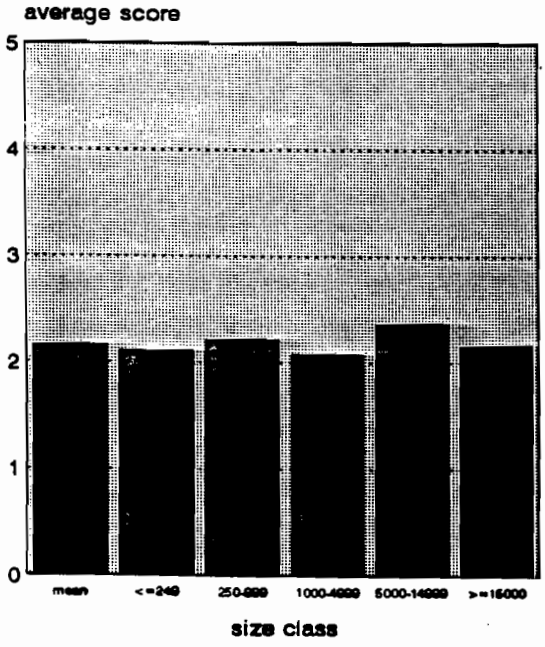


Figure 6. Cont.

#17. Distance to product market

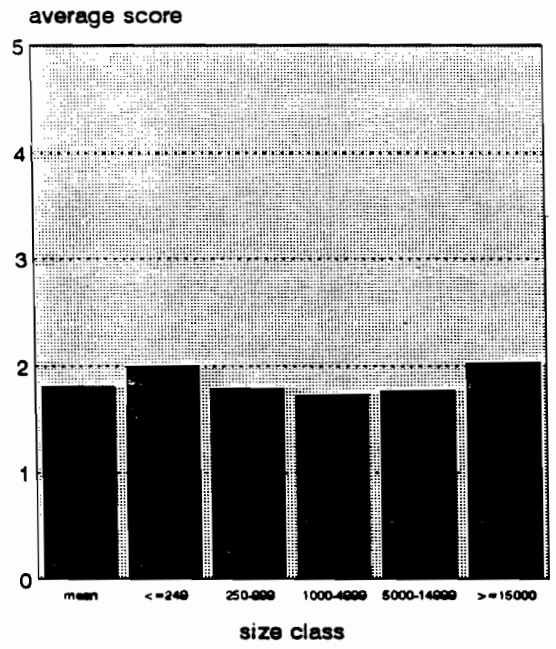


Figure 6. Cont.

CHAPTER 2

RAW MATERIAL CONSUMPTION

This chapter quantifies 1990 consumption of raw materials by respondents according to material type and, where appropriate, species. Anticipated changes in consumption over the next five years, information on wood flow distribution patterns, non-wood substitution, and respondent perceptions on current raw material issues are also presented.

Respondents were presented a list of raw materials (*e.g.*, lumber, plywood, *etc.*) and sublists of species where appropriate. They were asked to indicate 1990 consumption in customary units of measure that were shown beside each item on the questionnaire and to check a box indicating if they expected consumption to decrease, not change, or increase over the next five years. A listing of common and scientific names of wood species is presented in Appendix A.

A few respondents provided extremely unlikely material quantities. These were identified by examining frequency distributions for each material type/species category, comparing the suspect value with data supplied by other respondents, comparing the value with national production statistics available from trade associations, and informal discussion with experts familiar with the particular industry segment. Responses identified as highly unlikely were omitted from the data summary but are listed in footnotes to tables.

The material consumption data presented in this chapter should be interpreted with caution. By chance sampling, it is possible that the only user of one minor species or product responded while user(s) of another either were not included in the initial randomly selected mailing or received the survey but did not respond. While extrapolating aggregate totals of material categories to estimate consumption by the entire millwork industry may be reasonable, extrapolating usage of single species or product types, especially less frequently cited ones, may be very misleading.

2.1 Roundwood

Respondents were asked if they used roundwood (logs) as raw material and, if so, to list the species and volume. Table 13 indicates that only 29 respondents (5.8%) use roundwood. It was expected that use of roundwood would be low, since millwork manufacturers characteristically remanufacture materials such as lumber and panels. Total roundwood use by respondents was 6.9 million board feet. The most frequently cited species are oaks, white pine, white cedar, and mahogany. In terms of volume consumed, white pine ranks first at 42.8% followed by red pine (39.9%) and white-cedar (8.7%). Collectively these three species represent 91% of roundwood consumed by respondents.

Table 13. Roundwood Consumption--Volume and Frequency.

	Species	Number of Observations	Total Consumption (MBF)	% of Total Volume	Consumption Mean MBF/Observation
1.	white pine	3	2,950	42.8	983
2.	red pine	1	2,750	39.9	2750
3.	white-cedar	3	600	8.7	200
4.	oak	6	284	4.1	47
5.	poplar	2	202	2.9	101
6.	redwood	2	54	0.8	27
7.	red cedar	1	18	0.3	18
8.	mahogany	3	8	0.1	3
9.	maple	1	2	0.0	2
10.	pine	1	2	0.0	2
11.	fir	1	2	0.0	2
12.	cherry	1	2	0.0	2
13.	walnut	1	2	0.0	2
14.	Southern yellow pine	1	1	0.0	1
15.	not specified/misc.	4	14	0.2	5
	Total	29	6,891	100.0	

2.2 Lumber

Respondents were given a list of species, along with space to add others, and asked to indicate consumption in thousands of board feet (MBF). Tables 14 and 15 indicate that approximately 991 million board feet (bd ft) of lumber was used, of which 76% (756 million bd ft) is softwood lumber and the balance (234 million bd ft, 24%) is hardwood lumber. Very small volumes are species from outside the US/Canada. Since many respondents use more than one species, a total of 741 observations of softwood species and 1347 observations of hardwood species occurred.

2.2.1 Softwood Lumber

Two respondents were omitted from the softwood lumber summary. One reported consumption of 1,000 million board feet of Southern pine lumber and the other 820 million board feet of true-fir lumber. Each of these exceeds the combined use of softwood lumber by all other respondents. With these excluded, total consumption of softwood lumber was 756 million board feet (Table 14).

Ponderosa pine, traditionally considered to be the principal species used for millwork, was the most frequently identified species; 22% of observations were ponderosa pine which also ranked first (60.7%) in volume of softwood lumber consumed and second (2,782 MBF) in average consumption per user. Douglas-fir was the second most frequently identified species, but represents only 3.2% of softwood lumber volume and its use per establishment was quite low, ranking seventh. The third most commonly identified species were the southern pines, but these represent only 1.5% of total consumption and rank low in average volume per establishment. The fourth most commonly cited species is the hemlock/true-fir group, which accounted for

5.0% of the softwood lumber volume. The fifth most commonly cited species was eastern white pine. When combined with its western white pine counterpart, this pair actually places ahead of Douglas-fir in number of users and total volume. While eastern white pine lumber is cited very often, it is a very small percent of total consumption (0.2%) and consumption per observation is quite low. Western white pine accounts for 3.9% of total consumption and a much higher average use. The difference between these white pines may reflect numerous small cottage industries in the Northeast. The other noteworthy species is red cedar. While only 11 respondents use it, it ranks highest in volume per user and second (19.9%) in total consumption.

Ponderosa pine, red cedar, hemlock/true-fir, the white pines and Douglas-fir account for 92.9% of softwood lumber consumption. Eleven other identified species account for only 6%. Among these, radiata pine is noteworthy, as it is the only softwood species grown outside the US and Canada identified in the survey (by two respondents). This species is receiving more interest due to reductions in federal timber harvests and the US millwork industry is a market being targeted by Chilean and New Zealand growers of the species (Evison, 1993).

Table 14. Softwood Lumber Consumption--Volume and Frequency.

	Species	*Number of Observations	Total Species Consumption (MBF)	Percentage of Total Volume	Consumption Mean Per Observation (MBF)
1.	ponderosa pine	165	459,008.6	60.7	2,781.9
2.	red cedar	11	150,240.1	19.9	13,658.2
3.	hemlock, true-fir, hem-fir	84	37,600.0	5.0	447.6
4.	Western white pine	53	29,805.9	3.9	480.7
5.	Douglas-fir	128	24,226.6	3.2	189.3
6.	SPF	33	19,013.9	2.5	576.2
7.	Southern pine	112	11,685.6	1.9	104.3
8.	sugar pine	8	9,153.0	1.2	1,299.0
9.	spruce	31	3,291.6	0.4	106.2
10.	Eastern white pine	77	1,901.9	0.2	24.7
11.	radiata pine	2	1,760.0	0.2	880.0
12.	redwood	19	334.0	0.0	17.6
13.	cypress	3	23.0	0.0	7.7
14.	knotty pine	1	5.0	0.0	5.0
15.	heart pine	2	4.5	0.0	2.3
16.	lodgepole pine	1	3.0	0.0	3.0
17.	not specified/misc.	11	8,432.6	1.1	766.6
	Total	741	756,429.3	100.0	

*Note: Excludes one respondent at 1,000,000 MBF Southern pine and one respondent at 820,000 MBF true-fir.

2.2.2 Hardwood Lumber

Two respondents are excluded from the hardwood lumber summary. One reported consumption of 150 million board feet of red alder lumber, which is roughly half of the total alder lumber

production, and another reported 25 million board feet of cherry, more than 500 times the amount of cherry consumed by any other respondent and about 7% of the national production of cherry lumber production (Hardwood Review Yearbook, 1993).

Table 15 presents consumption of 234 million board feet of hardwood lumber by respondents. Red oak was the most frequently cited (25% of observations) and had the highest overall volume (58.7%). The second most commonly-cited species was red and soft maples which account for 4.4% of volume, but overall volume and usage per establishment are small. White oak was the third most-cited species and represented 2.9% of volume consumed.

Table 15. Hardwood Lumber Consumption--Volume and Frequency.

	Species	*Number of Observations	Total Species Consumption (MBF)	Percentage of Total Volume	Consumption Mean Per Observation (MBF)
1.	red oak	337	137,405.0	58.7	407.7.0
2.	poplar	110	44,409.0	19.0	361.6.1
3.	red/soft maple	310	10,236.5	4.4	33.0.4
4.	white oak	201	6,725.5	2.9	33.5
5.	basswood	7	4,350.4	1.9	621.5
6.	virola	2	3,081.0	1.3	1,540.5
7.	red alder	36	2,190.4	0.9	60.8
8.	birch	192	2,183.0	0.9	11.4
9.	mahogany	34	691.2	0.3	20.3
10.	sande	1	480.0	0.2	480.0
11.	ash	12	397.1	0.2	33.1
12.	cherry	34	363.1	0.2	10.7
13.	aspen/cottonwood	5	265.0	0.1	53.0
14.	walnut	13	115.1	0.0	8.9
15.	butternut	4	61.5	0.0	15.4
16.	hickory	2	18.0	0.0	9.0
17.	teak	4	16.0	0.0	4.00
18.	haiari	1	10.0	0.0	10.0
19.	lauan	1	5.0	0.0	5.0
20.	not specified/misc.	41	21,058.0	9.0	513.6
	Total	1,347	234,060.8	100.0	

*Note: Excludes one respondent at 150 million board feet of red alder and one respondent at 25 million board feet of cherry.

Birch, the fourth most frequently-cited species, has a low overall volume (0.9%) and low consumption per user. Poplar ranked fifth in number of citations and was the second most voluminous species, comprising 19.0% of the total hardwood lumber volume.

Collectively, red oak, poplar, red/soft maple and white oak represent 85.0% of hardwood lumber consumed by respondents. Tropical hardwood species were cited only 43 times (3.2% of observations) and accounted for about 2% of hardwood lumber consumption. When viewed in

the context of total consumption of both hardwood and softwood lumber, tropical hardwood lumber consumption is negligible.

2.3 Veneer and Panel Products

Comparing quantities of various panel products can be confusing, since these products are normally reported on the basis of square feet, surface measure. To standardize statistics, each of these products has a standard thickness basis that is used. However, the standard thickness basis is not the same for the different types of panel products. For example, the standard thickness basis for plywood is 3/8 inch, while for particleboard it is 3/4 inch. This section presents information according to these usual industry conventions.

2.3.1 Veneer

About 110 million square feet of veneer was consumed by respondents (Table 16). Red oak was the most often-cited veneer species (37% of observations) and comprises 70.5% of the total veneer quantity consumed by survey respondents. Its per-establishment consumption is the fourth highest.

Table 16. Veneer Consumption--Volume and Frequency.

	Species	Number of Observations	Total Species Consumption (MSF)	Percentage of Total Volume	Consumption Mean Per Observation (MSF)
1.	red oak	197	78,287.8	70.5	397.4
2.	maple	63	14,352.7	12.9	227.8
3.	lauan	6	8,067.0	7.3	1,344.5
4.	birch	162	3,155.7	2.8	19.5
5.	ponderosa pine	3	1,574.0	1.4	524.7
6.	Southern pine	7	1,254.5	1.1	179.2
7.	mersaw	1	576.0	0.5	576.0
8.	hickory	1	375.0	0.3	375.0
9.	cherry	14	165.6	0.1	11.8
10.	ash	4	79.5	0.1	19.9
11.	mahogany	11	65.3	0.1	5.9
12.	poplar	2	60.0	0.1	30.0
13.	anegre	1	60.0	0.1	60.0
14.	walnut	9	59.3	0.1	6.6
15.	white oak	3	7.0	0.0	2.3
16.	teak	2	5.0	0.0	2.5
17.	blanquita	1	1.0	0.0	1.0
18.	not specified/misc.	39	2,832.2	2.6	72.6
	Total	526	110,977.7	100.0	

Birch is the second most frequently cited species (31% of observations), but total quantity used (2.8%) and consumption per establishment are quite small. Maple is the third most-cited species (12% of observations) and is second with 12.9% of the total veneer quantity. Although cited by

relatively few, lauan, a species from tropical Asia, represented 7.3% of the total quantity and had the highest use per observation. Collectively, these four species accounted for 93.5% of veneer consumed. The remaining 6.5% of veneer consumed consisted of 0.7% other tropical hardwoods, 0.7% other domestic hardwoods, 2.5% domestic softwoods, and 2.6% unspecified species. Tropical hardwood veneers represent less than 10% of total veneer consumption.

2.3.2 Plywood

Two respondents are excluded from the plywood summary. One reported consumption of 750 million square feet of southern pine plywood and another 100 million square feet of plywood of unspecified species. In contrast, all other respondents reported a combined plywood consumption of only 19.3 million square feet (Table 17).

Douglas-fir is the most frequently cited plywood species (46% of observations) and the most voluminous (60.5%) used by the millwork industry (Table 17). Southern pine is the second most frequently cited (16%) and voluminous species with 29.1% of the total volume.

Douglas-fir and southern pine plywood combine to account for 90% of plywood consumed by respondents. The remaining five identified species (four hardwood species and one softwood) make up a minimal amount of the total plywood volume used by survey respondents.

Table 17. Plywood Consumption--Volume and Frequency.

	Species	*Number of Observations	Percentage of Total Volume	Total Species Consumption (MSF) 3/8 basis	Consumption Mean Per Observation (MSF)
1.	Douglas-fir	101	11,713.0	60.5	116.0
2.	Southern pine	34	5,639.0	29.1	165.9
3.	birch	12	93.2	0.5	7.8
4.	hemlock	1	20.0	0.1	20.0
5.	red oak	5	18.8	0.1	3.7
6.	poplar	2	11.7	0.1	5.9
7.	ash	2	4.0	0.0	2.0
8.	not specified/misc.	61	1,872.2	9.7	62.0
	Total	218	19,371.9	100.0	

*Note: Excludes one respondent at 750,000 MSF of Southern pine plywood and one respondent at 100,000 MSF of miscellaneous plywood.

2.3.3 Reconstituted Panels

Respondent use of these panel products, made from wood strands, flakes, chips, sawdust, shavings, or pulped fiber bundles, is summarized in Table 18. Quantities are in customary square foot units, which have different reporting bases. To standardize, quantities are also shown after conversion to solid cubic foot volume equivalents (Briggs 1994). Excluded from the table are three respondents reporting 50, 350, and 900 million square feet of particleboard,

respectively; the smallest of these is about double the combined use of all 183 other respondents using particleboard. Also excluded is one respondent reporting 100 million square feet of MDF, roughly six times the combined use of all other MDF consumers; one respondent reporting 50 million square feet of hardboard, roughly six times the combined use of all other hardboard consumers; and one respondent reporting 1,000 million square feet of OSB, roughly 25 times the combined use of all other OSB consumers.

Particleboard is the most frequently cited (37% of observations) and most voluminous (56.5%) of these reconstituted panel products used by respondents. MDF was almost as frequently cited (33% of observations) and accounts for 34.1% of the volume. Hardboard represented 20% of the observations but only 2.8% of the volume while OSB represented only 5% of the observations and 4.2% of the volume. Several other reconstituted or composite panel products were cited with melamine materials being the most frequent. Many respondents may have indicated composites based on the wood substrate rather than the type of surface finish.

Table 18. Reconstituted Panel Consumption--Volume and Frequency.

	Species	Basis	*Number of Observations	Total Species Consumption (MSF)	(MCF)	Percentage of Total Volume	Consumption Mean Per Observation (MSF)
1.	particleboard	3/4	183	26,050	1,628	56.5	142
2.	MDF	3/4	167	15,734	983	34.1	94
3.	hardboard	1/8	103	7,688	80	2.8	75
4.	OSB	3/8	25	3,918	123	4.2	157
5.	all others		22	2,150	67	2.4	98
	Total		500			100.0	

*Note: Excludes one respondent at 50 million square feet of particleboard; one respondent at 350 million square feet of particleboard; one respondent at 900 million square feet of particleboard; one respondent at 100 million square feet of MDF; one respondent at 50 million square feet of hardboard; and one respondent at 1,000 million square feet of OSB.

2.4 Wood Raw Materials Consumption Summary

Data presented in the preceding raw materials sections are based on customary units of measure of the various raw materials. Since roundwood is based on board feet (log scale), lumber is based on board feet (mill tally), and panel products are based on square footages reported on different thickness standards, the quantities of these raw materials are not directly comparable. Table 19 summarizes consumption after these materials have been converted to a consistent solid cubic foot equivalent (Briggs, 1994). Appendix B lists conversion factors used in this report.

Table 19 also presents the percentage of expenditures on wood raw materials by the millwork industry, derived from US Department of commerce statistics (Briggs, *et al.*, 1994) In general, there is reasonable agreement between the shares of volumes from the respondent data and shares of expenditures from the US Department of Commerce. Some differences should be

Table 19. Total Raw Material Consumption by Type of Material.

Wood Raw Material	Unit	Total Reported Volume	%	Thousand Cubic Foot (MCF) Equivalents	%	% of Total	% of Expenditures*
Roundwood							
softwood	MMBF	6.38	92.5	1,063.0	92.5	1.5	0.4
hardwood	"	.50	7.5	83.4	7.3	0.1	0.0
unknown	"	0.01	0.2	2.3	0.2	0.0	0.0
Subtotal	"	6.89	100.0	1,148.7	100.0	1.6	0.4
Lumber							
softwood	MMBF	756.4	76.4	44,553.7	69.9	63.7	70.8
hardwood	"	234.1	23.6	19,497.3	30.4	27.9	14.5
unknown	"	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal		990.5	100.0	64,051.0	100.0	91.6	85.3
Plywood							
softwood	MMSF 3/8	17.4	89.7	543.7	89.7	0.8	1.3
hardwood	"	0.1	0.7	4.0	0.7	0.0	2.8
unknown	"	1.9	9.7	58.6	9.7	0.1	0.0
Subtotal		19.4	100.0	606.3	100.0	0.9	4.1
Veneer							
softwood	MMSF	2.8	2.5	88.6	7.3	0.1	0.0
hardwood	"	105.3	94.9	1095.3	90.3	1.6	5.5
unknown	"	2.8	2.6	29.4	2.4	0.0	0.0
Subtotal		110.9	100.0	1,213.3	100.0	1.7	5.5
Reconstituted Panels							
particleboard	MMSF 3/4	26.05		1,628.1	56.5	2.3	1.8
MDF	MMSF 3/4	15.73		983.4	34.1	1.4	1.0
hardboard	MMSF 1/8	7.69		80.0	2.8	0.1	2.0
OSB	MMSF 3/4	3.92		122.6	4.3	0.2	0.0
other		2.15		67.3	2.3	0.1	0.0
Subtotal				2,881.4	100.0	4.1	4.8
Total				69,900.7	100.0	100.0	100.0

*Based on US Department of Commerce Census of Manufacturers (1987).

expected due to differences in qualities, and hence unit prices, between softwoods and hardwoods sought by millwork producers. Using plywood as an example, softwoods dominate volume used while hardwoods dominate expenditures. Part of the difference may reflect purchase of lower qualities of softwood plywood for substrate uses. Hardwood plywood may be used for more expensive exposed surfaces having a premium on appearance. There may also be some discrepancies in reporting plywood which has a softwood core and hardwood face.

On a cubic volume basis, lumber accounts for about 92% of wood materials consumed; softwood lumber is 64% and hardwood lumber 28%. Note that the relative amount of softwood

versus hardwood lumber on a solid cubic basis (69.6% *vs* 30.4%) differs from the proportions (76%, 24%) on a board foot basis (shown in Tables 14 and 15). This is due to differences in nominal as opposed to actual dimensions of softwood versus hardwood lumber (Briggs 1994).

When examining veneer and panel products, reconstituted panels are used in relatively greater quantity but veneer and plywood account for relatively higher shares of expenditures. This should not be too surprising, given differences in where these materials are applied in products and differences in unit prices.

2.5 Wood Species Distribution and Use

This section presents respondent consumption patterns of selected raw material species by state. The intent is to determine the extent that a species indigenous to a particular region is utilized by millwork industries in that region as opposed to being transported in raw material form to other regions where it is converted to millwork products. Dirks and Briggs (1991) found that secondary wood industries in Washington State, including millwork, were heavily concentrated near large population centers. Section 1.8 found that, with the exception of the largest establishments, raw material supply and distance to raw material sources were ranked relatively low among business concerns. Furthermore, distance to markets was ranked of least concern among all size classes.

Secondary wood products establishments are small, tend to have a local market focus, and tend to produce specialty and custom products (Dirks and Briggs 1991). Chapter 3 shows that many of these same characteristics typify the millwork industry respondents. There may be advantages in being close to the customer rather than to sources of raw materials. Local/regional differences in housing styles and millwork preferences (for example, New England *vs*. Southern California) may favor locally-established millwork producers, who may be in a better position to serve rather unique local customer demands. It may also be less expensive to transport raw materials such as lumber and panels over long distances than to transport bulkier and more fragile millwork products such as windows, doors, and moldings. If these characteristics are true, we speculate that species indigenous to a particular region are commonly consumed as raw material by millwork establishments in states outside their native region. This possibility was examined by mapping the distribution of respondents using lumber and plywood of several species by state.

2.5.1 Douglas-fir

Douglas-fir resources are concentrated in the Pacific Northwest states. A total of 177 of the 500 respondents (35.4%) consume Douglas-fir lumber, Douglas-fir plywood, or both. Douglas-fir lumber is consumed by 128 (25.6%) respondents and Douglas-fir plywood is consumed by 101 (20.2%) of all respondents. Approximately 10% of respondents consumed both Douglas-fir lumber and Douglas-fir plywood.

Douglas-fir lumber and plywood are consumed by respondents located in 44 states, making it the most extensively distributed and most frequently used species by respondents (Figure 7). The three states with the highest number of Douglas-fir consumers are California (n = 26), Florida (n = 12), and Oregon (n = 12).

2.5.2 Red Alder

Red alder originates in coastal Oregon and Washington and is used as lumber by millwork producers. Only 18% of red alder consumers are located in Washington and Oregon. California has the most consumers (21%) and alder is used by respondents located in 18 other states, including six East of the Mississippi (Figure 8).

2.5.3 Ponderosa Pine

Ponderosa pine is found throughout the inland west and is one of the most frequently cited species (164 respondents). It is used in both lumber and veneer form. It is used in all but five states; 12 of the 15 states with at least four respondents using ponderosa pine are outside its natural range (Figure 9).

2.5.4 Southern Pine

Southern pines originate in the Southeast and South Central regions. They are consumed as lumber (n = 113 respondents), plywood (n = 13 respondents), and veneer (n = 7 respondents). Only three respondents indicate they consume Southern pine in more than one form.

The two regions where this species group originates account for 48.5% of respondents using them. However, respondents in 24 other states consume Southern pine; of the 14 states with four or more respondents using this species, eight are outside the two regions where it grows (Figure 10).

2.5.5 Tropical Hardwood

Approximately 11% of respondents use at least one tropical hardwood species. However, tropical hardwoods represent only 0.13% of total lumber volume and 0.16% of total panel product volume. Mahogany is the most widely used tropical hardwood, with 76.3% of the 59 respondents using tropical hardwoods using this species. Mahogany is the most frequently used tropical hardwood species for both lumber and panel products . The tropical hardwood species with highest volume used by respondents is virola (70.0%). Its volume, however, is attributable to only two observations. This high volume may be due to random sampling variation among responses. As might be expected, tropical hardwood consumption is more concentrated in states that have a coastal boundary (Figure 11).

