

Wood Material Use in the U.S. Cabinet Industry: 1999 – 2001

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Abstract

A combination of fax and mail questionnaires were used to estimate consumption of wood based products by the U.S. cabinet industry and evaluate current management issues affecting the cabinet industry. Group 1 companies (>\$20 million in sales) were contacted and sent a fax questionnaire. A random sample of 1034 Group 2 companies (<\$20 million in sales and >10 employees) were sent a mail questionnaire. A total of 19 usable questionnaires were received from Group 1 companies and 217 usable questionnaires were received from Group 2 companies. Group 1 respondents averaged 1,108 employees and \$125.81 million in sales. Group 2 respondents averaged 27 employees and \$2.31 million in sales. A shortened questionnaire (questionnaire 2, one page) was sent to half of the Group 2 sample frame resulting in twice the response rate as that of the long questionnaire (questionnaire 1, three pages).

Results indicated that the cabinet industry used an estimated 484 million board feet of hardwood lumber. Nearly 95% of the hardwood lumber purchases were grade 1 common or better. The most common used species were red oak (44%) and hard maple (24%). An estimated 58 million board feet of components and 68,344 doors were also purchased by cabinet manufacturers in 1999. Softwood lumber use was estimated at 25 million board feet, consisting primarily of white (49%) and southern yellow (36%) pine. The most commonly used panel products were particleboard and hardwood plywood, at an estimated 1,044 million square feet (1/2 inch basis) and 279 (3/8 inch basis) million

square feet respectively. Other panel products used by the industry were medium density fiberboard, hardboard, and softwood plywood. Approximately 156 (any thickness) million square feet of veneer was used. Lumber purchases were primarily direct from sawmills (66%) for Group 1 companies and from wholesalers/distributors (53%) for Group 2 companies. Panel product purchases followed the same trend with Group 1 companies buying primarily direct from manufacturers (44%) and the majority of Group 2 purchases coming from wholesalers/distributors (84%).

Group 1 companies sold their products through factory sales people (54%) and to home improvement/building supply centers (37%). Group 2 companies sold their products through factory sales people (77%) and to builders and remodelers (62%). The largest proportion of cabinet types sold by both Groups 1 and 2 were face frame kitchen cabinets (74% and 38% respectively).

Companies from both groups reported producing certified (green) products. The majority of companies indicated they purchased some parts from outside sources. Companies from both groups reported considering alternative materials to substitute for wood. Products that were mentioned include strawboard, urban waste MDF, and plastic mouldings. Concerns rated highest by cabinet companies were finding qualified employees, increasing raw material prices, keeping qualified employees, and wood quality.

Dedication

This study is dedicated to my father, Frank D. Olah. He has given me guidance, love, and support over the past twenty-four years. I only hope that I can achieve the same level of success, integrity, and respect from others in the industry as he has garnered over the last thirty years as a procurement forester. I would also like to thank my mother Susan, sister Christine, and girlfriend Laurie, who also provided love and support throughout this project.

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Preface

This thesis consists of four chapters. Chapter One defines the problem, outlines the objectives, and reviews literature pertinent to this study. Chapter Two introduces information relevant to survey design and methods of increasing response rates with direct mail questionnaires, and presents results of measures taken by the researcher to increase the response rate for the direct mail portion of this study. Chapter Three discusses the results of this study regarding material use, material purchases, sales, and relevant management issues in the cabinet industry. Chapter Four summarizes the results, gives conclusions, and outlines the limitations to this study. Some duplication of information exists within chapters. This was necessary to allow chapters to stand alone as separate publications. The author apologizes for inconveniences this causes the reader.

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Chapter 1

Abstract

The cabinet industry is an integral part of the U.S. forest products industry and the economy as a whole. It consumes large amounts of wood and wood based products. These include hardwood and softwood lumber, particleboard, hardwood and softwood plywood, medium density fiberboard, veneer, and hardboard. This mix of material and species change as the industry grows and consumer preferences change. This research is designed to estimate the amount and types of materials used by the industry in 1999 and predict changes for the year 2001. It also analyzes some managerial issues currently facing cabinet producers.

Introduction

The United States (U.S.) secondary wood products industry is a major consumer of both solid and panel wood based products. It was estimated in 1997 that eight major wood products markets consumed over 90% of hardwood lumber, more than 13 billion board feet (Hansen and West 1998). These markets include, in decreasing order of consumption: pallets, furniture, dimension and components, exports, millwork, cabinets, flooring, and railway ties. Firms involved in the production of wood kitchen and bath cabinets accounted for an estimated 1.2 (9.2%) of this 13 billion board feet when figuring in the appropriate component contribution to this number (i.e., the percentage of component parts that are consumed by the cabinet industry). Softwood lumber is also used by the cabinet industry, although to a much lesser degree. In 1993 it was estimated the stock cabinet industry (SIC 2434) consumed approximately 33.6 million board feet of softwood lumber (Hansen et al. 1995).

In addition to solid lumber, the cabinet industry uses large volumes of wood based panel products. In 1993 it was estimated that the stock cabinet industry used 411.4 million square feet of particleboard, 284.8 million square feet of hardwood plywood, and 13.8 million square feet of wood veneer (Hansen et al. 1995) . These numbers were projected to increase significantly by 1995; 44.4% for particleboard, approximately 23% for hardwood plywood, and 88.1% for hardwood veneer. Medium density fiberboard (MDF) and hardboard are other panel products that are used in significant numbers by the cabinet industry (54.5 and 93 million square feet respectively) (Hansen et al. 1995).

In addition to using large quantities of wood based raw materials, the cabinet industry is a major employer. The U.S. Department of Labor (2000) estimated that the stock cabinet industry employment averaged 93,800 persons in 1999. Panches (1993) found that in 1991 stock cabinet firms accounted for approximately 75% of total employment. Applying the same ratio here we can estimate total employment at roughly 125,000 persons for 1999.

Problem Statement and Justification

The cabinet industry is a substantial and integral part of the U. S. wood products industry. Not only does it use a variety of wood based materials from a number of processing sectors, but it employs a significant number of workers as well. Demand for cabinets has been steadily increasing since 1991 with the resurgence of the U.S. economy. Total demand for cabinets has increased nearly 76% from 45.3 million units in 1991 to 79.7 million units in 1998 (Table 1.1) (Iwanski and Koenig 2000). Estimated figures for 1999 show a slight decrease to 79.5 million units.

Table 1.1. Total demand for cabinets (millions of units)

Total Demand for Cabinets (millions of units)								
1991	1992	1993	1994	1995	1996	1997	1998	1999
45.3	50.0	56.8	64.9	72.2	73.5	78.2	79.7	79.5*

* estimated

The last in-depth wood material utilization study conducted for the cabinet industry was in 1995. This study both estimated and categorized all wood based material usage for stock (SIC 2434) cabinet producers for the year 1993 in addition to projecting use for 1995 (Hansen et al. 1995). Given the high degree of growth within the industry since 1993 and the absence of recent data estimating overall wood use within the

industry, it is necessary to update current material use in the cabinet sector. This study will indicate trends and changes in the wood based materials used by the cabinet industry. It will attempt to identify and evaluate perceptions of current management issues facing the industry. Detailed information concerning wood consumption estimates are important to the industry. Not only will this information assist current manufacturers, but it will benefit manufacturers who supply the industry as well. Sawmills and other primary processors supplying the cabinet industry with raw materials need all available information concerning trends and changes in the use of those materials in order to adjust and plan business strategy. It is also important for government decision makers to understand the importance of the cabinet industry to the U.S. economy.

Research Objectives

This study will:

1. estimate the total volumes of wood and wood based materials used by the U.S. cabinet industry by species, grade, type, and region of manufacture; and
2. evaluate perceptions of current management issues affecting the cabinet industry.

Literature Review: U.S. Cabinet Industry

Demographics

In 1991 it was estimated that 12,500 firms were involved in the production of cabinets (Punches 1993). Roughly half were stock cabinet manufacturers and the

remainder of these firms were custom cabinet manufacturers. Stock cabinets are those that are limited in availability to standard sizes in three inch increments. These are generally mass-produced by the larger manufacturers. Custom cabinets are those made for individual specifications and preferences based on individual customer orders. Manufacturers of custom cabinets are typically smaller firms. Recently, a new product category of semi-custom cabinetry has emerged. Semi-custom cabinetry falls between custom and stock, offering more specialty sizes than stock but not affording total customization of the product (Garet 1990). Although most of these firms are small, the majority of production came from a relatively few number of larger companies. In 1991 large stock manufacturers (3% of total firms) accounted for 60% of industry sales (Punches 1993).

Market Size and Sources of Demand

U.S. demand for cabinets has grown steadily since the economy bottomed out in 1991. In 1998 the total demand for cabinets was 79.7 million units, which was a 76% increase from the 45.3 million units used in 1991 (Table 1.1) (Iwanski and Koenig 2000). A 1999 Wood & Wood Products survey indicated that 88.2% of cabinet makers surveyed viewed 1998 as either “very good” or their “best year ever” (Adams 1999). This same survey reported that 82.3% of respondents predicted 1999 would be either “very good” or “best year ever.”

Behind this strong growth in demand has been the resurgence of the U.S. economy. Following the recession of the early nineties the U.S. economy has made a

strong comeback. The Gross Domestic Product (GDP) has increased nearly 60% since 1990 and exceeded 9 trillion dollars in 1999 (Baily et al. 2000) (Table 1.2).

Table 1.2. Gross domestic product (\$ billions)

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
5,803	5,986	6,319	6,642	7,054	7,401	7,813	8,301	8,760	9,256

This economic growth, coupled with low unemployment and high consumer confidence, has helped to fuel new housing starts, which are a major source of demand for cabinetry. Total U.S. housing starts have grown 64% since 1991 to over 1.6 billion in 1999 (Baily et al. 2000) (Table 1.3).

Table 1.3. Total U.S. housing starts (thousands)

1991	1992	1993	1994	1995	1996	1997	1998	1999
1,014	1,200	1,288	1,457	1,354	1,477	1,474	1,617	1,667

Another factor driving the strong demand for cabinets is the increase in the repair and remodeling market. In 1999 the repair and remodeling market accounted for an estimated two-thirds of total cabinet demand and the total sales for the remodeling industry as a whole are expected to reach \$140 billion by 2000 (Iwanski and Koenig 2000). The strength of the R&R market has traditionally helped to stabilize the cabinet industry during periods of fluctuating housing starts and a relative decrease in the number of cabinet units used in new construction.

Wood Material Use

The U.S. cabinet industry consumes a variety of wood and wood based materials from a number of primary processing sectors. In 1991 it was estimated that the cabinet industry used 523 million board feet of hardwood lumber (Punches 1993). This figure can be compared to one from a 1998 study by Hansen and West. They reported that in

1997 the cabinet industry consumed roughly 1.2 billion board feet of hardwood lumber (Hansen and West 1998). This indicates over a 150% increase in hardwood lumber use from 1991 to 1997. Due to differences in the material use estimations of the two studies this number may be higher than the actual increase. However, a substantial increase would be expected given that cabinet unit sales grew nearly 76% during the same period (Iwanski and Koenig 2000).

The cabinet industry consumed an estimated 71.6 million board feet of softwood lumber in 1991, 51 million by the stock cabinet industry (Punches 1993). A follow up study estimated that the stock cabinet industry softwood lumber consumption was 33.6 million board feet in 1993 with an expected increase of 81.9% for 1995 (Hansen et al. 1995). These differences may be attributed to differences in sampling and estimation techniques.

In 1991 the cabinet industry used approximately 846.6 million square feet of particleboard and 294 million square feet of hardwood plywood with 518.4 and 106 respectively coming from the stock cabinet industry (Punches 1993). A later study reported the stock cabinet industry particleboard use at 411.4 million square feet and hardwood plywood (both veneer and fiber core) use at 248.8 million square feet for 1993 (Hansen et al. 1995). Again, the discrepancies in these numbers may be attributed to sampling and estimation techniques. In the former study square footage figures were converted to a base thickness while in the latter they were not. Both studies predicted increased use of both materials, however, particleboard use was estimated to increase 44.4% and hardwood plywood use 23% for 1995 (based on the later study). A summary of the findings from the 1995 study (Hansen et al. 1995) is shown in Table 1.4.

Table 1.4. Estimated use of wood materials in 1993 and predicted use in 1995 for the U.S. stock cabinet industry (SIC 2434)

Wood Material	Unit of Measure	Estimated Use in 1993	Predicted use in 1995	Predicted Change (%)
Hardwood Lumber	MMBF	276.1	427.6	54.9
Edge Glued Panels/Cut-to-Size Blanks	MMBF	11.9	13.5	13.1
Softwood Lumber*	MMBF	33.6	61.0	81.9
Softwood Plywood	MMSF	49.4	57.0	15.5
Hardwood Plywood (veneer core)	MMSF	191.6	232.0	21.1
Hardwood Plywood (fiber core)	MMSF	93.2	118.2	26.8
Particleboard	MMSF	411.4	594.2	44.4
Medium Density Fiberboard	MMSF	54.5	66.0	21.2
Hardboard	MMSF	93.0	122.8	32.0
Veneer	MMSF	13.8	26.0	88.2
Cabinet Doors	Million pieces	27.5	37.6	36.7
Drawer Fronts	Million pieces	17.5	18.8	7.4

* Some soft hardwoods may have been reported under this category.

1. Panel volumes are without an assigned thickness or basis.
2. Predicted change was calculated prior to rounding.

The substantial differences in the estimated hardwood lumber use from the three different studies cited should be noted here. PUNCHES (1993), Hansen et al. (1995), and Hansen and West (1998) show hardwood lumber use at 523, 276, and 1,200 million board feet, respectively. Even though the studies were performed in different years more consistency between the numbers would be expected. Some of the discrepancy is due to differences in sampling and estimation techniques, while some can be attributed simply to the intricacies of conducting studies of this type. This illustrates how difficult it is to estimate any kind of material use in an industry as fragmented and complex as that of wood cabinets.

Species and Grade Mix

Oak traditionally has been the dominant wood used in the cabinet industry. It was estimated in 1991 that 63.9% of the lumber used for cabinet production was red oak (PUNCHES 1993). Other species were hard maple 8.3%, cherry 4.3%, birch 3.9%, white pine 3.5%, ash 3.4%, and soft maple 2.6%. Some recent studies, however, indicate that preferences may be changing. A 1994 survey of cabinet door preferences turned in the

following percentages: oak 40%, maple 30%, cherry 17%, and pecan/hickory 6% with minimal percentages reported for other species (Anonymous 1994). A recent 1998 survey showed maple surpassing oak as the species of choice for cabinet manufacturers, and hickory experiencing a sizable increase in preference as well. The resulting percentages were as follows: maple 32%, oak 25%, hickory 14%, cherry 12%, and pine 4%, with minimal percentages reported for other species (Moss and Stella 1998).

Cabinetmakers have traditionally used higher grades of lumber. PUNCHES (1993) found that more than 86% of the lumber purchased by stock manufacturers was graded 1 common or better and more than 98% of the lumber purchased by custom manufacturers was graded 1 common or better.

Industry Trends and Concerns

Outsourcing

Outsourcing (i.e., purchasing components from outside sources) has become common practice within the cabinet industry. Top reasons given for outsourcing are the ability to save money, better precision parts, less inventory, and convenience (Anonymous 1993, Adams 1992). A 1993 survey of both U.S. furniture and cabinet manufacturers showed that 88% of respondents purchased parts from outside sources and more than half intend to increase this practice in the next 24 months (Anonymous 1993). This same study linked component purchases with increased profits. A study by Vlosky (1996) showed kitchen and bathroom cabinets together as being the largest customer segment for component manufacturers.

Distribution Channels

The cabinet industry has recently experienced some shifts in distribution channels. Punches (1993) indicated that in 1991 the breakdown of sales by distribution channel were as follows: builders and remodelers 28.2%, independent stocking distributors 22.3%, dealers 17.1%, direct 15.6%, and home improvement centers 9.3%. More recent studies have shown an increase in the number of cabinets being distributed through home improvement centers, up to 26% in 1997 (Anonymous 1997). This change has been attributed to the growth of both the home improvement centers and the repair and remodeling market (Headly 1995), and has come at the expense of contractors and wholesale distributors (Koeing 1993). One factor companies like about stores such as Lowe's and The Home Depot is it gives them the chance to get their product directly in front of the customer (Anonymous 1999b). For this reason home centers have become a pivotal channel for cabinet sales (Adams 1998b).

Mergers

The normally fragmented cabinet industry has recently experienced consolidation. This has come in the form of mergers and acquisitions of smaller producers. Increases in competition and customer expectations have driven this trend. Through these acquisitions and mergers companies seek to increase market share, add new products, add flexibility, establish new distribution networks, and increase their overall economy of scale advantages (Adams 1998b).

An example of what an acquisition can add to a company's portfolio is demonstrated by the 1997 buyout of Textwood Ind. by Masco. This move not only

helped Masco to increase market share, but also broadened their distribution capabilities while adding cabinet door and componet operations as well. Fortune Brands and Armstrong World Industries are some other examples of companies who have looked to expand their operations through mergers and acquisitions (Adams 1998b). This consolidation is beginning to have an impact as the larger companies are getting larger. Middle size companies are feeling the pinch as they struggle to compete on economies of scale with the bigger firms and are unable to find the niche markets that the smaller companies have the ability to fill (Forth 1999).

Increasing Flexibility

Another recent trend in the cabinet industry is the emphasis on increased flexibility and shorter lead times. This is the result of increased demand, customer expectations, and the demand for more product designs (Forth 1999). This has lead many companies to invest in more flexible, high tech equipment in order to meet these challenges and compete effectively (Christianson 1994). Another result of this trend is an increase in outsourcing. While all companies are feeling the pressure of increasing customer expectations, not all can afford to run out and buy expensive equipment to respond to it. Outsourcing has been one avenue through which smaller companies have been able to gain flexibility without a large capital investment (Christianson 1998).

