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# Raw Materials Use by Mississippi Furniture Manufacturers, 1989

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# Executive Summary

Mississippi's furniture industry has grown rapidly in recent years and now ranks nationally in production of specific types of furniture. Furniture producers in the state use many types of wood and nonwood raw materials. Raw materials expenditures were almost \$330 million for 92 firms that responded to a 1989 survey. The survey included upholstered and nonupholstered furniture producers as well as hardwood dimension and frame producers. Substantial amounts of these raw materials were obtained from suppliers within the state.

Wood-based raw materials important to the state's furniture industry are furniture frames, plywood, and lumber. Annual expenditures were reported for furniture frames and plywood of \$52.7 million and \$42.6 million, respectively. Reported lumber expenditures were more than \$38 million annually. Oak was the most commonly used species of lumber in furniture production in Mississippi.

Both air-dried lumber and kiln-dried lumber were used in furniture production. Almost all of the Mississippi firms that reported using kiln-dried lumber used such lumber exclusively. The desired moisture content was reported to be roughly 20 percent for air-dried lumber and only 8 percent for kiln-dried lumber.

Lumber was graded by 29 percent of the 92 firms that responded to the survey. Lumber of grade #1C was used most often by the state's dimension stock producers and nonupholstered furniture producers; #2C was used most often by upholstered furniture firms. The amount used and percentage yield for the FAS grade of lumber differed significantly between the dimension stock firms and those that produced

nonupholstered furniture. The nonupholstered furniture producers used more FAS grade lumber and had higher percentage yields.

Wood used by the furniture industry in Mississippi came primarily from within the state, and from Alabama and Tennessee. Firm size and the preferred geographic source of oak lumber were significantly related. In general, smaller firms desired oak that was grown in the southern United States, while larger firms did not express a geographic preference in the source of oak lumber.

While only 42 percent of the responding firms reported using nonwood-based raw materials, the value of nonwood raw materials still accounted for more than 50 percent of all raw materials purchased. The largest single nonwood raw material used by the furniture industry in Mississippi was fabric covering, which accounted for more than 40 percent of the nonwood raw materials purchased by the firms responding to our survey. Foam cushion was another important nonwood-based raw material, making up almost one-third of the total nonwood-based raw materials used by the responding firms.

Primary problems associated with wood-based raw materials were moisture content, strength, and machining. No significant associations were found, however, between the level of problem severity and producer types. New air quality standards will have varying effects among the different firms, but the severity of the problem was not found to be associated with any one type of furniture producer. The greatest problem the industry faced with obtaining more wood-based raw materials from Mississippi sources was reported to be lack of available timber.

# Raw Materials Use by Mississippi Furniture Manufacturers, 1989

## Introduction

One of Mississippi's most important industries is furniture manufacturing. With more than 25,000 employees, the furniture industry accounts for more than 10 percent of total manufacturing employment in the state (Mississippi Department of Economic Development, 1990). Since 1982, furniture industry employment has grown faster than any of the state's manufacturing industries. In 1986 alone, 11 new firms were established, 39 existing firms expanded production, and a total of more than 2,500 manufacturing jobs were added by the industry (adapted from Coleman and Bryant, 1987). Production of furniture is expected to be high through the early decades of the 21<sup>st</sup> century (Koch, 1985).

Mississippi ranks nationally in production of several specific types of furniture, particularly upholstered household furniture. The state's \$125 million value of shipments of "dual-purpose sleep furniture," for example, led the nation in 1987 (USDC Bureau of Census, 1990). The state's 1987 value of shipments of this product was 22 percent higher than second-ranked North Carolina, and 81 percent higher than third-ranked California.

Several reports have described how the furniture industry began in Mississippi and why it has flourished. "The Mississippi Furniture Industry and Its Use of Wood-Based Materials" (Bullard et al., 1988), for example, describes early reports by the Tennessee Valley Authority (1963), Peterson (1966), and the Mississippi Economic Council (1987). One of the most important factors in the industry's manufacturing success has been the relative availability of wood and nonwood raw materials.

## The Survey

Our survey of Mississippi furniture manufacturers was designed to estimate the volumes and values of their wood and nonwood raw materials, to obtain general information on geographic sources for important raw materials, and to gather information on manufacturing operations and problems. The survey was conducted in the spring and summer of 1989 by the Social Science Research Center at Mississippi State University under a contractual arrangement

with the Forestry Department of the Mississippi Agricultural and Forestry Experiment Station.

The survey was conducted by mail, using addresses and product listings in the 1989 *Mississippi Manufacturers Directory* (Mississippi Department of Economic Development, 1989). Followup telephone contacts and on-site visits were used to increase response rates. Responses were obtained from 92 firms, or 55 percent of the 166 firms contacted. Our overall survey response rate was very high compared to most surveys of wood-based industries. Bush et al. (1987), for example, obtained a 38 percent response rate in a survey of sawmills and pallet manufacturers. Their response rate was comparable to forest products industry surveys by Bowyer et al. (1986), Govett and Sinclair (1984), and Sinclair and Govett (1983).

In the present report, we summarize survey responses for three types of firms: (1) **nonupholstered**, wood household furniture producers (SIC 2511); (2) **upholstered**, wood household furniture producers (SIC 2512); and (3) **hardwood dimension and flooring mills** (SIC 2426)<sup>1,2</sup>. A copy of the survey questions mailed to upholstered furniture producers is available from the authors.

Survey forms for nonupholstered and hardwood dimension producers were similar except that inappropriate questions, e.g., those relating to fabric and cushions, were deleted.

Our survey response rate was 47.5 percent for firms producing nonupholstered furniture, 57.4 percent for upholstered furniture producers, and 64.1 percent for hardwood dimension manufacturers. Response rates are presented by employment size category for each of the producer groups in Table 1. The responding firms represent 14,682 employees—approximately 54

<sup>1</sup>Standard Industrial Classifications (SIC) codes are updated and periodically published by the Office of Management and Budget (1987). Throughout the present report, "nonupholstered furniture" refers to SIC 2511, "upholstered furniture" refers to SIC 2512, and "hardwood dimension" refers to SIC 2426. Complete definitions for SIC codes 2511, 2512, and 2426 are in the Appendix.

<sup>2</sup>When applied to hardwood products, the term "dimension" refers to "material that has been cut to size for furniture or pallet manufacture" (Haygreen and Bowyer, 1987). Although SIC 2426 also includes hardwood flooring mills, survey forms were mailed only to firms with dimension stock listed as a product in the 1989 *Mississippi Manufacturers Directory*.

**Table 1: Percentage of firms responding by product type and size class.**

Number of employees	Nonupholstered furniture (SIC 2511)	Upholstered furniture (SIC 2512)	Hardwood dimension (SIC 2426)
	(No. firms responding/No. firms contacted)		
1-25	16/35 = 45.7%	6/10 = 60.0%	12/14 = 85.7%
26-49	4/4 = 100%	6/10 = 60.0%	3/7 = 42.8%
50-99	2/8 = 25.0%	5/11 = 45.5%	7/11 = 63.6%
100-199	4/4 = 100%	7/13 = 53.8%	3/4 = 75.0%
200-499	2/6 = 33.3%	5/14 = 35.7%	0/3 = 0%
500+	0/2 = 0%	10/10 = 100%	-
Total	28/59 = 47.5%	39/68 = 57.4%	25/39 = 64.1%

percent of the total number of employees in Mississippi's furniture industry in 1989.