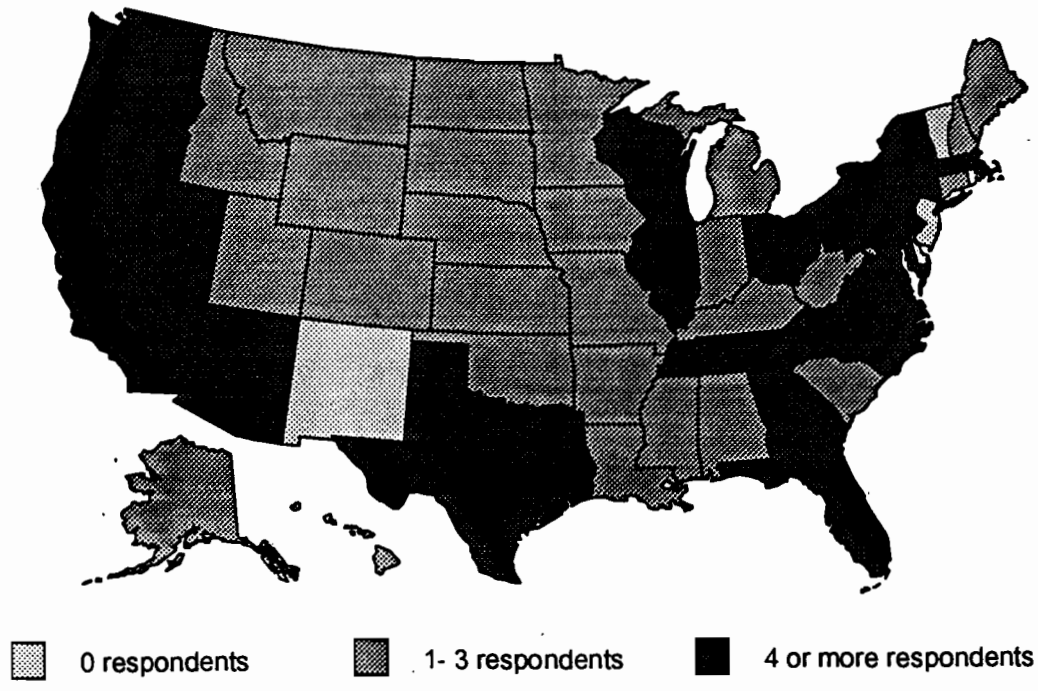


Figure 7. Douglas-fir Consumers by State

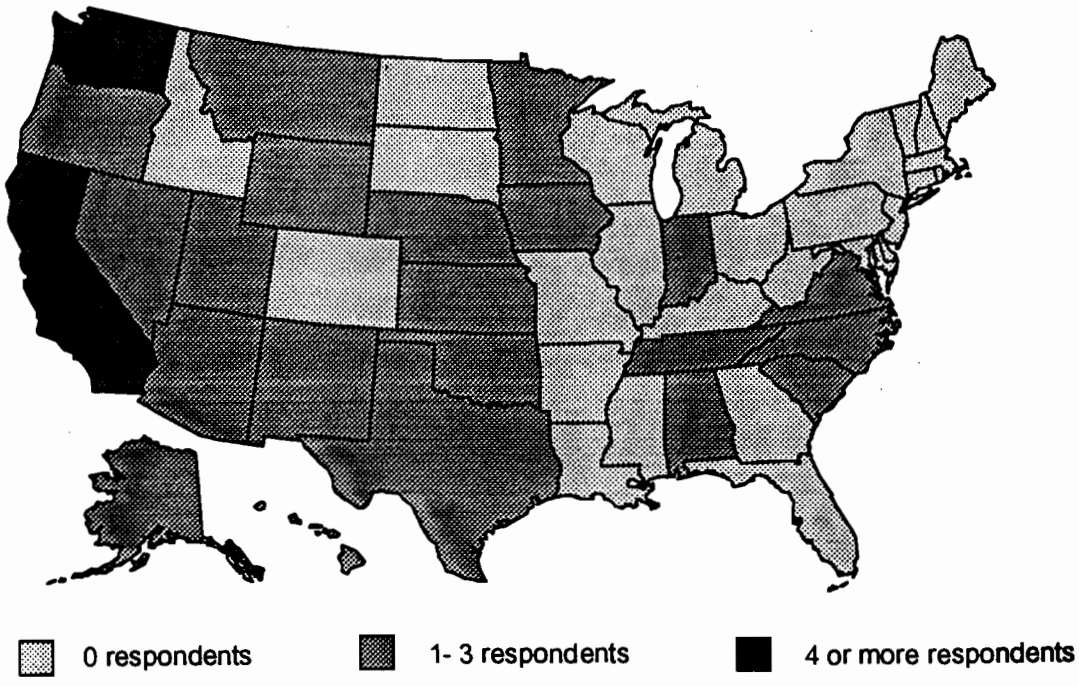


Figure 8. Red Alder Consumers by State

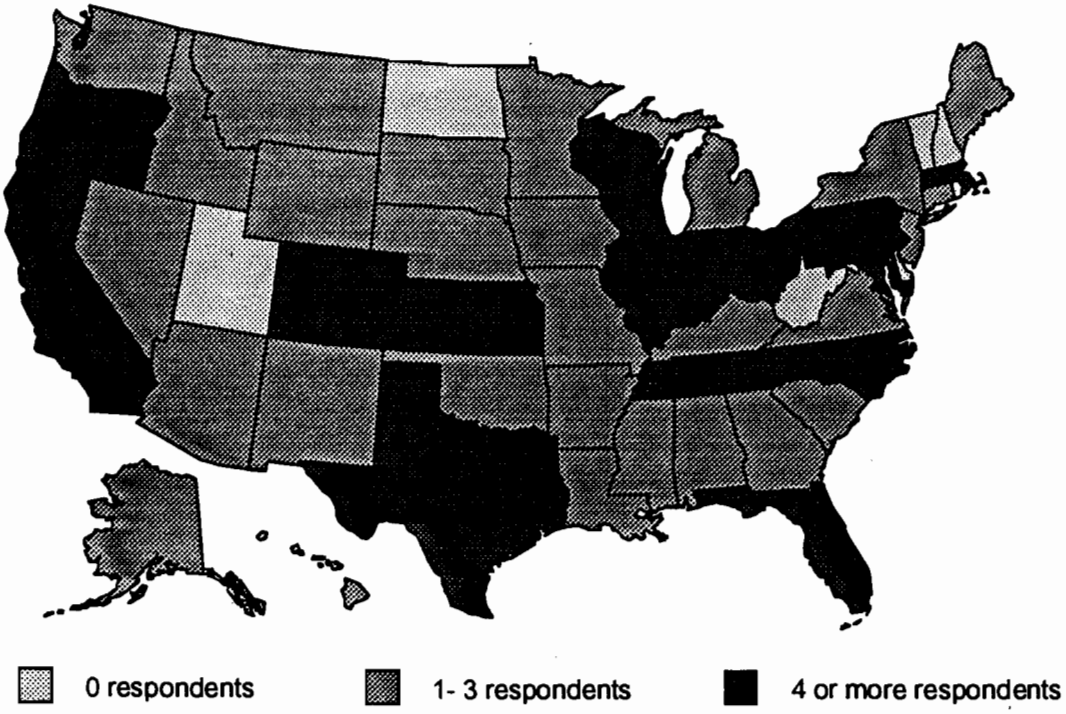


Figure 9. Ponderosa Pine Consumers by State

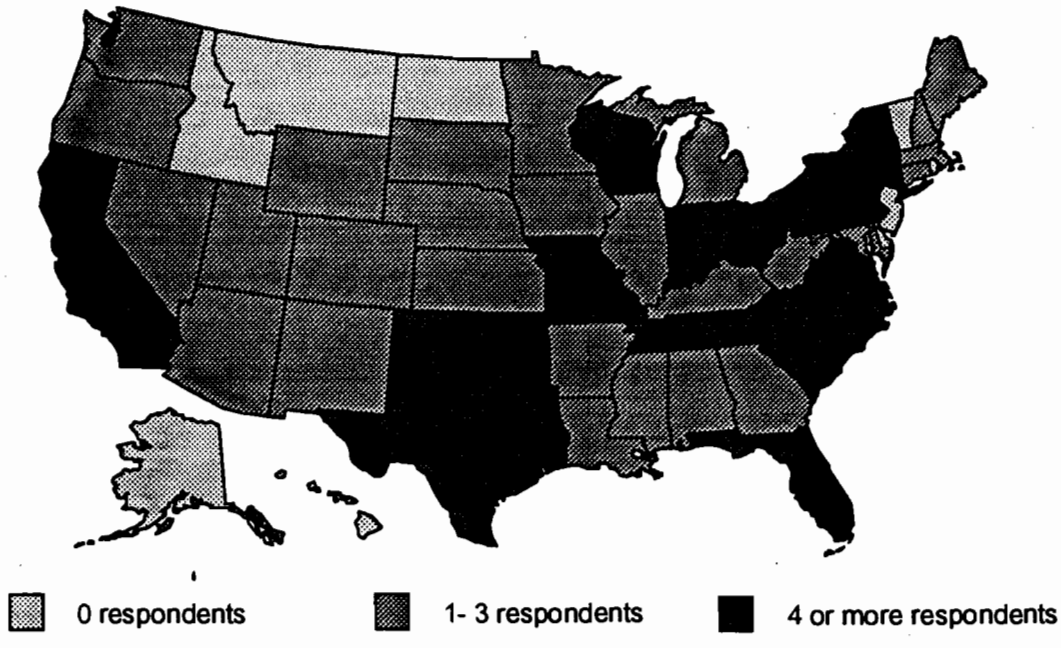


Figure 10. Southern Yellow Pine Consumers by State

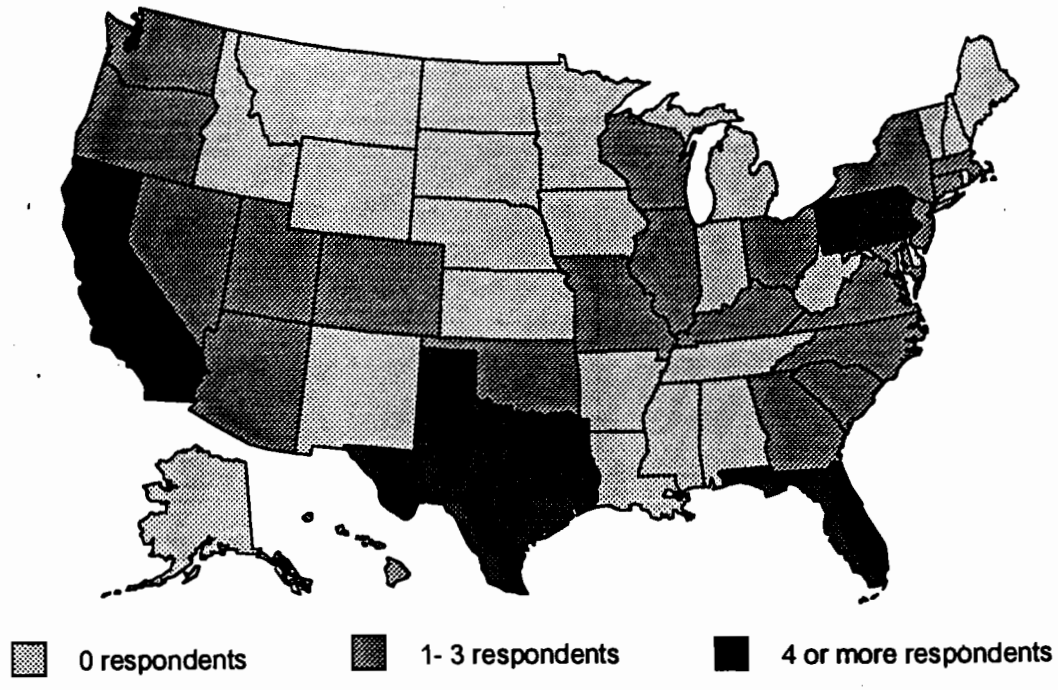


Figure 11. Tropical Hardwood Consumers by State

These species patterns provide interesting insight on raw material consumption patterns by millwork industries and suggest that it is common practice to transport raw materials to millwork establishments located far from the natural range of the species. While species tend to be somewhat more heavily used in the region of origin, these patterns suggest that there must be a combination of factors that lead millwork producers to acquire raw materials over long distances.

Although much additional research is needed on understanding factors affecting millwork establishment location, several additional clues will be presented in Chapter 3.

2.6 Wood Use Trends

Respondents were asked to indicate whether they believed that consumption of specific raw materials would decrease, not change, or increase over the next five years. These choices were numerically coded 1, 2, or 3, respectively, and averaged for all respondents as shown in Figures 12-13. Raw materials eliciting fewer than ten responses are omitted from the figures. All materials received average scores between "no change" and "increase"; none had an average score suggesting a decrease.

The three softwood lumber species whose consumption is expected to increase the most are Eastern white pine, red cedar, and spruce. The three species receiving the lowest scores are Western hemlock, fir, and Douglas-fir. Approximately 25% of the respondents using Douglas-fir expect their level of consumption will decline. Consumption of walnut, mahogany, ash, and poplar are expected to increase more than other hardwood lumber species. White oak, birch, and red alder received the lowest scores. Approximately 15% of the respondents consuming alder indicate that they expect their volume of consumption to decrease in the next five years. It is interesting to note that the four softwood species and one hardwood species with the lowest scores are all from the Western region where harvests from federal lands are being greatly reduced due to environmental issues.

Among panel products, modest increases in plywood consumption are anticipated by respondents. Mahogany veneer consumption is expected to increase the most, relative the other veneer species while cherry is likely to sustain the least amount of growth. MDF is expected to realize the highest volume increase of reconstituted panels. Hardboard received the lowest overall score among reconstituted panel products.

2.7 Consumption of Non-Wood Raw Materials

Only 80 (16.2%) of the 500 respondents used non-wood materials in 1990. Of these, 56 (70.0%), consumed one non-wood material, 15 (18.8%) consumed two non-wood materials, and 9 respondents (11.2%) consumed three non-wood materials. Three non-wood materials were the most used by any respondent. Seventeen non-wood materials were specifically identified and when unspecified materials are included, a total of 113 observations were obtained (Table 20). Of these, plastic (laminates) represent 45 (43.3%) observations.

There is a statistically significant trend toward greater use of non-wood materials by larger establishments (Table 21). The largest establishments are much more likely to use non-wood materials. For every respondent in the smallest size-class using non-wood materials, there are 8.3 that do not, but for every large-sized establishment consuming non-wood materials, only 2.8 establishments do not. Table 22 presents the average level of sales for establishments consuming zero, one, two and three non-wood materials and reinforces the positive association between increasing respondent size and use of non-wood materials.

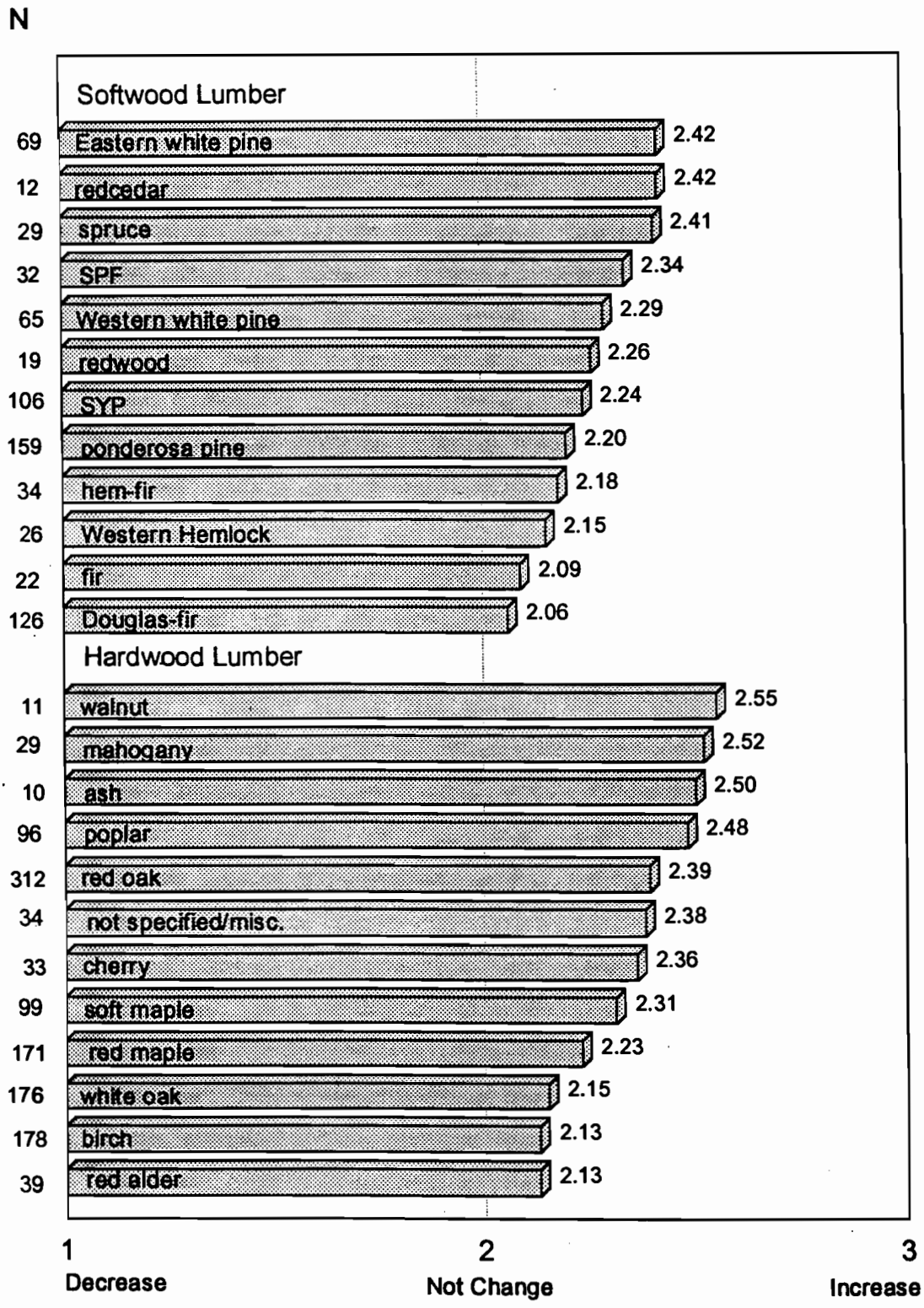


Figure 12. Anticipated Lumber Consumption Trends by Species/Type

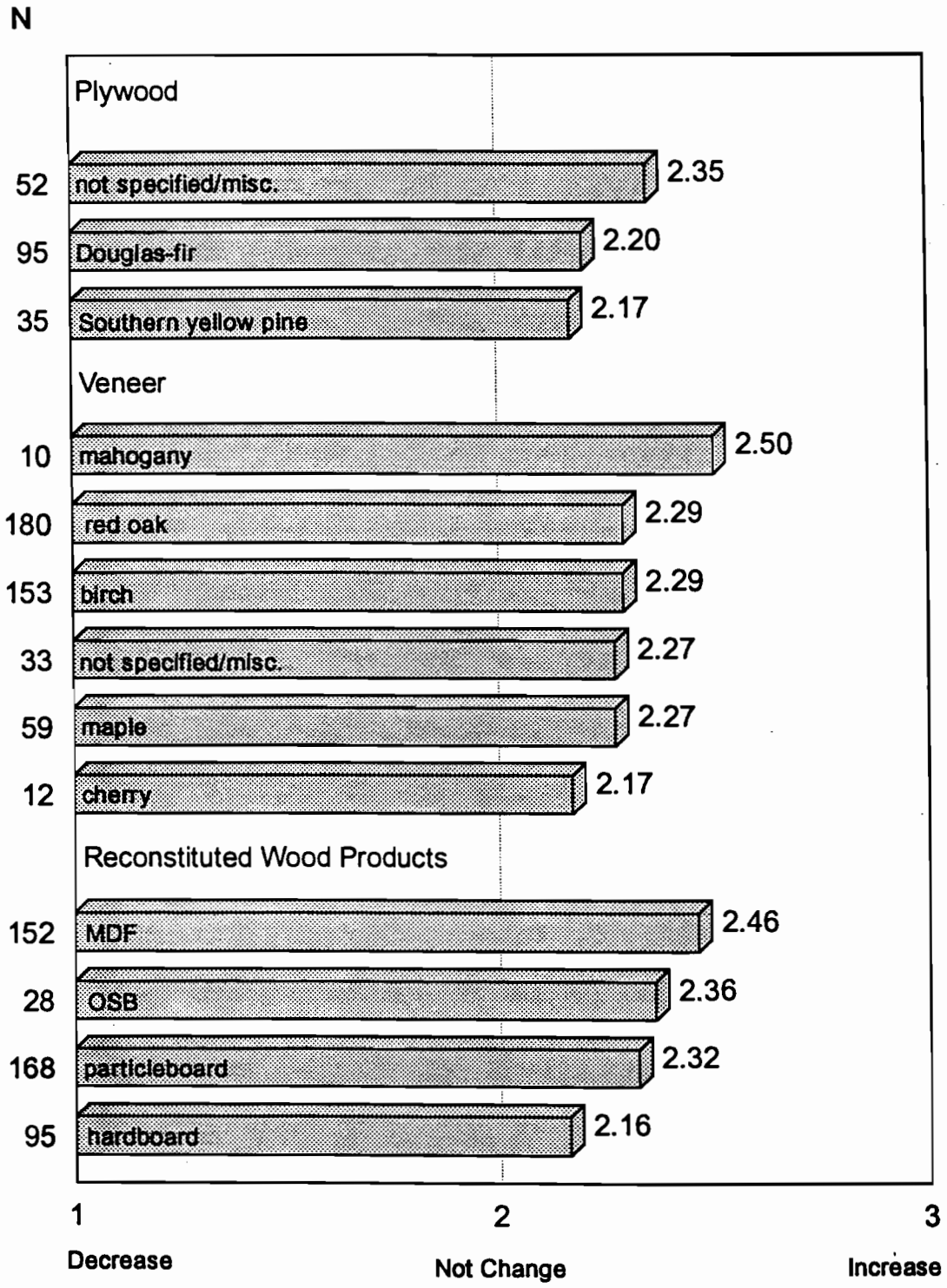


Figure 13. Anticipated Panel Product Consumption Trends by Species/Type

Table 20. Non-Wood Material Consumption Frequency.

Non-Wood Substitute	Number of Observations
plastic (laminate)	45
fiberglass	10
corian®	9
aluminum	7
steel	6
vinyl	4
PVC edging	4
Plexiglass	4
metal	3
formica	3
acrylic	2
fypon®	2
avonite®	1
glass	1
styrofoam	1
polyurethane	1
polyesters	1
not specified	9
Total	113

Table 21. Non-Wood Material Consumption by Sales Size Class.

Sales Size Class ($ 000)		Non-wood Material Consumption Observations	Percentage of Respondents within Size Class Consuming Non-wood Material
(1)	≤249	11	12.1
(2)	250-999	31	21.8
(3)	1000-4999	31	22.5
(4)	5000-14999	16	28.6
(5)	≥15000	12	36.4

Table 22. Average Sales of Respondents Using Different Numbers of Non-wood Materials.

Number of Non-wood Materials Consumed	Sales Mean	Standard Deviation
0	$14,762,741.0	183,585.6
1	$22,886,014.0	119,042.6
2	$51,511,429.0	217,426.7
3	$145,248,571.0	376,924.9

2.8 Raw Material Supply Issues

Since wood raw materials comprise a large percentage of a millwork establishments' costs (section 1.6), respondents were asked to indicate their agreement with six statements concerning raw material issues (Figure 14). They ranked each statement on a five-point Likert scale where 1 indicated strong agreement with the statement and five indicated strong disagreement. Two of the three statements receiving the highest agreement rating from respondents relate to increased competition from non-wood millwork products and greater use of non-wood materials within the millwork industry. Wood quality issues were defined to recognize two different aspects of wood quality: the "inherent quality" of the wood as determined by growth rate, number of knots, *etc.*; and "process-induced quality" considerations such as drying, surfacing, accurate sizing, etc. The former, relating to availability of wood with desired inherent quality characteristics, received the higher rating and ranked second among the statements. Respondents had the least agreement with a statement that reduced demand for tropical hardwoods through consumer boycotts or other factors would help expand their markets. This may reflect the fact that tropical hardwoods comprise a negligible portion raw materials used by respondents (Section 2.5.5), hence they may feel that changes in supply of these species or demand for them will have little impact.

Another supply issue concerns the potential impact of reduced harvests on federal lands. Of three statements related to the impact of reduced supplies from federal lands, respondents most strongly agreed that this will make it more difficult to obtain the quality of wood they require (Figure 14). They indicated that they are more likely to respond by finding substitute wood species than to change manufacturing methods or use non-wood materials.