Other Room Cabinets

In 1997 4.9 million (6% of total market) other room cabinets units were sold (Adams 1999). This number was projected to grow 18% to 5.5 million units in 1999. Most of these other room cabinets consist of entertainment centers, bookcases, home-

office furniture, and utility room cabinets. Companies see the expansion into other room cabinets as a way to increase sales and take market share from the furniture manufacturers. Dick Titus, Executive Director of KCMA commented: “Certainly it is a growing trend, as remodeling has increased, the interest and opportunities for that market have expanded” (Adams 1999, pg. 51).

Raw Materials

Future wood supply (price, quality, and availability) is a major area of interest for the cabinet industry. In Wood & Wood Products annual top 25 cabinetmakers survey it has consistently ranked as a primary concern. Most recently, in the 1999 survey, two-thirds of respondents (66.6%) were at least very concerned with the future of wood prices (Adams 1999). For this reason firms are looking for viable substitutes. In regards to the issue, one executive commented his company would be investing more time in research and development of new materials (Anonymous 1997). The increased shipments of particleboard and MDF (18% and 45% respectively) from 1993 to 1998 are certainly attributable in some part to this issue (Anonymous 1999c). These two types of panel products are both used in the production of cabinets and have shown recent increases in use (Moss and Stella 1998).

An interesting new development in the area of panel products is wheat-straw particleboard. This product is similar to traditional particleboard but is made from wheat straw instead of wood particles. It has been welcomed by the CPA (Composite Panel Association) and is comparable (in some cases superior) in performance to traditional particleboard (Rich 1998). In early 1998 two companies, one a kitchen component

manufacturer and one a RTA furniture manufacturer, agreed to purchase at least 80% of the wheat-straw board produced by a new 144 million square foot plant in Canada (Rich 1998). This indicates that companies are beginning to use this product, and it should become more accepted. As solid wood resources become more scarce and expensive, and pressure from “green” groups increase, new composite products such as wheat board will increase in use.

Government Regulations

Government regulations in the areas of wood dust and air quality have become a serious concern for the industry. Most industry executives consider these regulations to be necessary evils (Headley 1995), but do have the potential to cause companies problems. In the 1999 Wood & Wood Products annual top 25 cabinet makers survey finishing regulations were cited by at least 90% of companies to be of some concern, with over 65% of the firms being very concerned (Adams 1999). There was a similar response regarding wood dust regulations. The problem is that compliance with newer and more stringent air quality regulations can be very expensive, and some companies may not have access to the necessary financial resources. As environmental pressure continues to grow these regulations are only going to increase. Regarding the problem, one industry executive commented the only thing to do is “support my Congressman and keep the pressure on him to eliminate some of the government regulations” (Anonymous 1997).

Employment Problems

A big challenge that faces cabinet manufacturers is finding and keeping skilled employees. As the economy has flourished into the late nineties, wages have gone up and

unemployment has gone down (Headley 1995). Also, with the increased use of optimization and computer technology in the industry there is a need for more technically skilled people (Headley 1995). These factors have worked together to make it more difficult to find and retain qualified people. Over 70% of companies surveyed in the 1999 Wood & Wood Products annual top 25 survey were at least very concerned with this issue in the future (Adams 1999). Many companies have begun to increase wages, improve employee benefits, and are beginning to offer formal training (Adams 1999, Adams 1998a, Christianson 1998, Headley 1995). All of these amount to increased costs for companies.

Benefits of Research

The objectives of this research are to assess wood based material use for the U.S. cabinet industry and evaluate current management issues facing the industry. This information will be beneficial to many parties. First it will benefit wood cabinet manufacturers. Compiling and making available information about wood use by the cabinet industry will help to create a benchmark for firms to compare themselves to others within the industry. It will allow companies to evaluate their wood use in relation to regional and national averages. New information related to managerial issues will also help keep firms abreast of what is happening in the industry.

New material use data will benefit wood product suppliers to the industry. This study will allow for comparisons to previous research to identify material use trends. Suppliers can use this information to strategically position themselves within the industry. This study also has the potential to identify substitute materials that are beginning to get

consideration from manufacturers, which should be of great interest to wood product suppliers. The information gathered through this study will assist in determining the direction for future research as well.

The methodology of this study is being looked at as a model for future material use studies. Currently the trend for these types of studies is to conduct large mailings. This study is attempting to differ from past methodologies by conducting a census of the major companies (>\$20 million sales) via fax in conjunction with a mailing to a random sample of medium size (<\$20 million sales, >10 employees) firms. The mailing to medium size firms will be divided between short (one page) and long (three pages) questionnaires as described in the methodology section. This will allow for analysis on the effect of questionnaire length on response rate.

The results and conclusions of this study will be made available through several venues. Articles may be submitted to the Forest Products Journal and Wood and Fiber Science. The information will also be available through the USDA Forest Service. Additionally, a summary of the study will also be accessible via the Virginia Tech Center for Forest Products Marketing and Management web site.

Methodology

Sample Development

The population of interest in this study are stock and custom cabinet manufacturers (SIC 2434 and SIC 571202). Due to the large number of firms producing cabinets, over 12,000 (Punches 1993), the population was stratified into two groups and sampled accordingly. The two grouping parameters were:

1. Top manufacturers by sales dollars (over \$20 million);
2. remaining cabinet producers with over 10 employees.

The population was selected and stratified as such because it is believed that they account for the majority of wood material use and exhibit similar production characteristics.

In determining sample size, an equation was taken from Ballenger and McCune (1990). This equation derives sample size based on the question that offers the highest variance. In this particular study the question considered to have the largest possible variance was a rating question using a likert scale from 1 to 7. The equation is as follows:

$$n = [(Z_{\alpha/2})^2(\sigma)^2]/h^2$$

where: n = sample size

$Z_{\alpha/2}$ = reliability coefficient

σ = estimated population standard deviation

h = allowable tolerance level

A confidence interval of 95% will be used for this study therefore the variables and subsequent calculation are as follows:

$$Z_{\alpha/2} = 1.96$$

$$\sigma = (\text{max value} - \text{min value})/6 = (7-1)/6 = 1$$

$$h = \pm 0.2 \text{ for } \alpha = .05$$

$$n = [(1.96)^2(1)^2]/(0.2)^2 = 96.04 \text{ rounded to } 97$$

Given this sample size of nearly 100 units then approximately 100 surveys were needed to be completed from Group 2. Given a conservative response rate of around 10% then 1000 surveys were mailed to Group 2. A census was attempted for Group 1 (approximately 55 companies).

The mailing/contact list for this study was compiled from several different sources. The bulk of it came from the American Business Disc 2000 (American Business

Disc 2000). The list for Group 2 was a random sample drawn from this source. The list for Group 1 was a combination of companies taken from the American Business Disc 2000, the KCMA member list, as well as publications on top industry leaders (American Business Disc 2000, KCMA Member List 2000, Anonymous 1999a).

Data Collection

Data collection for this project was done via a fax questionnaire for Group 1 and a mail questionnaire to Group 2. Survey research has been shown to be one of the best methods available for gathering primary data to describe a large population (Babbie 1989). The questionnaire had three sections, corresponding to the objectives of this project. One section related to demographic information for each company. Another section contained questions necessary to ascertain specific material use and production data for that company. The third section had a series of scaled and open-ended questions that were geared at identifying and rating perceptions of current managerial issues.

A preliminary questionnaire was developed containing the aforementioned sections. Questions 1, 2, 18, and 19 pertain to demographic information about the company. They ask for the type of manufacturer (stock, custom, semi-custom), number of employees, and total sales (\$). Questions 3-11 are designed to gain information on material use, sales, and production from each company. Specific material purchases for the production of cabinets are addressed by questions 3-6. Sales and production information is asked for in questions 7-11.

Management issues are covered in questions 12-17. Questions 12-16 are yes/no and open-ended questions relating to certified products, wood substitutes, and

outsourcing. Question 17 is a rating question that asks for levels of concern on current managerial issues facing the industry. These management questions relate to some of the industry trends and concerns that are discussed in the literature review. These were deemed to be important issues to the industry and selected as those to be addressed by this study.

This questionnaire was faxed to a number of companies from both groups in order to pre-test it before distribution to the selected companies. Following the pre-test the questionnaire was finalized based on respondents comments and designated questionnaire 1 (Appendix). It was three pages in length. A second questionnaire was then excerpted from the original questionnaire using only those questions necessary to determine material use of the company. This was one page in length and designated questionnaire 2 (Appendix). The reasoning behind this is addressed later.

Group 1 companies (greater than \$20 million in sales) were then contacted by phone. The purpose and goals of the research were explained and their cooperation in the study requested. If companies agree to participate in the study then the original questionnaire (questionnaire 1) was faxed to them for completion. It was thought that if companies were directly contacted it would increase the chance that the questionnaire would get to the right person. Also, fax surveys can yield higher response rates (Aaker et al. 1998). Given the small size of Group 1 this was a feasible option.

The randomly selected companies from Group 2 were mailed the survey. One-half were sent the original questionnaire (questionnaire 1, three pages in length) while half were sent questionnaire 2 (one page in length). This allowed for analysis to be done on the relationship between survey length and response rate in addition to the material use

information. Three mailings occurred over the period of late March to early June.

Between mailings one and two a reminder postcard was sent to all companies that had not responded at that point (Appendix). A similar reminder letter was sent between mailings two and three.

Data Analysis

Material Use Estimates

Originally, estimations were going to be done based on a per employee and per unit (individual boxes) basis. Total industry cabinet production is typically reported in units. It was thought that if average material per unit could be determined based on respondents, this would be a feasible way to extrapolate overall material use. However, most Group 2 companies did not know how many units they produced. The reliability of figures given by those companies that did report unit production were very inconsistent, and deemed unusable. Therefore, all material estimations for this project were done based on employment.

Companies were questioned regarding total material purchases for the year 1999 and predicted purchases for 2001. For both Groups 1 and 2, material use for each material category (i.e., hardwood lumber, particleboard, plywood, etc.) was summed for all responding firms and divided by the total number of employees from these firms. This produced an average material use per employee for each group.

Material use estimates for Group 1 was determined as follows. Based on respondents and various industry publications, industry employment accounted for by Group 1 companies (those with over \$20 million annual sales) was estimated

(Anonymous 1999a). This employment estimate was multiplied by the average material use per employee for Group 1 companies to arrive at an estimate for total material consumption by Group 1 companies.

Material use estimates for Group 2 was determined as follows. Total industry employment was estimated based on U.S. Department of Labor data. The estimated employment for Group 1 companies was then subtracted from this total employment number to arrive at an estimate of employment accounted for by firms having less than \$20 million in sales. This number was multiplied by the Group 2 average material use per employee to arrive at an estimate of total material consumption for companies having less than \$20 million in sales. It should be noted here that Group 2 material use for 2001 was estimated based only on respondents from questionnaire 1. Due to the shortening done for questionnaire 2 predicted purchases were unable to be asked. Therefore, material use for 2001 was determined by applying percentage increases/decreases from respondents to questionnaire 1 to 1999 material use calculated from all Group 2 (both questionnaire 1 and 2) respondents.

The estimates arrived at for both groups were then summed to arrive at an estimate for total industry material consumption. An example calculation is shown below:

- Total industry employment is estimated at 125,000 persons
- Group 1 employment is estimated at 43,000 persons
- Average hardwood lumber per employee for Group 1 = 1000 bdf
- Average hardwood lumber per employee for Group 2 = 500 bdf

$$\begin{aligned}\text{Group 1 total} &= [(43,000) \times (1000 \text{ bdf/empl})] = 43,000,000 \text{ bdf} \\ \text{Group 2 total} &= [(125,000 - 43,000) \times (500 \text{ bdf/empl})] = 41,000,000 \text{ bdf} \\ \text{Overall industry total} &= [(43,000,000) + (41,000,000)] = 84,000,000 \text{ bdf}\end{aligned}$$

Species Use Estimations

For both groups species use estimations were calculated by applying each responding firm's percent use to its total lumber use. The board feet for each species was then totaled and divided by the total lumber consumed. Again this was done individually for each group and then summed to arrive at an industry total. The exact same procedure was used for both groups to determine the grade breakdowns of hardwood lumber purchases. A sample calculation is shown below:

- It is determined that Group 1 consumed 500,000,000 bdft of hardwood lumber
- 250,000,000 bdft of the hardwood lumber consumed by Group 1 is Red Oak
- It is determined that Group 2 consumed 400,000,000 bdft of hardwood lumber
- 150,000,000 bdft of the hardwood lumber consumed by Group 2 is Red Oak

$$\text{Group 1 Red Oak \%} = [(250,000,000) / (500,000,000)] = 50\%$$

$$\text{Group 2 Red Oak \%} = [(150,000,000) / (400,000,000)] = 37.5\%$$

$$\text{Overall Industry Red Oak \%} =$$

$$[(250,000,000) + (150,000,000)] / [(500,000,000) + (400,000,000)] = 44.4\%$$

It should be noted here that Group 2 species use for 2001 was estimated based only on respondents from questionnaire 1. Due to the shortening done for questionnaire 2 predicted species breakdowns were unable to be asked. Therefore, species use for 2001 was determined by applying percentage increases/decreases from respondents to questionnaire 1 to 1999 species use calculated from all Group 2 (both questionnaire 1 and 2) respondents.

Managerial Issues

The questions relating to management issues (see # 12-17 in questionnaire 1 located in Appendix) were analyzed using frequency tables. For the question which asks

companies to rate their concern on different issues using a likert scale means were computed. Differences were checked for within groups using analysis of variance (ANOVA). Differences were checked for between groups using the Mann-Whitney rank sum test. The Mann-Whitney rank sum test is a non-parametric statistical test used to compare independent means from small (<30) sample sizes.

Questionnaire Analysis

Comparisons were made between responding firms from Group 2 that received the different questionnaires. Half were sent the original questionnaire consisting of three pages (questionnaire 1) while the other half were sent questionnaire 2, which consisted of only one page. Analysis was made on the response rate and responses between the two questionnaires.

Non-response Bias

Non-response bias was checked by contacting firms that did not return the questionnaire. Thirty non-responding firms participated in follow up calls and were questioned about hardwood lumber, particleboard, hardwood plywood, and employment. This allowed for an average material use per employee to be calculated. This was compared to respondent data using the t-test of independent means to determine if there was any statistical difference between the two. The results of the t-test are shown in Table 1.5.

Table 1.5. Non-response bias results

Variable	Group	Mean	Std. Deviation	2-tail Significance
Hardwood lumber (bdft) per employee	Respondent	2003.6	2448.0	0.198
	Non-respondents	2668.1	3442.9	
Particleboard (sqft) per employee	Respondent	4197.9	10448.4	0.265
	Non-respondents	6413.4	7127.0	
Hardwood plywood (sqft) per employee	Respondent	2664.8	5254.4	0.045
	Non-respondents	4954.7	8161.8	

Respondents n = 180, Non-respondents n = 30

The t-test shows that there is some difference present between respondents and non-respondents for hardwood plywood per employee. A significance of 0.045 is below the 95% cutoff of 0.05. This indicates that respondents may have a lower per employee consumption of hardwood plywood than non-respondents. The possibility exists that consumption of this material was underestimated. It is also possible that due to the large degree of variation in material mixes used by cabinet producers, the small population of non-respondents contacted may have used uncharacteristically high volumes hardwood plywood. The high degree of variation is shown by the standard deviations, which in all cases are larger than the means.

Another way to test for non-response bias is to compare early respondents to late respondents (Armstrong and Overton 1977). It is based on the premise that if non-response bias is present, it can be detected between these early and late respondents. Again a t-test of independent means was performed on hardwood lumber, particleboard, and hardwood plywood per employee. This test was done on the first thirty and last thirty respondents for Group 2 as a whole, as well as the first thirty and last thirty questionnaire 2 respondents. In both cases, no significant differences were detected between these respondents. The first twenty and last twenty questionnaire 1 respondents were also analyzed using a t-test of independent means. This test was done on three randomly

selected rating issues taken from question 17. They were finding qualified employees, increasing raw material prices, and the economy. The only instance where a difference was detected was finding qualified employees, with a significance of 0.043. This difference is most likely attributable to the inherently high variability that comes with these types of rating questions. Based on the results of the non-response tests, non-response bias was not viewed to be a serious problem in this study.

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Chapter 2

Abstract

Direct mail questionnaires are a popular method of collecting primary data for market research. One problem associated with administering mail questionnaires is the possibility of non-response bias. One way to decrease this possibility is through higher response rates. The researchers analyzed the effects of questionnaire length on response rate with direct mail questionnaires to an industrial sample. Two independent samples of medium sized cabinet producers (< \$20 million in sales and > 10 employees) randomly drawn from the same population were sent two different questionnaires. One questionnaire was three pages in length and the other was one page in length. The results showed that the sample receiving the short questionnaire had nearly double the response rate (30.8% vs. 16.6%). Using the statistical test for comparing two binomial proportions it was shown that the response rate for the shorter questionnaire was significantly higher. Subsequent t-tests on selected responses from both questionnaires indicated that the short questionnaire added no bias to the study.

Introduction

Whenever data is collected from a large population using a direct mail questionnaire, non-response bias can become a problem. That is, the respondents to the questionnaire may differ in some fundamental way from the non-respondents. This can cause the data that is received to be biased toward the respondents, thus not representative of the population that is being sampled. One way to decrease the chances of non-response bias becoming a problem is to increase the number of participants in a study, i.e., increase the response rate from the sample frame. This chapter discusses data collection, questionnaire design, and factors that can be controlled to improve the response rate for direct mail questionnaires. It summarizes the results of a study that investigated the affect of questionnaire length on the response rate from an industrial (cabinet manufacturers) sample frame.