Economies of scale occur as firms get larger and are able to take advantage of lower per unit costs of producing the product. Although economies of scale are somewhat limited in all three industries, furniture industry firms in Mississippi with less than 100 employees were more frequently SIC 2426 firms (82.1%) and SIC 2511 firms (79.7%) than SIC 2512 firms (45.6%).

### Statistical Procedures

Comparisons of means were performed using the LSMEANS option in SAS version 5.12 (SAS Institute, 1985). The option is appropriate for comparisons of means where sample sizes differ. The procedure was performed on all of the variables related to expenditures on wood-based raw materials. Fisher's protected LSD procedure (Steel and Torrie, 1980) was practiced prior to performing comparisons of means, however. That is, if the analysis of variance F-test for treatment influence was not significant at the 0.05 level, comparison of means was not performed. In addition, interaction between main effects was tested in each analysis of variance, with interaction found present in only one case. For this case, influence of main effects was not analyzed as is appropriate when interaction is present (Steel and Torrie, 1980). Frequency distributions were compared with chi-square tests.

### Raw Materials

The 92 furniture and hardwood dimension producers responding to our survey reported total raw materials expenditures of almost \$330 million per year. Woodbased materials represented 49 percent of the total, and fabric covering and foam represented 37 percent of raw material purchases (Figure 1).

A 1986 survey of the state's furniture industry by

the Mississippi Research and Development Center reported that wood-based raw materials represented only 29 percent of the industry's total annual expenditures. Differences in the estimates are due to the R&D Center study including other SIC classes in addition to SIC 2426, 2511, and 2512. Also, the R&D Center study included expenditures for paper, plastic, and other miscellaneous products that were not included in our survey.

### Wood-related Raw Materials

Our estimates of wood-related raw materials expenditures are for the SIC 2511 and 2512 firms only. Sixty-seven such firms, just over half of those contacted, responded to the survey. SIC 2426 firms were not included in the wood-based raw materials estimates to avoid "double counting" that would occur by such firms selling furniture frames, dimension parts, or other dimension stock to upholstered furniture producers.

### Volumes and Values

Furniture manufacturers reported a total cost of \$161.5 million for wood-based raw materials, with \$38.1 million for lumber alone (Figure 2). Oak was the most prevalent species of lumber reported by the furniture producers, with 41 firms spending \$22.4 million annually. These firms each used an average of just over 1.2 million board feet of oak lumber per year. Comparisons of means were performed for all species of lumber, with no significant differences found between SIC classes at the 0.05 level.

Nonlumber, wood-based raw materials important to the furniture industry included furniture frames (\$52.7 million) and composite board products (\$52.8 million). Other nonlumber, wood-based raw materials annual expenditures ranged from \$13.2 million for wood trim to \$1.1 million for other dimension parts.

If the sample is assumed to be representative of the industry, the dollar values for the raw materials can be expanded. The expanded dollar value for all wood-based raw materials used by Mississippi's furniture industry is almost \$250 million. Lumber alone comprised approximately \$46 million, of which almost \$30 million was made up of oak lumber. Important nonlumber, wood-based raw materials have expanded annual expenditures of almost \$92 million for furniture frames and more than \$71 million for plywood.

### Characteristics of Lumber Used

Of the firms responding, 40 used hardwood lumber that was air dried—26 of these firms used air-dried lumber exclusively. Most of the responding firms that used air-dried hardwood lumber bought it after it had been dried, with only 10 firms air drying it

MILLIONS OF DOLLARS

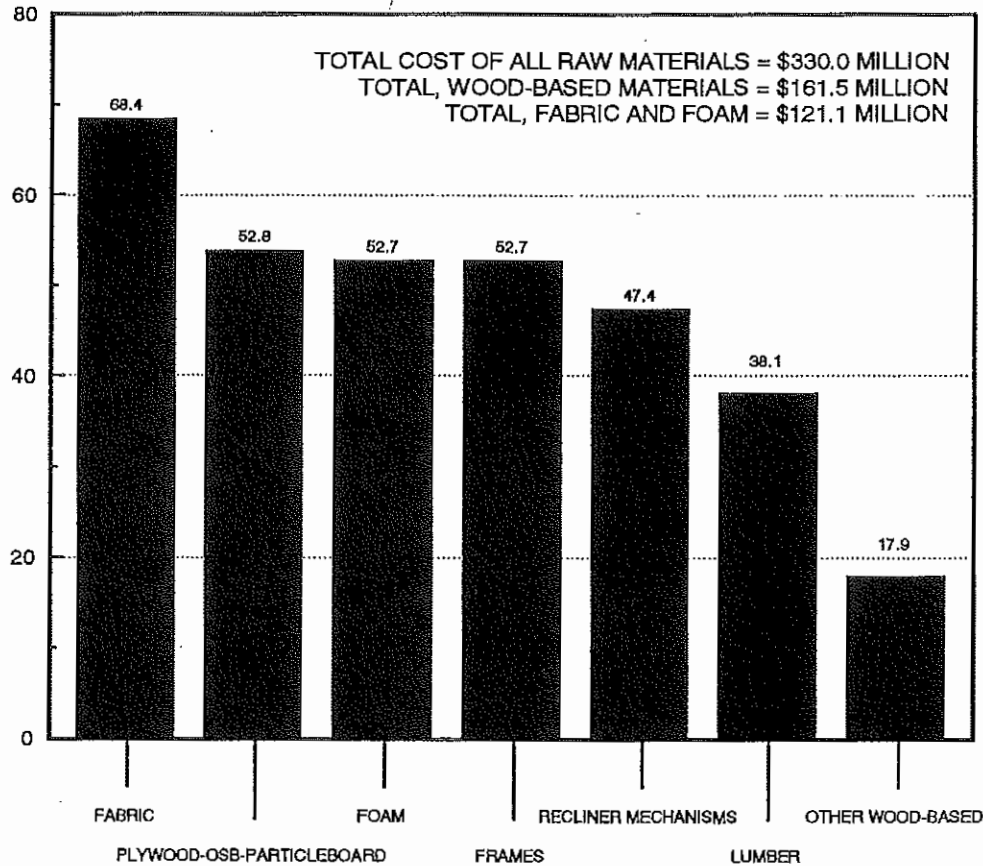


Figure 1. Total cost of raw materials used by 92 of Mississippi's furniture manufacturers, 1989.

themselves. The average desired moisture content for air-dried lumber was 20 percent, and firms reported no problems in reaching the desired moisture content. The mean cost for air-dried lumber was reported to be \$321 per thousand board feet (MBF).