Table 23 and Figures 15-16 present perspectives on these issues with respect to size of respondent. Differences due to respondent size were not statistically significant. However, there are some interesting contrasts between the smallest and largest size classes as noted in the following discussion of the statements which are arranged in order from the most to least overall agreement.

#1. Competition from producers of non-wood products will grow substantially in the next 5 years. Scores indicate strongest agreement by the largest establishments. Within size classes the smallest two size classes had this as the top statement they agreed with, while larger establishments had this statement in position #2 or 3.

#2. Compared to 5 years ago, it is more difficult to obtain quality wood at any price. Scores indicate strongest agreement by the largest establishments. Within size class this issue was rated #1-2 by the three larger size classes and #3 among the smallest two classes.

#3. The use of non-wood materials in the millwork industry will grow substantially in the next 5 years. Scores indicate strongest agreement by the largest establishments. Within size class this received a #2 ranking among the smallest two size classes and #1 or #3 among larger respondents.

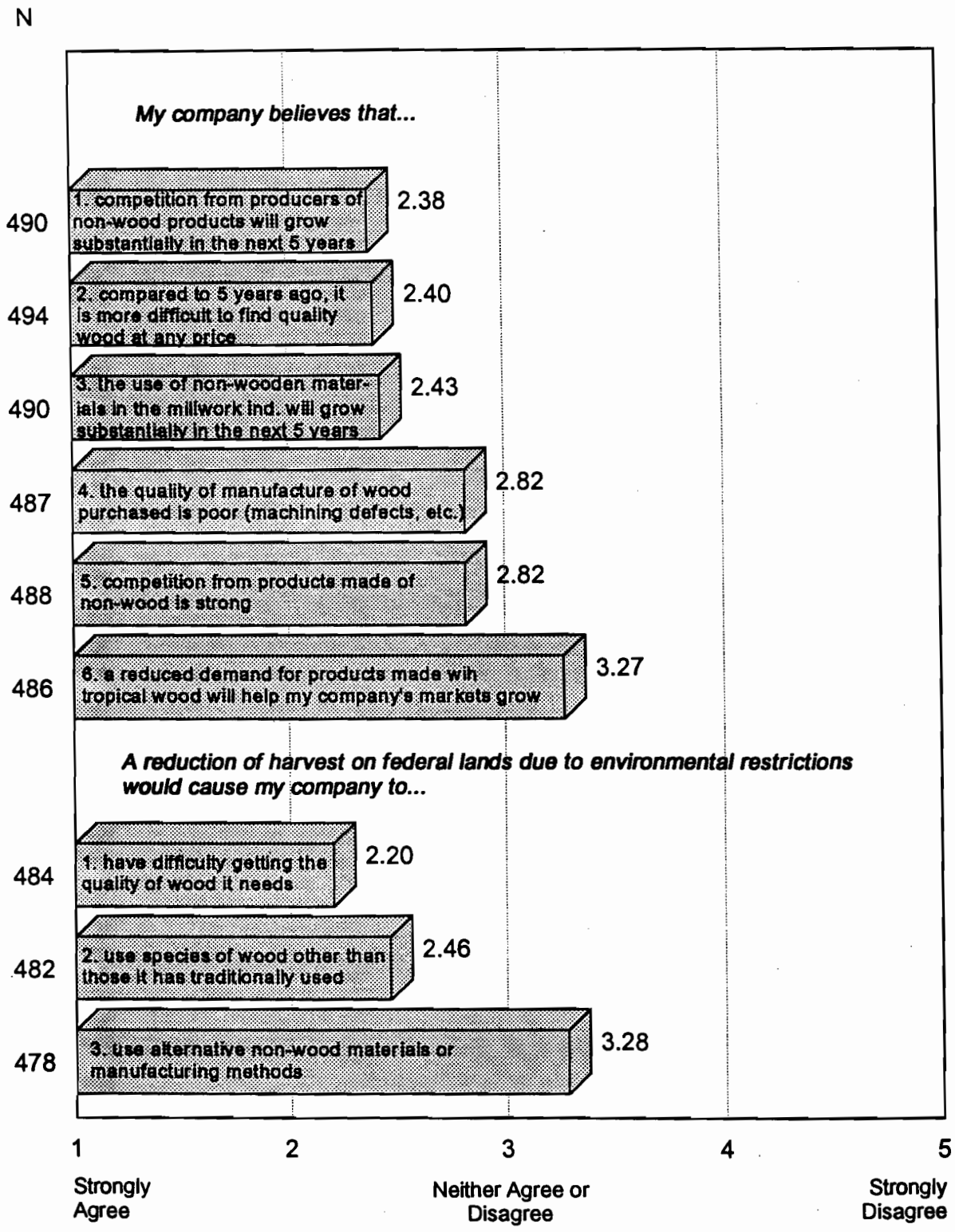
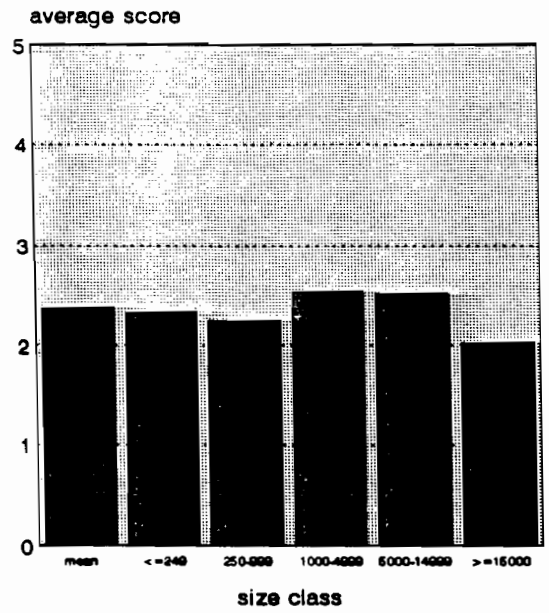
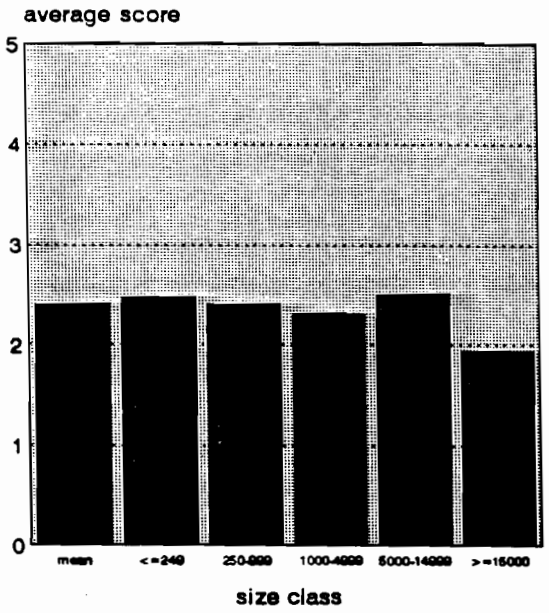


Figure 14. Ranking of Raw Materials Supply Issues

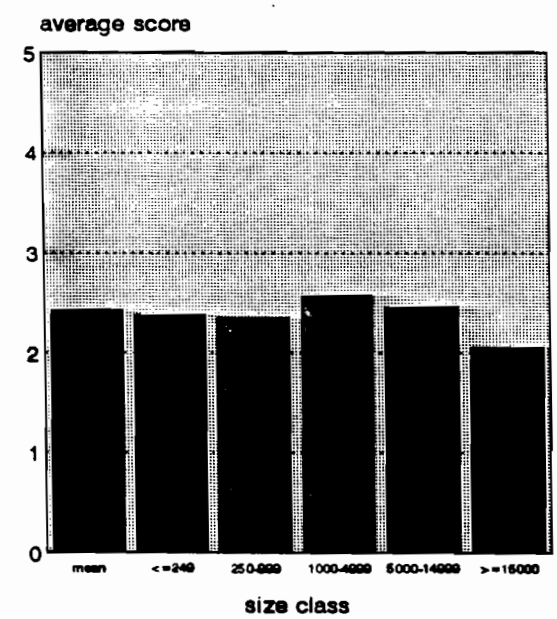
#1. Competition from producers of nonwood products will grow



#2. It is more difficult to find quality wood at any price



#3. Use of nonwood materials in the millwork industry will grow



#4. Quality of manufacture of wood purchased is poor

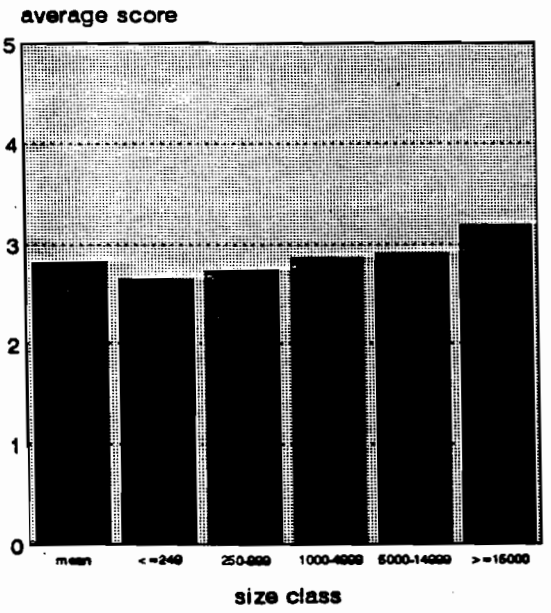
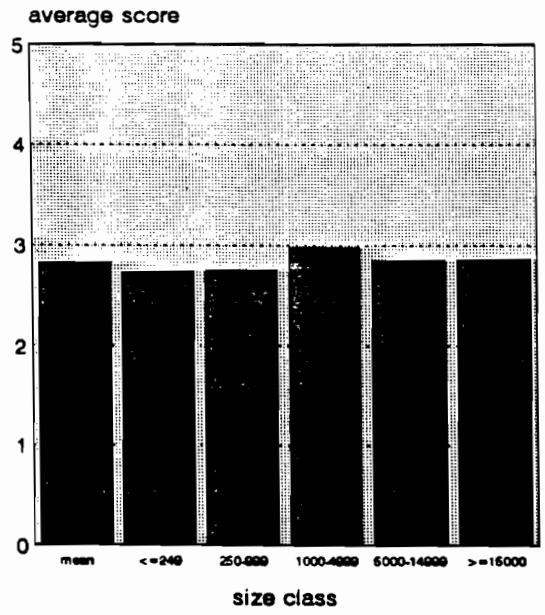


Figure 15. Ranking of Raw Material Issues by Sales Size Class

#5. Competition from products made of nonwood materials is strong



#6. Reduced demand for products from tropical wood will help markets grow

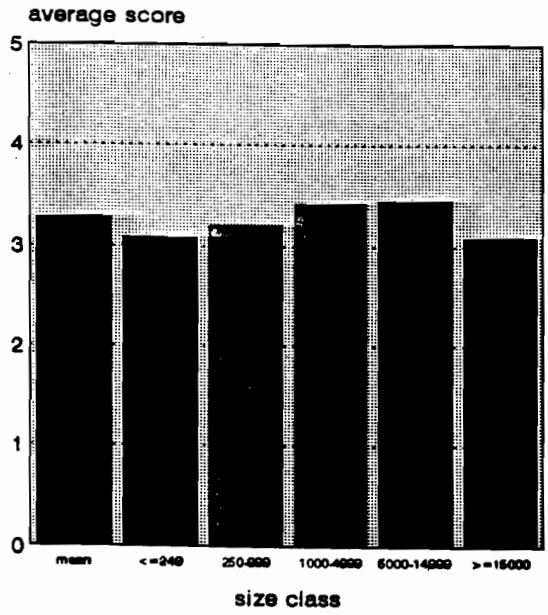


Figure 15. Cont.

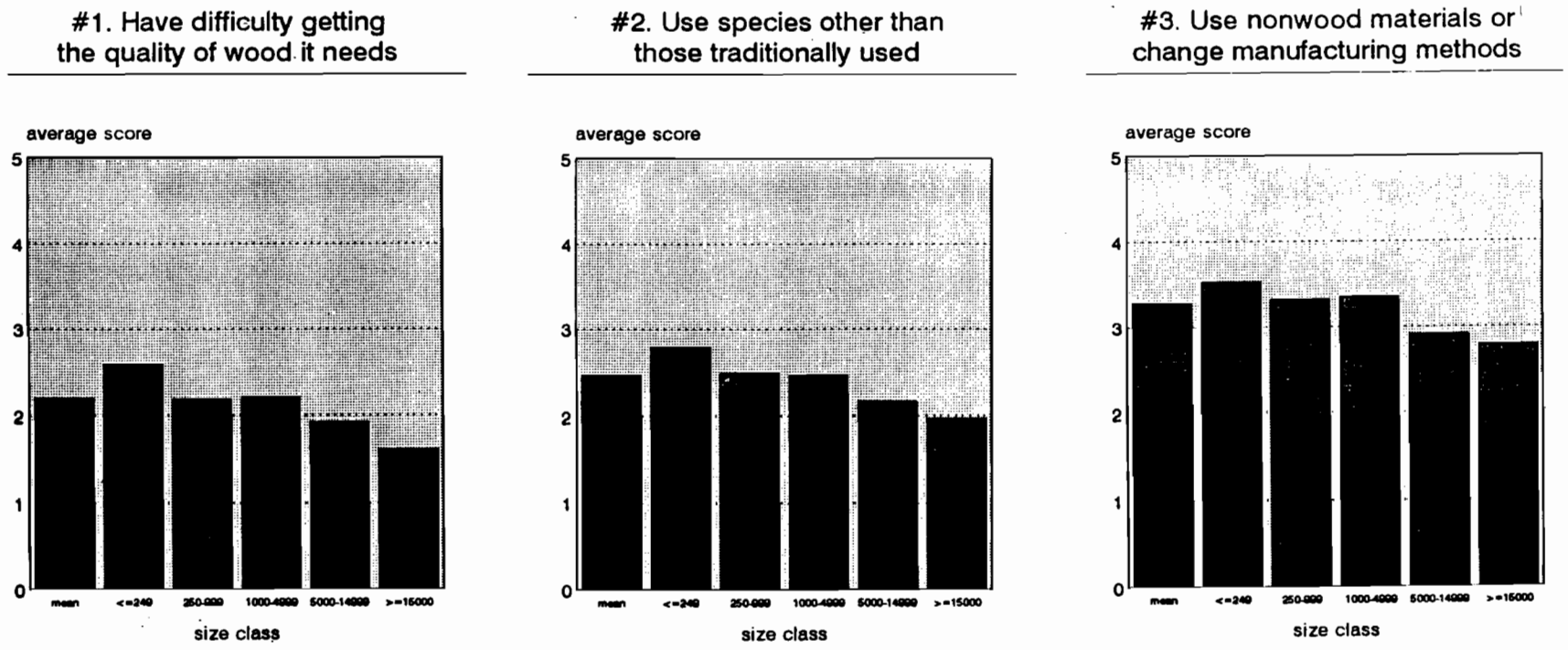


Figure 16. Effect of Reduced Federal Harvest: By Sales Size Class

#4. The quality of manufacture of purchased wood is poor. This issue pertains to improperly dried, surfaced, or sized wood raw materials. Scores indicate greater agreement with smaller size. Within size class this issue was rated #4 among the smallest two size classes and #5-6 by larger classes. Perhaps larger establishments exercise stronger programs to control quality of incoming raw material.

#5. Competition from products made from non-wood raw materials is strong had average scores that showed little trend with size. It was rated #5 by the three smallest classes and #4 by the largest two.

#6. A reduced demand for products made with tropical wood will help my company's markets grow. This received the lowest agreement score and within size classes had the lowest ranking in all but one size class, which rated it next to last. Apparently there is little belief that consumer concerns with tropical rain forests and boycotts of products made from tropical hardwoods will result in expanded markets for US millwork producers. This may reflect the very low incidence of use of tropical species noted earlier in this chapter.

When examining the issue of decreasing federal harvests, there was a positive trend toward stronger agreement with each statement and increasing size of establishment (Figure 16, Table 23). The largest establishments more strongly agreed that quality wood will be more difficult to obtain, that they will seek substitute wood species, and that they will adopt different manufacturing methods or use non-wood substitutes.

Table 23. Ranking of Raw Material Supply Issues by Sales Size Class.

	Sales Size Class ($000)											
	(1) ≤249		(2) 250-999		(3) 1000-4999		(4) 5000-14999		(5) ≥15000		(6) Combined	
Rank	**Topic**	**Score**	**Topic**	**Score**	**Topic**	**Score**	**Topic**	**Score**	**Topic**	**Score**	**Topic**	**Score**
My company believes that...												
1	E.	2.33	E.	2.25	A.	2.31	D.	2.46	A.	1.94	E.	2.38
2	D.	2.38	D.	2.36	E.	2.54	A.	2.50	E.	2.03	A.	2.40
3	A.	2.47	A.	2.40	D.	2.58	E.	2.52	D.	2.06	D.	2.43
4	B.	2.65	B.	2.74	B.	2.87	C.	2.84	C.	2.85	B.	2.82
5	C.	2.73	C.	2.75	C.	2.97	B.	2.91	F.	3.09	C.	2.82
6	F.	3.08	F.	3.20	F.	3.42	F.	3.45	B.	3.19	F.	3.27
A reduction of harvest on federal lands due to environmental restrictions would cause my company to...												
1	I.	2.59	I.	2.19	I.	2.21	I.	1.93	I.	1.61	I.	2.20
2	G.	2.79	G.	2.49	G.	2.46	G.	2.16	G.	1.97	G.	2.46
3	H.	3.52	H.	3.32	H.	3.35	H.	2.91	H.	2.79	H.	3.28

Letters identifying the nine issues correspond to the following list:

A. Compared to 5 years ago, it is more difficult to find quality wood at any price
B. The quality of manufacture of wood purchased is poor (machining defects, *etc.*)
C. Competition from products made of non-wood materials is strong
D. The use of non-wood materials in the millwork industry will grow substantially in the next 5 years
E. Competition from producers of non-wood products will grow substantially in the next 5 years
F. A reduced demand for products made with tropical wood will help my company's markets grow
G. Use species of wood other than those it has traditionally used
H. Use alternative non-wood materials or manufacturing methods
I. Have difficulty getting the quality of wood it needs

CHAPTER 3

MILLWORK PRODUCTS, 1990 SALES, AND MARKETING

This chapter discusses the product mix, product specialization and product development activities of respondents. It also summarizes 1990 sales, geographic scope of markets, market channels, and ratings of factors contributing to product success.

3.1 Manufacturing Category

The survey asked respondents to identify which of the following manufacturing categories pertained to their establishment. Also listed are SIC codes that would be applied by the US Department of Commerce Census of Manufacturers if the category were the principal business activity of the respondent.

- sawmill and planing mill, SIC 2421
- hardwood dimension and flooring, SIC 2426
- specialty product sawmill, SIC 2429
- millwork, SIC 2431
- wood kitchen cabinets, SIC 2434
- structural wood members, SIC 2439
- other (please specify)

Respondents were asked to check all categories that applied. This question served two purposes

- To identify those who were mailed a survey but do not produce millwork. Of the 902 surveys returned, 402 indicated that they did not manufacture millwork in 1990. Some of these were a mix of suppliers, wholesalers, and retailers, who are not actual producers of millwork. Others were manufacturers of othe products for which millwork is apparently an incidental activity. This information on ineligible establishments was incorporated into the calculations of response rate and estimation of total number of millwork producing establishments (Bialozynski, 1993).

- To gain insight on the degree to which those who manufacture millwork also manufacture non-millwork products. Of the 500 respondents who indicated that they manufacture millwork, only 221 (44.2%) checked millwork as their sole manufacturing category while 279 (55.8%) checked at least one other. Table 24 summarizes the non-millwork activities of those who also manufacture millwork; almost 40% of the observations involve cabinet manufacture. The fact that such a large percentage of respondents checked other manufacturing categories points to the difficulty of truly segregating millwork from other products that respondents manufacture. It would be very difficult to obtain data on raw material consumption, sales, labor use, etc., for individual product lines without resorting to a very lengthy and burdensome questionnaire that many may refuse to answer. The fact that millwork and non-millwork activities of respondents are not separated in this report should

be kept in mind by the reader. The data presented in this report pertain only to the 500 respondents who indicated that they manufacture a millwork product.

Table 24: Frequency of Non-Millwork Product Lines of Respondents

Manufacturing Category	Number of Observations	Percent of Observations	Percent of 500 Respondents
Cabinets			
Wood kitchen cabinets	174	43.2	34.8
Other cabinets	22	5.5	4.4
	196	48.7	39.2
Hardwood dimension & flooring	68	16.9	13.6
Sawmilling			
Sawmill & planing	35	8.7	7.0
Specialty product sawmill	21	5.2	4.2
	56	13.9	11.2
Structural wood members	27	6.7	5.4
Misc. furniture	14	3.5	2.8
Other	41	10.2	8.2
Total	402	100.0	

3.2 Principal Product Line

Section 3.1 indicated the general extent to which respondents who produce millwork also manufacture other products but does not indicate what is considered to be the principal or main product line. This distinction is important since the US Department of Commerce Census of Manufactures classifies establishments according to the principal product line. Table 25 shows that 82.5% of respondents who manufacture millwork consider millwork to be their principal product line. Moldings were the most frequently cited (52.2%) principal product line, followed by doors (25.9%). Of the 17.5% indicating that millwork was not the principal product, cabinets were the most commonly identified principal product.

3.3 Product Incidence

In describing product lines, respondents indicated specific types of products they produce. Table 26 summarizes the frequency with which various products were listed. The number of observations greatly exceeds the number of respondents since most produce a multitude of products. Table 26 should not be interpreted as share of sales since price differences are not incorporated in the data. Section 3.8 presents product shares of sales.

Compared to principal product lines presented in Table 25, the most notable change is the drop in moldings from 43.1% of principal product lines to 22.1% of products listed. Those who consider moldings as the principal product line may also list a variety of other products which

Table 25: Product Mix and Principal Product Line of Respondents

	Principal Product Line Manufactured by Respondents		
	N	% of Total	% of Subtotal
Millwork			
molding	198	43.1	52.2
doors	98	21.3	25.9
windows	32	7.0	9.0
stairs	17	3.7	4.5
misc.	34	7.4	8.4
subtotal	379	82.5	100.0
Non-millwork			
cabinets	38	8.3	47.5
misc	19	9.2	23.8
subtotal	80	17.5	100.0
Total	459	100.0	

Table 26. Frequency of Products Manufactured by Respondents

	Sales Size Class ($000)											
	(1) ≤249		(2) 250-999		(3) 1000-4999		(4) 5000-14999		(5) ≥15000		All Respondents	
	n	%	n	%	n	%	n	%	n	%	n	%
Moldings	72	21.0	111	21.4	112	22.6	43	24.7	18	22.5	356	22.1
Doors	58	17.0	92	17.7	100	20.2	38	21.8	21	26.2	309	19.2
Windows	43	12.6	71	13.7	59	11.9	22	12.6	11	13.8	206	12.8
Stairs	44	12.9	73	14.1	69	13.9	18	10.3	9	11.2	213	13.2
Misc. millwork	7	2.0	11	2.1	8	1.6	8	4.6	1	1.2	35	2.2
Finish & trim	56	16.4	81	15.6	76	15.4	22	12.6	10	12.5	245	15.2
Cabinets	22	6.4	34	6.6	19	3.8	6	3.4	1	1.2	82	5.1
Other												
lumber, ply-wood	4		4		4		3		3		18	
non-wood pro-duct fabri-cation	0		1		1		0		0		2	
wood proces-sing, re-manufacture	3		4		2		1		0		10	
flooring	0		2		1		0		0		3	
furniture	4	5.0	6	6.2	2	6.5	1	5.2	0	5.0	13	5.8
case work	4		12		16		1		0		33	
ind./comm. woodwork	1		2		4		3		1		11	
installation	0		0		1		0		0		1	
construction	0		1		0		0		0		1	
pallets, crates, boxes	1		0		0		0		0		1	
siding	0		0		1		0		0		1	
Not specified	23	6.7	14	2.7	20	4.0	8	4.6	5	6.2	70	4.3
Total	342	100.0	519	100.0	495	100.0	174	100.0	80	100.0	1610	100.0

has shifted the overall pattern. Part of the change may also be related to the separation of moldings from finish and trim products which are listed by 15.2% of respondents. Many, who identified moldings as the principal product line, may convert lumber raw material into both moldings and finish and trim which they consider as separate markets. The other notable change is the increase of stairwork from 3.4% of principal product lines to 13.2% of product listings. Stairwork may be a secondary product line for many respondents.

There is a tendency for larger establishments to more frequently list door manufacturing and to less frequently list stairwork, finish and trim and cabinet products.

3.4 Degree of Specialized Product Manufacture

Respondents were asked to indicate by Yes of No if they manufacture commodity, specialty, or custom products; they could indicate Yes for one or all three possibilities. Table 27 indicates the total number of respondents answering each question and the percentage who answered "Yes." Of the 379 who answered the question regarding production of commodity products, 41.6% answered Yes. Of the 409 who answered the question regarding specialty products, 84.6% answered Yes, and of the 442 who answered the question regarding custom products, 97.1% answered Yes. While there is a tendency for smaller establishments to produce a higher percent of custom products, the differences among size classes in custom produced manufacture were not statistically significant. However, there are statistically significant trends toward increased manufacture of specialty and commodity products by larger establishments.