Data Collection

Data collection is an integral part of marketing research. Depending on whether primary or secondary data are being collected, there are several different methods of collecting information. In this research primary data was being collected on the use of wood and wood based products in the U.S. cabinet industry. The three different types of primary data collection methods available are qualitative research, surveys, and experiments (Aaker et al. 1998). Each of these methods has advantages and disadvantages and their applicability depend on the circumstances and goals of the research. Qualitative research is well suited for exploratory analysis and gaining a better

understanding of key findings (Gupta et al. 1998). It usually consists of observing and interacting with respondents. An example of this would be a focus group. Surveys are a more flexible form of data collection than qualitative research. They can be designed to serve many purposes, ranging from qualitative to quantitative, as well as showing causal relationships. Experiments are typically used to show causal relationships. This is done through the manipulation of an independent variable (i.e., advertising) to determine the effect on a dependent variable (i.e., sales) (Aaker et al. 1998). Deciding which is the most appropriate method of data collection depends on the goals of the research and the characteristics of the population being observed. Where primary data is being collected to describe a large population, survey research has been shown to be the best method available (Babbie 1989). As this was the goal for this study, survey research was decided upon as the method for data collection.

Questionnaire Design

Research questionnaires are designed around three main goals. These goals are to meet the objectives of the project, obtain the most complete and accurate information possible, and to accomplish this within the limits of available time and resources (Anderson et al. 1983). In regards to meeting the objectives of the project, it is important that they are clearly understood, with the questions selected and modeled accordingly. Questions asked should be relevant to the objectives of the project. Those that are not will add unnecessary length and clutter the questionnaire.

Decisions must also be made when writing individual questions. Examples of these are open- or closed-ended questions, and direct versus indirect methods of asking

questions. Close-ended questions are structured, typically presenting the respondent with a list of options to choose from. Open-ended questions ask for a reply in the respondent's own words, with no answers being suggested. A modification of this is open-ended questions with a pre-classification. In this case the respondent is asked an open-ended question accompanied with some parameter. An example of this would be asking an individual to indicate how much lumber they purchase and specifying it be reported in board footage. Direct versus indirect methods of questioning depends on the nature of the respondents. Direct questioning assumes that the respondent can and will try to respond accurately, while indirect questioning is used when it is thought an individual will not accurately respond to the question either because of inability to understand it or inadequate knowledge to answer it (Gupta et al. 1998). Material tracking studies typically include both open- and closed-ended questions, with open ended questions aimed at material volume information and close-ended questions geared towards demographic information. Due to the straightforwardness of these studies, a direct method of questioning is normally used.

Question order is also an important consideration. Typically, the first questions are easy and non-threatening. This helps encourage respondents to continue with the survey. Questions should follow a logical order, with related questions grouped together. This helps to ease the mental effort required and encourages well thought out answers (Dillman 1978).

Factors Affecting Response Rate

In the case with research projects that utilize a direct mail questionnaire for data collection, the participation of the selected sample is very important to its success. A high response rate decreases the chance of non-response bias, which can become a problem when sampling a large population. Aaker et al. (1998) lists the following six factors as having the greatest influence over survey participation:

1. Perceived amount of work required to complete survey (largely dependent on length of questionnaire)
2. Intrinsic interest of the topic
3. Characteristics of the sample
4. Credibility of the sponsoring organization
5. Level of induced motivation (incentives)
6. Increased unethical use of marketing research to sell products

Length is an important consideration when designing a questionnaire. It is one of the first things that participants notice, and usually creates an immediate impression as to how much time/work will be required to complete it. Past studies on this topic have indicated that shorter questionnaires do produce higher response rates (Bean and Roszkowski 1995, Chuchinprakam et al. 2000).

Another factor that has been shown to have some affect on response rates is the sponsoring organization. University sponsorship has been shown to be more effective than commercial sponsorship (Greer and Lohtia 1994, Johnson and Schneider 1995). This links to two of the factors Aaker lists, the credibility of the sponsoring organization and the increased unethical use of market research to sell products. University conducted studies are normally not-for-profit and the results are made available to the public.

One of the most effective ways of achieving good response rates is following (either completely or in part) the total design method pioneered by Dillman (1978). It is a

complete system of administering a research study using a mail questionnaire. It deals with all facets of the process starting from questionnaire design all the way through following up with non-respondents. Some specific issues from the total design method that have been shown to have positive effects on response rates are: pretesting the questionnaire, individually addressed cover letters, a well designed questionnaire (format, layout, questions), pre-addressed postage paid return envelopes, follow up contact with non-respondents (reminder letters or postcards), and the use of incentives (Carroll 1994, Paxson 1995, Turley 1999).

Cabinet Industry and Typical Response Rates

The cabinet industry traditionally has low response rates to material use studies. For medium size firms (greater than 10 employees and less than \$20 million in sales) typical response rates have been from 15 to 20% (Punches 1993, Hansen et al. 1995). This is probably attributable to time restraints associated with running small to medium size businesses. For this reason it was decided to alter methodology from past wood material studies conducted at Virginia Tech with the intent of increasing response rate for this study. Questionnaire length was selected as the most appropriate method to test on response rate. Forest product related material tracking studies conducted in the past at Virginia Tech are already based, in part, on the Dillman Total Design Method, and encompass the majority of other methods shown to increase response rate (Dillman 1978). It was decided to shorten the questionnaire in hopes that respondents would perceive a smaller amount of work is required to complete it. The researchers thought

this would be the most effective way to help gain the highest possible response rate for this study.

Objectives

This study will:

1. measure the effect of questionnaire length on response rate; and
2. compare data received on varying length questionnaires for differences.

Methodology

The population of interest in this study are stock and custom cabinet manufacturers (SIC 2434 and SIC 571202). Due to the large number of firms producing cabinets, over 12,000 (Punches 93), the population was stratified into two groups and sampled accordingly. The group used for this study was medium size cabinet manufacturers. These were considered to be companies with greater than ten employees and less than \$20 million in annual sales.

Data collection for this project was via a mail questionnaire. The questionnaire included three sections. The first section related to demographic information for each company. The second section contained questions necessary to ascertain specific material use and production data for that company. The third section had a series of scaled and open-ended questions that were geared at identifying and rating perceptions of current managerial issues.

A preliminary questionnaire was developed based on the three aforementioned sections. This questionnaire was faxed to a number of companies to pre-test it before

distributing to the sample frame. Following the pre-test the questionnaire was finalized based on respondents comments. This questionnaire was designated questionnaire 1 and was three pages in length (Appendix). A second questionnaire was then excerpted from this original questionnaire using only those questions necessary to determine total material use of the company. This was designated questionnaire 2 and was only one page in length (Appendix). This was for the purpose of analyzing and comparing differences in response rates and material utilization information from the two questionnaires.

A total of 1,034 companies were mailed questionnaires. Exactly one-half (517) were sent questionnaire 1 and the other one-half questionnaire 2. All companies received the same cover letters accompanying the questionnaires in the three mailings that occurred for this study (Appendix). All companies received the same reminder postcard between mailings one and two, and the same reminder letter sent between mailings two and three (Appendix).

Non-response Bias

Non-response bias was checked by contacting firms that did not return the questionnaire. Thirty non-responding firms participated in follow up calls and were questioned about hardwood lumber, particleboard, hardwood plywood, and employment. This allowed for an average material use per employee to be calculated. This was compared to respondent data using the t-test of independent means to determine if there was any statistical difference between the two. The results of the t-test are shown in Table 2.1.

Table 2.1. Non-response bias results

Variable	Group	Mean	Std. Deviation	2-tail Significance
Hardwood lumber (bdft) per employee	Respondent	2003.6	2448.0	0.198
	Non-respondents	2668.1	3442.9	
Particleboard (sqft) per employee	Respondent	4197.9	10448.4	0.265
	Non-respondents	6413.4	7127.0	
Hardwood plywood (sqft) per employee	Respondent	2664.8	5254.4	0.045
	Non-respondents	4954.7	8161.8	

Respondents n = 180, Non-respondents n = 30

The t-test shows that there is some difference between respondents and non-respondents for hardwood plywood per employee. A significance of 0.045 is below the 95% cutoff of 0.05. This indicates that respondents may have a lower per employee consumption of hardwood plywood than non-respondents. The possibility exists that consumption of this material was underestimated. It is also possible that due to the large degree of variation in material mixes used by cabinet producers, the small population of non-respondents contacted may have used uncharacteristically high volumes of hardwood plywood. The high degree of variation is shown by the standard deviations, which in all cases are larger than the means.

Another way to test for non-response bias is to compare early respondents to late respondents (Armstrong and Overton 1977). It is based on the premise that if non-response bias is present, it can be detected between these early and late respondents. Again a t-test of independent means was performed on hardwood lumber, particleboard, and hardwood plywood per employee. This test was done on the first thirty and last thirty respondents for all questionnaires together, as well as the first thirty and last thirty questionnaire 2 respondents. In both cases, no significant differences were detected between these respondents. The first twenty and last twenty questionnaire 1 respondents

were also analyzed using a t-test of independent means. This test was done on three randomly selected issues taken from question 17, which asked respondents to rate their level of concern on some current managerial issues. They were finding qualified employees, increasing raw material prices, and the economy. The only instance where a difference was detected was finding qualified employees, with a significance of 0.043. This difference is most likely attributable to the inherently high variability that comes with these types of rating questions. Based on the outcome of the non-response bias tests, non-response bias was not thought to be a serious problem in this study.

Results

The adjusted response rates for the study are shown in Table 2.2, with a breakdown based on questionnaire type shown as well. The adjusted response rates were calculated by dividing the number of usable questionnaires by the total number sent out minus bad addresses and those returned as not producing wood cabinets.

Table 2.2. Adjusted response rates for Group 2

Questionnaire Type	Sent Questionnaires	Returned Questionnaires		Bad Addresses	Adjusted Response Rate
		Usable	No		
1	517	76	36	22	16.6%
2	517	141	26	33	30.8%
Overall	1034	217	62	55	23.7%

The response rate from questionnaire 2 is nearly twice that of questionnaire 1. If response rate is viewed as a proportion, it is possible to test for significance between two response rates using the statistical test for comparing two binomial proportions (Ott 1993). This test was performed on the response rates from questionnaires 1 and 2. It showed that with 95% confidence the response rate for questionnaire 2 was significantly higher than the response rate for questionnaire 1.

The possibility existed that the shorter questionnaire elicited bias responses from companies. This was tested for using the t-test of independent means between material use on a per employee basis from the two questionnaires. The results from the t-tests are shown in Table 2.3.

Table 2.3. T-test results between questionnaires 1 and 2 for material consumption per employee

Variable	Questionnaire	Mean	Std. Deviation	2-tail Significance
Hardwood lumber (bdft) per employee	1	1,987.5	2,180.8	0.952
	2	2,011.1	2,573.8	
Softwood lumber (bdft) per employee	1	726.2	2,701.1	0.103
	2	306.7	590.6	
Particleboard (sqft) per employee	1	2,854.5	3,357.8	0.235
	2	4,836.7	12,446.3	
MDF (sqft) per employee	1	493.0	732.6	0.056
	2	977.0	1,849.1	
Hardboard (sqft) per employee	1	3,230.4	21,970.7	0.139
	2	282.7	754.6	
OSB (sqft) per employee	1	2.3	12.7	0.328
	2	18.0	121.7	
Hardwood plywood (sqft) per employee	1	1,837.6	2,338.3	0.146
	2	3,058.1	6,146.8	
Softwood plywood (sqft) per employee	1	456.2	1,096.9	0.386
	2	877.1	3,608.3	
Doors per employee	1	169.6	319.3	0.365
	2	380.6	1,831.8	
Edge glued panes/blanks (bdft) per employee	1	81.9	326.5	0.453
	2	260.4	1,811.7	
Other parts (bdft) per employee	1	130.9	681.3	0.522
	2	252.9	1,367.9	
Veneer (sqft) per employee	1	246.2	1,250.0	0.469
	2	378.5	1,088.9	

Questionnaire 1 n = 58, Questionnaire 2 n = 122

At a 95% confidence level no significant differences were found in any material use categories. Only MDF use showed some evidence of possible differences with a significance of 0.056 (0.05 is the cutoff for 95%). This is most likely attributable to the large amount of variation in material mixes used by different cabinet producers.

Average material use per firm between questionnaire types was also analyzed using the t-test of independent means. The results are shown in Table 2.4. Using a 95% confidence level, no significant differences were found for material use per firm between the two questionnaires.

Table 2.4. T-test results between questionnaires 1 and 2 for material consumption per firm

Variable	Questionnaire	Mean	Std. Deviation	2-tail Significance
Hardwood lumber (bdft)	1	79,606.0	155,444.4	0.929
	2	82,794.0	250,746.7	
Softwood lumber (bdft)	1	42,994.0	262,072.6	0.141
	2	7,635.0	28,062.8	
Particleboard (sqft)	1	79,064.0	107,742.0	0.230
	2	121,189.0	255,380.2	
MDF (sqft)	1	16,932.0	35,680.4	0.481
	2	21,814.0	46,495.3	
Hardboard (sqft)	1	44,413.0	245,655.1	0.237
	2	14,447.0	91,673.3	
OSB (sqft)	1	99.0	658.9	0.416
	2	468.0	3,409.5	
Hardwood plywood (sqft)	1	76,361.0	228,445.6	0.855
	2	70,613.0	180,436.5	
Softwood plywood (sqft)	1	13,560.0	37,087.9	0.791
	2	15,880.0	61,505.0	
Doors	1	4,023.0	7,538.1	0.384
	2	16,575.0	109,149.4	
Edge glued panes/blanks (bdft)	1	3,757.0	19,543.1	0.539
	2	7,656.0	46,209.6	
Other parts (bdft)	1	6,220.0	39,024.7	0.865
	2	7,475.0	49,317.2	
Veneer (sqft)	1	8,989.0	50,169.8	0.634
	2	12,930.0	52,548.9	

Questionnaire 1 n = 58, Questionnaire 2 n = 122

The mean number of employees and annual sales reported by respondent companies was also checked for differences between questionnaires using the t-test of independent means. Again at a 95% confidence level, no significant differences were detected. These results are shown in Table 2.5. This indicates that the differences in the two questionnaires did not add any bias to the study.

Table 2.5. T-test results between questionnaires 1 and 2 for employees and total sales dollars

Variable	Questionnaire	Mean	2-tail Significance
Full time employees	1 (n = 69)	29	0.369
	2 (n = 138)	26	
Total sales (\$ millions)	1 (n = 58)	2.6	0.239
	2 (n = 127)	2.2	

Conclusions

In looking at the respondents it can be seen that the response rate from questionnaire 2 was much higher than that for questionnaire 1 (Table 2.2). Given that the length of the questionnaire was the only variable altered, these results indicate that a shorter questionnaire will increase response rate. This was the result for this study, as all other variables were kept constant during the data collection stage other than questionnaire length. Subsequent t-tests showed that by shortening the questionnaire, no new bias was introduced.

The use of a shorter, more focused questionnaire for future material tracking studies appears promising. Splitting the sample between long and short questionnaires, as was done for this project, also has some advantages. In addition to allowing for analysis to be done on response rates, it facilitates a large response base for primary objectives (material utilization, which was included on both questionnaires) while still providing some data for other objectives (management issues, which were include only on questionnaire 1).

These results indicate that the use of a shorter questionnaire for future studies of this kind would increase response rate. This would be especially applicable when dealing with industries that have traditionally low response rates to such studies. This increase in

response rate would benefit future studies of this kind for two reasons. One, it would reduce the chance of non-response bias becoming a factor. Two, it would reduce the size of the sample frame required to assure a minimal number of respondents for statistical analysis to be performed.

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Chapter 3

Abstract

A combination of fax and mail questionnaires were used to estimate consumption of wood based products by the U.S. cabinet industry and evaluate current management issues affecting the cabinet industry. Group 1 companies (>\$20 million in sales) were contacted and sent a fax questionnaire. A random sample of 1034 Group 2 companies (<\$20 million in sales and >10 employees) were sent a mail questionnaire. A total of 19 usable questionnaires were received from Group 1 companies and 217 usable questionnaires were received from Group 2 companies. Group 1 respondents averaged 1,108 employees and \$125.8 million in sales. Group 2 respondents averaged 27 employees and \$2.3 million in sales.

Results indicated that the cabinet industry used an estimated 484 million board feet of hardwood lumber. Nearly 95% of the hardwood lumber purchases were grade 1 common or better. The most common used species were red oak (44%) and hard maple (24%). An estimated 58 million board feet of components and 68,344 doors were also purchased by cabinet manufacturers in 1999. Softwood lumber use was estimated at 25 million board feet, consisting primarily of white (49%) and southern yellow (36%) pine. The most common used panel products were particleboard and hardwood plywood, at an estimated 1,044 million square feet (1/2 inch basis) and 279 (3/8 inch basis) million square feet respectively. Other panel products used by the industry are medium density fiberboard, hardboard, and softwood plywood. Approximately 156 (any thickness)

million square feet of veneer was used. Lumber purchases were primarily direct from sawmills (66%) for Group 1 companies and from wholesalers/distributors (53%) for Group 2 companies. Panel product purchases followed the same trend with the Group 1 companies buying primarily direct from manufacturers (44%) and the majority of Group 2 purchases coming from wholesalers/distributors (84%).

Group 1 companies sold their products primarily to home improvement/building supply centers (37%), while Group 2 companies sold their products predominately to builders and remodelers (62%). The majority of cabinet types sold by both Groups 1 and 2 were face frame kitchen cabinets (74% and 38% respectively).

Companies from both groups reported producing certified (green) products. The majority of companies purchased some parts from outside sources (outsourced). Of the companies that reported looking at the use of wood substitutes, strawboard, urban waste MDF, and plastic mouldings were most frequently mentioned. Concerns rated highest by cabinet companies were finding qualified employees, increasing raw material prices, keeping qualified employees, wood quality, and air quality regulations.