Kiln-dried lumber was used by 59 firms, with 47 of these firms reporting that they use **only** kiln-dried hardwood lumber. The lumber is bought by the majority of the firms after it has been kiln-dried. Only 17 firms reported that they kiln-dried the lumber themselves. Average moisture content for kiln-dried lumber was approximately 8.25 percent. Firms that used kiln-dried lumber reported no serious problems in reaching the desired moisture content. The average cost of kiln-dried hardwood lumber was reported to be \$594 per MBF.

Comparison of means tests were performed to determine if size of the firm or SIC class had an effect on whether the firm used kiln-dried or air-dried lumber. The smaller firms bought significantly more ( $P$ -value = 0.0025) kiln-dried lumber than did the larger firms.

This could be explained by the fact that the larger firms are more likely to kiln-dry the lumber themselves. Hardwood dimension firms and the nonupholstered furniture producers differed significantly ( $P$ -value = 0.0466) in their use of kiln-dried lumber. The nonupholstered furniture firms used significantly more kiln-dried hardwood lumber than did the hardwood dimension firms. For air-dried lumber, the only statistical differences occurred between the nonupholstered furniture producers and the other two types of firms. The  $P$ -value for the comparison between the hardwood dimension firms and the nonupholstered furniture producers was 0.0399, while the difference between the nonupholstered furniture producers and the upholstered furniture producers had a  $P$ -value of 0.025.

Only 38 percent of 69 responding firms graded their hardwood lumber. Nine firms reported that they did not use any hardwood lumber. Furniture plants typically select the lowest grade of lumber that will yield the product size specifications they require; the

smaller the pieces, the lower the grade that can be used (Haygreen and Bowyer, 1987).

Most of the hardwood dimension firms used No. 1 Common (#1C) grade lumber, as defined by the National Hardwood Lumber Association (NHLA). For the definitions of the grades of hardwood lumber see the NHLA publication *NHLA Inspection Training Manual* (1984).

The best grades, FAS (first and seconds) and SEL (select), were used by five of the hardwood dimension producers firms (Figure 3). Grades of No. 2 Common

(#2C) and No. 3A Common (#3AC) combined were used by 12 firms. The actual percentage yield for the hardwood dimension producers was 50 to 74 percent for 60 percent of the firms that used FAS grade lumber. Yields for SEL lumber were divided between 0 to 24 percent and 75 to 100 percent, with both responses occurring equally. The majority of the firms that used #1C had yields that ranged from 50 to 74 percent. Yields of 25 to 49 percent occurred most often in grades of #2C and #3AC.

The grade most often used by the nonupholstered

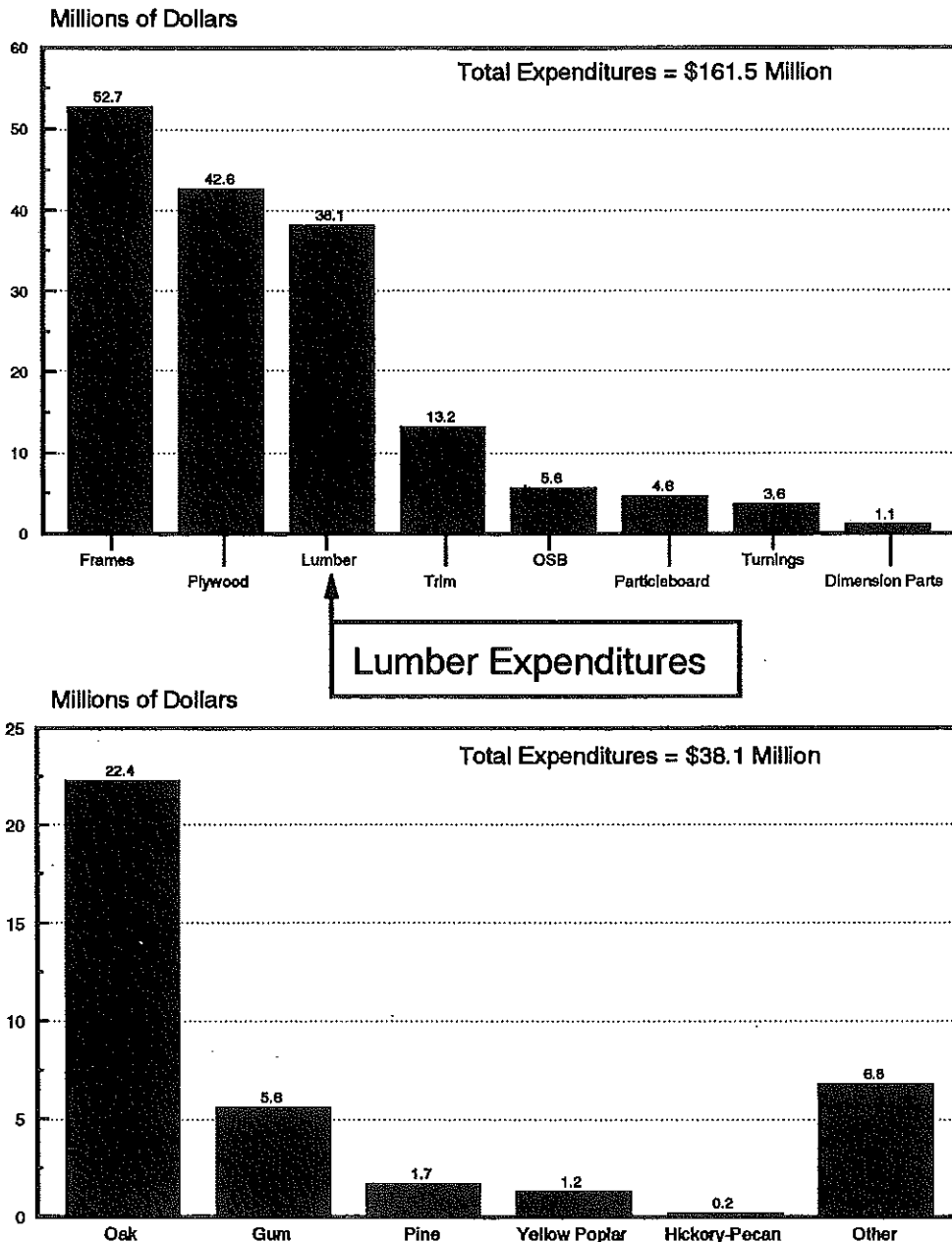


Figure 2. Annual expenditures on wood-based raw materials, with a breakdown of lumber expenditures by species groups for responding nonupholstered and upholstered furniture firms.