Table 27. Specialization of Product Manufacture

	Sales Size Class ($000)											
	(1) ≤249		(2) 250-999		(3) 1000-4999		(4) 5000-14999		(5) ≥15000		Combined	
	#	%	#	%	#	%	#	%	#	%	#	%
Commodity	72	34.7	115	22.6	113	40.7	50	70.0	29	89.7	379	41.6
Specialty	74	82.4	129	79.1	123	88.6	51	88.2	32	90.6	409	84.6
Custom	86	98.8	139	99.3	131	98.5	55	89.1	31	90.3	442	97.1

3.5 Geography of Markets

Table 28 lists the number and percentage of respondents located in each region and the number of respondents that sell products in each region. More respondents market in the Northeast than any other region. The South Central region has the lowest number of millwork respondents and the lowest number marketing within that region. There is an association between the percentage of establishments located in a region and the region's percentage of total US population. The last column suggests that these more populous regions tend to have relatively fewer outsiders that market into them. This suggests that millwork industries may tend to locate near large populations and once they do it becomes difficult for outsiders to penetrate.

Table 28. Domestic Sales Distribution by Region.

Region	Number Selling in Region	Number Located in Region	Percentage Located in Region	Percentage of US Population*	Ratio of Number Selling in Region to Number Located There
Northeast	205	113	22.6	23.4	1.81
Southeast	187	79	15.8	14.5	2.37
South Central	134	61	12.2	15.4	2.20
North Central	191	133	26.6	25.4	1.44
West	170	114	22.8	21.4	1.49
Total			100.0	100.0	

* Source: US Statistical Abstract, 1990.

Table 29 shows a trend between the average number of regions in which respondents market products and the size of the establishment. The two smallest size classes (less than $1 million sales per year) tend to distribute primarily in the region in which they are located. Establishments in the next two ($1-14.9 million) size classes expand distribution to a two-region area. The largest establishments distribute in more than three regions. The mode or most commonly cited number of regions in which respondents market products was one region except for the largest sales class where the mode was five regions.

Table 29. Market Participation According to Region and Size Class.

Sales Size Class		Mean Number of Product Market Regions	Mode
(1)	≤ 250	1.31	1
(2)	250-999	1.30	1
(3)	1,000-4,999	1.96	1
(4)	5,000-14,999	2.11	1
(5)	≥ 15,000	3.47	5

Respondents were also asked to indicate by Yes of No if their products were marketed locally, regionally, nationally or internationally. Most respondents answered all four parts as requested but some elected to only answer yes to the part(s) that pertained to them and left the others blank. Table 30 shows the breakdown of responses to each part and shows the Yes answers as a percent of the 500 total respondents. The percentages would be somewhat higher if the number of blank responses to each question were excluded. It is the authors' opinion that most of the blanks were cases where the respondent skipped parts that did not pertain rather than answering No. This may explain why there is a rising trend of blanks as the geographic scope expands.

The data show a rapid decline in participation as geographic scope, hence distance to markets expands. Only 26% market at the national level and only 11% export. The generally limited

market geography may explain why distance to markets received a low rating as a business concern in Section 1.9.

Table 30: Geographic Participation in Markets

	----------Number----------				
Market Region	**Yes**	**No**	**Blank**	**Total**	**Percent Yes**
Local	461	19	20	500	92.2
Regional	323	126	51	500	64.6
National	129	289	82	500	25.8
International	54	350	96	500	10.8

Table 31 presents a more detailed view of market geography according to size class. This table is based on a subset of respondents who answered both the market geography question and who provided sales data. Consequently there are minor differences from Table 30. With the exception of local market participation, which was very high for all sizes, there are significant trends toward greater participation in regional, national and international markets with larger establishment size.

Table 31. Market Participation by Size Class.

	Sales Size Class ($000)				
Region	**(1) ≤249**	**(2) 250-999**	**(3) 1000-4999**	**(4) 5000-14999**	**(5) ≥15000**
Local	93.4	93.0	93.5	87.5	100.0
Regional	48.4	60.0	78.3	73.2	100.0
National	11.0	16.9	34.8	35.7	70.0
International	2.2	6.3	10.9	19.6	46.7

3.6 Marketing Channels

Respondents were asked to check which marketing channels they use (Figure 17). Most indicated multiple channels, with 1349 total observations. The most popular market channel is the "contractor, builder" as indicated by 404 respondents (30.4% of observations). Sales to retail consumers are the second most common marketing channel (335 respondents, 24.8% of observations), industrial consumers are third (225 respondents, 16.7% of observations), and wholesalers and retailers are the fourth and fifth most popular marketing channels, 188 and 151 respondents (13.9% and 11.2% of observations), respectively. Four additional channels, domestic agent, exporter/trading company, and foreign agent, represent only 2.8% of observations. The "other" category, 0.5% of observations, included architects and designers, government, foreign consumer, in-house or inter-corporation, and mail order.

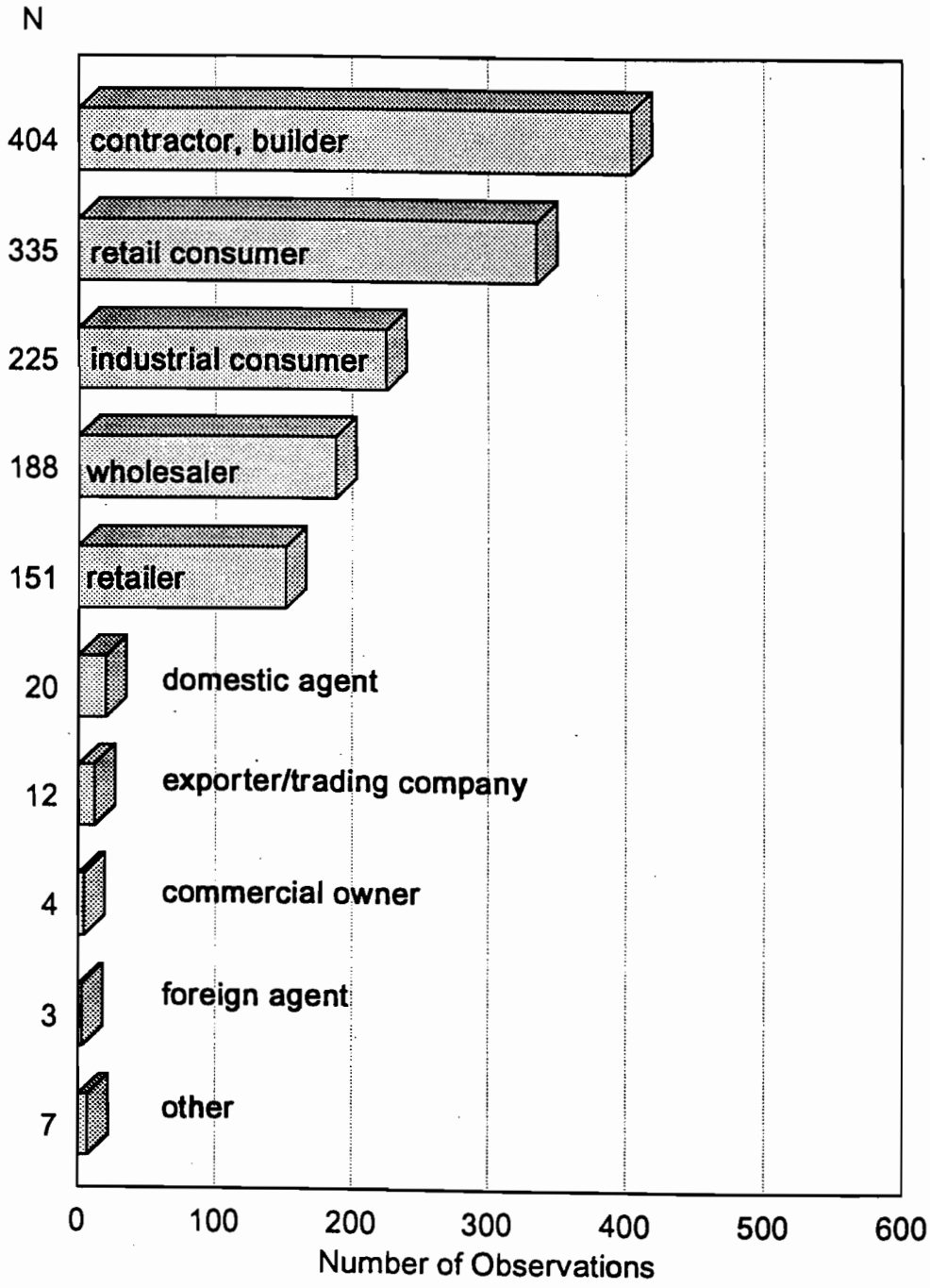


Figure 17. Utilization of Market Channels

Statistical analyses reveal that the use of marketing channels changes with sales size classes. Smaller establishments tend to rely heavily on direct sales to contractor/builder and retail consumers while large establishments rely more heavily on industrial consumers, retailers and wholesalers (Figure 18).

3.7 Investment in Product Development

On average, more than a fifth (22.9%) of respondents indicate that they do not engage in any product development efforts (Figure 19). About 45.0% engage in occasional product development, and nearly a third (32.0%) indicate that they are involved in continuous product development efforts.

Figure 19 also reveals trends between establishment size and the level of product development efforts. Generally larger firms are much more likely to have continuous product development activity and are the least likely to have no product development. Occasional product development is the most commonly identified level of product development for every size class except the largest.

3.8 1990 Sales

The following summary of 1990 sales excludes data from three respondents which together represented 71.9% of total sales of all respondents. It is believed that these were larger, integrated forest products corporations which gave data on total corporate sales rather than millwork sales. Total sales reported by the remaining respondents was $2.05 billion. Table 32 summarizes 1990 sales according to establishment size.

About 20% of respondents are in the smallest (≤$249,000) sales size class but together these represent only 0.6% of 1990 sales. Approximately 30% of respondents are in the $250-999,000 and $1,000-4,999,000 size classes, but these represent just 3.4% and 14.3% of 1990 sales respectively. The $5,000-14,999,000 size class represents 12.3% of respondents and 21.8% of 1990 sales. The largest sales size class, more than $15 million per year, while representing only 6.6% of respondents, accounts for 60% of 1990 sales.

Table 32 indicates that the average 1990 sales of all respondents was $4.4 million, of which 82.2% or $3.7 million was millwork products. There is a tendency for smaller establishments to have a lower percentage of sales resulting from millwork products; millwork products account for about two-thirds of total sales of the smallest two size classes and 85% of total sales of the largest.

3.8.1 Product Shares of 1990 Sales

The previous section indicated that about 82.5% of 1990 sales were millwork products and 17.5% were non-millwork. A subset of these respondents provided detailed data on sales according to product group. The product group shares of sales are summarized in Table 33. The left column shows the shares of all products. The rise in non-millwork share from 17.5% in

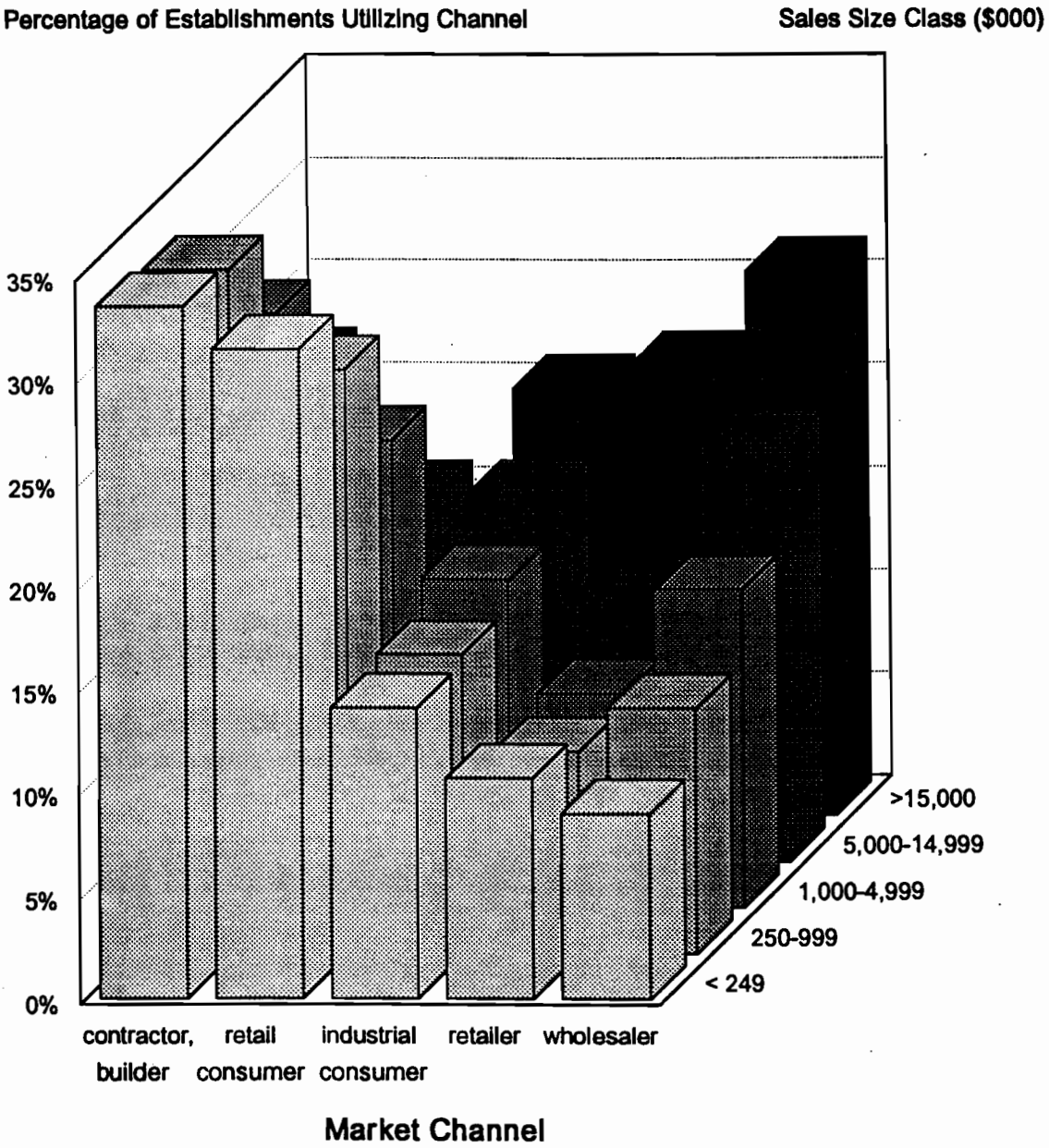
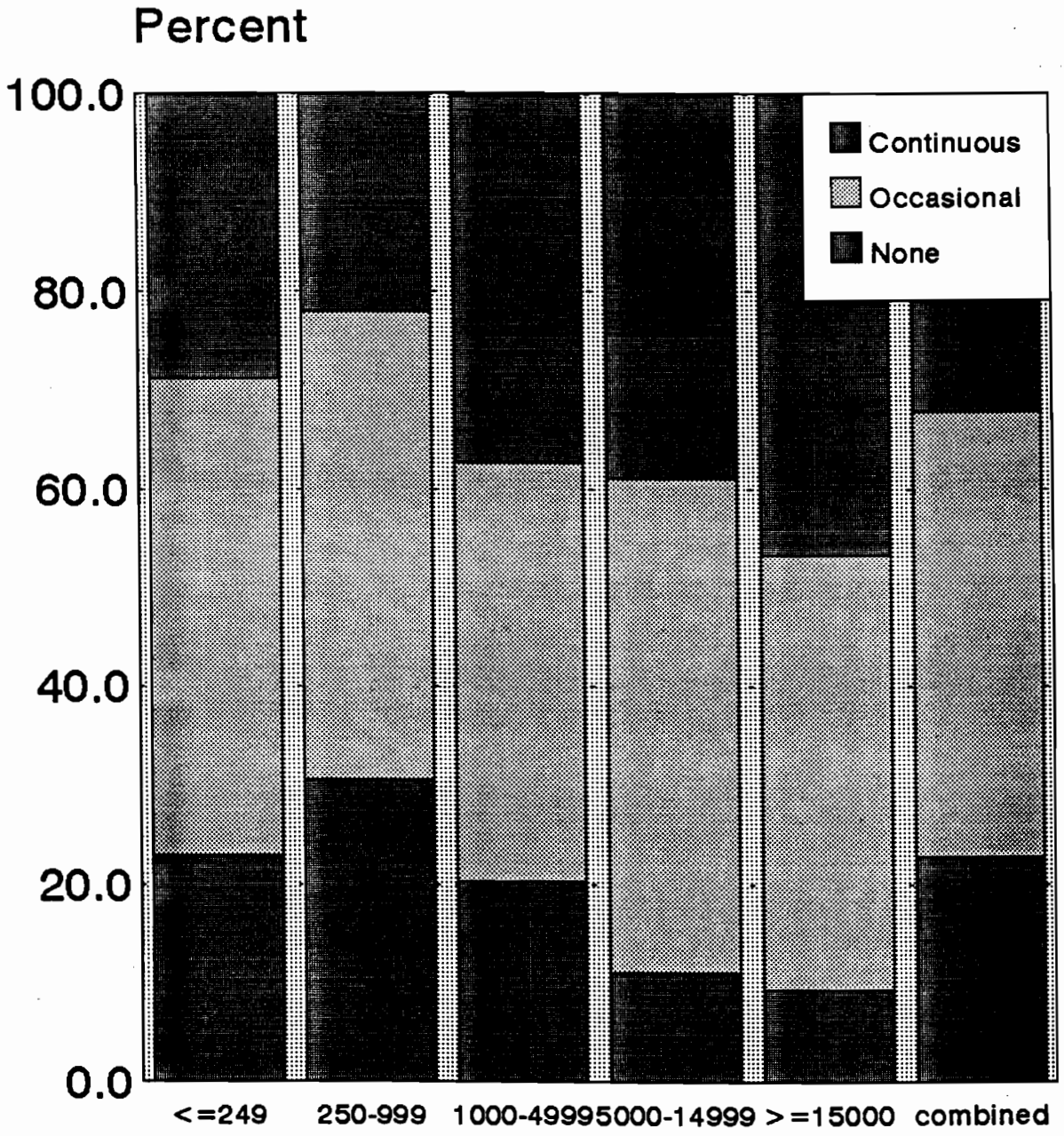


Figure 18. Utilization of Market Channels According to Size Class



Continuous	28.7	22.0	37.2	38.9	46.9	32.0
Occasional	48.3	47.5	42.3	50.0	43.8	45.0
None	23.0	30.5	20.4	11.1	9.4	22.9

Sales Size Class ($000)

Figure 19. Level of Product Development Efforts

Table 32 to 28.6% in Table 33 is due to the smaller number of respondents providing this added level of detail. The next column shows recalculated shares when non-millwork sales are excluded. The last column shows shares when sales data are summarized for the small subset of respondents who have no product line other than millwork.

Table 32. 1990 Total Sales by Respondent Size Class (includes primary and secondary products).

Region	Sales Size Class ($000) (1) ≤249	(2) 250-999	(3) 1000-4999	(4) 5000-14999	(5) ≥15000	All Respondents
Mean, 000	$131	$488	$2,135	$8,018	$41,049	4,449
% Millwork Sales	*67.5*	*66.2*	*72.6*	*77.1*	*84.7*	*82.2*
% Non-Millwork Sales	*32.5*	*33.8*	*27.4*	*22.9*	*15.3*	*17.8*
	100.0	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Std Dev, 000	61	193	957	2,803	36,578	13,647
Minimum, 000	$0	$250	$1,000	$5,000	$15,000	0
Maximum, 000	$235	$950	$4,700	$14,000	$150,000	150,000
Mode, 000	$200	$500	$2,000	$6,000	$15,000	300
Median, 000	$130	$450	$2,000	$7,500	$28,000	900
N	91	142	138	56	30	457
% of Estab.	19.9	31.1	30.2	12.3	6.6	100.0
% of Sales	0.6	3.4	14.3	21.8	59.9	100.0

Table 33. Product Group Shares of 1990 Sales

Product Group	All Respondents Including Millwork	All Respondents Excluding Non-Millwork	Respondents that Only Manufacture Millwork
Molding	33.7%	47.2%	31.5%
Doors	18.2%	25.4%	28.7%
Windows	9.0%	12.6%	18.1%
Stairs	6.2%	8.7%	17.6%
Miscellaneous	4.5%	6.3%	4.0%
Non-millwork	28.6%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

3.8.2 Sales and Employment

Data from the 411 respondents who gave both employment and sales data indicates that mean annual sales per employee is $91,590. Figure 20 reveals that mean sales per employee increases with sales size class. Mean sales per employee of the smallest sales size class is about one fifth that of the largest size class.

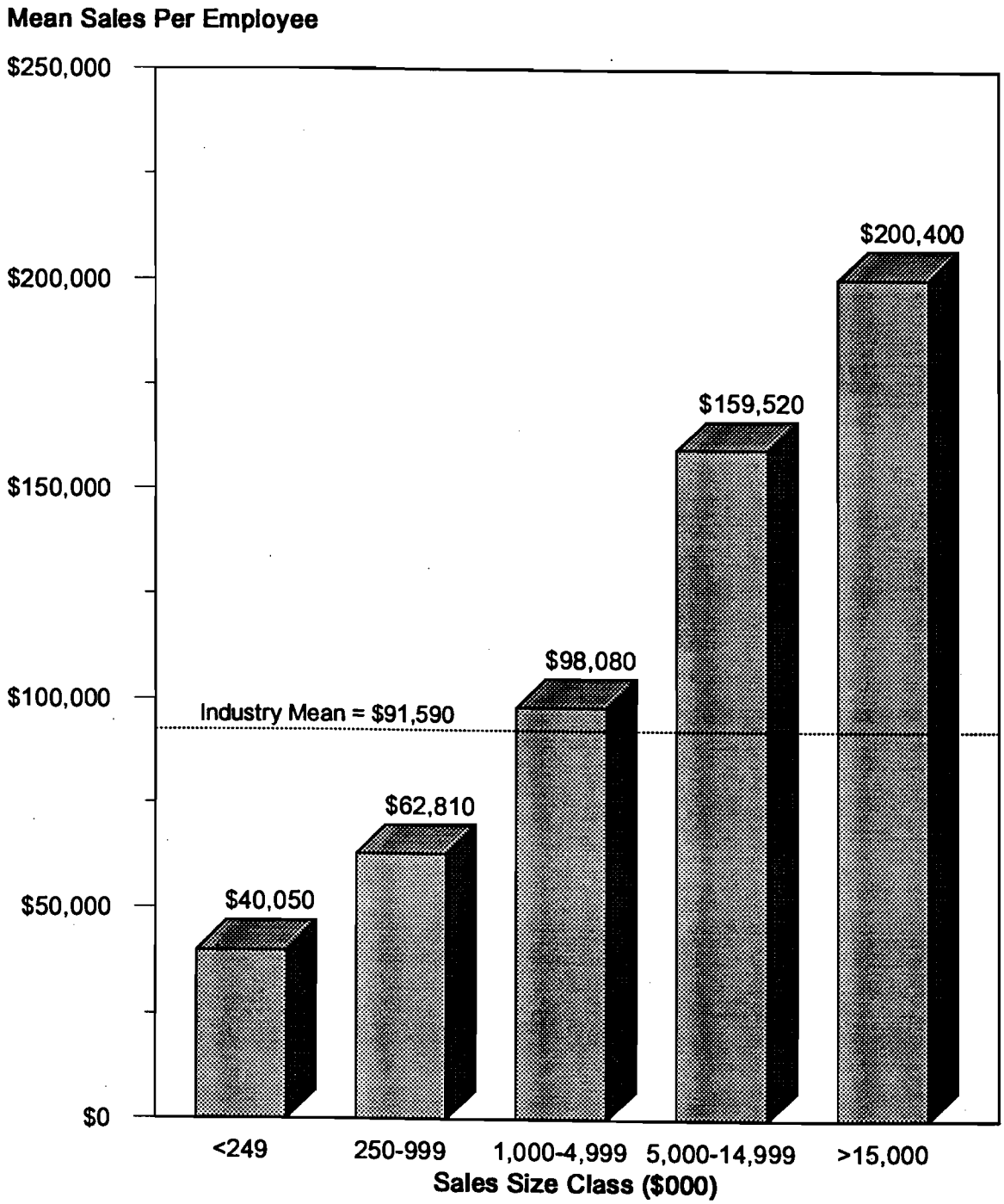


Figure 20. Mean Annual Sales Per Employee by Size Class

3.9 Product Success Factors

Respondents were asked to rank the importance of 25 factors that may be keys to success of their products. These factors were rated using a five-point Likert scale where one indicated the factor was extremely important an five indicated that it was not important. Respondents ranked 11 factors extremely to very important, led by company reputation, product quality, and product appearance (Figure 21). Six of the top 11 items are related to providing various services to customers and four are related to product quality and appearance. This suggests that successful millwork producers must develop, cultivate, and listen to customers and emphasize quality. The least important attribute is ability to produce a product in metric sizes.