Introduction

The United States secondary wood products industry is a major consumer of both solid and panel wood based products. It was estimated in 1997 that eight major wood products markets consumed over 90% of hardwood lumber, more than 13 billion board feet (Hansen and West 1998). Firms involved in the production of wood kitchen and bath cabinets accounted for an estimated 1.2 (9.2%) of this 13 billion board feet, when figuring in the appropriate component contribution to this number (i.e., the percentage of component parts that are consumed by the cabinet industry). In addition to hardwood lumber and components, the cabinet industry utilizes a number of other wood based products. These include softwood lumber, both hardwood and softwood plywood, particleboard, medium density fiberboard, hardboard, and veneer.

In addition to using large quantities of wood based raw materials, the cabinet industry is a major employer. The U.S. Department of Labor (2000) estimated that the stock cabinet industry employment averaged 93,800 persons in 1999. Panches (1993) found that stock cabinet firms accounted for approximately 75% of total employment. Applying the same ratio here we can estimate total employment at 125,000 persons.

Over the past decade the wood cabinet industry has flourished with the resurgence of the U.S. economy. Both the gross domestic product and total U.S. housing starts have increased more than 50% since 1991, shown in Table 3.1 (Bailey et al. 2000).

Table 3.1. Gross domestic product and U.S. housing starts

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
GDP (billions)	6.00	6.32	6.64	7.05	7.40	7.81	8.30	8.76	9.26
Housing starts (millions)	1.01	1.20	1.29	1.46	1.35	1.48	1.47	1.62	1.67

This economic prosperity has helped to fuel over a 70% increase in cabinet demand over the same period (Iwanski and Koenig 2000). This is illustrated in Figure 3.1.

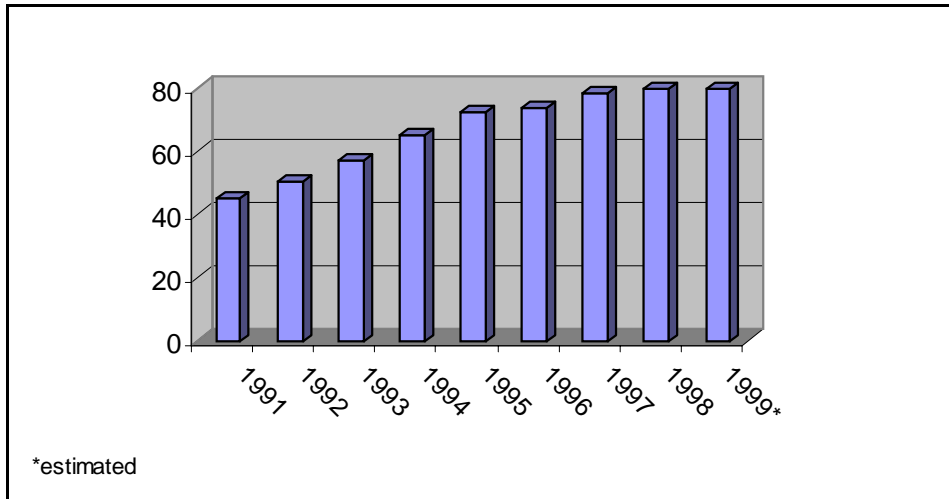


Figure 3.1. Total demand for cabinets (millions of units)

The last in-depth wood material utilization study conducted for the cabinet industry was in 1995 (Hansen et al 1995). Given the high degree of growth within the industry since 1993 and the absence of recent data estimating overall wood use within the industry, it is necessary to update current material use in the cabinet sector. Detailed information concerning wood consumption estimates is important to the industry. Not only will this information assist current manufacturers, but it will benefit manufacturers who supply the industry as well. Sawmills and other primary processors supplying the cabinet industry with raw materials need all available information concerning trends and changes in the use of those materials in order to be in a better position to adjust to these and plan business strategy.

Research Objectives

This study will:

1. estimate the total volumes of wood and wood based materials used by the U.S. cabinet industry by species, grade, type, and region of manufacture; and
2. evaluate perceptions of current management issues affecting the cabinet industry.

Methodology

Sample Development

The population of interest in this study are stock and custom cabinet manufacturers (SIC 2434 and SIC 571202). Due to the large number of firms producing cabinets, over 12,000 (Punches 93), the population was stratified into two groups and sampled accordingly. The two grouping parameters were:

1. Top manufacturers by sales dollars (over \$20 million);
2. remaining cabinet producers with over 10 employees.

The population was selected and stratified as such because it is believed that they account for the majority of wood material use and exhibit similar production characteristics. The mailing/contact list was compiled from the American Business Disc 2000, Kitchen Cabinet Manufacturers Association membership list, and various industry publications (American Business Disc 2000, KCMA Member List 2000, Anonymous 1999).

Data Collection

A questionnaire was developed based on the study objectives. It was pre-tested with companies from both groups 1 and 2. The questionnaire was finalized based on respondent comments and designated questionnaire 1 (Appendix). A shorter, one page, questionnaire was excerpted from the original questionnaire for use with one-half of the Group 2 sample to help improve response rates. This was designated questionnaire 2 (Appendix).

A census was attempted for Group 1 (approximately 55 companies) via a fax questionnaire. Group 1 was sent questionnaire 1. A random sample of 1034 companies was selected from Group 2. Of the selected Group 2 sample frame one-half were sent questionnaire 1 (three pages) and one-half were sent questionnaire 2 (one page).

Data Analysis

Material Use Estimates

Companies were questioned regarding total material purchases for the year 1999 and predicted purchases for 2001. For both Groups 1 and 2, material use for each material category (i.e., hardwood lumber, particleboard, plywood, etc.) was summed for all responding firms and divided by the total number of employees from these firms. This produced an average material use per employee for each group.

Material use estimates for Group 1 was determined as follows. Based on respondents and various industry publications (Anonymous 2000, Iwanski and Koenig 2000), industry employment accounted for by Group 1 companies (those with over \$20

million annual sales) was estimated at approximately 43,000. This employment estimate was multiplied by the average material use per employee for Group 1 companies to arrive at an estimate for total material consumption by Group 1 companies.

Material use estimates for Group 2 was determined as follows. Total industry employment was estimated to be approximately 125,000. This estimate was arrived at in the following manner. In 1999 The U.S. Department of Labor (2000) estimated that the stock cabinet industry employment averaged 93,800. Punches (1993) found that stock cabinet firms accounted for approximately 75% of total employment. Applying the same ratio we can estimate total employment at 125,000. This was thought to be a conservative estimate of total employment.

The estimated employment for Group 1 companies was subtracted from the total employment number to arrive at an estimate of employment accounted for by firms having less than \$20 million in sales. This number was multiplied by the Group 2 average material use per employee to arrive at an estimate of total material consumption for companies having less than \$20 million in sales. It should be noted here that Group 2 material use for 2001 was estimated based only on respondents from questionnaire 1. Due to the shortening done for questionnaire 2, predicted purchases were unable to be asked. Therefore, material use for 2001 was determined by applying percentage increases/decreases from respondents to questionnaire 1 (n = 53) to 1999 material use calculated from all Group 2 (both questionnaire 1 and 2, n = 180) respondents.

The estimates arrived at for both groups were then summed to arrive at an estimate for total industry material consumption. An example calculation is shown below:

- Total industry employment is estimated at 125,000 persons
- Group 1 employment is estimated at 43,000 persons
- Average hardwood lumber per employee for Group 1 = 1000 bdft
- Average hardwood lumber per employee for Group 2 = 500 bdft

Group 1 total = [(43,000) x (1000 bdft/empl)] = 43,000,000 bdft

Group 2 total = [(125,000 – 43,000) x (500 bdft/empl)] = 41,000,000 bdft

Overall industry total = [(43,000,000) + (41,000,000)] = 84,000,000 bdft

Species Use and Lumber Grade Estimations

For both groups species use estimations were calculated by applying each responding firm's percent use to its total lumber use. The board feet for each species was then totaled and divided by the total lumber consumed. Again this was done individually for each group and then summed to arrive at an industry total. The exact same procedure was used for both groups to determine the grade breakdowns of hardwood lumber purchases. A sample calculation is shown below:

- It is determined that Group 1 consumed 500,000,000 bdft of hardwood lumber
- 250,000,000 bdft of the hardwood lumber consumed by Group 1 is Red Oak
- It is determined that Group 2 consumed 400,000,000 bdft of hardwood lumber
- 150,000,000 bdft of the hardwood lumber consumed by Group 2 is Red Oak

Group 1 Red Oak % = [(250,000,000) / (500,000,000)] = 50%

Group 2 Red Oak % = [(150,000,000) / (400,000,000)] = 37.5%

Overall Industry Red Oak % =

[(250,000,000) + (150,000,000)] / [(500,000,000) + (400,000,000)] = 44.4%

It should be noted here that Group 2 species changes for 2001 were estimated based only on respondents from questionnaire 1. Due to the shortening done for questionnaire 2 predicted species breakdowns were unable to be asked. Therefore, species use for 2001 was determined by applying percentage increases/decreases from

respondents to questionnaire 1 to 1999 species use calculated from all Group 2 (both questionnaire 1 and 2) respondents.

Managerial Issues

The questions relating to management issues were analyzed using frequency tables. For the question which asks companies to rate their concern on different issues using a likert scale means were computed. Differences were checked for within groups using analysis of variance (ANOVA). Differences were checked for between groups using the Mann-Whitney rank sum test.

Non-response Bias

Non-response bias was checked by contacting firms that did not return the questionnaire. Thirty non-responding firms participated in follow up calls and were questioned about hardwood lumber, particleboard, hardwood plywood, and employment. This allowed for an average material use per employee to be calculated. This was compared to respondent data using the t-test of independent means to determine if there was any statistical difference between the two. The results of the t-test are shown in Table 3.2.

Table 3.2. Non-response bias results

Variable	Group	Mean	Std. Deviation	2-tail Significance
Hardwood lumber (bdft) per employee	Respondent	2003.6	2448.0	0.198
	Non-respondents	2668.1	3442.9	
Particleboard (sqft) per employee	Respondent	4197.9	10448.4	0.265
	Non-respondents	6413.4	7127.0	
Hardwood plywood (sqft) per employee	Respondent	2664.8	5254.4	0.045
	Non-respondents	4954.7	8161.8	

Respondents n = 180, Non-respondents n = 30

The t-test shows that there is some difference between respondents and non-respondents for hardwood plywood per employee. A significance of 0.045 is below the 95% cutoff of 0.05. This indicates that respondents may have a lower per employee consumption of hardwood plywood than non-respondents. The possibility exists that consumption of this material was underestimated. It is also possible that due to the large degree of variation in material mixes used by cabinet producers, the small population of non-respondents contacted may have used uncharacteristically high volumes of hardwood plywood. The high degree of variation is shown by the standard deviations, which in all cases are larger than the means.

Another way to test for non-response bias is to compare early respondents to late respondents (Armstrong and Overton 1977). It is based on the premise that if non-response bias is present, it can be detected between these early and late respondents. Again a t-test of independent means was performed on hardwood lumber, particleboard, and hardwood plywood per employee. This test was done on the first thirty and last thirty respondents for Group 2 as a whole, as well as the first thirty and last thirty questionnaire 2 respondents. In both cases, no significant differences were detected between these respondents. The first twenty and last twenty questionnaire 1 respondents were also analyzed using a t-test of independent means. This test was done on three randomly selected rating issues taken from question 17. They were finding qualified employees, increasing raw material prices, and the economy. The only instance where a difference was detected was finding qualified employees, with a significance of .043. This difference is most likely attributable to the inherently high variability that comes with

these types of rating questions. Based on the results of the non-response tests, non-response bias was not viewed to be a serious problem in this study.

Results

Respondent Profile

A total of seventeen companies from Group 1 responded to the fax questionnaire. Two additional respondents from the Group 2 mailing that reported over \$20 million in sales were placed into Group 1. Of these nineteen companies, six were stock, six were custom, and seven were semi-custom manufacturers. The regional distribution of these companies is shown in Figure 3.2.

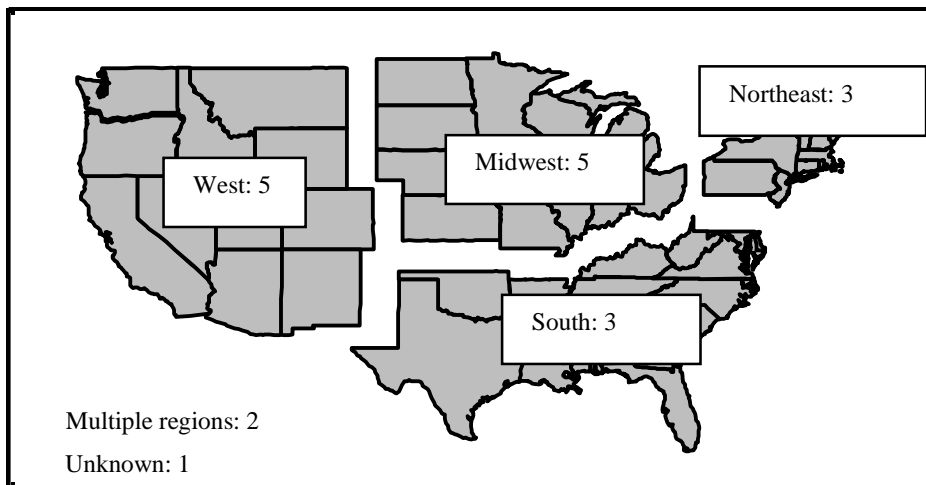


Figure 3.2. Regional distribution of Group 1 (>\$20 million in sales) respondents

The average employment of Group 1 companies was 1,108. The total employment of these respondent companies was 21,045. This represents nearly one-half of total employment for companies meeting Group 1 criteria (over \$20 million in sales). This estimation was based on Furniture Design and Manufacture's Year 2000 Top 300 Companies (Anonymous 2000). The average sales of Group 1 respondents were \$125.8

million. They accounted for a total of over \$2.1 billion in total sales (this figure is actually higher as some companies did not report sales dollars). It should be noted that some Group 1 companies had multiple facilities. The averages shown represent company wide figures, not individual facility figures.

A total of 217 usable questionnaires were received from the Group 2 mailings, which equated to an adjusted response rate of 24%. This is shown in Table 3.3 along with a breakdown of regional response rates.

Table 3.3. Adjusted response rate for Group 2

Region	Sent Questionnaires	Returned Questionnaires		Bad Addresses	Adjusted Response Rate
		Usable	Not Usable		
Northeast	126	33	6	7	29%
South	402	75	22	25	21%
Midwest	240	55	18	11	26%
West	266	54	16	12	23%
Overall	1034	217	62	55	24%

As indicated, two of the respondent companies were placed into Group 1 based on annual sales of over \$20 million dollars. Of the remaining 215 companies, 6 were stock manufacturers, 185 were custom, 23 were semi-custom, and one was other. The respondents appear to be biased towards custom manufacturers. However, many of the respondents that replied as custom manufacturers were listed in the original database as being stock manufacturers. It is believed that these firms responded as such due to the increase in customization that is being offered by smaller manufacturers. Increased customization is the only way they can compete effectively and create a niche separate from the larger more efficient stock manufacturers. This leads to most small to medium size companies now classifying themselves as custom manufacturers. The regional distribution of these respondents is shown in Figure 3.3.

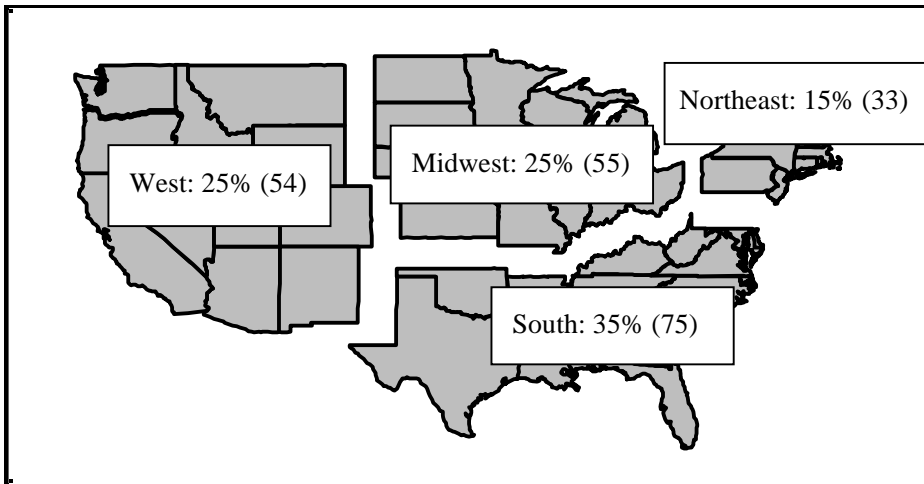


Figure 3.3. Regional distribution of Group 2 respondents

The average employment for Group 2 was 27, with total employment of respondents at 5,679. The average sales for Group 2 companies were \$2.3 million, with sales totaling \$428 million. Table 3.4 shows a comparison of Group 1 and 2 respondents. It can be seen that Group 1 companies are substantially larger than Group 2 companies.

Table 3.4. Group 1 versus Group 2 respondents

Group	Avg. Employment	Total Employment	Avg. Sales \$millions	Total Sales \$millions
1	1,108 (n = 19)	21,045	125.8 (n = 17)	2,138.7
2	27 (n = 207)	5,679	2.3 (n = 185)	427.9

Material Use

As was explained in the methodology section, material use estimates were based on average use per employee, and extrapolated based on total employment. This was done separately for each group and summed to arrive at industry totals. Table 3.5 shows the average material use per employee for each group. These were the averages used for the material estimates.