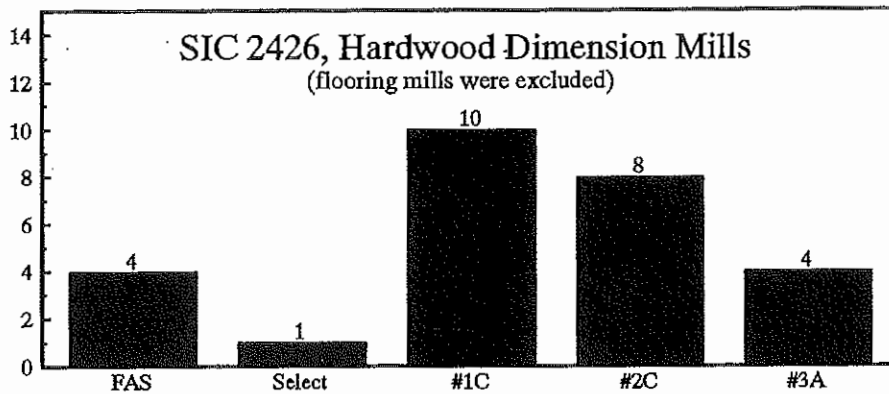
furniture firms was #1C. Other grades that were used extensively were FAS and Select, with eight firms using each grade. Only six firms used lumber of grade #2C or #3AC. Yields for FAS and SEL were reported to be at least 75 percent for three-quarters of the firms that used these grades. The majority of the firms that used grades #1C and #2C reported yields of 50 to 74 percent.

The lumber grade most widely used by upholstered

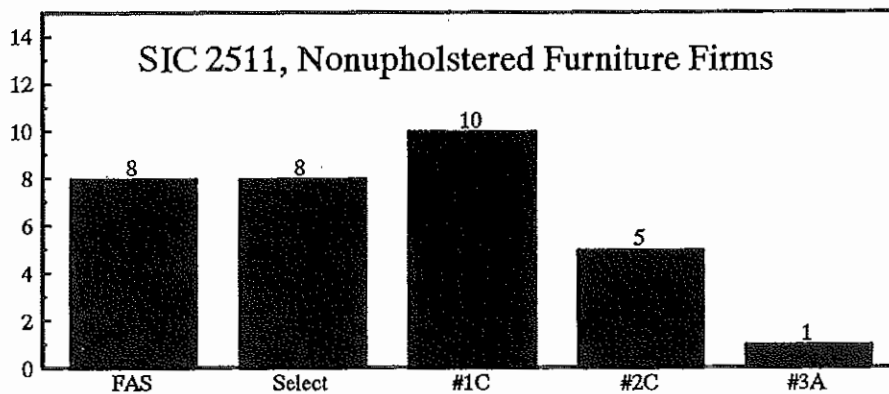
furniture firms was #2C, although 10 firms used #1C lumber. Only four firms used lumber of grades FAS or SEL, and five firms used grade #3AC. At least 50 percent of the upholstered furniture firms that used graded lumber reported yields of between 50 and 74 percent.

Comparison of means tests were performed to determine if there were significant differences in the grades of lumber used by the various SIC and employment

Number of Firms



Number of Firms



Number of Firms

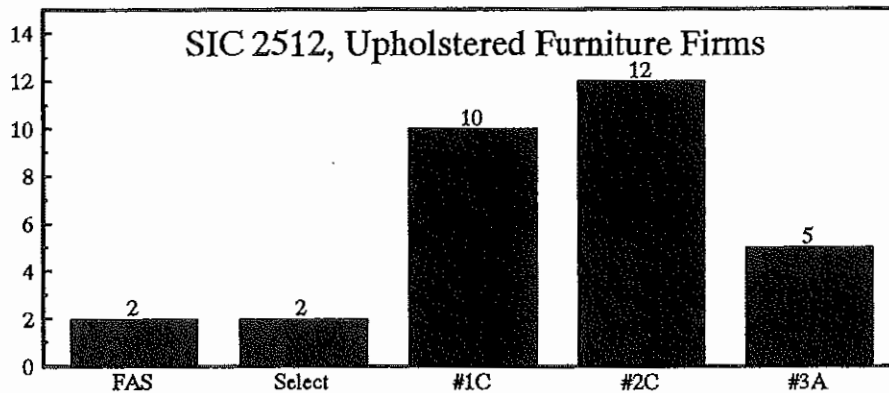


Figure 3. Grades of lumber used by SIC 2426, 2511, and 2512 firms.

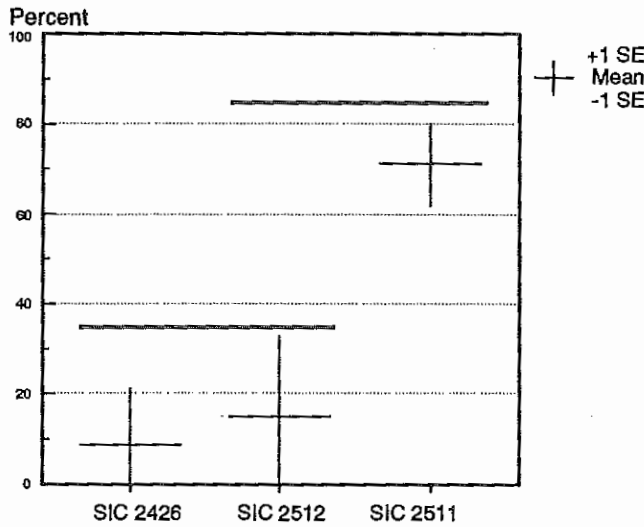


Figure 4. Comparison of means for FAS grade lumber by SIC code (horizontal bars indicate not significantly different,  $\alpha = .05$ ).

size classes. A significant difference ( $P$ -value = 0.0036) was found between hardwood dimension producers and nonupholstered furniture producers for the mean percentage of FAS lumber used (Figure 4). Most of the hardwood dimension firms produced furniture frames, for which appearance is unimportant. Conversely, physical appearance of the wood was critical for nonupholstered furniture producers because the wood is visible in the final product. Significant differences were not found for any other grades. Comparison of means tests were also performed on the percentage

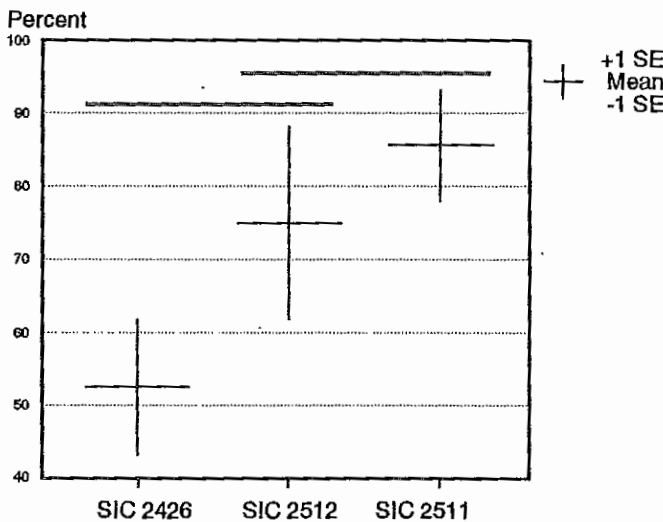


Figure 5. Percentage yield for grade FAS by SIC code (horizontal bars indicate not significantly different,  $\alpha = .05$ ).

yields that the firms reported. The only significant difference ( $P$ -value = 0.0186) occurred between hardwood dimension producers and nonupholstered furniture producers for the percentage yield of FAS lumber (Figure 5).