Analysis found no statistically significant trends in ratings due to size class (Table 34, Figure 22). Respondent rankings for a given topic tended to have very high variation within each size class which may reflect the diversity of millwork products. Although rankings are not statistically different among the size classes there are some interesting contrasts between small and large establishments. The following paragraphs present the factors in order of their overall rating with comments establishment size differences. Comments are made with respect to both average score on the Likert scale and the relative importance of the issue within each size class.

#1. Your Company's reputation scores indicated no trend with size class. Within size classes, this issue was rated #3 by the smallest and largest establishments and #1 by the middle three sizes classes.

#2, #3 (tie) Provide a high quality product and attractive appearance of product. There were no trends in average score with size class. Within size classes, product quality was #2 for all except the largest, which rated it #1. Product quality may be more important to the largest establishments because of their greater involvement in commodity products (Section 3.4) where a reputation for better quality may be viewed as a competitive edge. The largest establishments are also much more involved in exporting (Section 3.5) where quality requirements of foreign purchasers may be stringent. Product appearance was #1 for the smallest and #2-4 for the others. The higher ranking of appearance by the smallest establishments may reflect their greater involvement in producing custom products (Section 3.4).

#4. On-time delivery scores indicate that it was less important in the smallest size class. Within size class, this factor was rated #3-4 by all but the smallest which rated it #8. The lower rating by the smallest may reflect their greater reliance on custom products and their focus on local markets (Sections 3.4, 3.5).

#5. Consistent dimensions had scores and within size class rankings (#4-5) that showed no trend with size class.

#6. Customer support after the sale showed no trend in average scores. Within size classes, this factor was rated #6 by the two largest size classes and #7-8 by the three smaller size classes.

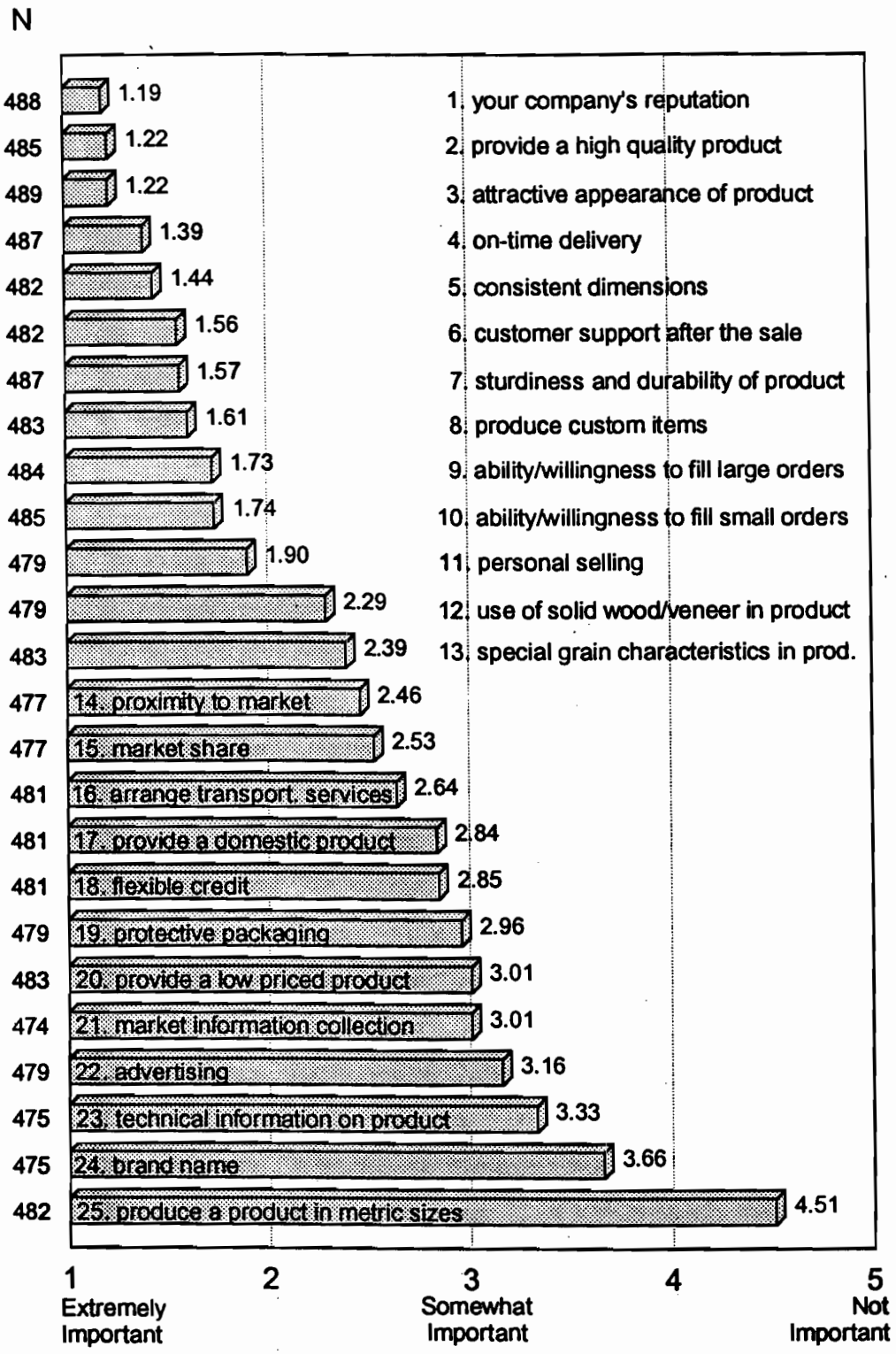


Figure 21. Ranking of Product Success Attributes

#7. Sturdiness and durability of product scores indicate greater importance in the smaller size classes. Within size classes, this factor was rated higher (#5-6) by the two smallest classes and #8-9 by the others.

#8. Produce custom items scores indicate greater importance in the smaller size classes. Within size classes, this factor was rated #4 by the smallest and declined to #11 for the two largest size classes. This is consistent with differences in product specialization (section 3.4).

#9 & #10. Ability/willingness to fill large orders and ability/willingness to fill small orders were essentially tied in the overall ratings. There was no trend in scores or within class rank on ability to produce large orders. However, the largest establishments indicate ability to fill small orders was less important compared to smaller establishments.

#11. Personal selling scores and within size class ratings indicate no trend with size class.

#12. Use of solid wood/veneer in product scores and within size class ratings indicate no trend with size class.

#13. Special grain characteristics in the product scores and within size class ratings indicate no trend. Combined with #12, it appears that use of natural solid wood and veneers and highlighting special grain features are fairly important characteristics for millwork producers. This is consistent with the concerns with quality of wood supply (see Section 2.8).

#14. Proximity to market scores indicate less importance as size class increases. Within size classes, this factor dropped steadily from #12 in the smallest to # 20 in the largest size class. This is consistent with trends of geographic scope discussed in Section 3.5.

#15. Market share scores and within size class rankings indicate this factor is increasingly important as size increases. This may reflect the trend toward more production of commodities (Section 3.4) and broader market geography (Section 3.5) in larger establishments.

#16. Arrange transportation services scores and within size class rankings indicate increased importance with larger size. This may reflect broader marketing geography of larger establishments (Section 3.5).

#17. Provide a domestically made product scores and within size class rankings indicate greater importance in the smaller size classes. It is noteworthy that the latter are much more likely to be involved in commodities and international markets (Section 3.5).

#18. Flexible credit scores and within size class rankings indicate no trend.

#19. Protective packaging scores and within size class rankings indicate greater importance with increased establishment size. Larger establishments, which market products over a broader

geography (Section 3.5) may need to take greater care in protecting the product when shipped over greater distances.

#20. Provide a low priced product scores and within size class rankings indicate no trend with size class.

#21. Market information collection scores and within-class rankings indicate higher concern with increased size of establishment. This may reflect the greater involvement in commodities and international markets by larger establishments (Sections 3.4, 3.5) where market intelligence is necessary to penetrate and protect market shares.

#22. Advertising scores and within class rankings indicate no trend with size class. Apparently formal product advertising is not viewed as a critical success factor.

#23. Technical information on product scores and within class rankings indicate little trend with size class. The largest establishments scored this factor as somewhat less important than other sizes. .

#24. Brand name scores and within class rankings suggest that this factor is more important to larger establishments. While brand naming is not very important overall, larger establishments, which market over a broader geography and which have a greater tendency to produce commodity products rate this factor more strongly.

#25. Produce a product in metric sizes received the lowest scores and within class ranking in all size classes. This may become more important in the future if export markets continue to grow.

Table 34. Importance of Product Attributes* According to Sales Size Class.

	Sales Size Class ($000)									
	(1) ≤249		(2) 250-999		(3) 1000-4999		(4) 5000-14999		(5) ≥15000	
Rank	Topic	Score	Topic	Score	Topic	Score	Topic	Score	Topic	Score
1	I.	1.14	Q.	1.14	Q.	1.16	Q.	1.18	A.	1.23
2	A.	1.24	A.	1.18	A.	1.21	A.	1.20	I.	1.26
3	Q.	1.29	I.	1.23	I.	1.22	N.	1.20	Q.	1.26
4	L.	1.40	N.	1.38	N.	1.34	I.	1.23	N.	1.32
5	J.	1.41	B.	1.44	J.	1.39	J.	1.27	J.	1.48
6	B.	1.42	J.	1.53	L.	1.52	R.	1.58	R.	1.67
7	R.	1.56	L.	1.54	R.	1.56	U.	1.69	V.	1.81
8	N.	1.58	R.	1.57	B.	1.63	B.	1.82	U.	1.81
9	T.	1.66	T.	1.65	U.	1.63	T.	1.82	B.	1.97
10	U.	1.75	U.	1.73	T.	1.73	Y.	1.84	Y.	1.97
11	Y.	1.94	Y.	1.82	Y.	1.93	L.	2.05	L.	2.06
12	M.	2.17	D.	2.10	D.	2.36	V.	2.16	D.	2.16
13	D.	2.29	C.	2.29	V.	2.39	O.	2.36	T.	2.26
14	C.	2.46	M.	2.37	C.	2.41	D.	2.43	O.	2.39
15	G.	2.59	V.	2.68	M.	2.52	C.	2.48	C.	2.48
16	F.	2.87	G.	2.74	O.	2.57	K.	2.60	W.	2.52
17	V.	2.90	O.	2.74	G.	2.84	M.	2.60	K.	2.55
18	O.	2.91	S.	2.83	S.	2.87	W.	2.71	F.	2.91
19	S.	2.92	K.	3.08	W.	2.91	S.	2.73	S.	2.97
20	X.	3.09	W.	3.13	K.	2.91	F.	2.98	M.	3.03
21	K.	3.28	F.	3.14	F.	3.00	X.	3.09	P.	3.07
22	H.	3.30	X.	3.2/8	X.	3.17	P.	3.27	X.	3.10
23	W.	3.38	H.	3.41	H.	3.20	G.	3.36	G.	3.13
24	P.	3.91	P.	3.71	P.	3.76	H.	3.43	H.	3.67
25	E.	4.51	E.	4.57	E.	4.46	E.	4.62	E.	4.26

* Letters identifying the 25 issues correspond to the following list:

A. attractive appearance of product
B. sturdiness and durability of product
C. special grain characteristics in product
D. use of solid wood/veneer in product
E. produce a product in metric sizes
F. provide a low priced product
G. provide a domestically made product
H. technical information on product
I. provide a high quality product
J. consistent dimensions
K. protective packaging
L. product custom items
M. proximity to market
N. on-time delivery
O. arrange transportation services
P. brand name
Q. your company's reputation
R. customer support after the sale
S. flexible credit
T. ability/willingness to fill small orders
U. ability/willingness to fill large orders
V. market share
W. market information collection
X. advertising
Y. personal selling

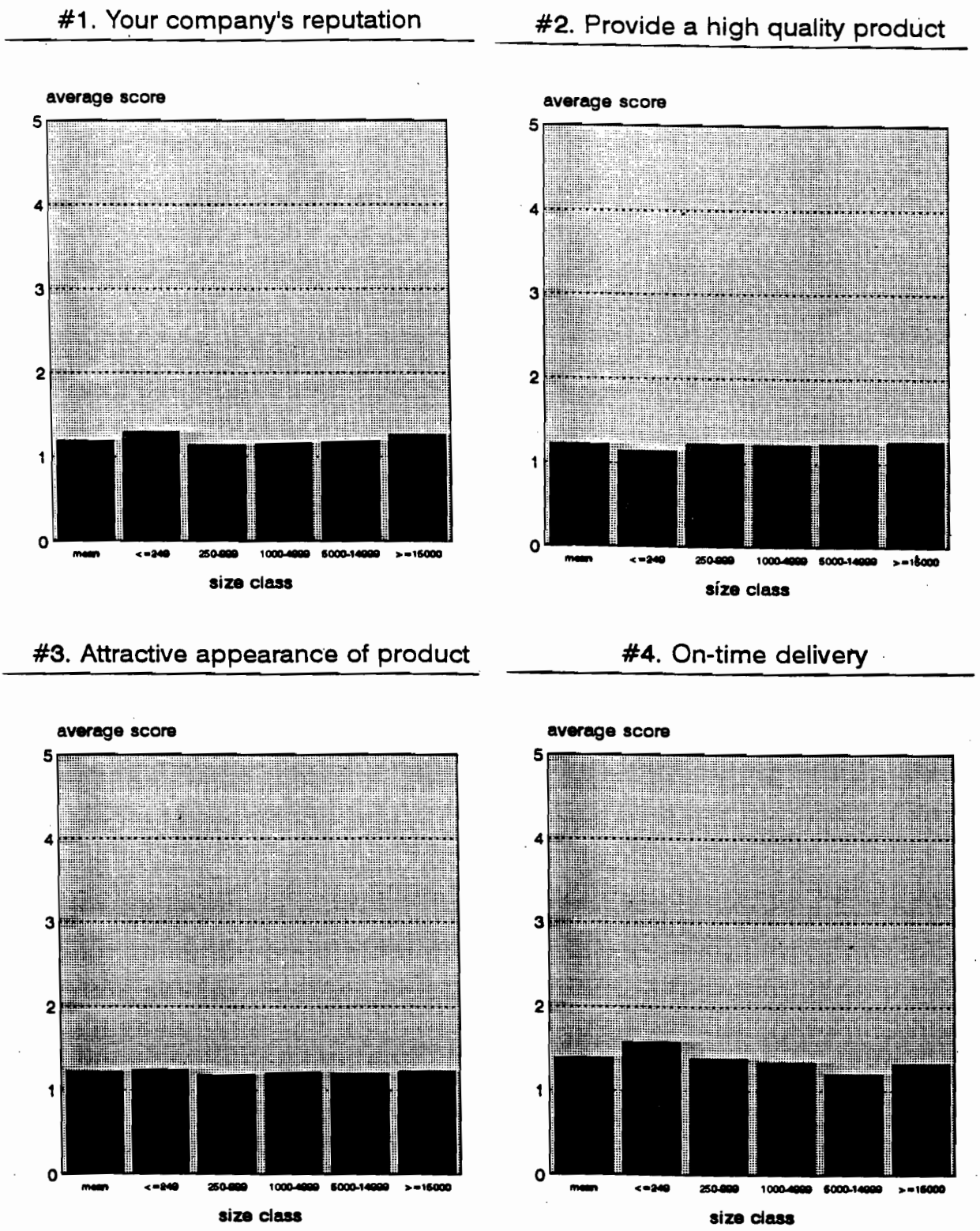
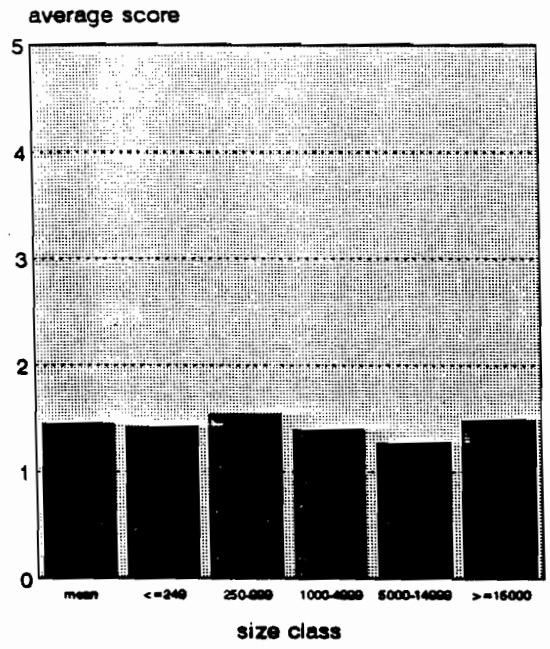
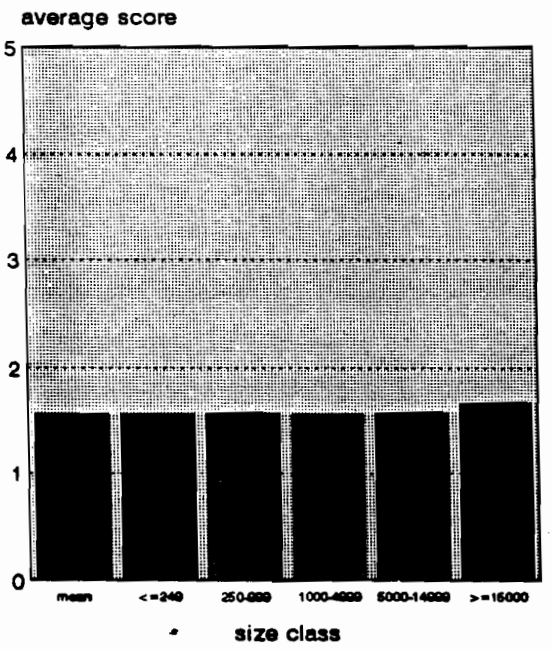


Figure 22. Ranking of Product Success Attributes by Sales Size Class

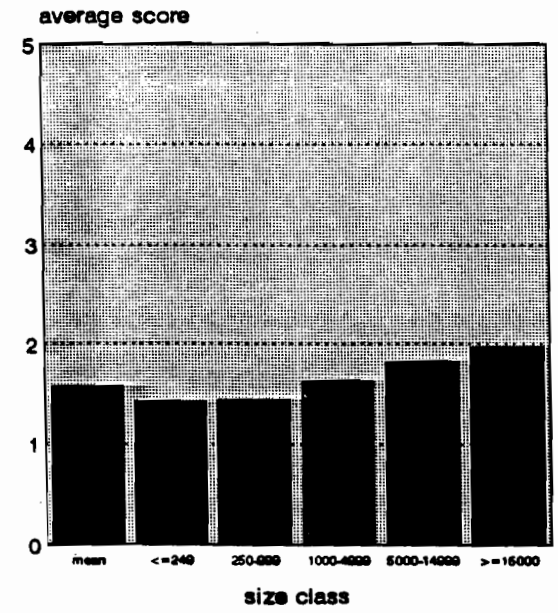
#5. Consistent dimensions



#6. Customer support after sale



#7. Sturdiness & duratility of product



#8. Produce custom items

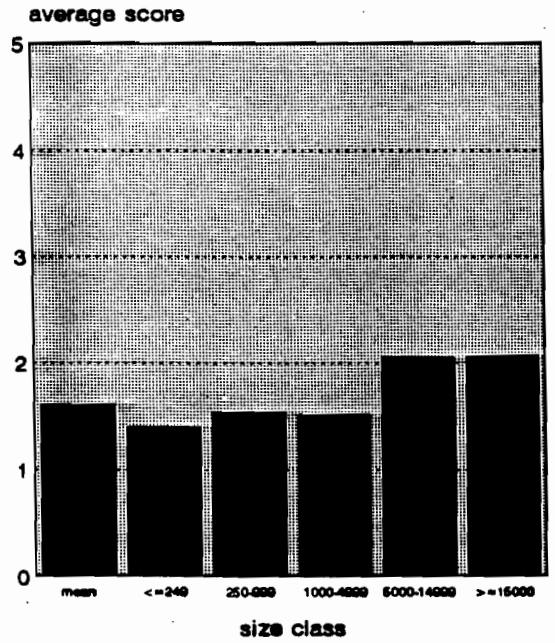
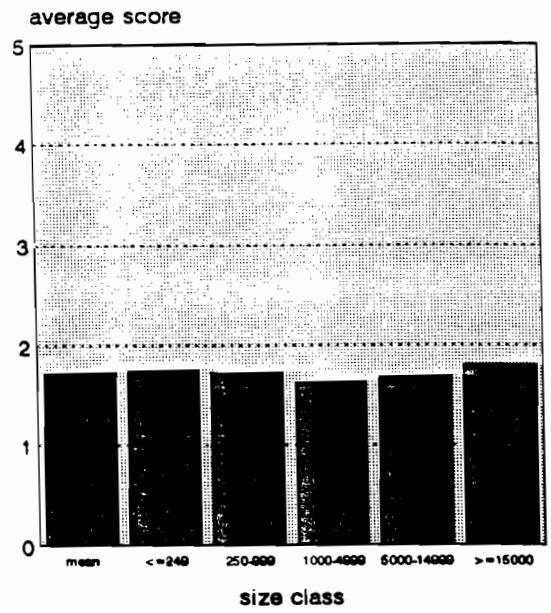
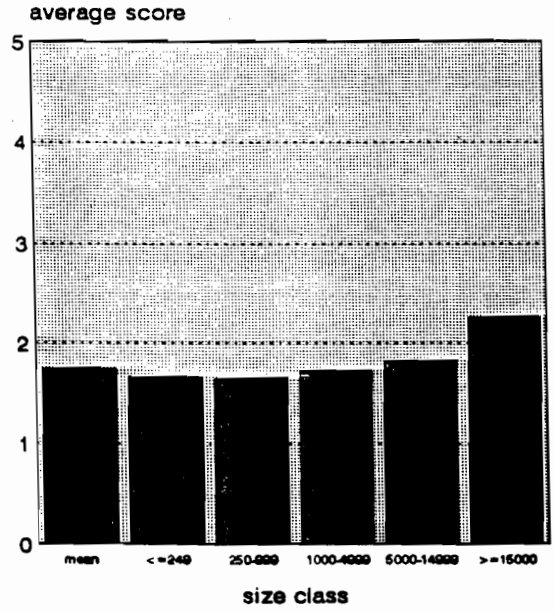


Figure 22. Cont.

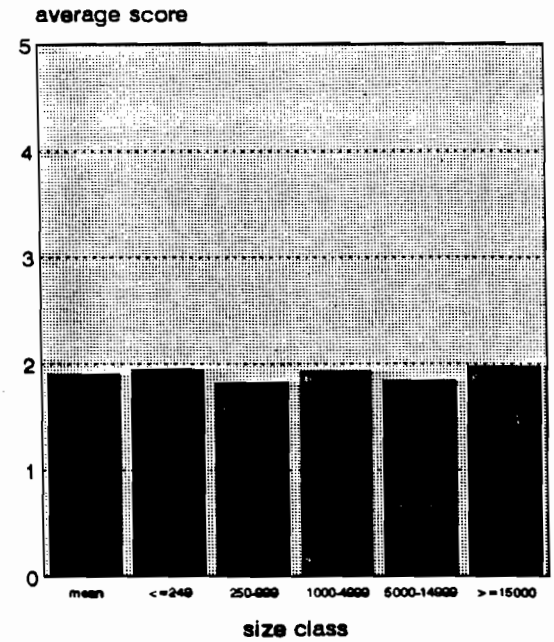
#9. Ability/willingness to fill large orders



#10. Ability/willingness to fill small orders



#11. Personal selling



#12. Use of solid wood/veneer in product

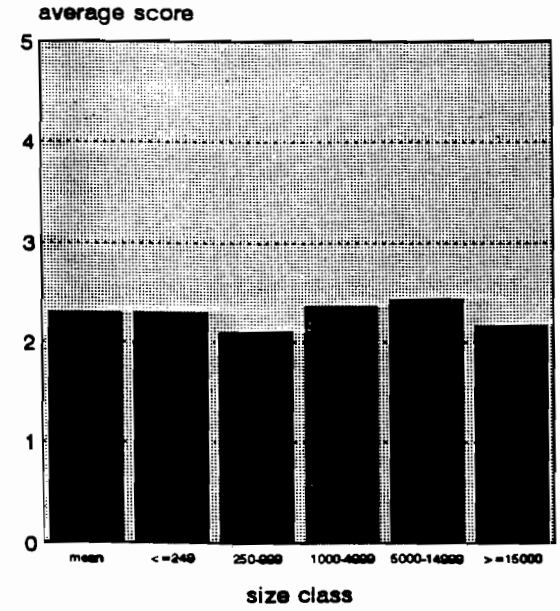
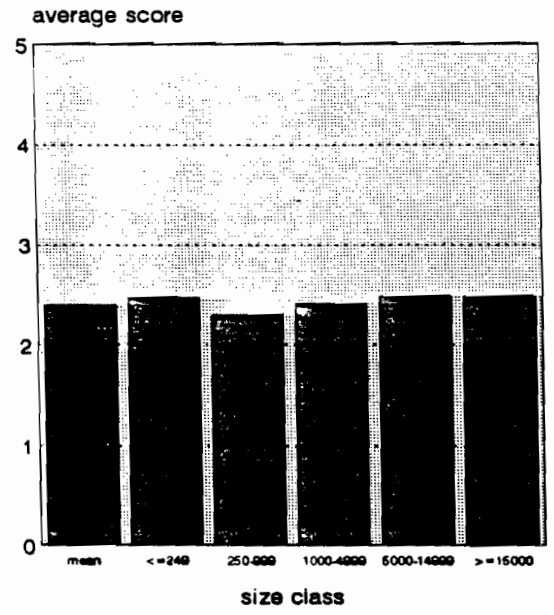
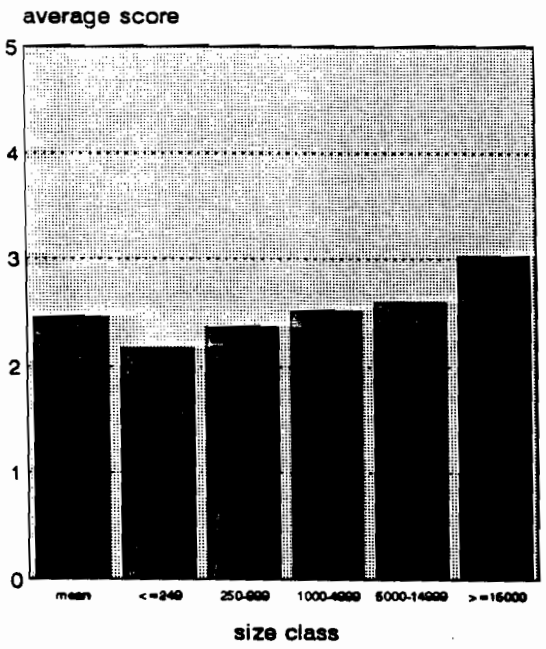


Figure 22. Cont.