Table 3.5. Average material use per firm and employee for 1999

Material	Group	Average per Firm	Average per Employee
Hardwood Lumber (bdft)	1 (n=18)	6,477,000	5,606
	2 (n=180)	81,767	2,966
Softwood Lumber (bdft)	1 (n=16)	15,350	18
	2 (n=180)	19,029*	690*
Particleboard (sqft)	1 (n=16)	15,049,516	16,845
	2 (n=180)	107,616	3,904
Medium Density Fiberboard (sqft)	1 (n=16)	1,168,000	1,307
	2 (n=180)	20,241	734
Hardboard (sqft)	1 (n=16)	724,750	811
	2 (n=180)	24,103	874
Oriented Strandboard (sqft)	1 (n=16)	5,438	6
	2 (n=180)	349	13
Hardwood Plywood (sqft)	1 (n=16)	1,323,993	1,481
	2 (n=180)	72,465	2,629
Softwood Plywood (sqft)	1 (n=16)	26,650	30
	2 (n=180)	15,132	549
Cabinet Doors	1 (n=16)	690,235	723
	2 (n=180)	12,531	455
Edge-Glued Panels or Cut-to-Size Blanks (bdft)	1 (n=16)	145,250	163
	2 (n=180)	6,400	232
Other Cabinet Parts (bdft)	1 (n=16)	224,938	252
	2 (n=180)	7,071	257
Veneer (sqft)	1 (n=17)	2,777,235	2,811
	2 (n=180)	11,660	423

*These number are high due to a Group 2 outlier in the data, see explanation in text

An outlier in the data with regard to softwood lumber use was found in the Group 2 respondents. This firm used an unusually high volume of softwood lumber. Due to its dramatic effects on the material extrapolations, it was removed from the data used for softwood lumber calculations. When this firm is removed, the Group 2 softwood lumber use per firm and per employee drop to 7,962 and 293.13 respectively. The relative position of this outlier to the other data is shown in Figure 3.4. It can be seen that most all softwood lumber per employee is concentrated between 0 and 2,000 board feet per employee, while the outlier is at 20,000 board feet per employee.

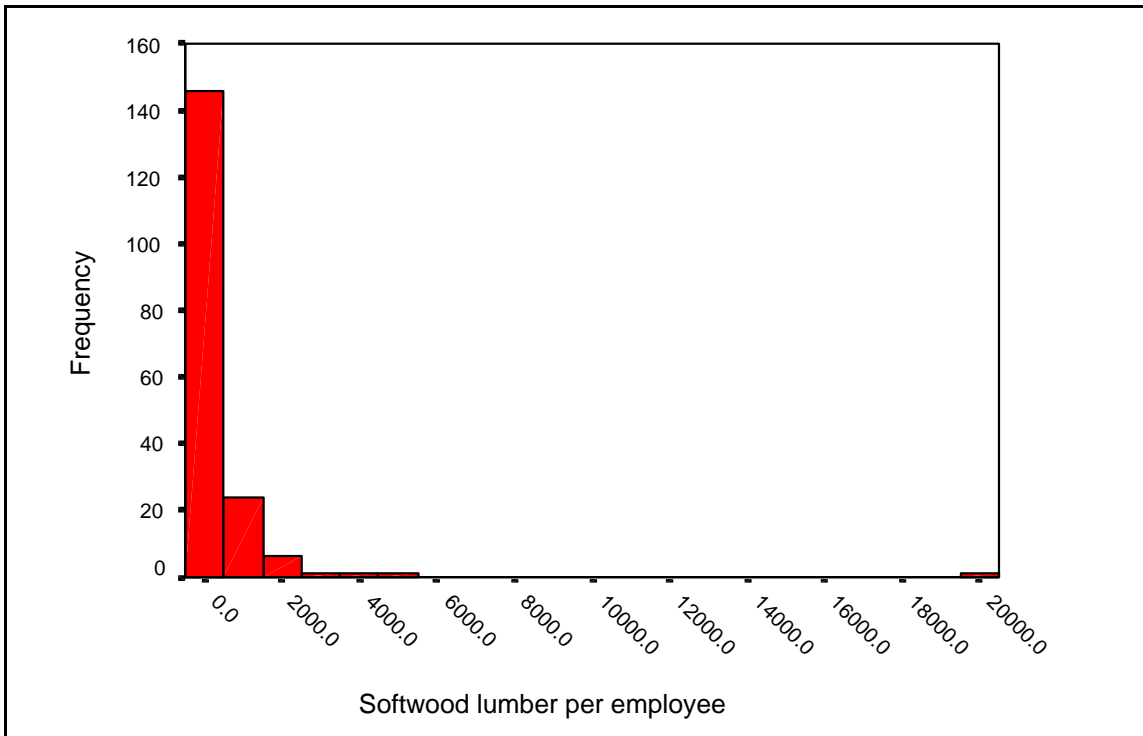


Figure 3.4. Histogram showing softwood lumber outlier

Hardwood Lumber

This study estimated total hardwood lumber consumption for the cabinet industry to be approximately 484 million board feet in 1999. This figure was divided evenly between groups, with Group 1 accounting for 49.8% and Group 2 accounting for 51.2%. Overall, hardwood lumber use was predicted to increase 16% to 562.7 million board feet for 2001. Table 3.6 shows hardwood lumber use for 1999, predicted use for 2001, and breakdowns by group.

Table 3.6. Estimated hardwood lumber use for 1999 and predicted use in 2001

Group	Use in 1999 (MMBF)	Predicted use in 2001 (MMBF)	Percent Change
1	241.1 (n=18)	290.9 (n=12)	+20.65%
2	243.2 (n=180)	271.8 (n=54)	+11.76%
Total	484.3	562.7	+16.18%

The South used the largest amount of hardwood lumber at approximately 185.2 million board feet followed by the Midwest (155.8), West (83.1), and the Northeast (61.4). The South and Midwest regions account for roughly 70% of hardwood lumber use. This would be expected since the majority of firms and employment are located in these regions. A breakdown of hardwood lumber use by region for 1999 and predicted use for 2001 is shown in Table 3.7.

Table 3.7. Regional estimation of hardwood lumber use for 1999 and predicted use in 2001

Region	Use in 1999 (MMBF)*	Predicted use in 2001 (MMBF)*	Percent Change
Northeast	61.4 (13%)	78.5 (14%)	+27.77%
South	185.2 (38%)	225.5 (39%)	+21.77%
Midwest	155.8 (32%)	176.8 (31%)	+13.51%
West	83.1 (17%)	95.0 (16%)	+14.23%
Overall	484.3	562.7	+16.17%

*Regional usages do not add up to exact overall use due to necessary differences in estimation procedures

Of the hardwood lumber purchased in 1999, 33% was FAS and Selects, 62% was 1-common, 5% was 2-common, and less than 1% was below 2-common. This is shown in Figure 3.5.

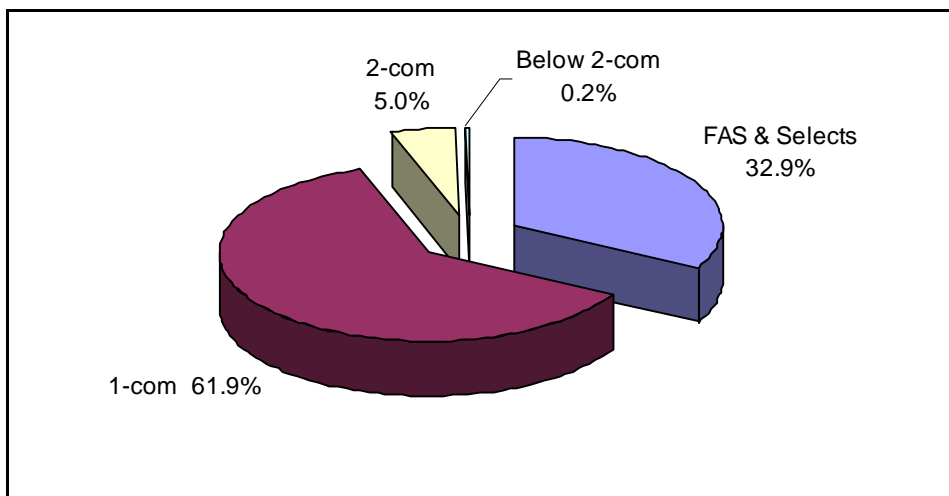


Figure 3.5. Overall hardwood lumber use by grade for 1999

Differences in grade use by groups were clear. Group 1 companies used predominately 1-common lumber (76.5%). Group 2 companies used slightly more FAS and Selects (51.9%) than 1-common (47.4%). This is shown in Figure 3.6.

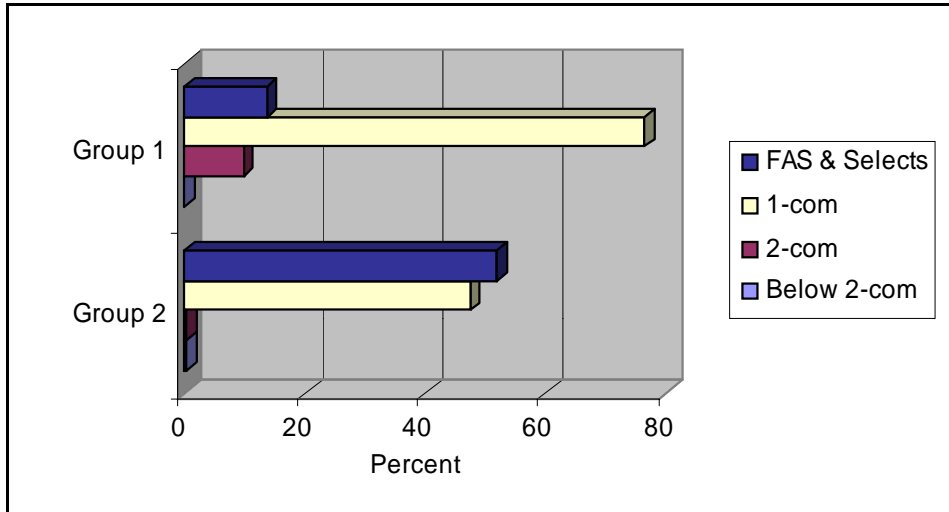


Figure 3.6. Percentage of hardwood lumber grades used by Groups 1 and 2 for 1999

The difference in grade use between groups is most likely attributable to differences in production characteristics. Small to medium size companies are typically more customized than larger manufacturers. This difference in production structure requires a different grade mix. Higher grades like FAS and Selects provide more flexibility to the more custom oriented producers.

Red oak was the most heavily used species by cabinet manufacturers. It accounted for 44% of all hardwood lumber purchases. It was followed by hard maple, cherry, soft maple, ash, hickory, poplar, white oak, alder, birch, and other miscellaneous hardwood species. This breakdown is illustrated in Figure 3.7.

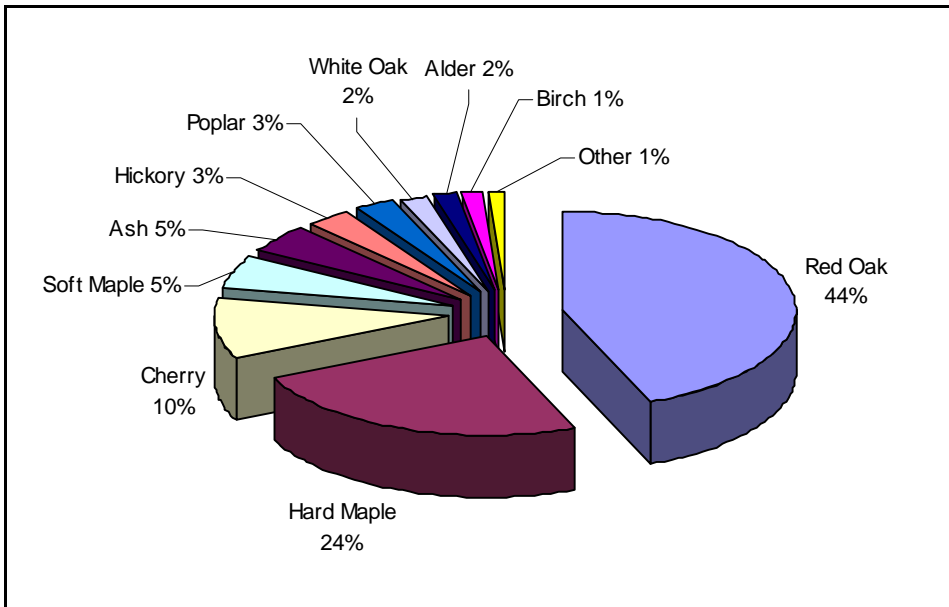


Figure 3.7. Hardwood lumber use by species for 1999

Other than red and white oak, there were no major changes in hardwood species mix predicted for 2001. This is shown in Table 3.8. Red oak showed a 6.8% decline from 43.8% of hardwood lumber use, while white oak increased 7.5% to account for over 10% of hardwood lumber use. Most of this change is the result of a dramatic shift in species use predicted by one large manufacturer. When this manufacturer's volume figure is removed from the data the percentages remain nearly the same at approximately 44% for red oak and 2% for white oak. However, due to the large size of the manufacturer in question there would be some affect, with the actual change being less dramatic than the shift shown in Table 3.8.

Table 3.8. Estimated hardwood lumber use by species for 1999 and predicted use for 2001

Species	Estimated Use in 1999		Predicted Use in 2001	
	Volume (MMBF)	% of Total	Volume (MMBF)	% of Total
Red Oak	212.3	43.8	208.0	37.0*
White Oak	9.8	2.0	53.7	9.5*
Ash	22.5	4.7	24.7	4.4
Hard Maple	117.4	24.2	127.1	22.6
Soft Maple	26.2	5.4	28.9	5.1
Cherry	47.9	9.9	57.2	10.2
Birch	6.4	1.3	6.8	1.2
Hickory/Pecan	15.3	3.2	18.8	3.3
Walnut	1.7	0.4	1.9	0.3
Alder	7.8	1.6	16.3	2.9
Poplar	12.7	2.6	13.4	2.4
Imported Hardwoods	1.2	0.3	1.1	0.2
Other Hardwoods	3.1	0.6	4.8	0.9
Total	484.3	100.0	562.7	100.0

*respective change from 1999 could be overestimated due to an outlier in the data, see text for explanation

Group 1 and Group 2 companies showed slightly different species mixes. Group 1 companies used predominately red oak and hard maple, accounting for over 80% of hardwood lumber purchases. Wood use for Group 2 companies was more dispersed among other species, with red oak, hard maple, cherry, and ash accounting for around 77% of purchases. This would be expected since smaller manufacturers generally are more likely to offer customized products. Species breakdowns by group are shown in Table 3.9.

Table 3.9. Estimated hardwood lumber species breakdown by groups for 1999

Species	Group			
	1		2	
	Volume (MMBF)	% of Total	Volume (MMBF)	% of Total
Red Oak	120.9	50.1	91.4	37.6
White Oak	2.8	1.2	7.0	2.9
Ash	0.5	0.2	22.1	9.1
Hard Maple	74.2	30.8	43.1	17.7
Soft Maple	15.3	6.3	10.9	4.5
Cherry	18.3	7.6	29.6	12.2
Birch	0.0	0.0	6.4	2.6
Hickory/Pecan	6.8	2.8	8.4	3.5
Walnut	<0.1	<0.1	1.7	0.7
Alder	0.2	0.1	7.6	3.1
Poplar	1.6	0.7	11.2	4.6
Imported Hardwoods	0.0	0.0	1.2	0.5
Other Hardwoods	0.5	0.2	2.6	1.0
Total	241.1	100.0	243.2	100.0

Red oak was the most predominately used hardwood species for all regions. In each case hard maple followed red oak as the second most used species. The South used the largest volumes of red oak, ash, hard maple, cherry, and poplar. The only major species the South did not have the highest volume for was hard maple, in which case the Midwest used the most. A further breakdown of hardwood lumber species use by region is shown in Table 3.10.

Table 3.10. Estimated hardwood lumber species use by region in 1999

Species	Northeast		South		Midwest		West	
	Volume (MMBF)	%	Volume (MMBF)	%	Volume (MMBF)	%	Volume (MMBF)	%
Red Oak	24.8	40.4	72.8	39.3	67.5	43.3	46.0	55.3
White Oak	0.2	0.3	6.1	3.3	2.8	1.8	0.3	0.4
Ash	1.8	2.9	22.2	12.0	1.5	1.0	0.1	0.1
Hard Maple	16.2	26.4	30.1	16.3	43.8	28.1	17.5	21.0
Soft Maple	3.7	6.1	15.9	8.6	7.9	5.1	2.3	2.7
Cherry	8.4	13.7	17.8	9.6	15.8	10.1	8.1	9.8
Birch	0.3	0.5	2.8	1.5	3.3	2.1	0.5	0.6
Hickory/Pecan	2.6	4.3	5.8	3.1	7.7	5.0	0.9	1.1
Walnut	0.1	0.1	0.3	0.2	1.2	0.8	0.2	0.3
Alder	<0.1	<0.1	1.0	0.6	0.5	0.3	4.9	5.9
Poplar	1.7	2.8	8.4	4.5	3.6	2.3	1.4	1.7
Imported Hardwoods	0.1	0.1	1.2	0.6	<0.1	<0.1	0.1	0.1
Other Hardwoods	1.5	2.4	0.8	0.4	0.2	0.1	0.8	1.0
Total	61.4	100.0	185.2	100.0	155.8	100.0	83.1	100.0

Parts and Components

In 1999 an estimated 68.3 million cabinet doors, 26.3 million board feet of edge-glued panels and cut-to-size blanks, and 31.8 million board feet of other cabinet parts were used by the wood cabinet industry. The use of these materials was predicted to increase 14%, 13%, and 12%, respectively in 2001. Table 3.11 shows estimated use for 1999, predicted use for 2001, and a breakdown of use by group.