The thickness of lumber used by almost 68 percent of all firms was 4/4. Of the hardwood dimension producers responding, 32 percent used lumber that was 5/4 in thickness. Twenty percent of the hardwood dimension producers used 8/4 lumber (Figure 6). The percentages do not add to 100 because many firms used more than one thickness of lumber. Five-quarter lumber was also used by 32 percent of the nonupholstered furniture producers, with 18 percent of these firms using 6/4 and 29 percent using 8/4 lumber. Forty-nine percent of the upholstered household furniture firms reported using hardwood lumber that was 5/4.

### Sources for Wood-based Materials

Most of the lumber supplied to the firms in our survey came from Mississippi, although significant amounts were also obtained from Alabama and Tennessee (Figure 7). Of the \$22.4 million in oak lumber reported by 92 firms, for example, 33 percent was obtained from Mississippi sources. Fifty percent of all firms stated that the major problem with getting more wood from Mississippi sources was the lack of available hardwood sawtimber.

We tested for geographic preferences in the source of oak lumber. Using the chi-square test, a significant relationship ( $P$ -value = 0.008) was found between the different SIC classes and the desired source. The hardwood dimension producers and nonupholstered furniture producers stated that they prefer "southern oak" over "northern oak," while upholstered furniture firms showed no preference in the general geographic source of their oak lumber. A significant relationship ( $P$ -value = 0.008) was also found between the size of the firm and the desired source. The smaller firms, those with fewer than 100 employees, preferred "southern oak," while the larger firms did not report a geographic preference.

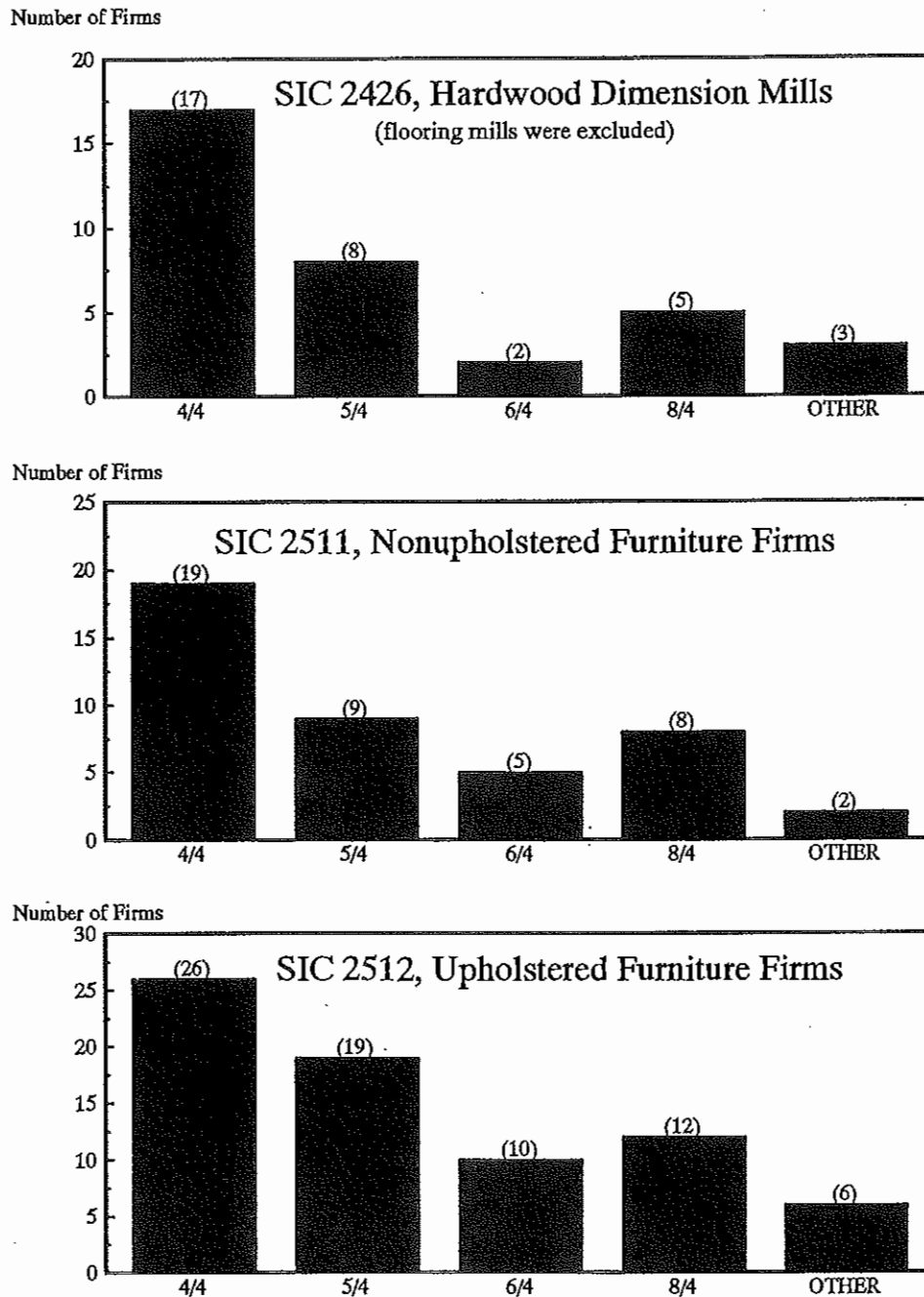
Wood products that were used by the furniture firms in Mississippi rarely came from the firm itself or a parent company. Only two of the 92 responding firms own timberland, and vertical integration toward raw materials sources is much less prevalent in the furniture-related industries in Mississippi than in other forest products industries in the state. Dubois et al. (1991), for example, reported Georgia Pacific Corporation in 1989 managed more than 900,000 acres within the state, while only 6,000 acres were owned or managed by the respondents of our furniture industry survey.

**Nonwood Raw Materials**

Of the raw materials shown in Figure 1, only upholstered, wood household furniture firms reported using nonwood-based raw materials. The most expensive nonwood raw material was fabric covering (\$68.4 million). Seventeen firms reported spending more than \$4 million each for fabric covering annually. Foam cushion was purchased by 20 firms, with a total

expenditure of \$52.7 million. Seven firms reported an average of slightly less than \$6.8 million per year for recliner mechanisms. The average annual expense of upholstered furniture firms for nonwood raw materials was more than \$11 million, compared to slightly more than \$2 million for wood-based raw materials.