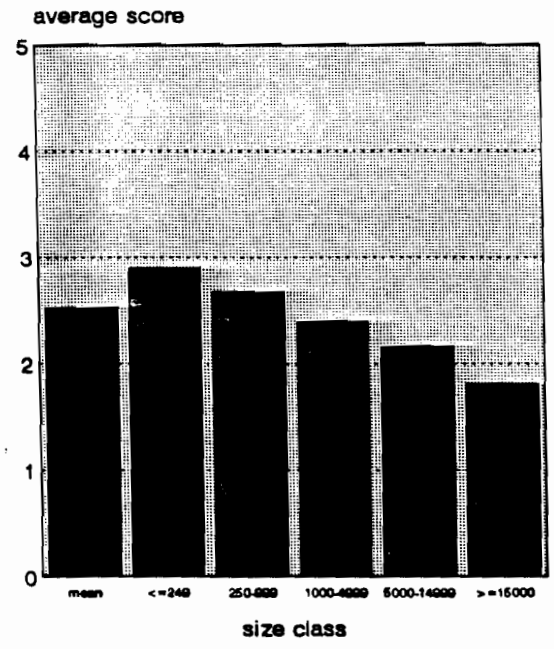
#13. Special grain characteristics in product



#14. Proximity to market



#15. Market share



#16. Arrange transportation services

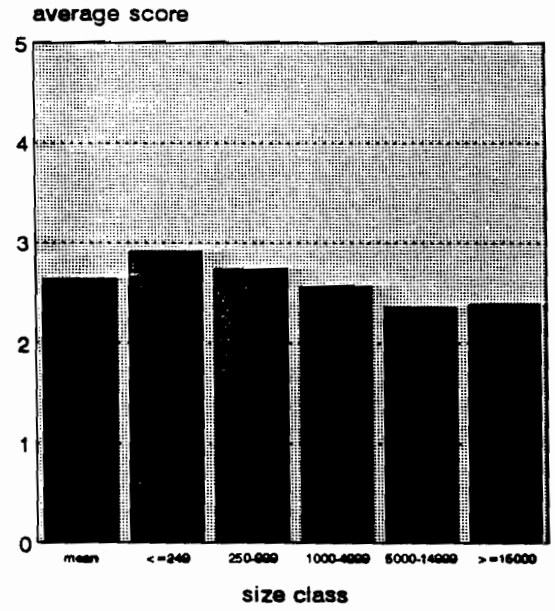
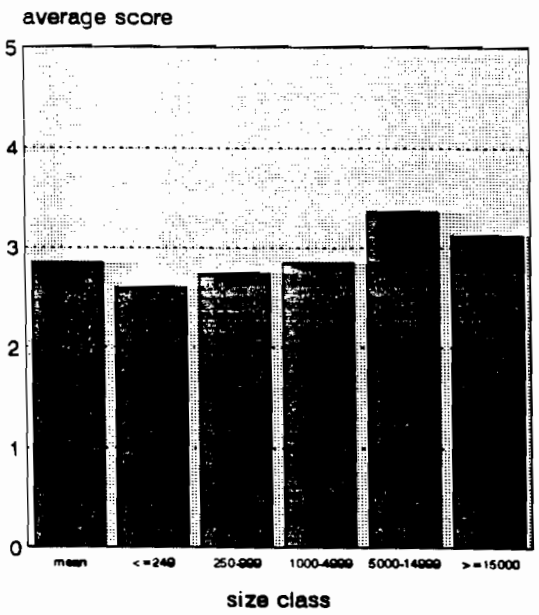
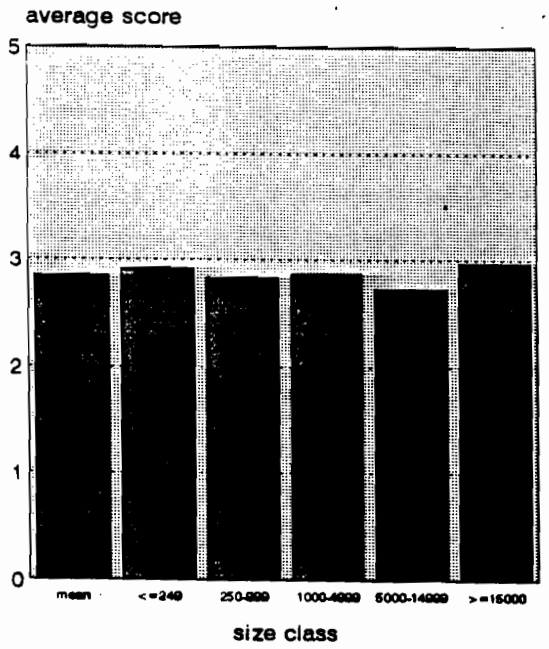


Figure 22. Cont.

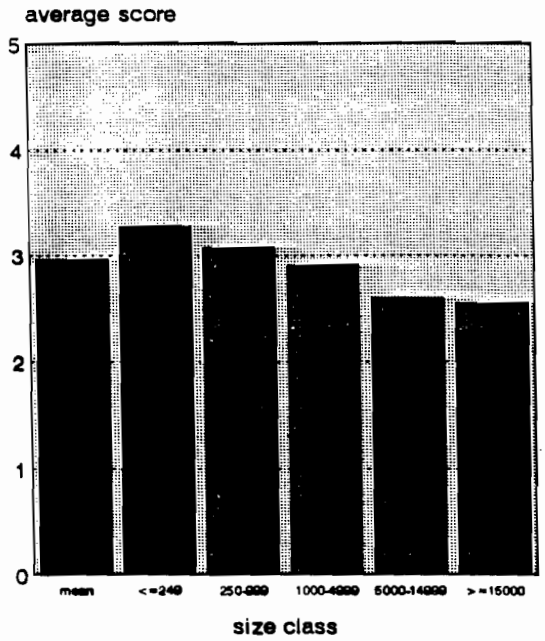
#17. Provide a domestically made product



#18. Flexible credit



#19. Protective packaging



#20. Provide a low priced product

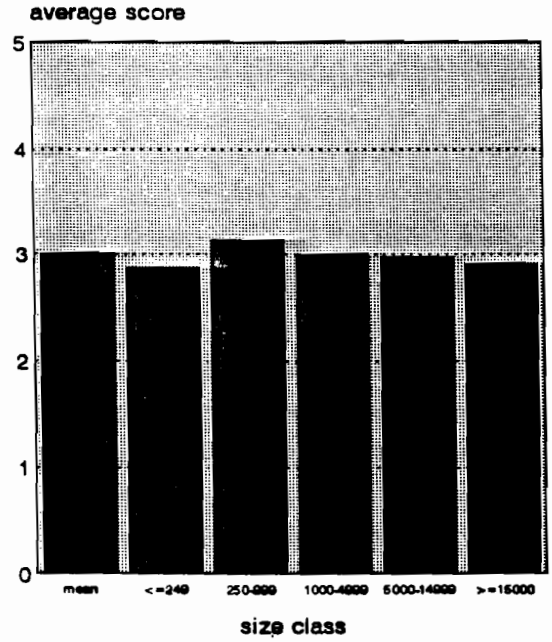
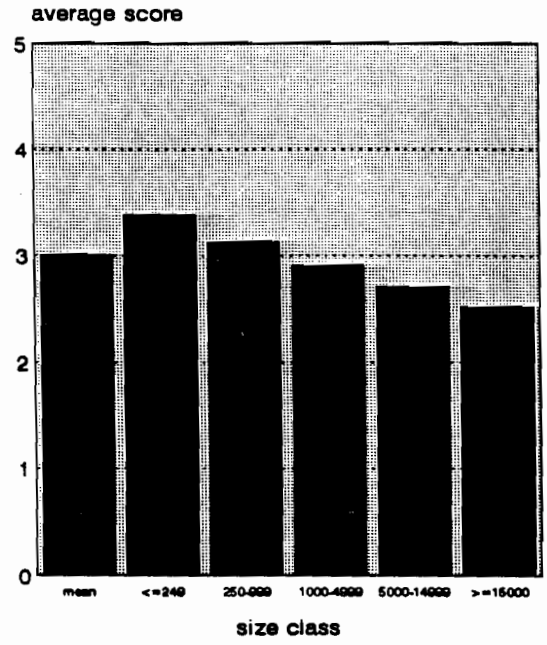
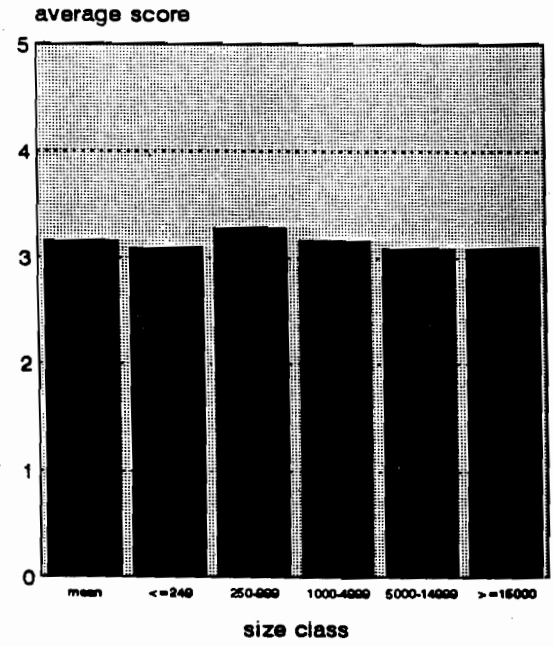


Figure 22. Cont.

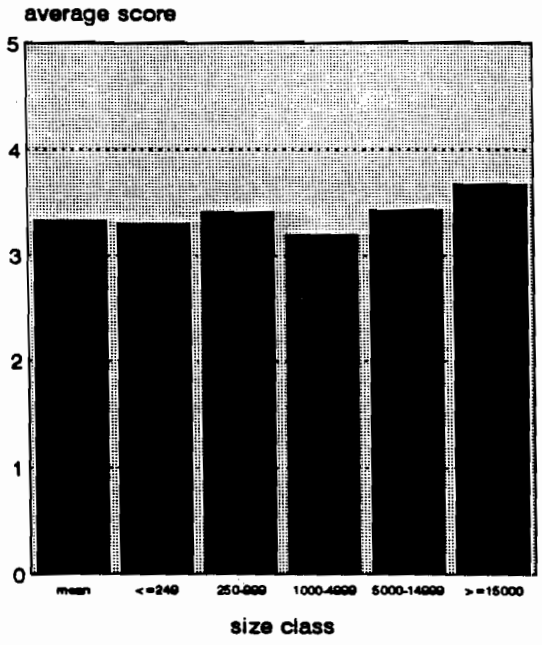
#21. Market information collection



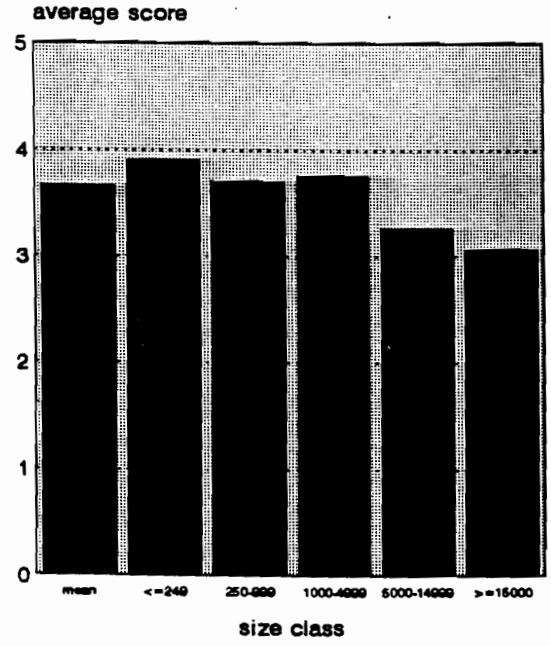
#22. Advertising



#23. Technical information on product



#24. Brand name



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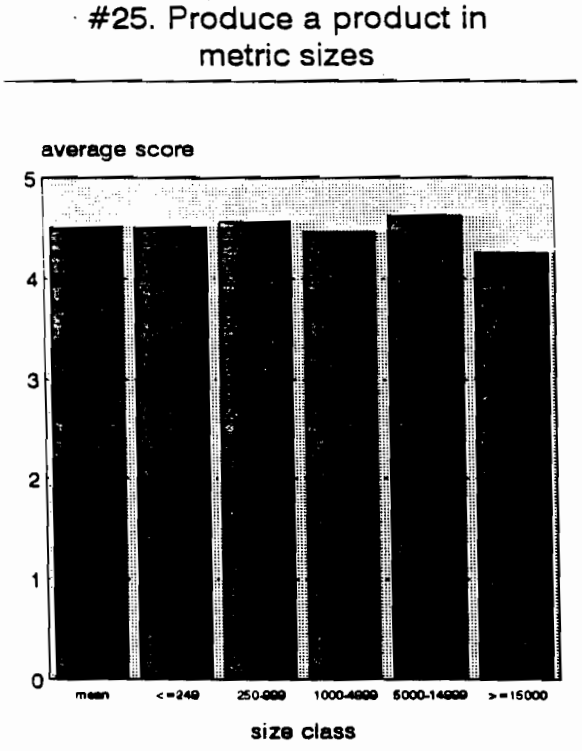

Figure 22 Cont.

CHAPTER 4

EXPORT SALES AND MARKETING

This chapter focuses on export activities of respondents. The survey asked respondents to provide data regarding 1990 exports. Since 1990, US millwork exports have grown substantially (Briggs, *et al.*, 1994). About 11% of respondents indicated that they were involved in international marketing with participation strongly skewed toward larger establishments (Section 3.5). Table 30 indicated that 54 respondents had export sales. Of these 44 provided export sales data. Exports for these respondents ranged from 1% to 95% of total sales with a simple mean of 8.3%. On a dollar basis, they had total sales of $393.5 million of which $20.4 million (5.2%) were exports. Total and export sale averages for these respondents were $8.943 million and $0.464 million respectively. Extrapolation from the 44 who provided export sales data to 54 who indicated that they exported increases the estimate from $20.4 million to about $25 million. Since total sales of both exporting and non-exporting respondents were $2.05 billion, exports are estimated to be about 1.2% of total 1990 sales.

4.1 Exporter Characteristics

4.1.1 Size of Exporting Establishment

The average exporting respondent had about three times more total employees (92.8 vs 30.5) and 2.7 times greater annual sales ($8.9 million vs $3.9 million) than the average non-exporter.

Table 35 compares size class distributions of exporting and non-exporting respondents. Only 1.1% of the smallest respondents exported in 1990, while 27.3% of the largest respondents exported. The overall average of 9.6% of respondents who export differs from the 10.8% found in Table 30 due to different numbers of respondents who answered various questions in the survey.

Table 35. Sales Size Class of Exporters vs Non-Exporters.

	Sales Size Class ($000)											
	(1)		(2)		(3)		(4)		(5)		All	
Export Status	≤249		250-999		1000-4999		5000-14999		≥15000		Respondents	
	#	%	#	%	#	%	#	%	#	%	#	%
Exporter	1	1.1	6	4.4	15	10.9	13	23.2	9	27.3	44	9.6
Non-Exporter	90	98.9	136	95.6	123	89.1	43	76.8	24	72.7	416	90.4
Total	91	100.0	142	100.0	138	100.0	56	100.0	33	100.0	460	100.0

4.1.2 Form of Ownership

Table 36 contrasts the forms of ownership of exporters and non-exporters by sales size class and Table 37 presents the distribution of ownership forms among exporters, non exporters, and all

respondents combined (from Table 4). Exporting is relatively less likely when the establishment is organized as a single proprietorship and more likely under other forms of organization. Table 36 shows the breakdown within each ownership form; the totals do not exactly match due to different numbers of respondents answering questions. Of the 24.3% of respondents organized as single proprietorships, only 2.5% exported in 1990. Of regular/limited partnerships, which represent 5% of all respondents, 12% exported in 1990. A similar fraction, 10%, of privately held corporations (68.7% of all respondents) exported in 1990 and 30% of publicly held corporations (2% of respondents) export. These differences in export status among types of ownership are statistically significant.

Table 36. Type of Ownership of Exporting Respondents.

	Single Proprietorship		Regular/Limited Partnership		Privately Held Corporation		Publicly Held Corporation		All Respondents
	#	%	#	%	#	%	#	%	#
Exporter	3	2.5	3	12.0	34	10.0	3	30.0	43
Non-Exporter	118	97.5	22	88.0	307	90.0	7	70.0	454
Total	121	100.0	25	100.0	342	100.0	10	100.0	497

Table 37: Ownership Type of Exporting, Non-Exporting and All Respondents

	Single Proprietorship	Regular/Limited Partnership	Privately Held Corporation	Publicly Held Corporation	All Respondents
Exporter	7.0%	7.0%	79.0%	7.0%	100.0%
Non-exporter	26.0%	4.8%	67.6%	1.5%	100.0%
All Respondents	24.3%	5.0%	68.7%	2.0%	100.0%

4.1.3 Utilization of Production Capacity

There is no statistically significant difference in use of production capacity between exporters and non-exporters. The most frequently cited production capacity utilization for exporters is 80-89%, for non-exporters it is 70-79% (Table 38). The mean utilization of production capacity for exporters is 71.0%, for non-exporters it is 68.6%.

4.1.4 Geographic Location of Exporters

Although there were a few exceptions, exporting respondents tend to be found in states that share a boundary with Canada or Mexico, are coastal or are along a major waterway. The three states with the highest number of exporting establishments are Florida, California, and Washington.

4.2 Factors Influencing Success in Exporting

Respondents were asked to rank on a five-point Likert scale the importance of 19 factors that may influence the export decision. The scores for each factor, according to whether or not a respondent has participated in exporting, are summarized in Figures 23-24.

Table 38. Utilization of Production Capacity: Exporters vs Non-Exporters.

a. Number of respondents

Export Status	Utilization of Production Capacity (%)										
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-100	Total
Exporter	1	0	1	1	1	6	7	10	11	5	43
Non-Exporter	5	7	11	21	23	69	71	87	81	66	454
Total	6	7	12	22	24	75	78	97	92	71	497

b. Percentage of respondents

Export Status	Utilization of Production Capacity (%)										
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-100	Total
Exporter	2.3	0.0	2.3	2.3	2.3	14.0	16.3	23.3	25.6	11.6	100.0
Non-Exporter	1.1	1.6	2.5	4.8	5.2	15.6	16.1	19.7	18.4	15.0	100.0

Respondents that do not export cited "focus only on domestic markets" as the most important factor for not exporting. This was followed by size of establishment is too small, no way to contact potential foreign buyers, not enough time, and inadequate foreign market research. As shown in previous sections, non-exporters are much smaller than exporters. They may have a perception that exporting is an activity that only large establishments can accommodate and apparently feel that they lack resources to develop the necessary understanding and contacts to be successful in exporting. Trade assistance programs aimed at these areas may be helpful in introducing them to export markets. The remaining factors had relatively small influence. Many of these may have received low influence ratings because the non-exporters' lack of experience in foreign trade may preclude any basis for rating them.

Figure 24 reveals very different ratings by exporters. Although no factor received ratings higher than 3 (somewhat influential), the top three are: competition in foreign markets, financing terms, and no way to contact potential foreign buyers. Of the top ten factors identified by exporters, five (financing terms, no way to contact potential foreign buyers, not enough time, inadequate foreign market research, and language and/or communication barriers) could be addressed by trade-assistance organizations.

Many of the factors receiving low influence ratings by both exporters and non-exporters are formidable international concerns that lie beyond the realm of a company's influence.