Table 3.11. Estimated component use for 1999 and predicted use in 2001

Material	Group	Use in 1999	Predicted use in 2001	Percent Change
Cabinet Doors (thousands)	1	31,070 (n=16)	37,719 (n=11)	+21.40%
	2	37,274 (n=180)	40,077 (n=53)	+7.52%
	Total	68,344	77,791	+13.82%
Edge-Glued-Panels or Cut-to-Size Blanks (MMBF)	1	7.0 (n=16)	9.4 (n=11)	+34.29%
	2	19.3 (n=180)	20.4 (n=53)	+5.70%
	Total	26.3	29.8	+13.31%
Other Cabinet Parts (MMBF)	1	10.8 (n=16)	13.1 (n=11)	+21.30%
	2	21.0 (n=180)	22.5 (n=53)	+7.14%
	Total	31.8	35.6	+11.95%

The majority of components purchased by manufacturers are hardwoods. By summing the board footage of these components with hardwood lumber use it is possible to arrive at an estimate of the total hardwood lumber accounted for by the wood cabinet industry (both directly through lumber, and indirectly through components). Since use of cabinet doors is measured in thousands, this number must be converted to board feet. Based on an average unit size of 33 to 36 inches (addressed later in results), it could be estimated that on average each door is approximately 16 inches wide. Assuming (conservatively) the average height of a door is 24 inches and made using 4/4 lumber, each door would contain approximately 2.7 board feet of lumber. A 1998 kitchen trends survey showed that 79% of doors were solid wood and 10% were a mix of painted MDF and solid wood substrates (Moss and Stella 1998). Assuming then that approximately 85% of doors purchased by firms were solid wood this would equate to 156.8 million board feet of lumber. When this is summed with edge-glued-panels and cut-to-size blanks and other cabinet parts, the total comes to roughly 215 million board feet of component parts used by the cabinet industry in 1999. Assuming component manufacturers typically get about 60% yield (Lamb 2000) from rough lumber this would mean that approximately 358 million board feet of hardwood lumber was used to produce the 215 million board feet of components used by the industry. When adding this number to the amount of hardwood lumber used it can be estimated (under the preceding assumptions) that the cabinet industry used approximately 843 million board feet of hardwood lumber.

The South and West accounted for the majority of component use, accounting for 70% of cabinet doors, 69% of edge-glued panels and cut-to-size blanks, and 89% of other

cabinet parts. Table 3.12 shows regional breakdowns of component use for 1999 and predicted use in 2001.

Table 3.12. Regional estimation of component use for 1999 and predicted use in 2001

Material	Region	Use in 1999	Predicted use in 2001	Percent Change
Cabinet Doors (thousands)	Northeast	2,684 (4%)	3,024 (4%)	+12.67%
	South	22,299 (34%)	26,054 (34%)	+16.84%
	Midwest	16,692 (26%)	19,843 (26%)	+18.88%
	West	23,417 (36%)	26,733 (36%)	+14.16%
	Overall	68,344	77,791	+13.82%
Edge-Glued-Panels or Cut-to-Size Blanks (MMBF)	Northeast	3.4 (14%)	4.9 (17%)	+44.12%
	South	9.5 (38%)	9.9 (35%)	+4.21%
	Midwest	4.2 (17%)	4.8 (17%)	+14.29%
	West	7.7 (31%)	8.8 (31%)	+14.29%
	Overall	26.3	29.8	+13.31%
Other Cabinet Parts (MMBF)	Northeast	1.1 (4%)	1.1 (4%)	+0.00%
	South	16.7 (57%)	17.5 (57%)	+4.79%
	Midwest	2.2 (7%)	2.5 (8%)	+13.64%
	West	9.5 (32%)	9.5 (31%)	+0.00%
	Overall	31.8	35.6	+11.95%

*Regional uses do not add up to exact overall use due to necessary differences in estimation procedures

Softwood Lumber

In 1999 the cabinet industry consumed an estimated 24.7 million board feet of softwood lumber. This is relatively small (5%) when compared to hardwood use, but still deserves consideration. An increase of 11% was predicted for 2001. Group 2 companies used the vast majority of this lumber, accounting for 97%. Table 3.13 shows estimated softwood lumber use for 1999, predicted use for 2001, and a breakdown of this use by Groups 1 and 2.

Table 3.13. Estimated softwood lumber use for 1999 and predicted use in 2001

Group	Use in 1999 (MMBF)	Predicted use in 2001 (MMBF)	Percent Change
1	.7 (n=16)	.8 (n=11)	+14.29%
2	24.0 (n=179)	26.5 (n=52)	+10.42%
Total	24.7	27.3	+10.53%

The South consumed the largest volume of softwood lumber at 28%. Overall, however, softwood lumber use was relatively evenly dispersed between regions. The South and the West showed the greatest predicted increases at 13% and 11% respectively. Regional consumption breakdowns for 1999 and predicted use for 2001 are shown in Table 3.14.

Table 3.14. Regional estimation of softwood lumber use for 1999 and predicted use in 2001

Region	Use in 1999 (MMBF)	Predicted use in 2001 (MMBF)	Percent Change
Northeast	5.5 (23%)	5.5 (21%)	+0.00%
South	6.8 (28%)	7.7 (30%)	+13.24%
Midwest	5.8 (24%)	6.0 (23%)	+3.45%
West	6.1 (25%)	6.8 (26%)	+11.48%
Overall	24.7	27.3	+10.53%

*Regional usages do not add up to exact overall use due to necessary differences in estimation procedures

White pine was the most commonly used species by cabinet producers, constituting 40% of use. Southern yellow pine was second at 36%. The remaining softwood lumber use consisted of a mix of other species that were not a significant amount by themselves. They included spruce, fir, ponderosa pine, knotty pine, and imported softwoods. Softwood lumber species mix is shown in Figure 3.8.

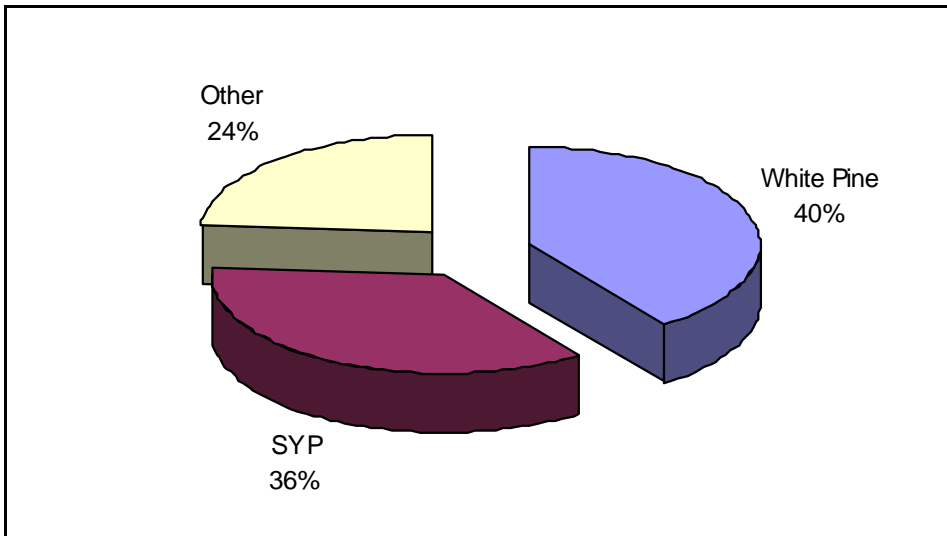


Figure 3.8. Softwood lumber use by species for 1999

There was no significant change in species mix predicted for 2001. Softwood lumber use by species for 1999 and predicted use for 2001 are shown in Table 3.15.

Table 3.15. Estimated softwood lumber use by species for 1999 and predicted use for 2001

Species	Estimate Use in 1999		Predicted Use in 2001	
	Volume (MMBF)	% of Total	Volume (MMBF)	% of Total
Southern Yellow Pine	9.0	36.4	10.1	37.0
White Pine	9.9	40.1	10.7	39.2
Imported Softwoods	0.1	0.4	0.2	0.7
Other Softwoods	5.7	23.1	6.3	23.1
Total	24.7	100.0	27.3	100.0

Different species mixes were present between Groups 1 and 2. Group 1 used predominately white pine and some southern yellow pine. Group 2 companies used white and southern yellow pine in approximately equal volumes to make up over 75% of respective use. The remainder of use was split between the other softwood species previously mentioned. A breakdown of species use by group is shown in Table 3.16.

Table 3.16. Estimated softwood lumber species breakdown by groups for 1999

Species	Group			
	1		2	
	Volume (MMBF)	% of Total	Volume (MMBF)	% of Total
Southern Yellow Pine	<0.1	6.8	9.0	37.5
White Pine	0.7	93.2	9.2	38.3
Imported Softwoods	0.0	0.0	0.1	0.4
Other Softwoods	0.0	0.0	5.7	23.8
Total	0.7	100.0	24.0	100.0

Regionally, the West and Midwest used primarily white pine. The Northeast used predominately southern yellow pine, while the South was divided almost evenly between white pine and southern yellow pine. Other softwoods had relatively significant use in all regions except the Northeast. Imported softwoods were minimally used in every region. Regional breakdowns for softwood lumber species use are shown in Table 3.17.

Table 3.17. Estimated softwood lumber use by region in 1999

Species	Northeast		South		Midwest		West	
	Volume (MMBF)	%	Volume (MMBF)	%	Volume (MMBF)	%	Volume (MMBF)	%
Southern Yellow Pine	5.1	92.7	2.4	35.2	0.5	8.6	0.5	8.0
White Pine	0.3	5.5	2.7	39.5	3.6	62.1	4.1	66.7
Imported Softwoods	0.0	0.0	<0.1	0.3	0.1	1.7	<0.1	0.4
Other Softwoods	0.1	1.8	1.7	25.0	1.6	27.6	1.5	24.9
Total	5.5	100.0	6.8	100.0	5.8	100.0	6.1	100.0

Panel Products and Veneer

Cabinet producers used large volumes of panel products in 1999. Most commonly used was particleboard, of which an estimated 1,044 million square feet (1/2” basis) was used. Other panel products used by the industry were hardwood plywood, medium density fiberboard, hardboard, and softwood plywood. Very little oriented

strandboard was purchased. Additionally, 156 million square feet of veneer was used. Consumption was expected to increase for all materials except oriented strand board in 2001.

Group 1 companies accounted for the majority of particleboard and veneer use. Group 2 companies used higher volumes of all other materials. Estimated panel product and veneer use for 1999, predicted purchases for 2001, and breakdowns by group are shown in Table 3.18.

Table 3.18. Estimated panel products and veneer use for 1999 and predicted use in 2001

Material	Group	Use in 1999	Predicted use in 2001	Percent Change
Particleboard (MMSF 1/2")	1	724.3 (n=16)	833.4 (n=11)	+15.06%
	2	320.1 (n=180)	351.6 (n=53)	+9.84%
	Total	1,044.4	1,185.0	+13.46%
Medium Density Fiberboard (MMSF 1/2")	1	56.2 (n=16)	64.2 (n=11)	+14.23%
	2	60.2 (n=180)	60.6 (n=53)	+0.66%
	Total	116.4	124.8	+7.22%
Hardboard (MMSF 1/8")	1	34.9 (n=16)	42.9 (n=11)	+22.92%
	2	71.7 (n=180)	93.7 (n=53)	+30.68%
	Total	106.6	136.6	+28.14%
Oriented Strandboard (MMSF 1/2")	1	.3 (n=16)	.3 (n=11)	+0.00%
	2	1.0 (n=180)	1.0 (n=53)	+0.00%
	Total	1.3	1.3	+0.00%
Hardwood Plywood (MMSF 3/8")	1	63.7 (n=16)	74.9 (n=11)	+17.58%
	2	215.6 (n=180)	240.1 (n=53)	+11.36%
	Total	279.3	315.0	+12.78%
Softwood Plywood (MMSF 3/8")	1	1.3 (n=16)	1.4 (n=11)	+7.69%
	2	45.0 (n=180)	48.3 (n=53)	+7.33%
	Total	46.3	49.7	+7.34%
Veneer (MMSF) (any thickness)	1	120.9 (n=17)	145.2 (n=12)	+20.10%
	2	34.7 (n=180)	38.9 (n=53)	+12.10%
	Total	155.6	184.1	+18.32%

Regionally, the South used the largest volumes of all materials except veneer and oriented strandboard. The Midwest consumed the largest volume of veneer. Strong growth was predicted for all materials except oriented strandboard in each of the four

regions and medium density fiberboard in the South. Regional estimations for 1999 and predicted use for 2001 are shown in Table 3.19.

Table 3.19. Regional estimation of panel products and veneer use for 1999 and predicted use for 2001

Material	Region	Use in 1999	Predicted use in 2001	Percent Change
Particleboard (MMSF 1/2")	Northeast	126.6 (12%)	147.6 (12%)	+16.59%
	South	373.0 (36%)	422.4 (36%)	+13.24%
	Midwest	329.8 (31%)	379.4 (32%)	+15.04%
	West	222.8 (21%)	238.2 (20%)	+6.91%
	Overall	1,044.4	1,185.0	+13.46%
Medium Density Fiberboard (MMSF 1/2")	Northeast	13.6 (11%)	15.5 (12%)	+13.97%
	South	56.2 (45%)	51.8 (41%)	-7.83%
	Midwest	35.2 (28%)	38.8 (30%)	+10.23%
	West	19.4 (16%)	22.2 (17%)	+14.43%
	Overall	116.4	124.8	+7.22%
Hardboard (MMSF 1/8")	Northeast	1.7 (2%)	1.8 (1%)	+5.88%
	South	55.4 (51%)	63.2 (48%)	+14.08%
	Midwest	13.4 (12%)	16.3 (13%)	+21.64%
	West	38.3 (35%)	48.9 (38%)	+27.68%
	Overall	106.6	136.6	+28.14%
Oriented Strandboard (MMSF 1/2")	Northeast	0.5 (35%)	0.5 (35%)	+0.00%
	South	0.4 (29%)	0.4 (29%)	+0.00%
	Midwest	0.1 (7%)	0.1 (7%)	+0.00%
	West	0.4 (29%)	0.4 (29%)	+0.00%
	Overall	1.3	1.3	+0.00%
Hardwood Plywood (MMSF 3/8")	Northeast	28.6 (10%)	34.0 (11%)	+18.88%
	South	137.9 (48%)	149.4 (47%)	+8.34%
	Midwest	77.6 (27%)	87.8 (27%)	+13.14%
	West	44.7 (15%)	49.9 (15%)	+11.63%
	Overall	279.3	315.0	+12.78%
Softwood Plywood (MMSF 3/8")	Northeast	3.3 (7%)	3.4 (7%)	+3.03%
	South	28.3 (62%)	30.6 (62%)	+8.13%
	Midwest	1.3 (3%)	1.7 (3%)	+30.77%
	West	12.6 (28%)	13.4 (28%)	+6.35%
	Overall	46.3	49.7	+7.34%
Veneer (MMSF) (any thickness)	Northeast	6.8 (6%)	8.1 (6%)	+19.12%
	South	24.8 (20%)	28.8 (20%)	+16.13%
	Midwest	65.4 (54%)	79.1 (56%)	+20.95%
	West	24.5 (20%)	25.4 (18%)	+3.67%
	Overall	155.6	184.1	+18.32%

*Regional uses do not add up to exact overall use due to necessary differences in estimation procedures

Material Purchases

Group 1 and 2 respondents showed different purchasing patterns for lumber. Group 1 companies purchased the majority of their material directly from the manufacturer. Group 2 companies purchased most of their lumber (53%) from wholesalers/distributors. This trend would be expected since Group 1 companies generally buy in larger quantities than Group 2 companies, and in some cases, dry their own lumber. This is shown in Figures 3.9 and 3.10.

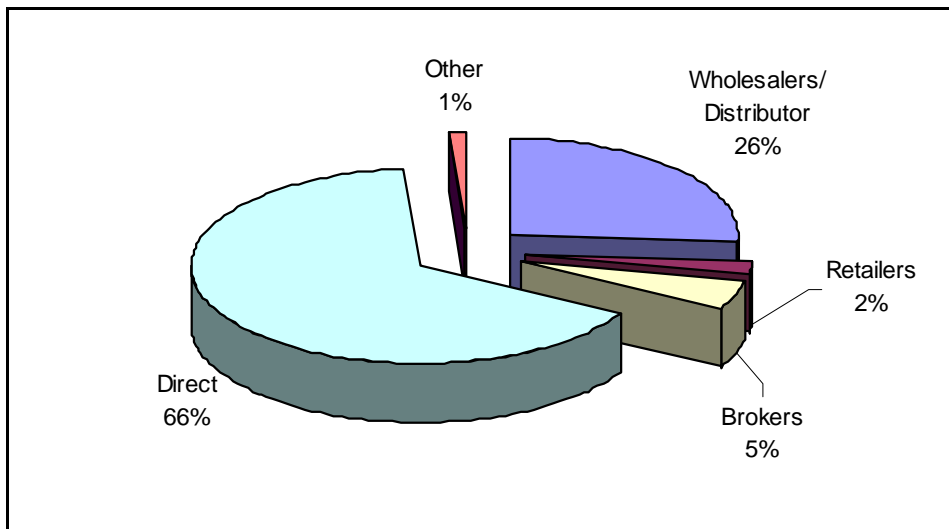


Figure 3.9. Estimated 1999 lumber sources for Group 1 companies

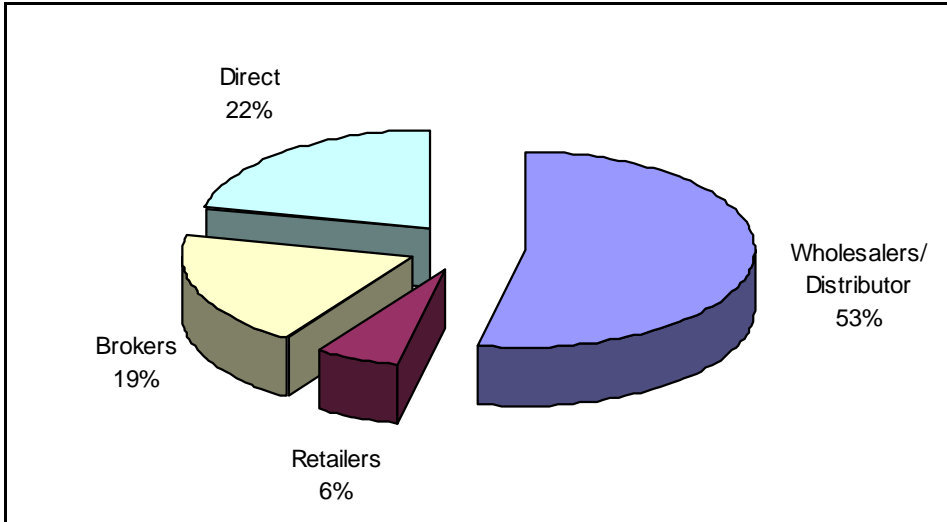


Figure 3.10. Estimated 1999 lumber sources for Group 2 companies

Panel purchases followed a similar trend to lumber purchases. The largest percentage of Group 1 purchases were direct from manufacturers. The majority of Group 2 purchases were again from wholesalers/distributors. This is illustrated in Figures 3.11 and 3.12. Also, all material purchasing information is summarized in Table 3.20.