Assuming the sample is representative of the industry, nonwood-based raw material purchases were



**Figure 6. Thickness of lumber used by hardwood dimension producers, 2511 and 2512 firms.**

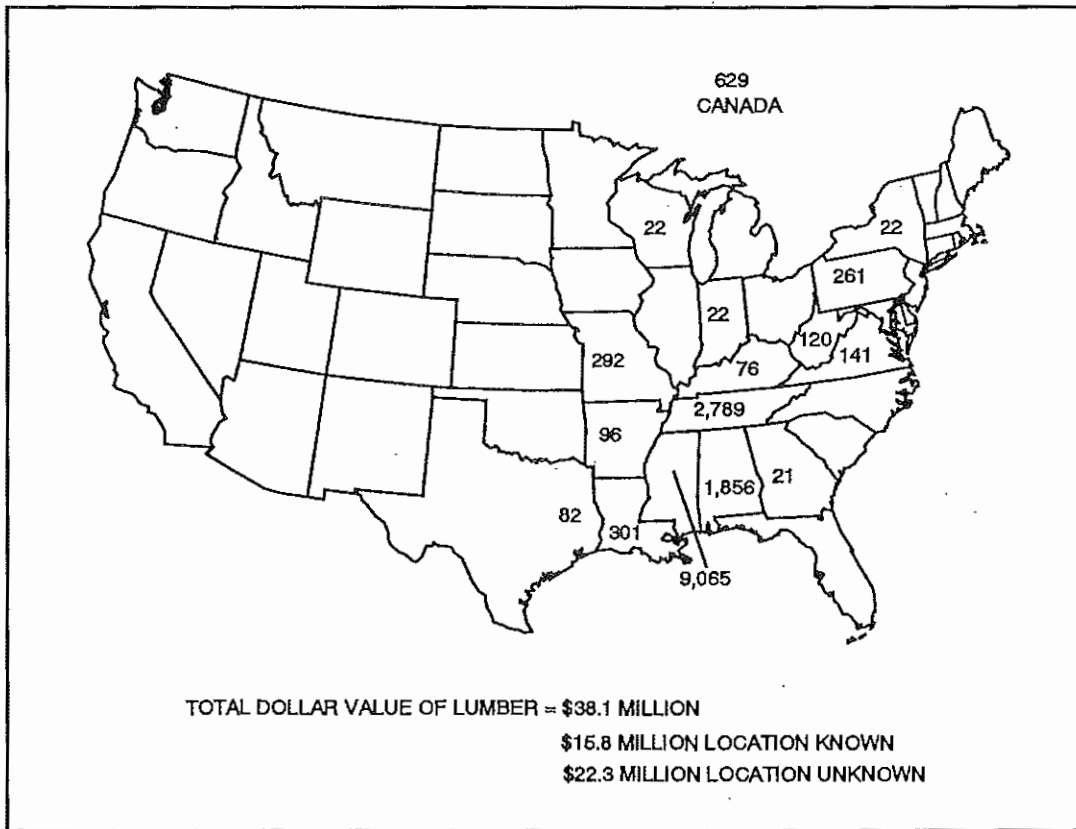


Figure 7. Value (in thousands of dollars) of lumber purchases by state for nonupholstered furniture producers and upholstered furniture firms.

almost \$300 million. Expanded nonwood-based purchases total \$119 million for fabric covering, almost \$92 million for foam cushion and more than \$85 million for recliner mechanisms.

### Manufacturing Processes

Most upholstered, wood household furniture firms reported that less than 5 percent of the wood used in furniture production was "show-wood"—wood that is visible in the finished product. With little visible wood in each piece of furniture, manufacturers are able to use lower grades of lumber. Further, they can use joints in which the fasteners are visible prior to being covered with fabric.

The most common types of joints reported by Mississippi's upholstered furniture firms were made with staples and dowels. These two types of joints accounted for more than 60 percent of all joints used by the furniture firms responding to our survey. Other types of joints that were used were gang nails, screws, or a combination of these.

Firms conduct tests on the strength of their wood-based raw materials at different time intervals. Of the 14 firms reporting strength testing, five test on a mon-

thly basis, four test on a weekly or a daily basis, three test on a semimonthly or a bimonthly basis, and only two firms reported testing on an annual basis. The material most often tested was hardwood lumber; particleboard and plywood were tested by six of the firms that responded (Figure 8).

A chi-square test was used to test for a significant relationship between the likelihood of strength testing and SIC and employment classes. A significant association ( $\alpha = 0.05$ ) was found between the likelihood of testing and firm size—larger firms were more likely to test their wood raw materials for strength than were smaller firms.

Forty-six percent of the firms using a periodic publication for price information on wood-based raw materials rely on the *Hardwood Market Report* (Figure 9). Another 24 percent use *National Hardwood Magazine*. Other periodicals that were commonly used included *Southern Lumberman* and the *Weekly Hardwood Review*.

### Manufacturing Problems

The most serious problem that Mississippi's furniture firms reported with obtaining more wood-based

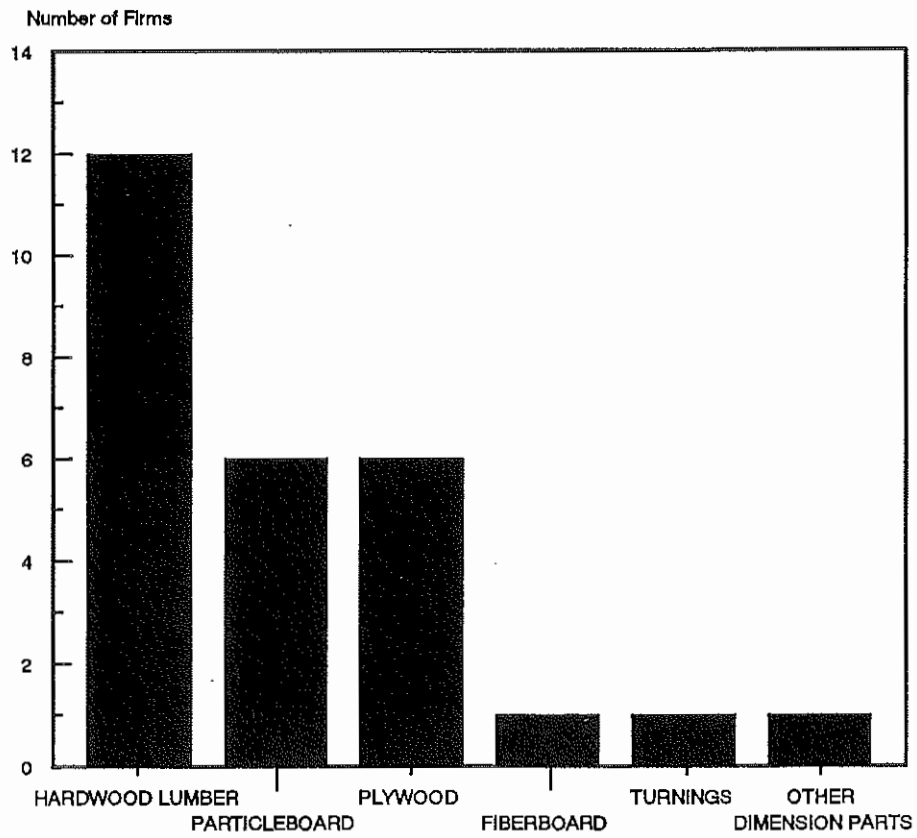


Figure 8. Wood-based raw materials that are tested for strength.