4.3 Motivations for Export

Respondents who were exporters were presented five statements concerning why they began exporting and were asked to indicate their agreement on a five-point Likert scale. They most strongly agreed with the statements, "sought an opportunity for greater profits," followed by

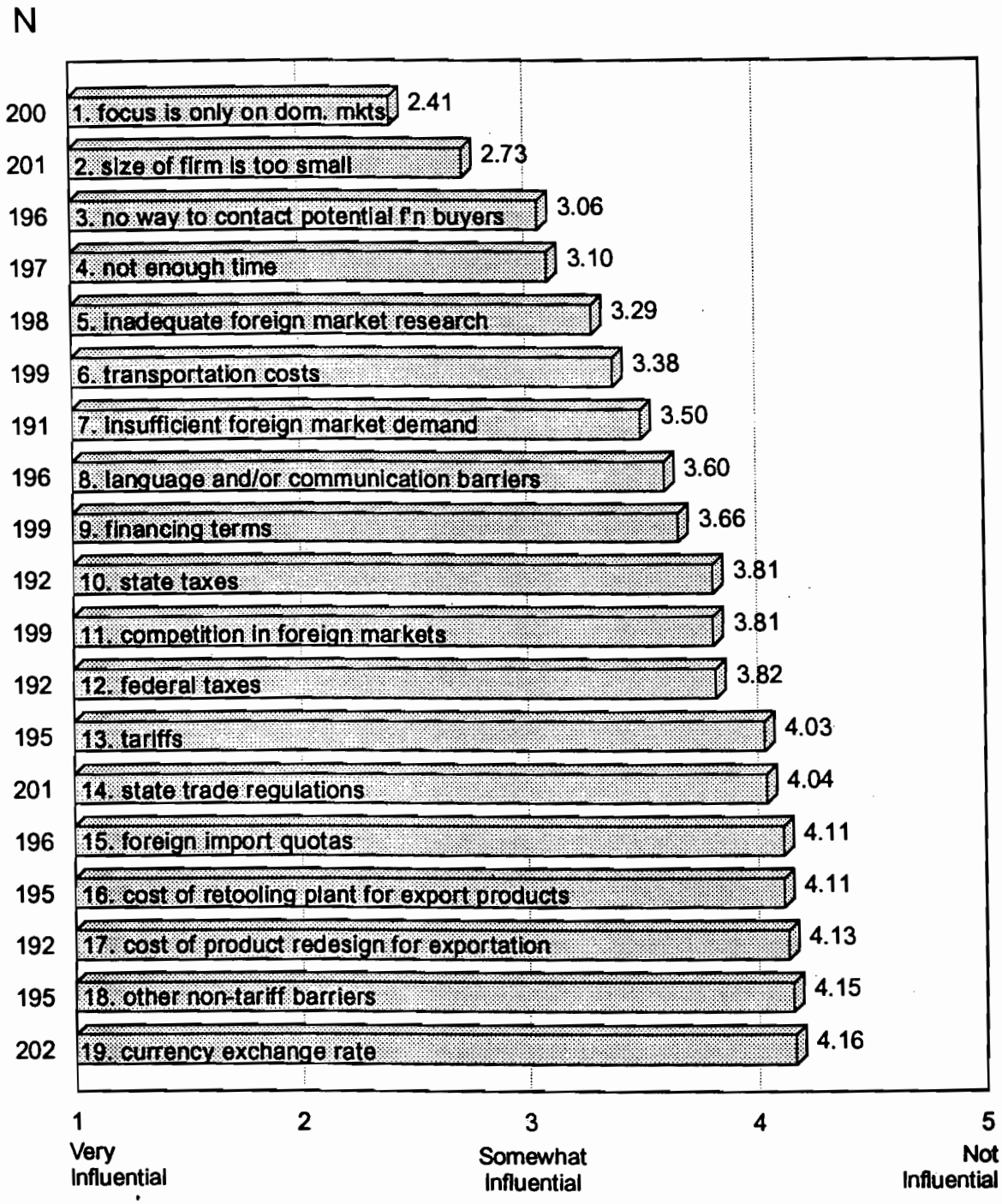

Figure 23. Factors that Influence Exporting: Ratings by Non-Exporters

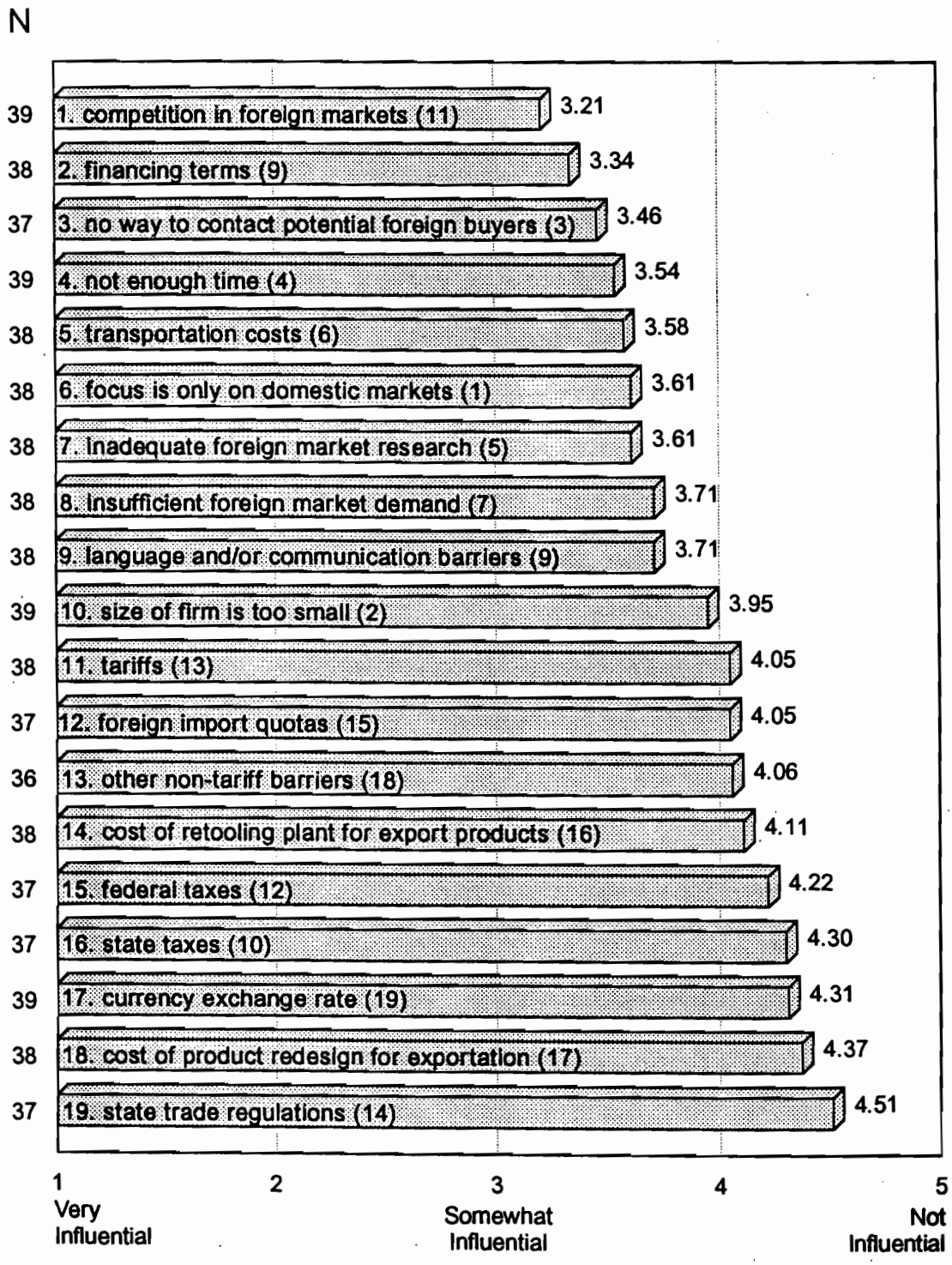

Figure 24. Factors that Influence Exporting: Ratings by Exporters
(Non-exporter rank of issue in parenthesis.)

"received an unsolicited offer," and "production capacity was underutilized" (Figure 25). They tended to disagree that "unsatisfactory domestic markets" and "my company developed an export product" were motivators for export sales.

4.4 Initiation of Export Sales

Exporting respondents were also asked to indicate how export sales were initiated. They were provided a checklist and were asked to check all methods used. Table 39 summarizes the results; the number of observations (85) exceeds the number of exporting respondents, indicating that an establishment's export sales are often initiated by more than one method. The most common method of initiating export sales is through a personal visit by a foreign customer (35.2%). Two methods tied for second place (16.5%) are a trade lead or order initiated by the customer (other than a personal contact) and contact by a foreign agent. These top three methods of export initiation can be viewed as reactive; the millwork establishment did not seek the foreign customer. Instead, the customer found the millwork producer who decided to meet a foreigner's need. Active initiation of exporting through "company visits to foreign countries to find customers" ranked as the fourth most common method (15.3%). All other export initiation methods occur relatively infrequently.

Table 39. Methods of Initiating Export Sales.

Method of Initiating Export Sales	Number of Observations	% of Obser-vations	% of the 44 Exporting Respondents
a. foreign customer visit to firm	30	35.2	68.2
b. trade lead or order initiated by customer	14	16.5	31.8
c. foreign agent visit to firm/contacted firm	14	16.5	31.8
d. company visits foreign country to find customers	13	15.3	29.5
e. company contact to an association expressing interest in exporting	5	5.9	11.4
f. broker/exporter contacts your firm	4	4.7	9.1
g. company participation in international trade show	2	2.3	4.5
h. company contact to a broker expressing interest in exporting	2	2.3	4.5
i. designer/architect contacted company	1	1.2	2.3
Total	85		

4.5 Export Marketing Channels

The market channel most commonly cited by exporters is the wholesaler as measured by 39.4% of exporting respondents (Figure 26). Export/trading companies and foreign agents were tied as the second most common export market channel. Other methods identified by respondents include industrial consumer, retail consumer, retailer, and domestic agent. In contrast to domestic market channels, export market channels tend to be more indirect, relying heavily upon intermediaries.

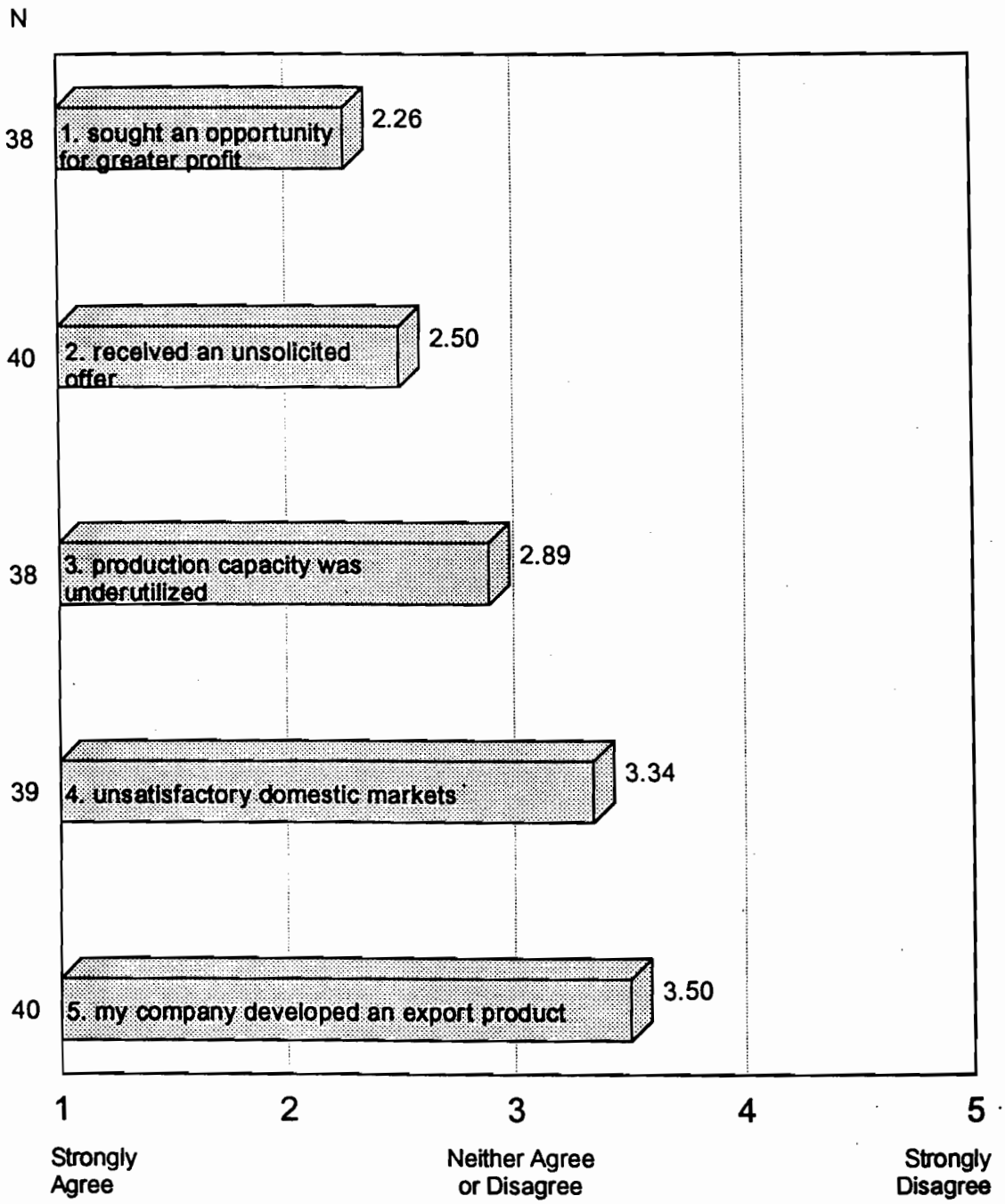

Figure 25. Factors Motivating Export Sales

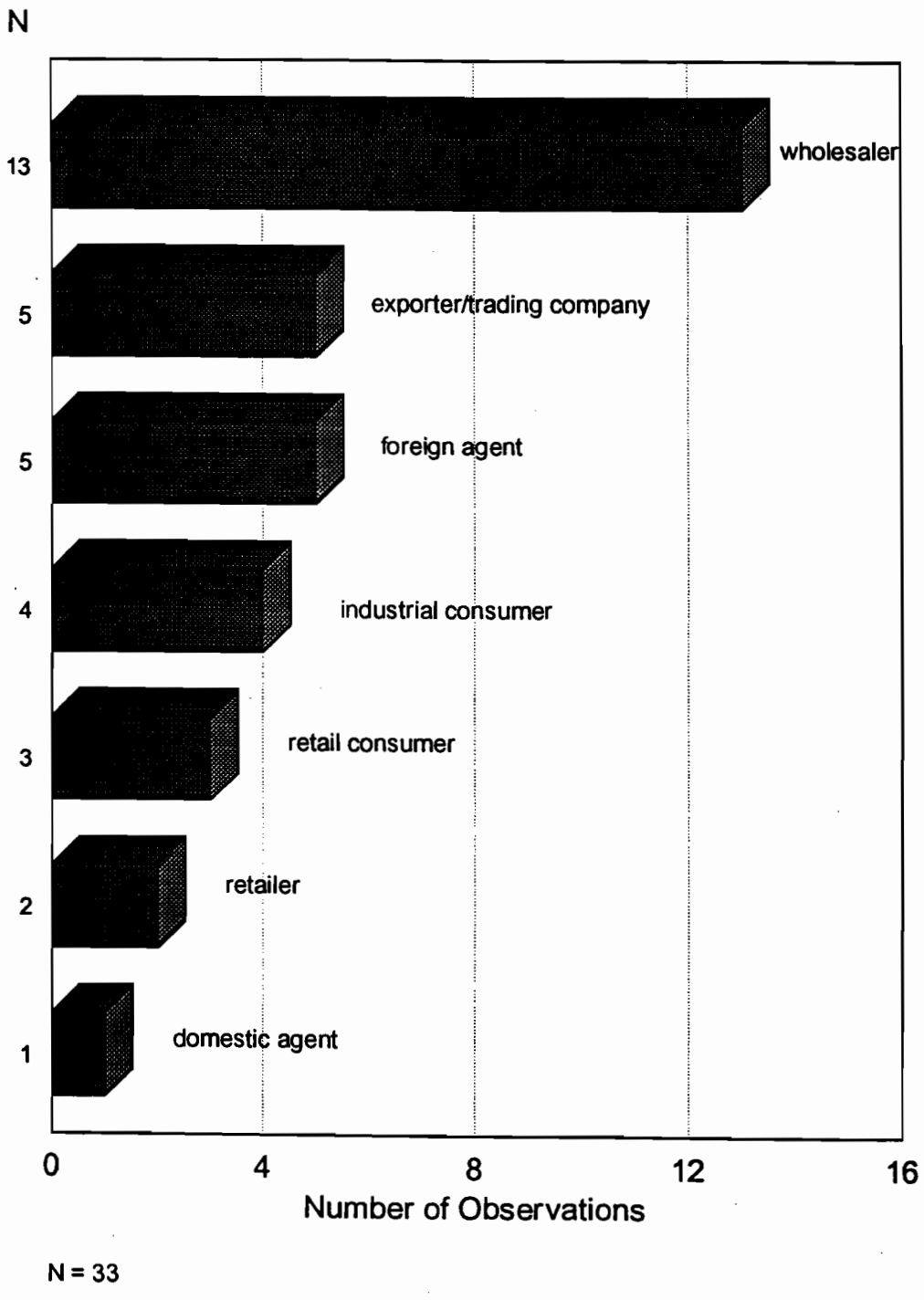

Figure 26. Market Channels Used by Exporters

4.6 Export Products

Table 40 presents the frequency with which different millwork products were identified as an export product. Due to a low number of observations, a breakdown of millwork products by their percentage of total export sales is not presented. Moldings were cited as the most frequently exported millwork product.

Table 40. Exported Product Frequencies.

Export Product	Number of Observations	Percent
Moldings	15	34.8
Doors	9	20.9
Staircases	5	11.6
Windows	2	4.8
Other	12	27.9
Total	43	100.0

4.7 Export Product Destinations

Of the 82 total observations, 36 (43.9%) Central or North American countries (Table 41) were cited most frequently as export destinations, with Canada being the most frequently cited (more than 50%). No information is available on the possible re-exporting of US-origin millwork from these countries to other destinations. The Pacific Rim, the second largest destination, accounted for 25.6% of all observations. Japan is the most frequently cited (almost 80%) Pacific Rim destination. Europe accounts for 22.0% of all export destinations, of which the UK accounts for 50%. Middle Eastern destinations were cited by only 3.7% exporting respondents.

Table 41. Export Product Destinations.

Trading Area	Country	Number of Observations		Percent
Americas	Canada	20		
	Mexico	6		
	Bahamas	4		
	Caribbean	4		
	Bermuda	2		
	Subtotal		36	43.9
Pacific Rim	Japan	16		
	Korea	2		
	Guam	1		
	Australia	1		
	Unspecified Pacific Rim	1		
	Subtotal		21	25.6
Europe	United Kingdom	9		
	Germany	4		
	Belgium	1		
	France	1		
	Netherlands	1		
	Unspecified Europe	2		
	Subtotal		18	22.0
Mideast	Saudi Arabia	1		
	Egypt	1		
	Unspecified Mideast	1		
	Subtotal		3	3.6
Destination Unknown			4	4.9
Total			82	100.0

CHAPTER 5

SUMMARY AND DISCUSSION

Chapter 5 combines survey results presented in Chapter 1-4 with information from other sources in an attempt to develop some preliminary projections and conclusions regarding the millwork industry. Since this survey represents 500 millwork respondents at one point in time, many "conclusions" should be viewed as hypotheses. There is no guarantee that these same conclusions would have been reached if the survey had been conducted at some other time in the past nor that they will be valid in the future. Only repeated study of the industry over time will determine if there is consistent agreement with the present findings.

5.1. PROJECTIONS

5.1.1 Projection Method

Total consumption of wood products was projected by a three step procedure similar to that used by Forbes, *et al.*, (1993).

1. Estimate national total sales of millwork products according to establishment size class (TS_i)

   $TS_i = (RS_i / R_i) / (S_i * C_i)$

where RS_i = total sales of respondents in the i-th size class, R_i = response rate for the i-th size class, S_i sampling ratio for the i-th size class, and C_i = coverage ratio of the i-th size class. The sampling ratio is the number of establishments in the sample divide by the number of establishments in the sample frame and the coverage ratio measures the degree to which the sample frame is believed to include all members of the wood millwork population. We believe that the mailing list and sampling procedure covered all segments of millwork producers and use a coverage ratio of one in the projections.

2. Estimate national consumption of a raw material for each size class (RM_{ij})

   $RM_{ij} = TS_i * CR_{ij}$

where CR_{ij} = average consumption per dollar of sales of material j within size class i.

3. The sum of the size class projections estimates national consumption by all millwork producers.

Table 42 presents consumption of wood raw materials by the 430 respondents who provided both sales and raw material consumption data. The first two rows indicate total sales and number of respondents by size class. These represent 86% of numbers of respondents and 87% of the $2.056 billion sales reported by all respondents. The remaining rows of Table 42 indicate the quantity of each material consumed by respondents in the size class and the corresponding

Table 42. Consumption Rates of Wood Raw Materials by Respondents

	Sales Size Class ($000)					
	(1) ≤249	(2) 250-999	(3) 1000-4999	(4) 5000-14999	(5) ≥15000	Combined
Total sales ($million)	12	66	283	417	1006	1785
# of respondents	87	133	132	52	26	430
Wood Material						
Logs						
swd, mmbf	0.054	0.205	6.120	0.000	0.000	6.379
, bf/$	0.005	0.003	0.022	0.000	0.000	0.004
hdw, mmbf	0.036	0.064	0.402	0.000	0.000	0.502
, bf/$	0.003	0.001	0.001	0.000	0.000	0.000
unk, mmbf	0.000	0.013	0.001	0.000	0.000	0.014
, bf/$	0.000	0.000	0.000	0.000	0.000	0.000
total, mmbf	0.090	0.282	6.523	0.000	0.000	6.895
, bf/$	0.008	0.004	0.023	0.000	0.000	0.004
Lumber						
swd, mmbf	1.149	6.035	189.313	34.982	283.288	514.767
, bf/$	0.098	0.092	0.668	0.084	0.281	0.288
hwd, mmbf	1.387	17.720	26.718	77.519	38.707	162.051
, bf/$	0.119	0.269	0.094	0.186	0.038	0.091
unk, mmbf	0.000	0.000	0.000	0.000	0.000	0.000
, bf/$	0.000	0.000	0.000	0.000	0.000	0.000
total, mmbf	2.536	23.755	216.031	112.501	321.995	676.818
bf/$	0.217	0.360	0.763	0.270	0.320	0.379
Plywood						
swd, mmsf	0.184	1.198	2.519	5.255	4.317	13.473
, sf/$	0.016	0.018	0.009	0.013	0.004	0.008
hwd, mmsf	0.112	0.115	2.235	0.184	0.778	3.424
, sf/$	0.010	0.002	0.008	0.000	0.001	0.002
unk, mmsf	0.080	0.147	0.358	0.632	0.640	1.857
sf/$	0.007	0.002	0.001	0.002	0.001	0.001
total, mmsf	0.376	1.460	5.112	6.071	5.735	18.754
, sf/$	0.032	0.022	0.018	0.015	0.006	0.011
Veneer						
swd, mmsf	0.005	0.000	0.023	0.157	1.000	1.185
, sf/$	0.000	0.000	0.000	0.000	0.001	0.001
hwd, mmsf	0.544	0.966	2.036	18.426	5.551	27.523
, sf/$	0.047	0.015	0.007	0.044	0.006	0.015
unk, mmsf	0.008	0.052	0.207	1.432	0.290	1.989
, sf/$	0.001	0.001	0.001	0.003	0.000	0.001
total, mmsf	0.557	1.018	2.266	20.015	6.841	30.697
, sf/$	0.048	0.015	0.008	0.048	0.007	0.17
Reconstituted panels						
particlebd, mmsf 3/4	7.110	1.176	2.099	9.492	6.057	25.934
, sf/$	0.608	0.018	0.007	0.023	0.006	0.015
mdf, mmsf 3/4	5.074	0.175	3.656	1.842	3.789	14.536
, sf/$	0.434	0.003	0.013	0.004	0.004	0.008
hardbd, mmsf 1/8	0.015	0.096	0.261	4.172	3.156	7.700
, sf/$	0.001	0.001	0.001	0.010	0.003	0.004
osb, mmsf 3/8	0.036	0.013	1.662	0.800	1.402	3.913
, sf/$	0.003	0.000	0.006	0.002	0.001	0.002
misc., mmsf 3/4	0.010	0.067	0.717	0.006	0.005	0.805
, sf/$	0.001	0.001	0.003	0.000	0.000	0.000

Note: swd = softwood; hwd = hardwood; unk = unknown variety; bf = board feed; sf = square feet.

ratio of quantity consumed per dollar of sales (CR_{ij} in the projection formulas). For example, respondents in the smallest size class consumed 0.054 MMBF of softwood logs or an average of 0.005 bd ft of softwood logs per dollar of their sales. In terms of quantities of materials consumed by all respondents, these mean rates are based on about one-third of all veneer and miscellaneous reconstituted panels, more than two-thirds of all softwood and hardwood lumber, and more than 90 percent of all other materials.

5.1.2 Estimated Number of Establishments Producing Millwork Products in 1990

The 1987 Census of Manufacturers indicated that 2782 establishments were produced millwork products as their primary activity (USDC, 1987)). No data on number of establishments are reported in the 1990 Annual Survey of Manufactures (USDC, 1990) but total employment rose from 89000 in 1987 to 90500. Assuming that average employment per establishment did not change, an estimate of 2829 primary millwork establishments in 1990 can be derived. This survey found that 17.5% of respondents manufacture a non-millwork product as their primary activity. Adjusting the 1990 estimate to include these results in an estimate of 3324 establishments with millwork as a primary or secondary activity. Bialozynski (1993) used the purchased list and data gathered during the survey sample mailing to estimate 3683 establishments producing millwork in 1990, either as the primary or a secondary activity. Luppold (1994) found 3492 such establishments in 1990. Census counts of number of establishments producing millwork are likely to be low since the Census may excuse very small establishments from reporting and establishments producing millwork as a secondary activity are counted in some other SIC group based on whatever product (kitchen cabinets, sawmilling, *etc.*) was their primary activity. Others have also noted the tendency for Census data to underestimate number of establishments and other statistics of wood industries (Brakovich, *et al.*, 1991; Floyd, *et al.*, 1993; Phelps and McCurdy, 1992).

It was previously noted that the purchased mailing list (7229 establishment names) contained producers of non-wood millwork, wholesalers and retailers, *etc.*, and hence overestimated the size of the sample frame (3324-3683 millwork producers in the US) by about 50%. Since the latter is very similar in size to the number of surveys mailed (3425), a sampling ratio of one is used in the projection formula.

5.1.3 Estimated 1990 National Sales by Millwork Producers

Projected national sales by millwork producers are presented in Table 43. These projections use the response rates by size class presented in the Introduction and respondent sales data in Table 32.

1990 total sales of millwork and nonmillwork products: Establishments producing millwork as either the primary or secondary product had projected total 1990 sales of all products of $12.3 billion. The 1990 Survey of Manufactures indicates $9.5 billion total value of shipments of all products by primary millwork manufacturers (USDC, 1990). The difference is easily explained by the survey inclusion of sales by those who manufacture millwork as a secondary product.