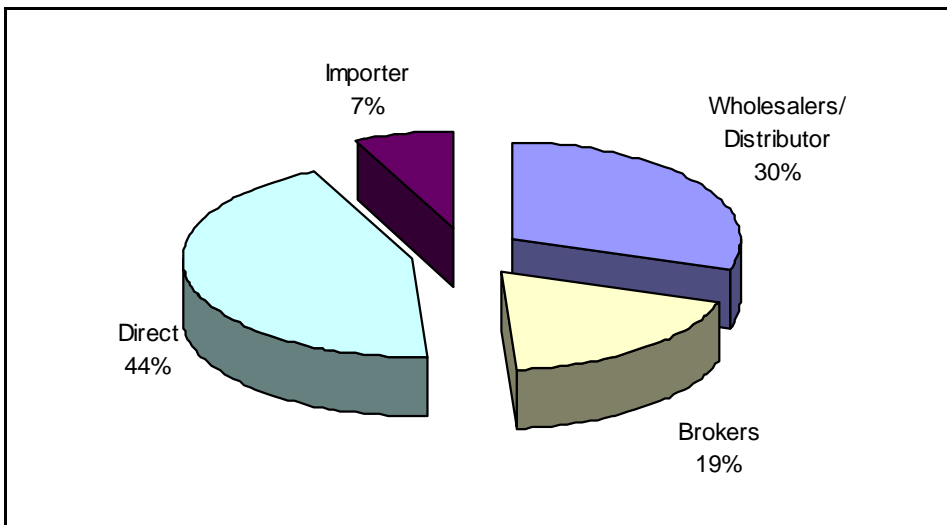


Figure 3.11. Estimated 1999 panel sources for Group 1 companies

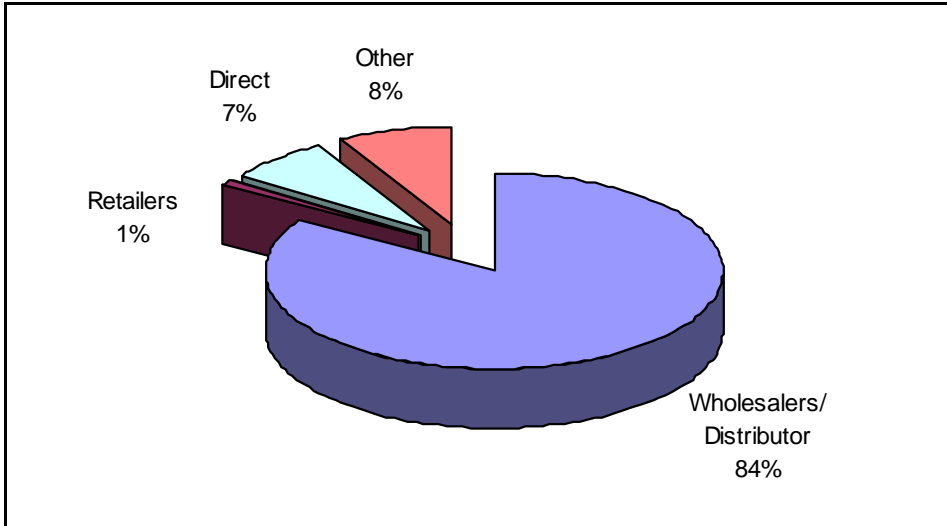


Figure 3.12. Estimated 1999 panel sources for Group 2 companies

Table 3.20. Estimated material sources for 1999

Channel	Lumber Purchases		Panel Purchases	
	Group 1	Group 2	Group 1	Group 2
Wholesalers/Distributor	25.7%	53.2%	29.7%	83.5%
Retailers	2.2%	6.0%	0.0%	1.1%
Brokers	5.2%	19.2%	19.0%	<0.1%
Direct from Manufacturer	66.1%	21.6%	43.7%	7.2%
Importer	0.0%	0.0%	7.6%	0.0%
Other	0.8%	0.0%	0.0%	8.2%
Total	100.0%	100.0%	100.0%	100.0%

Sales

Group 1 companies sold their product primarily through factory sales people and manufacturer's representatives, who accounted for 54% and 44% of sales respectively.

This can be seen in Figure 3.13.

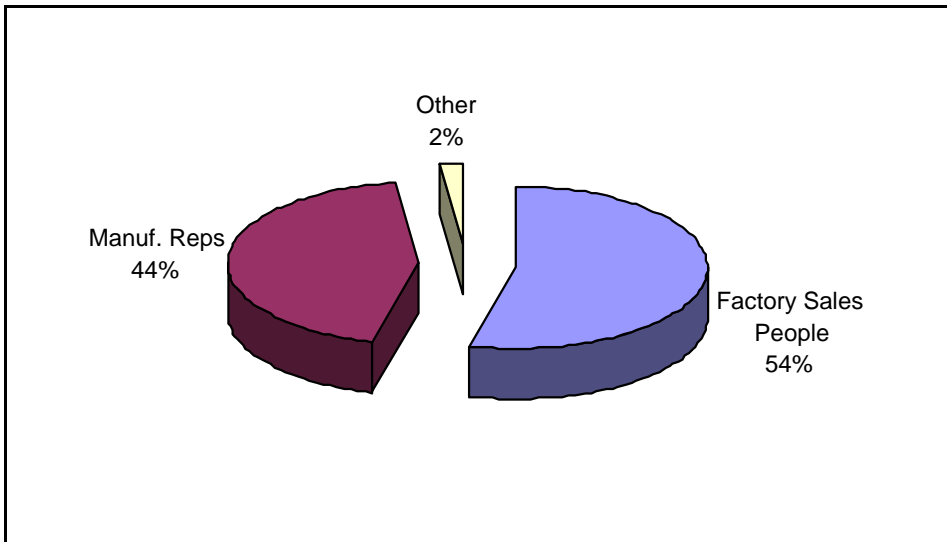


Figure 3.13. Salespersons utilized by Group 1 companies

Group 2 companies used predominately factory sales-people to move their product, representing 77% of sales. This is illustrated in Figure 3.14. In many cases with Group 2 companies the factory sales person is the owner and/or shop manager.

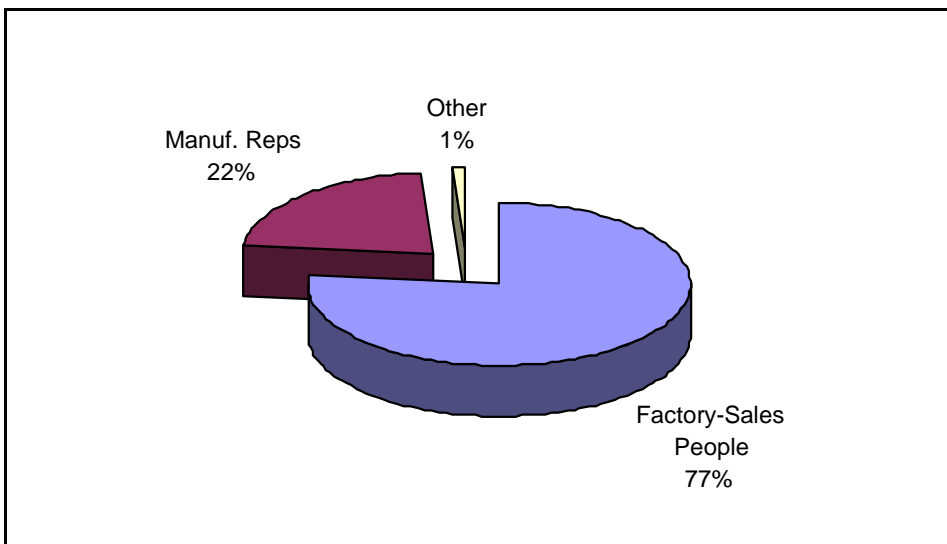


Figure 3.14. Salespersons utilized by Group 2 companies

Group 1 company sales were distributed through several major channels. Home improvement and building supply centers had the largest percentage. Dealers, independent distributors, and discount mass merchants followed in that order. Figure

3.15 shows the estimated percentage breakdown of sales channels for Group 1 companies.

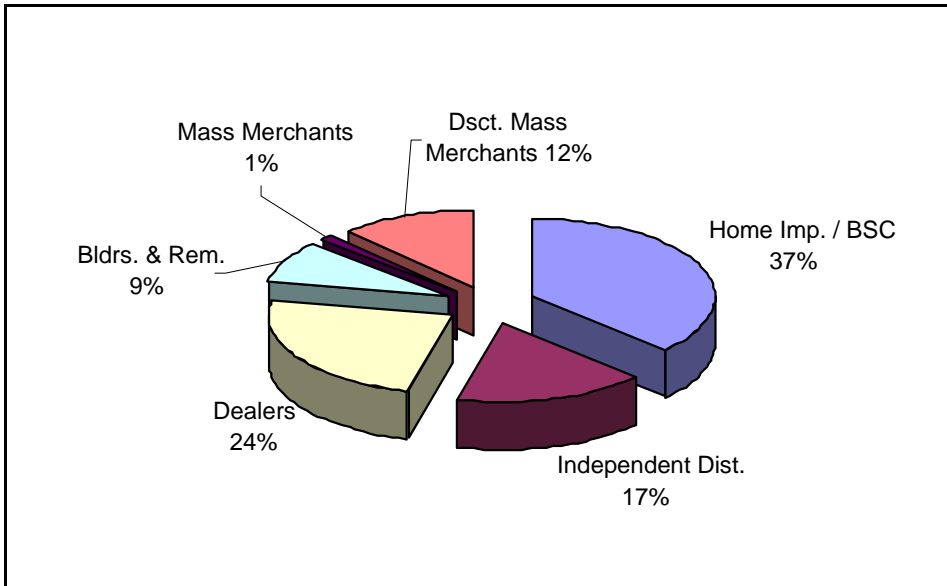


Figure 3.15. Estimated 1999 sales channels for Group 1 companies

Group 2 companies used a different sales channel mix than Group 1 companies. 62% of sales were to builders and remodelers, as compared to 9% for Group 1 companies. This is not a surprise since Group 2 manufacturers are usually more custom oriented than Group 1. Other channels used by Group 2 companies were dealers and direct to homeowner sales. Figure 3.16 illustrates the estimated sales channel breakdown by Group 2 companies. Table 3.21 estimates the complete breakdown of sales channels for both groups.

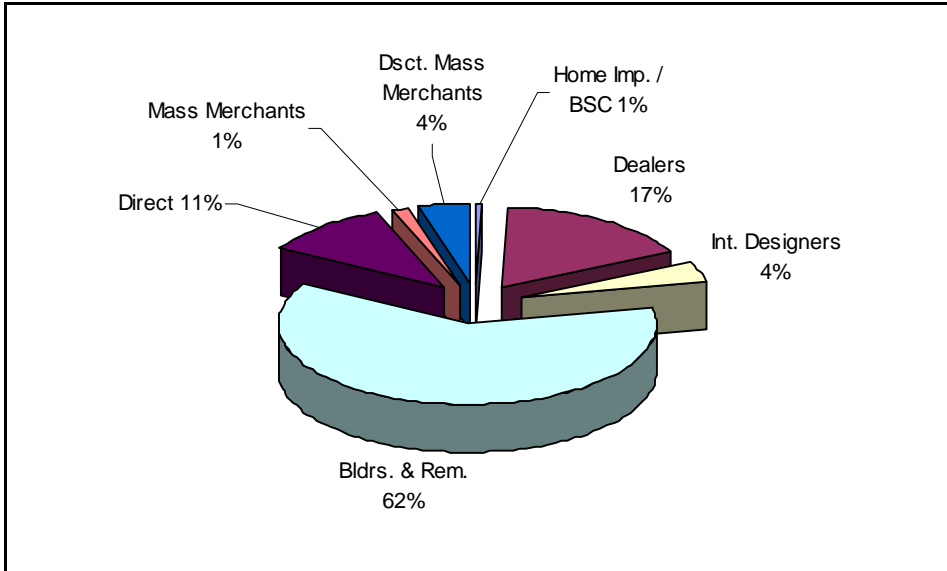


Figure 3.16. Estimated 1999 sales channels for Group 2 companies

Table 3.21. Estimated 1999 sales channels

Channel	Percent of Total Sales	
	Group 1	Group2
Home Improvement / Building Supply Centers	36.8%	0.7%
Independent Stocking Distributors	16.8%	0.0%
Dealers	23.9%	17.2%
Interior Designers	0.0%	3.8%
Builders and Remodelers	9.3%	61.8%
Direct to Homeowners	<0.1%	10.4%
Mass Merchants	1.1%	1.4%
Discount Mass Merchants	12.1%	4.4%
Company Owned Store or Factory Outlet	0.0%	0.3%
Total	100.0%	100.0%

The majority (74%) of Group 1 cabinet sales were in the form of face-frame kitchen cabinets. Bath cabinets were next, followed by frameless kitchen cabinets and other room cabinets. Figure 3.17 illustrates this breakdown.

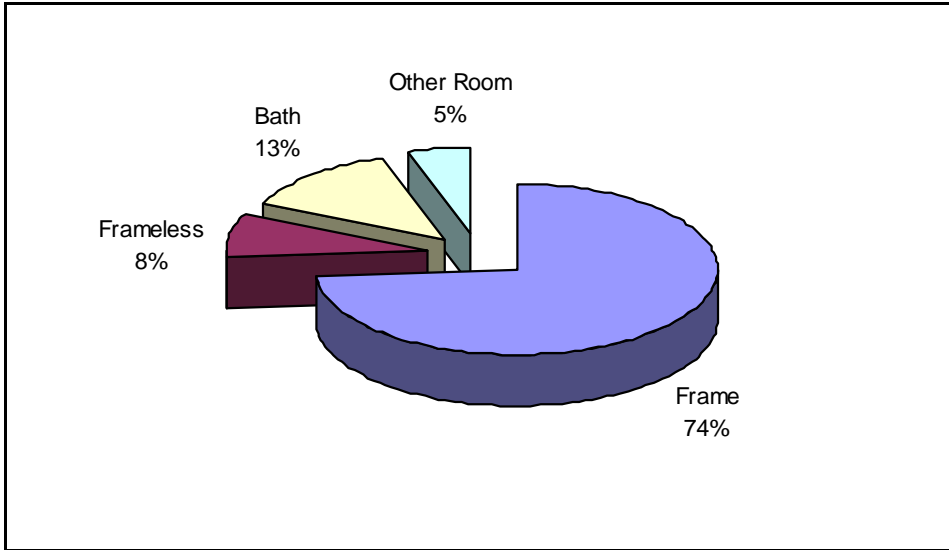


Figure 3.17. Estimated 1999 Group 1 cabinet sales by type

Group 2 company sales were not as skewed to face-frame kitchen cabinets as Group 1 companies, but it still represented the largest proportion at 38%. Frameless kitchen cabinets were also a sizable share at 26%. Other cabinets represented an estimated 18% of cabinet sales. Many respondents that reported this area were involved in commercial casework. Some respondents may have reported certain other room cabinets into this area as well. Estimated Group 2 cabinet sales are shown in Figure 3.18.

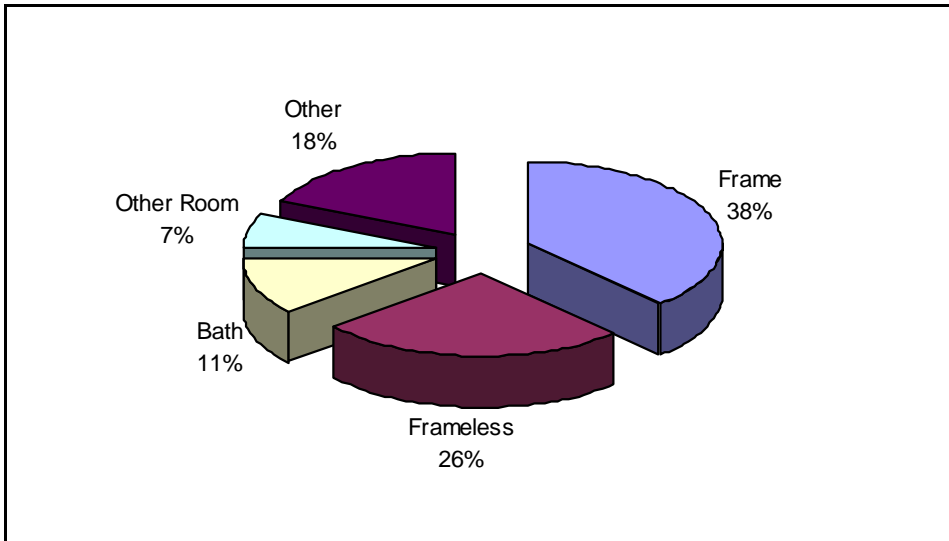


Figure 3.18. Estimated 1999 Group 2 cabinet sales by type

Sales by cabinet type for 2001 was predicted to remain virtually the same for both groups. This is shown in Table 3.22.