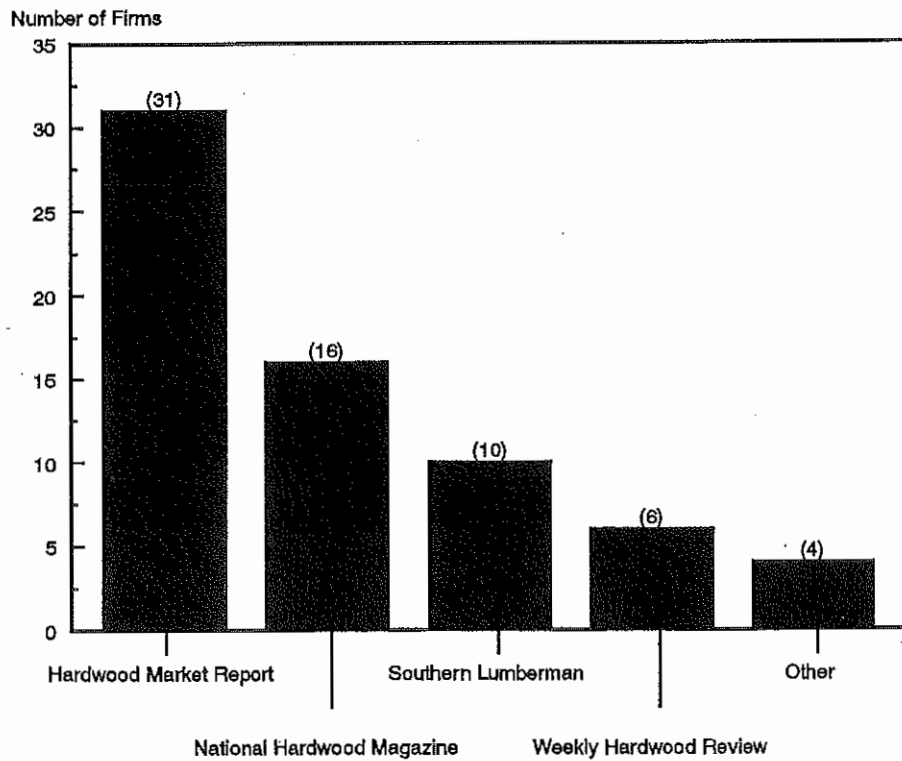


Figure 9. The use of publications for price information for wood-based raw materials.

raw materials from within the state was the lack of available hardwood timber and the resulting lack of suppliers of wood-based raw materials.

Of the 43 firms that reported a problem with obtaining wood-based raw materials from Mississippi sources, 23 stated the cause as a lack of available timber, or lack of suppliers of wood-based raw materials. Another 10 firms reported that the prices of lumber from Mississippi sources are not competitive with lumber from other areas. Nine of the 43 firms reported that the poor quality of Mississippi lumber prevented them from getting more lumber within the state.

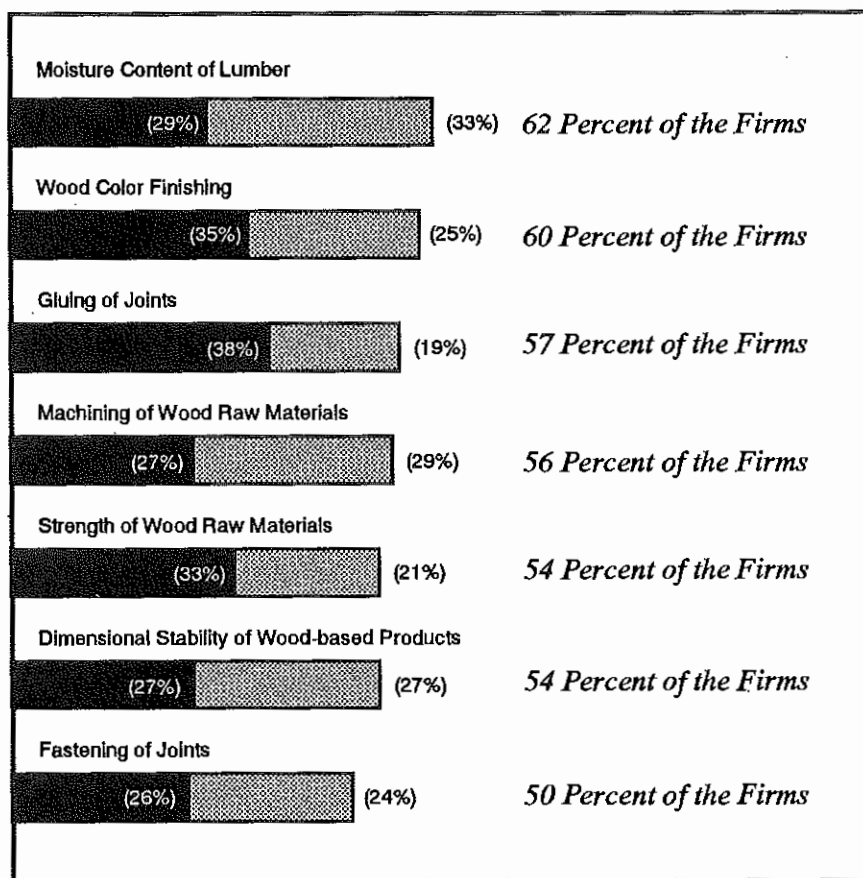
A significant relationship ( $\alpha = 0.05$ ) was found between the desire for more oak lumber from Mississippi and firm size. Firms with 100-plus employees reported that they wanted more oak lumber from Mississippi, while smaller firms general-

ly stated that they had an adequate amount. Supplies of air-dried lumber were reported as adequate.

Problems directly related to the raw materials used in furniture manufacturing were reported by many of the responding firms (Figure 10). Manufacturing type and problem type were significantly related ( $\alpha = 0.05$ ) for only two of the seven problems, however. Problems associated with moisture content were found to be significantly related ( $P\text{-value} = 0.004$ ) to SIC class. Moisture content problems were reported to be very serious for the nonupholstered furniture producers firms, while only somewhat serious for the 2512 firms.

Dimensional stability was also significantly related ( $P\text{-value} = 0.030$ ) with SIC class. The nonupholstered furniture producers firms reported very serious problems with dimensional stability. Such problems may be closely related to problems with moisture

**Figure 10. Manufacturing problems related to raw materials and their use. Percentages shown are the percentage of firms responding that reported problems with manufacturing.**



Serious Problem
  Somewhat Serious Problem

content—all but two of the firms that reported very serious problems with dimensional stability also reported very serious problems with moisture content. Dimensional stability was not a serious problem for upholstered furniture firms. These problems could be related to the nonupholstered furniture firms being more concerned with the staining and changes in dimension related to moisture content fluctuations. Upholstered furniture firms are not as concerned with the physical appearance of wood since the majority of the wood is covered by fabric. Lack of dimensional stability would be more of a problem for the nonupholstered furniture firms because changes in dimensions could cause deterioration of visible joints.

The new OSHA air quality standard of 1 milligram of wood dust per cubic meter will have varying effects on firms in the three SIC categories. Of the 25 hardwood dimension producers firms responding to the survey, 18 reported that compliance with the new standard would be a serious problem. Thirteen of the nonupholstered furniture producers firms also reported this as a serious problem, while only eight upholstered furniture firms reported it as a serious problem. There was no relationship between the proposed new OSHA air quality standard and SIC or employment classes ( $\alpha = 0.05$ ).