1990 sales attributable to millwork products: Of the $12.3 billion total sales, the projections estimate that $9.9 billion is attributable to millwork products. Adjusting the 1990 Survey of

Table 43. Projected US Sales and Wood Raw Materials Consumption by Millwork Producers

	Sales Size Class ($000)					
	(1) ≤249	(2) 250-999	(3) 1000-4999	(4) 5000-14999	(5) ≥15000	Combined
Sales ($million)						
Total	69	403	1370	3140	7330	12313
Millwork	47	267	994	2421	6208	9937
Wood Material						
Logs						
swd, mmbf	0.21	0.83	21.48	0.00	0.00	22.52
hwd, mmbf	0.14	0.26	1.41	0.00	0.00	1.81
unk, mmbf	0.00	0.05	0.00	0.00	0.00	0.06
total, mmbf	0.36	1.14	22.89	0.00	0.00	24.39
Lumber						
swd, mmbf	4.57	24.42	664.36	203.01	1746.84	2643.20
hwd, mmbf	5.52	71.70	93.76	449.86	238.77	859.61
unk, mmbf	0.00	0.00	0.00	0.00	0.00	0.00
total, mmbf	10.08	96.13	758.12	652.88	1985.61	3502.82
Plywood						
swd, mmsf 3/8	0.73	4.85	8.84	30.50	26.63	71.54
hwd, mmsf 3/8	0.44	0.46	7.84	1.07	4.80	14.62
unk, mmsf 3/8	0.32	0.60	1.26	3.67	3.95	9.79
total, mmsf 3/8	1.50	5.91	17.94	35.23	35.38	95.96
Veneer						
swd, mmsf	0.02	0.00	0.08	0.91	6.17	7.18
hwd, mmsf	2.16	3.91	7.14	106.93	34.24	154.39
unk, mmsf	0.03	0.21	0.73	8.31	1.79	11.07
total, mmsf	2.22	4.12	7.95	116.15	42.20	172.65
Reconstituted panels						
particlebd, mmsf 3/4	28.26	4.76	7.37	55.08	37.36	132.83
mdf, mmsf	20.17	0.71	12.83	10.69	23.37	67.77
hardbd, mmsf 1/8	0.06	0.39	0.92	24.21	19.47	45.05
osb, mmsf 3/8	0.14	0.05	5.83	4.64	8.65	19.32
misc., mmsf 3/4	0.04	0.27	2.52	0.03	0.03	2.89

Note: swd = softwood; hwd = hardwood; unk = unknown variety; bf = board feed; sf = square feet.

Manufactures $9.5 billion total sales with the 1987 Census of Manufactures fractions due to secondary products and miscellaneous receipts and applying the 1987 Census coverage ratio (96%) to account for sales of millwork by producers outside SIC 2431, results in an estimate of $9.0 billion sales attributed to millwork by both primary and secondary manufacturers.

1990 export sales of millwork products: Chapter 4 found that exports accounted for about 1.2% of respondent sales. Applying this to projected 1990 sales attributed to millwork, suggest that millwork exports were $120 million. Analysis of US Department of Commerce 1990 trade statistics indicated that 1990 millwork exports were $143 million (Briggs, *et al.*, 1994). The lower estimate based on respondent data can be partially explained by sampling error and by situations where some millwork producers may sell to other US firms that eventually export the products. In some of these cases, the respondent may consider this a domestic sale or may not even know that the product was eventually exported.

5.1.4 Estimated National Consumption of Raw Materials

Table 43 also presents projected 1990 national consumption of various types of wood raw materials by millwork producers. They consumed about 24 million board feet of roundwood logs, primarily softwoods. About 2.6 billion board feet of softwood lumber and 0.9 billion board feet of hardwood lumber were consumed. These represent about 6% of all softwood lumber and 8% of all hardwood lumber consumed in the US in 1990 (Blackmun, 1991). Luppold (1993) reported that hardwood lumber consumed by those with millwork as their principal business activity was 0.716 billion board feet in 1987 and 0.61 billion board feet in 1991. These values are lower than the survey projection but the survey also includes consumption by those with millwork as a secondary activity. Given these differences, the Luppold data and our projections appear to be in reasonable agreement. About 72 million and 19 million square feet (3/8 basis) of softwood plywood and OSB were consumed; compared to total US consumption of structural panels (Blackmun, 1991), this is less than 1%. Projected consumption of particleboard (133 million square feet, 3/4 basis), MDF (68 million square feet, 3/4 basis) and hardboard (45 million square feet, 1/8 basis) represent about 5%, 12%, and 1% of total US consumption of these materials (Blackmun, 1993). Almost all projected veneer consumption, 154 of 173 square feet was hardwood species and a small amount of hardwood plywood and miscellaneous reconstituted panels were consumed by millwork producers; no comparable US total consumption figures were available.

The projections and comparisons should be viewed with caution. The projections assume that raw material use is uniform between millwork and non-millwork products. For example, if hardwood lumber is relatively more intensively used for the non-millwork product lines of respondents, the projection of hardwood lumber used for millwork is biassed upward. Also, by the randomness of sampling and decisions or survey recipients to respond, it is possible that either the survey reached, or usable returns were received by, disproportionately more (or less) users of a particular material and this could introduce a sampling bias in the projections.

5.2 Establishment Characteristics

5.2.1 Forms of Ownership

More than two-thirds of respondents were organized as private corporations and almost one-fourth were sole proprietorships (Table 4). These results are very similar to organization patterns of the secondary wood products industries in the State of Washington (Dirks and Briggs, 1991), where 73% were private corporations and 24% sole proprietorships. These results differ from the composition of the members of the Architectural Woodwork Institute (AWI). Although many AWI members are millwork producers, many others are not. AWI membership is 32.1% private corporations, 3.5% sole proprietorships, and 63.0% public corporations (Architectural Woodwork Institute, 1991). The form of organization varies with size of establishment. The smallest are dominated (62.6%) by sole proprietorships, but this form of organization is much less common among larger sizes, all of which are at least 70% private corporations. Organization as a public corporation was very uncommon except for the largest size class; 15% of the largest respondents were public corporations. Form of ownership was also very different between exporters and non-exporters (Chapter 4) but much of this can be explained by the different forms of ownership between size classes and the fact that exporters are primarily larger establishments.

5.2.2 Employment

The average respondent employed 36.2 persons, of which 76.5% were direct labor; the ratio to administrative employees is 3.3 to 1. In contrast, the US Department of Commerce Census of Manufacturers had 32.0 employees per establishment in 1987 with direct labor (production workers) representing about 80% and a ratio of direct to administrative employees of about 4 to 1 (see Briggs, *et al.*, 1994). Using these data, the average survey respondent has 13.1% greater employment than the average Census establishment. There is a strong association between total employment and sales size class (Table 10). The smallest respondents have the smallest proportion of employees as direct labor.

Size ($000)	Number of Employees (Table 11)	Direct:Administrative Labor Ratio (Table 11)
≤ 249	4.6	2.4:1
250-999	9.3	3.2:1
1000-4999	27.3	3.4:1
5000-14999	68.5	3.2:1
≥ 15000	239.4	3.4:1

5.2.3 Capacity Utilization

In 1990, utilization of capacity ranged from 62% in the smallest establishments to 75% in the largest establishments with an average for all respondents of 68.8% (Table 6). A number of

respondents commented that capacity utilization was down due to the relatively poor US economic conditions.

5.2.4 Replacement Cost and Investment Plan

The average replacement cost for all respondents was $1.5 million. Average replacement cost ranged from $230,000 for the smallest size class to $9.4 million for the largest (Table 5). One half of respondents indicated a replacement cost of $450,000 or less.

Combining data from Tables 5, 10, and 32 reveals the following patterns:

Size Class	$ Replacement Cost ($000) per Employee	$ Replacement Cost ($000) per Direct Employee	$ Sales per $ Replacement
≤ 249	51.9	72.4	0.55
250-999	39.8	52.2	1.32
1000-4999	47.0	60.8	1.67
5000-14999	43.6	57.3	2.69
≥ 15000	39.1	50.5	4.39
Average	41.0	54.6	2.99

In terms of replacement cost per employee, the smallest establishments have somewhat higher replacement ratios than other size classes. There is a very strong trend in average sales per dollar of replacement cost with the smallest establishments having almost one eighth of the rate of return of the largest. The average values shown were calculated using replacement cost, sales and employment of the average respondent.

When asked about investment plans for the next five years, 26% of respondents indicated that they will increase investment in plant expansion, 30% will increase investments in new equipment, and 36% will increase purchases in used equipment (Table 11). About 29%, 26% and 23% plan to decrease investments in these respective areas. There were no strong trends in investment plans among the establishment size classes but it is interesting to note that the smallest size class was the only one which planned to increase spending relatively more on used rather than new equipment.

5.2.5 Cost Structure

The two largest cost categories for respondents are wood raw materials (36.7%) and direct labor (31.7%), which together, represent more than two thirds (68.4%) of total expenditures (Table 7). "Administration/overhead" costs and "other (non-wood) raw materials" represent 17.1% and 11.1% of total costs, respectively. The smallest identified cost item (4.3%) is marketing research and development.

Wood raw materials are a substantially larger cost item for large establishments than small establishments (Table 9). Conversely, direct labor costs represent a larger share of costs for

small establishments. The remaining cost items administration and overhead, other (non-wood) raw materials, and marketing R&D, vary little among the size classes.

The survey found expenditures for materials (wood plus non-wood) to be 47.8% for all respondents and 53.3% for those which exclusively manufacture millwork (Tables 7-8). This is in reasonably good agreement with 45% obtained for millwork manufacturers in the State of Washington (Dirks and Briggs, 1991) but is substantially less than the 70% cost of materials indicated by the Census of Manufacturers. Costs of direct or production labor are also in reasonable agreement between all respondents (31.7%), respondents who manufacture millwork exclusively (28.6%) and the State of Washington millwork producers (34%) but the Census is substantially lower at 18%. Some of the discrepancy between these sources may be due to differences in the base value used to calculate cost percentages.

5.3 Sales and Marketing

5.3.1 Total Annual Sales

The average respondent produced nearly $4.5 million in total annual sales in 1990, of which $3.7 million (82.2%) is sales of millwork products and the remainder secondary products (Table 32). When examined according to size class, 19.9% of respondents had 1990 sales of less than $250,000 but collectively these accounted for only 0.6% of total sales. Only 6.6% of respondents had sales of at least $15.00 million; but these accounted for 59.9% of total industry sales.

Size ($000)	% of Respondents	% of Total Sales
≤ 250	19.9	0.6
250-999	31.1	3.4
1000-4999	30.2	14.3
5000-14999	12.3	21.8
≥ 15000	6.6	59.9
Total	100.0	100.0

5.3.2 Product Mix

Millwork products accounted for 82.2% of total sales of respondents. The millwork share of sales rose from 67.5% in the smallest size class to 84.7% in the largest (Table 32). Moldings accounted for the largest portion of sales, followed by doors and windows (Table 33).

The survey shares differ from the US Department of Commerce 1990 Annual Survey of Manufactures, which estimates that 95% of value of shipments were millwork products. Of this 11.8% was attributed to moldings, 32.4% to doors, 27.7% to windows, and 28.1% to all others. Part of the discrepancy may be a result of the survey reaching all producers rather than just those with millwork as the principal product. For example, some respondents who indicate moldings

as the principal product may be considered to be part of SIC 2421, sawmills and planing mills. Further research will be necessary to understand these product share discrepancies.

5.3.3 Product Characteristics and Success Factors

When asked to characterize their product line, 96.4% indicated that they produced custom products, 83.4% produced specialty products, and only 40.5% manufacture what they consider to be commodity products. There was a trend for a greater percentage of the larger firms to manufacture commodities (Table 27). Small establishments are less likely to produce commodities and focus on custom and specialty products.

Respondents most commonly (45.0%) engage in product development on an occasional basis (Figure 19). Nearly a third (32.0%) have continuous product development, while the balance (22.9%), do not engage in any product development. Except for the largest size class, occasional product development was the most frequent response. The largest class most frequently indicated continuous product development.

Respondents were asked to give a one (extremely important) to five (not important) rating to a list of 25 product and service attributes (Table 34, Figure 21-22). Eleven items were rated between extremely important and important, led by company's reputation. Many highly rated success factors are related to ability to work closely with customers producing the size order needed, delivery when needed, *etc.* The six lowest-ranking items were: providing low-priced product, collecting market information, advertising, providing technical product information, brand name, and production of metric sizes.

The lack of emphasis on brand name and advertising, given that the top attribute is company reputation, suggests that most millwork establishments are do not invest resources in brand name recognition. Rather, they rely on cultivating customers in a local market and rely on reputation due to product and service quality to maintain and expand their base of direct market customers. These results are similar to the Washington State secondary wood industry (Dirks and Briggs, 1991). Although there were no statistically significant differences in the ranking of success factors according to respondent size, there were interesting contrasts between the smallest and largest. The smallest were much more concerned about availability and cost of capital which may underlie their greater likelihood to invest in used rather than new equipment and their concerns over capabilities of new vs used equipment. Other differences appear to be related to (1) the smallest being relatively more focused on custom products while the largest tend to be more involved in commodities and (2) the smallest concentrating on local markets while the largest market locally, nationally, and internationally.

5.3.4 Sales Geography

Almost all (92.2%) respondents sell their products locally (Table 30). Marketing within the region (Figure 2) in which they are located is conducted by 64.6%, and slightly over a quarter (25.8%) market products nationally. Only 10.8% market products internationally. Larger

respondents were much more likely to participate in national and export markets. There seems to be a tendency for millwork producers to locate in population centers, import wood raw materials from resource rich regions, and produce products tailored to local customer preferences.

5.3.5 Marketing Channels

As a consequence of the tendency to produce custom and specialty products and local/regional market focus, millwork establishments rely heavily upon direct marketing channels. The three most frequently used marketing channels, which account for 71.8% of all identified marketing channels, are customer-direct channels (Figure 17). These findings are consistent with Smith (1991) who found that 74% of Washington's pallet manufacturers use customer-direct channels. Intermediate marketing channels (wholesalers, retailers, agents, and trading companies) are only used in 27.9% of all millwork marketing transactions. Larger establishments with a broader market geography and greater tendency to produce commodities use intermediate marketing channels more frequently (Figure 18).

5.3.6 Export Sales and Exporter Characteristics

Exporter Characteristics

Only 10.8% of respondents exported in 1990 (Table 30). States that share a boundary with Canada or Mexico or which are located on coastlines or major waterways have the highest number of exporters. Exporters are generally larger than non-exporters: $10.4 million sales and 92.8 employees versus $3.9 million sales and 30.5 employees, respectively (Tables 35-37). However, exporters and non-exporters had essentially the same average utilization of capacity (Table 38). Exporters are much more likely to be public corporations than non-exporters (Tables 36-37). Of all respondents who were public corporations, 30% exported in 1990. Of all the privately-held corporations or regular/limited partnerships, 10-12% exported and, of single proprietorships, only 2.5% exported. These results are in agreement with others. Hammett and DeForest (1993) found that Southern hardwood lumber exporters are of larger size and more likely to be corporations and less likely to be sole proprietorships. Hammett, Cubbage, and Luppold (1991) found that exporting establishments are significantly larger than non-exporters and suggested that larger establishments can direct a stronger management focus on export marketing.

Export Sales

For those respondents that exported, export sales averaged 5.2% of total sales or about $464,000. As a percent of total sales of all respondents, exports are estimated to be about 1.2%.

Moldings are observed to be the most frequently exported millwork product followed by doors (Table 42). This agrees with analysis of US Department of Commerce trade statistics which found that 51.3% of value of US millwork exports were softwood and hardwood moldings with

doors second at 19.5% (Briggs, *et al.*, 1994). The most common export marketing channel is a wholesaler. In contrast to domestic sales which are dominated by customer-direct marketing, the majority of exported products are marketed through intermediaries.

The three most frequently cited export product destinations are: Canada, Japan, and England. North and Central American destinations account for 43.9% of all observations. Establishments typically export to foreign markets that are geographically closest.

Exporting Respondent Summary.

	Statistic
ESTABLISHMENT CHARACTERISTICS	
Exporting Establishments as a Percentage of Total	10.8%
State with Most Exporting Establishments	Florida
Most Frequently Cited Ownership Type	private corporation
Mean Product Capacity Utilization	71.0%
Mean Number of Employees Per Establishment	92.8
Mean Annual Sales Per Establishment	$8.9 million
MANUFACTURING ACTIVITIES AND EXPORT MARKETING	
Most Frequently Exported Millwork Product	moldings
Export Sales as a % of Total Sales (Exporters)	5.2%
Most Frequently Used Market Channel	wholesaler
Most Influential Export Issue	competition in foreign markets

Respondents not engaged in exporting identified domestic market focus, small size of firm, and inability to contact foreign buyers as the three leading reasons for not exporting (Figure 21). In contrast, respondents that are exporting indicate that the three most influential issues are competition in foreign markets, financing terms, and no way to contact potential foreign buyers (Figure 22). Issues extraneous to the establishment's realm of influence (trade regulations, tariffs, *etc.*) are considered relatively non-influential by both exporting and non-exporting respondents. These findings parallel those of Hammett and DeForest (1993) in their study on Southern hardwood lumber exporters.

Millwork establishments engage in export marketing to increase profits (Figure 23) but generally become involved in exporting by reacting to visits and inquiries by potential foreign buyers (Table 39). Aggressive export marketing through activities such as visiting foreign countries or participating in international trade shows is not the industry norm.

5.4 Raw Material Consumption

Table 19 summarized consumption of wood materials (on a solid cubic equivalent basis) and expenditures according to the US Department of Commerce.

5.4.1 Roundwood

Roundwood comprises a tiny fraction of the volume and expenditures for raw material consumed by the millwork industry. Only 5.8% of all respondents use roundwood as raw material and more than 90% of roundwood consumed is softwood species.

5.4.2 Softwood Lumber

Softwood lumber represents 63.8% of the volume and 72% of the expenditures for raw materials. Ponderosa pine (60.7%) and red cedar (19.9%) comprise the bulk of volume consumed. Relative to hardwood lumber consumption, softwood lumber is consumed by fewer respondents, but in much greater volume per respondents.

The use of imported radiata pine, despite much speculation (Crow's, 1992), was very limited in 1990. However, there is no reason to believe millwork manufacturers will not utilize radiata in light of further timber supply constraints (Tomasko, 1992; Evison, 1993).

5.4.3 Hardwood Lumber

Hardwood lumber represents 27.9% of the volume and 15% of raw material expenditures. Red oak is used by more establishments and in greater volume (58.7%) than any other species. Poplar is the second most voluminous hardwood lumber species (19.0%).

5.4.4 Plywood

Plywood represents only 0.9% of the volume and 4% of the raw material expenditures. Douglas-fir (60.5%) and Southern pine (29.1%) dominate volume consumed.

5.4.5 Veneer

Virtually all of the veneer consumed, 1.7% of raw material volume and 6% of raw material expenditures, is hardwood species. Red oak (70.5%) is the most voluminous veneer species.

5.4.6 Reconstituted Panels

Reconstituted panels represent 4.1% of the total volume and 3% of raw materials expenditures. Particleboard accounts for 56.5% of the volume of reconstituted panels, followed by medium density fiberboard (34.1%).

5.4.7 Non-wood Materials

Use of non-wood materials is practiced by 16.2% of respondents. Large respondents are three times more likely to use non-wood materials than the smallest; use of non-wood materials increased from 12.1% of the smallest to 36.6% of the largest respondents. The most frequently cited (40%) non-wood material is plastic laminates. Respondents indicated that reduced harvests on Federal lands are not likely to increase their use of non-wood product materials. However,

they believe that competition from producers of non-wood products will grow substantially in the future.

5.4.8 Five-Year Trends in Raw Material Consumption

Respondents were asked to indicate if they expected consumption of raw materials to decrease, not change, or increase over the next five years. All species and products received average ratings between "not change" and "increase." However, the five softwood and one hardwood lumber species receiving the lowest ratings were all from the West, where timber availability will decline as a result of reduced harvests on federal lands.

This survey was not designed to examine the potential impact of reduced demand for products made with tropical hardwood (Ozanne and Smith, 1993). Respondents did not agree with a statement that reduced demand for tropical species through boycotts and other factors will improve their markets. Also minimal volumes of tropical hardwoods are used by respondents so any decline in availability or popularity of such species would have minimal direct impact on their production.

5.5 Perceptions of Issues

Several questions in the survey requested respondents to rate the relative importance issue on their agreement with statements on a five-point Likert scale. Generally there were no statistically significant differences due to respondent size. However, there are some interesting contrasts between small and large respondents that are partially due to differences in degree of product specialization (commodity vs custom), geographic scope of markets, and ability to obtain financing.

5.4.1 Rating of Business Concerns

Respondents were asked to indicate their concern with a mix of 17 business factors internal and external to the organization's control (Section 1.9). A Likert value of one indicated "not a problem," while a rank of five indicated a serious problem. Only three items received mean scores exceeding three (some concern): labor skill and education, environmental (pollution) regulations, and labor costs. These were closely followed by availability and cost (interest rate) of capital. Of least concern was distance to product market. Interestingly, distance to raw material sources was a substantially higher concern. This may reflect a tendency for respondents to locate close to population centers where they can concentrate on strong direct links with customers. This tendency of secondary wood industries to locate near population centers and rely on local markets has been noted elsewhere (Dirks and Briggs, 1991).

5.4.2 Raw Material Issues

In the ranking of business factors, raw material supply ranked eighth among the 17 factors. However, there was a trend for this to be of greater concern as size of establishment increased. It ranked as the top concern among the largest establishments which, because of their greater

production quantities and hence greater demand for wood materials may be more cognizant of emerging wood supply issues. To gain further insight on raw material issues, respondents were presented with two sets of statements. One provided general statements concerning quality, use of substitutes, and the effect of changing consumer demand for tropical hardwoods. The other provided statements regarding the impact of reduced timber harvest from federal lands. A response score of one meant strong agreement and a score of five meant strong disagreement (Section 2.8).

With respect to the impact of reduced harvest from federal lands, respondents agreed that this will make it more difficult to obtain the quality of wood needed and that use of substitute species will become more common. They somewhat disagreed with the proposition that they would use alternative (non-wood) materials or change manufacturing methods.

When given six general statements regarding raw materials, they agreed that competition from non-wood products will grow substantially, that it is difficult to find quality wood raw material at any price, and that use of non-wood materials by millwork industries will grow. To some extent this seems to contradict their disagreement with increased use of non-wood materials in the previous section. They were neutral on statements that quality of manufacture of wood raw materials is poor and that competition from non-wood materials is presently strong. They disagree with the possibility that reduced consumer demand through boycotts or other means will improve their markets. This may reflect the very low usages of tropical hardwoods by respondents.

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APPENDIX A

COMMON AND SCIENTIFIC NAMES OF IDENTIFIED TREE SPECIES

Common Name	Scientific Name
alder, red	*Ulnus rubra*
anegre	*Aningeria* spp.
ash	*Fraxinus* spp.
aspen	*Populus* spp.
basswood	*Tilia americana*
birch	*Betula* spp.
butternut	*Juglans cinerea L.*
cherry	*Prunus serotina*
cottonwood	*Populus* spp.
cypress	*Taxodium distichum*
Douglas-fir	*Pseudotsuga menziesii*
fir, true	*Abies* spp.
haiari	*Alexa imperatricis*
hemlock	*Tsuga* spp.
hemlock, Western	*Tsuga heterophylla*
hemlock-fir (hem-fir)	*Tsuga* spp. , *Abies* spp.
hickory	*Carya* spp.
lauan	*Shorea* spp.
mahogany	*Khaya* spp., *Swietenia* spp.
maple	*Acer* spp.
maple, red	*Acer rubrum*
maple, soft	*Acer rubrum, Acer saccharinum*
mersaw(a)	*Anisoptera* spp.
oak	*Quercus* spp.
oak, red	*Quercus*, group *Erythobalanus*
oak, white	*Quercus*, group *Leucobalanus*
pine	*Pinus* spp.
pine, Eastern white	*Pinus strobus*
pine, heart	*Pinus* spp.
pine, knotty	*Pinus* spp.
pine, lodgepole	*Pinus contorta*
pine, ponderosa	*Pinus ponderosa*
pine, radiata	*Pinus radiata*
pine, red	*Pinus resinosa*
pine, southern yellow	*P. palustris, P. echinata, P. taeda, P. elliottii, P. rigida, P. serotina*
pine, sugar	*Pinus lambertiana*
pine, Western white	*Pinus monticola*
pine, white	*Pinus strobus, Pinus monticola*
poplar	*Populus* spp.
redcedar	*Thuja plicata* Donn (Western), *Juniperus* spp.
redwood	*Sequoia sempervirens*
sande	*Brosimum* spp.
spruce	*Picea* spp.
spruce-pine-fir (SPF)	*Picea* spp., *Pinus* spp., *Abies* spp.
sweetgum	*Liquidambar styraciflua*
teak	*Tectona grandis*
tulip-poplar	*Liriodendron tulipefera*
virola	*Dialyanthera* spp.
walnut	*Juglans nigra*
white-cedar	*Chamaecyparis thyoides, Thuja occidentalis*

APPENDIX B

RAW MATERIAL CONVERSION FACTORS

Coefficients used to convert the raw material volumes into cubic foot equivalents in Table 21 are those presented by Briggs (1993). Conversions utilized in this study are listed below.

Wood Raw Material	Reported Unit	Conversion Basis	Cubic Foot Conversion Multiple
Roundwood			
softwood	BF	-	.1667
hardwood	"	-	.1667
Lumber			
softwood	"	-	.0589
hardwood	"	-	.0833
Plywood			
softwood	MSF	3/8"	31.3
hardwood	"	3/8"	31.3
Veneer			
softwood	"	3/8"	31.3
hardwood	"	1/8"	10.4
Reconstitutes			
particleboard	"	3/4"	62.5
MDF	"	3/4"	62.5
hardboard	"	1/8"	10.4
OSB	"	3/8"	31.3
other	"	3/8"	31.3