### Literature Cited

- Bowyer, J.L., E. Kallio, C.R. Monson, and D.L. Nicholls. 1986. Standard blanks: a new alternative to hardwood lumber. *Forest Prod. J.* 36(2):67-73.
- Bullard, S.H., B.A. Doherty, and P.H. Short. 1988. The Mississippi furniture industry and its use of wood-based materials. *Miss. Forest. Prod. Util. Lab. Res. Rep.* 13. 20p.
- Bush, R.J., S.A. Sinclair, R.M. Shaffer, and B.G. Hansen. 1987. Equipment needs and capital expenditure budgets for eastern sawmills and pallet manufacturers. *Forest Prod. J.* 37(11/12):55-59.
- Coleman, D.L., and J.C. Bryant. 1987. Mississippi statistical abstract. Div. Bus. Res., College of Bus. and Ind., Miss. State University. 762p.
- Dubois, M.R., T.J. Straka, and L. Doolittle. 1991. Forestry and Mississippi's forest resources—their economic importance. *Miss. Agric. and For. Exp. Stn. Bull.* 971. 41p.
- Govett, R.L., and S.A. Sinclair. 1984. Market research for primary processors of northern softwood lumber. *Forest Prod. J.* 34(5):13-20.

- Haygreen, J.G., and J.L. Bowyer. 1987. *Forest Products and Wood Science*. Iowa State University Press. Ames, IA. 495p.
- Koch, Peter. 1985. Utilization of hardwoods growing on southern pine sites. *USDA For. Serv. Agric. Handb.* 605. 3,710p.
- Mississippi Department of Economic Development. 1990. Mississippi manufacturers directory. Report of the Miss. Dept. of Econ. Dev. Jackson, MS. 292p.
- \_\_\_\_\_. 1989. Mississippi manufacturers directory. Report of the Miss. Dept. of Econ. Dev. Jackson, MS. 385p.
- Mississippi Economic Council. 1987. Mississippi—the new furniture capital of America. Report of the Miss. Econ. Council. p.47-95.
- Mississippi Research and Development Center. 1986. Opportunities for industrial expansion, a northeast Mississippi furniture industry market void approach. *Miss. R&D Ctr. Report.* Jackson, MS. 40p.
- Office of Management and Budget. 1987. *Standard Industrial Classifications Manual 1987*. Nat. Tech. Info. Serv., Springfield, VA. 750p.
- Peterson, J. R. 1966. Mississippi's advantages for the manufacture of upholstered wood furniture. *Miss. R&D Ctr. Report.* Jackson, MS. 25p.
- SAS Institute, Inc. 1985. *SAS user's guide:statistics, version 5*. SAS Institute, Inc. 956p.
- Sinclair, S.A., and R.L. Govett. 1983. Production and distribution of balsam fir lumber in Eastern North America. *The Forestry Chronicle* 59(3):128-131.
- Steel, R. G., and J. H. Torrie. 1980. *Principles and Procedures of Statistics*. 2nd Ed. McGraw-Hill Book Co., New York, N. Y., 633p.
- Tennessee Valley Authority. 1963. Furniture industry expansion in the Tennessee Valley. TVA. 17 p.
- USDC Bureau of the Census. 1990. 1987 Census of Manufactures, Industry Series, Household Furniture. U.S. Govt. Printing Office, Washington, DC. 51p.

### Additional Sources of Information

- Bingham, S.A., and J.G. Schroeder. 1976. Short lumber in furniture manufacture. Part I. Short lumber in manufacture. Part II. Bolt and lumber

grading. Part III. Drying and handling of short  
lumber. Natl. Hardwood Magazine 50(11):34-35,  
48-50; 50(12):90-91, 112-113; 50(13):38-39, 49-50.

\_\_\_\_\_ and J.G. Schroeder. 1977. Short lumber  
in furniture manufacture. Integrated plants for  
production and use of short lumber Part IV. Natl.  
Hardwood Magazine 50(1):28-29, 32-33, 35-37.

Forrest, E.C. 1991. The potential of the upholstered  
furniture manufacturing industry in the deep  
South. Univ. of Oklahoma, Econ. Devel. Instit.  
Thesis Draft. 118p.

Kelly, J.F., and M. Sims. 1989. Forest resources of  
Mississippi. USDA For. Serv. Resour. Bull.  
SO-147. 63p.



# Appendix

# Appendix

## *Census of Manufactures Major Group 25—Furniture and Fixtures*

The description and listings below are adapted from the *Standard Industrial Classification Manual*, 1987 (U.S. Office of Management and Budget 1987).

The Furniture and Fixtures "Major Group" includes "establishments engaged in manufacturing household, office, public building, and restaurant furniture; and office and store fixtures." Nonupholstered wood household furniture is classified in Industry 2511; upholstered wood household furniture is classified in Industry 2512; those firms manufacturing hardwood dimension and flooring are classified in Industry 2426.

**Industry  
No.**

**2511**

### **Wood Household Furniture, Except Upholstered**

"Establishments primarily engaged in manufacturing wood household furniture commonly used in dwellings." The list below includes the following modifiers, where appropriate: "wood," "household" and "except upholstered."

Beds	Headboards
Bookcases	High chairs
Breakfast sets	Juvenile furniture
Bridge sets	Magazine racks
Buffets	Nursery furniture
Cedar chests	Playpens
Chairs, bentwood	Rockers
Chairs	Room dividers
Chests, silverware	Screens, privacy
Chiffonniers and chifforobes	Secretaries
China closets	Stands, telephone, bedside
Coffee tables	Stools
Console tables	Garden furniture
Cots	Storage chests
Cradles	Swings, porch
Cribs	Tables
Desks	Tea wagons
Dining room furniture	Unassembled furniture
Dressers	Unfinished furniture
Dressing tables	Vanity dressers
End tables	Wardrobes
Frames for box springs	Whatnot shelves

**Industry  
No.**

**2512**

**Wood Household Furniture, Upholstered**

“Establishments primarily engaged in manufacturing upholstered furniture on wood frames.” The list below therefore includes the modifiers “upholstered,” and “with wood frames.”

Chairs	Other household furniture
Couches	Recliners
Davenports	Rockers
Juvenile furniture	Sofas
Living room furniture	

*Census of Manufactures Major Group 24—Lumber and Wood Products, Except Furniture*

**Industry  
No.**

**2426**

**Hardwood Dimension and Flooring Mills**

“Establishments primarily engaged in manufacturing hardwood dimension lumber and workings therefrom; and other hardwood dimension, semi-fabricated or ready for assembly; hardwood flooring; and wood frames for household furniture.” The list below includes the following modifiers: “hardwood,” “wood,” and “dimension.”

Carvings, furniture	Furniture turnings and carvings
Chair frames	Lumber
Chair seats	Rounds and rungs, furniture
Frames for upholstered furniture	Stock, chair
Furniture stock	Table slides
Furniture squares	