Table 3.22. Estimated 1999 and predicted 2001 cabinet sales by type

Cabinet Type	Group 1		Group 2	
	1999 Sales	Predicted 2001 Sales	1999 Sales	Predicted 2001 Sales
Face-Frame Kitchen Cabinets	74.2%	74.3%	37.8%	37.6%
Frameless Kitchen Cabinets	8.2%	7.1%	25.8%	25.8%
Bath Cabinets	13.3%	13.8%	10.7%	10.5%
Other Room Cabinets	4.3%	4.8%	7.5%	7.4%
Other	0.0%	0.0%	18.2%	18.7%
Total	100.0%	100.0%	100.0%	100.0%

Respondents were asked to give a breakdown of cabinet unit (individual boxes) widths produced by their company in 1999. The distribution of these widths is shown in Figure 3.19. It appears that 29-39" wide cabinets are the most commonly produced sizes for both groups. The distribution of other widths around this 29-39" category is fairly even and normal for both groups.

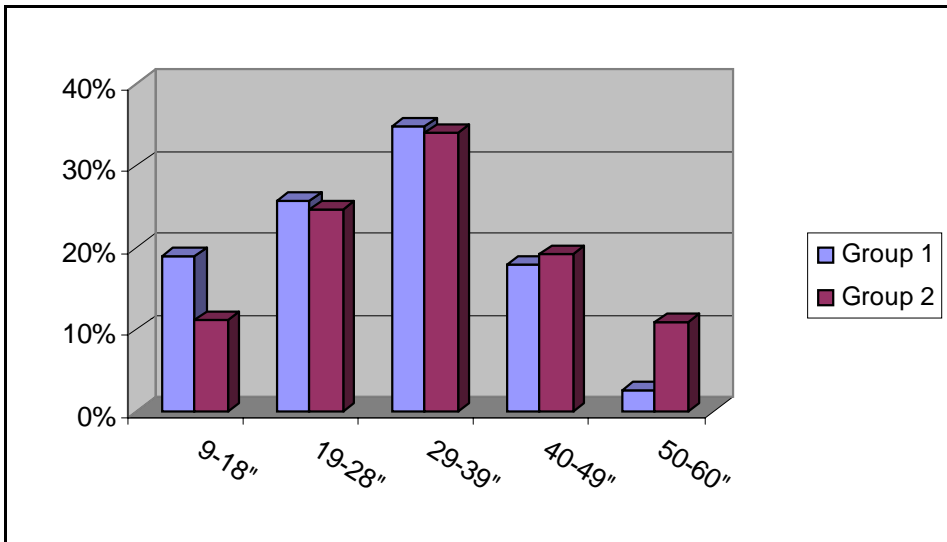


Figure 3.19. Distribution of cabinet unit (individual box) widths

Management Issues

Certified Products

Firms receiving questionnaire 1 were asked if they produced any certified (certified products are those which are produced using wood materials that are certified as being grown and harvested in a sustainable and environmentally friendly manner) cabinet products. Of thirteen Group 1 companies responding to this question, four (31%) said they did produce certified products. Two of the nine companies that indicated they didn't produce certified products said they see themselves beginning to produce certified products in the future. Of the sixty-nine Group 2 companies responded to this question, seven (10%) said they produce certified products. Nine of the sixty-two companies that didn't produce certified products said they see themselves beginning to produce certified products in the future.

For both groups the relative percentage of companies producing certified products was higher than expected. The researcher believes it is possible some companies did not read the question carefully and thought it dealt with product quality certification (i.e., KCMA certified products). It would be expected, however, that Group 1 companies would have a higher percentage of companies producing certified products, which was the case here.

Distribution channels may have some effect here. Group 1 companies distribute an estimated 37% of their products through home improvement and building centers. There is a push by some members of this channel (The Home Depot and Lowes) to increase their selection of certified wood products in all product categories. There has

been a large increase in these types of stores in the past decade with the growth of the repair and remodeling market. Group 1 companies that begin positioning themselves now to meet the demand of these large building supply/home improvement chains in the future will have an advantage in gaining more of their business. There is much less motivation for Group 2 companies to produce certified products. Most of their sales (71%) are through builders and remodelers and direct to homeowners, where currently the demand for this type of product does not exist.

Wood Substitutes

Respondents were asked if they have looked at using alternative materials to substitute for wood. Of thirteen Group 1 companies, five (39%) replied yes. Companies responding “yes” were asked to list what materials they were looking at. The list for these Group 1 companies included strawboard, urban waste MDF, plastic mouldings, and vinyl wrapped mouldings. Of seventy-one responding Group 2 companies, twenty (28%) replied yes. Substitute products they listed included strawboard, foam rubber trim, and plastic mouldings. A number of Group 2 companies listed plywood, particleboard, and MDF. This indicates that these companies consider these wood composites as wood substitutes.

It would be expected that a higher percentage of Group 1 companies have looked at wood substitutes. Their production characteristics and higher capital resources lend themselves toward developing the use of new substitute products. Wood product substitution will continue to get attention as the price of traditional wood products

increases. As markets become more price competitive it becomes increasingly difficult for manufacturers to pass higher raw material prices on to the consumer.

Outsourcing

Respondents were asked to indicate what percentage of parts they purchased from outside sources. All twelve Group 1 companies responding to this question said they purchased some percentage of parts from outside sources. Two companies indicated they purchased 100% of their parts from outside sources. Respondents were then asked if they plan to increase the amount of parts they purchase in the future. Six of the twelve Group 1 companies responded “yes”. Of sixty-eight Group 2 companies, forty-eight (70%) said they purchase some percentage of parts from outside sources. Twenty-one of these said they plan to increase the percentage of parts they purchase in the future.

Outsourcing is a trend that will continue in the cabinet industry. It is a tool that is heavily used by both large (Group1) and small (Group 2) companies. It facilitates greater production flexibility and allows for increased variety in product offerings without the hassle of increased inventory and expensive capital investment for new machinery.

Issues Facing Cabinet Industry

Companies were asked to rate their concern from 1 to 7 (1 = not concerned, 4 = some concern, 7 = very concerned) on the following management issues facing the cabinet industry: air quality regulations, finding qualified employees, keeping qualified employees, employee benefits (workman’s comp, health), price cutting by competitors, foreign competition, industry consolidation, wood supply, wood quality, increasing raw material prices, economy, and certified wood products movement. The mean rating for

each issue from groups 1 and 2 is shown in Figure 3.20. Group 1 had at least some concern for all issues except price cutting by competitors, certified wood products movement, industry consolidation, and foreign competition. Group 2 had at least some concern for all issues except certified wood products movement, industry consolidation, and foreign competition.

Because of the small sample size ($n = 14$) from Group 1, the non-parametric Mann-Whitney rank sum test was used to detect significant differences on mean rating of issues between groups. With an $\alpha = 0.05$ the only difference detected was on air quality regulations with a significance of 0.026. This indicated that Group 1 companies are more concerned with air quality regulations than Group 2 companies.

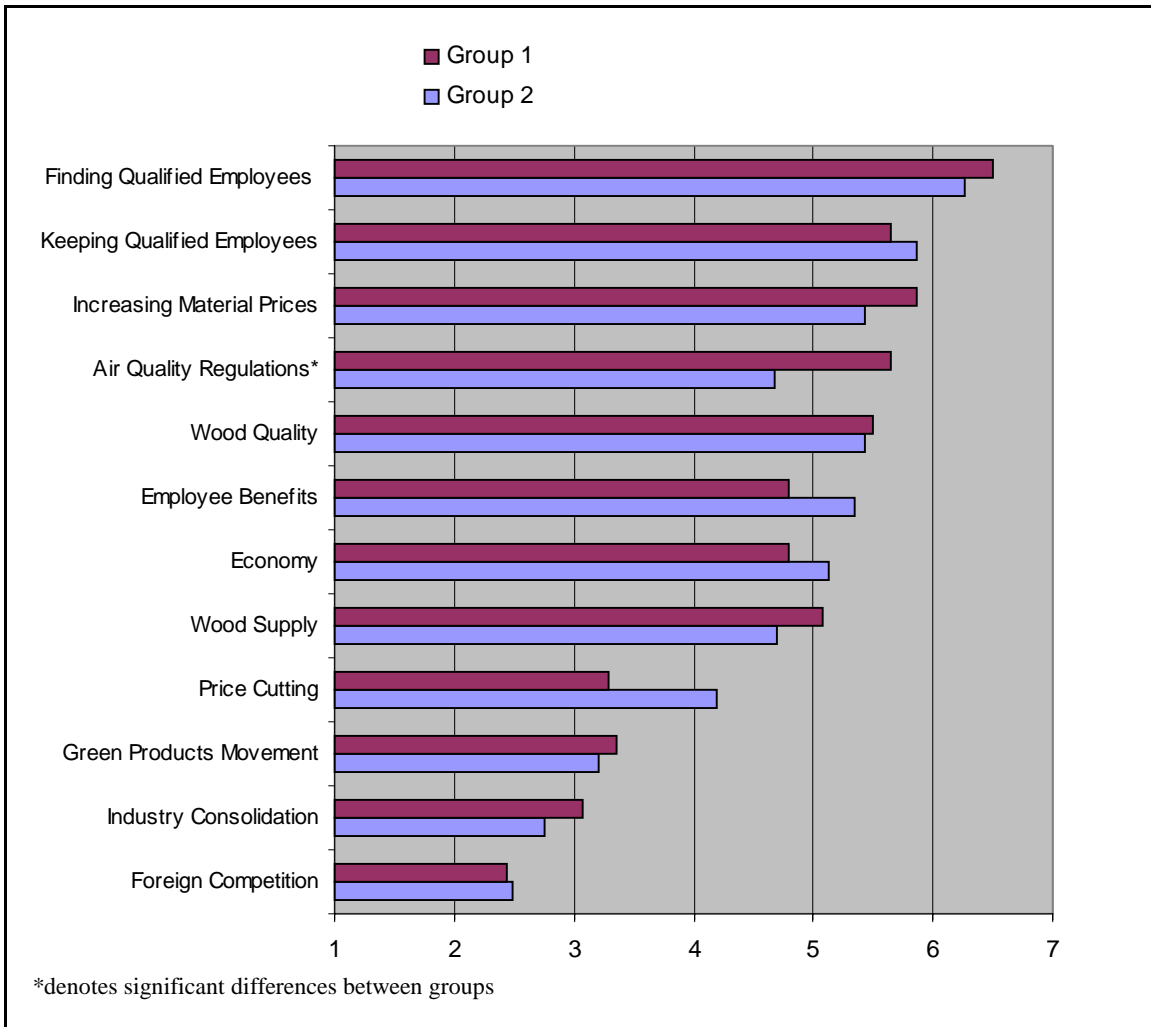


Figure 3.20. Mean rating of concern on issues facing cabinet industry

An ANOVA was run on each group to test for differences within groups on mean ratings of issues. For both groups it showed there were differences present. Tuckey's Hoestly Significant Difference post hoc test was run to differentiate between significantly different homogeneous subsets within each group. Table 3.23 for Group 1 and Table 3.24 for Group 2 show the issues that had like means according to Tuckey's HSD (alpha = 0.05). They show the top concerns of Group 1 companies to be finding qualified employees, increasing raw material prices, air quality regulations, keeping qualified employees, wood quality, and wood supply. The top concerns of Group 2 companies

were finding and keeping qualified employees, followed by increasing raw material prices, wood quality, employee benefits, and the economy.

Table 3.23. Homogeneous subsets for Group 1 ratings on current management issues

Issue (n = 14)	Mean Rating	Subsets (alpha=0.05)			
Finding Qualified Employees	6.5	*			
Increasing Raw Material Prices	5.9	*	*		
Air Quality Regulations	5.6	*	*		
Keeping Qualified Employees	5.6	*	*		
Wood Quality	5.5	*	*		
Wood Supply	5.1	*	*		
Economy	4.8		*	*	
Employee Benefits	4.8		*	*	
Green Products Movement	3.4			*	*
Price Cutting	3.3				*
Industry Consolidation	3.1				*
Foreign Competition	2.4				*

*indicate significantly different group means at an alpha level of 0.05 using Tuckeys Honestly Significant Difference test for homogeneous subsets.

Table 3.24. Homogeneous subsets for Group 2 ratings on current management issues

Issue	Mean Rating	Subsets (alpha=0.05)			
Finding Qualified Employees (n = 66)	6.3	*			
Keeping Qualified Employees (n = 67)	5.9	*	*		
Increasing Raw Material Prices (n = 67)	5.4		*	*	
Wood Quality (n = 68)	5.4		*	*	
Employee Benefits (n = 67)	5.3		*	*	
Economy (n = 68)	5.1		*	*	
Wood Supply (n = 66)	4.7			*	*
Air Quality Regulations (n = 68)	4.7			*	*
Price Cutting (n = 68)	4.2				*
Green Products Movement (n = 62)	3.2				*
Industry Consolidation (n = 67)	2.8				*
Foreign Competition (n = 64)	2.5				*

*indicate significantly different group means at an alpha level of 0.05 using Tuckeys Honestly Significant Difference test for homogeneous subsets.

Comparisons to Past Research

One way to analyze material tracking studies is to compare the results to similar studies done in the past. Two studies were performed at Virginia Tech in the early nineties that estimated wood material use in the U.S. cabinet industry. Punches (1993) estimated material use, purchases, and sales information for the cabinet industry as a whole in 1991, Hansen et al. (1995) estimated material use for the stock cabinet industry for 1993. Material estimates from those studies along with the estimates from this study are shown in Table 3.25.

Table 3.25. Comparison of past wood material cabinet studies

Material	Material Use		
	Punches 1991 (2)	Hansen et al. 1993 (1, 3)	Olah 1999
Hardwood Lumber (MMBF)	523.0	276.1	484.3
Softwood Lumber (MMBF)	71.6	33.6	24.8
Particleboard (MMSF, 1/2" basis)	846.6	411.4	1,044.4
Medium Density Fiberboard (MMSF, 1/2" basis)	114.1	54.5	116.4
Hardboard (MMSF, 1/8" basis)	162.7	93.0	106.6
OSB (MMSF, 1/2" basis)	1.2		1.3
Hardwood Plywood (MMSF, 3/8" basis)	294.0	284.8	279.3
Softwood Plywood (MMSF, 3/8" basis)	84.7	49.4	46.3
Cabinet Doors (million doors)	22.8	27.5	68.3
Edge-glued-panels Cut-to-size blanks (MMBF)	26.4	11.9	26.3
Other Cabinet parts (MMBF)	98.2		31.8
Veneer (any thickness)	93.1	13.8	155.6
Drawer Fronts (million pieces)		17.5	

1. The Hansen et al. study was only for stock (SIC 2434) cabinet manufacturers.
2. For the Punches study other cabinet parts were reported in million lineal feet.
3. For Hansen et al. study panel products were reported without assigned thicknesses.

Material estimations from Punches and Hansen et al. show some large and inconsistent differences despite being conducted only two years apart. Although Hansen et al. is specific for stock cabinet manufacturers, more consistency between the numbers would be expected since stock manufacturers make up the large majority of production (83% by sales in 1991 based on Punches study). This discrepancy is most likely

attributable to differences in sampling and estimation procedures. Punches study extrapolated material volumes based on sampling ratio's and Hansen et al. extrapolated material volumes based on employment. Due to similarities in sampling and extrapolation techniques in this study and the Hansen et al. study, comparisons could most appropriately be made between these two when analyzing material utilization estimates. Although panel thickness is not specified in the Hansen et al. study it is still useful for indicating overall trends.

It would be expected that use of all materials would have increased since 1993 given that cabinet production has grown 40% during the same time period (Iwanski and Koenig 2000). Volumes of hardwood lumber, particleboard, medium density fiberboard, components (cabinet doors, edge-glued-panels and cut-to-size-blanks, other cabinet parts), and veneer all show significant increases from the Hansen et al. study. Hardboard showed a slight increase. The high increase in component purchases may indicate an escalation in outsourcing (purchasing parts from outside sources), which at the same time could have an effect on hardwood lumber consumption. The more finished components firms purchase from outside sources, the less rough lumber they need to buy.

Some materials, however, show decreases in consumption. These include softwood lumber, hardwood plywood, and softwood plywood. The decline in the use of softwood lumber could be attributed to changes in consumer preferences as well as the increased use of soft hardwoods (i.e., poplar), which can substitute for softwood lumber for use such as shelving and internal framing material. The decline in the use of hardwood and softwood plywood is offset by dramatic (>100%) increases in particleboard, medium density fiberboard, and veneer use. Particleboard and medium

density fiberboard (both can be overlaid with veneer or other laminates) are less expensive than plywood and are possibly being used in applications where plywood (both hardwood and softwood) was traditionally used. Also, the increased use of laminated versus wood finished cabinets could have some effect here.

There have also been changes regarding species use from the earlier two studies to this one. Table 3.26 shows species percentages for the three major species; red oak, hard maple, and cherry. Red Oak was the dominant species in both the Punches and Hansen et al. studies at 73% and 75% respectively. This study estimates red oak use at 44%, a decrease of roughly 30%. The difference was made up by hard maple, with an increase of roughly 14%, and cherry, with an increase of roughly 5%. This is most likely the result of changes in consumer preferences and economic prosperity. As consumers have additional disposable income they are willing to pay extra for the higher priced species and a more customized appearance.

Table 3.26. Species comparison for past cabinet studies

Species	Percent of Total Hardwood Lumber		
	Punches 1991	Hansen et al. 1993 (1)	Olah 1999
Red Oak	72.6	74.7	43.8
Hard Maple	9.4	10.3	24.2
Cherry	4.8	3.7	9.9

1. Study only for stock cabinet manufacturers

There were minor differences in the overall breakdown of lumber grades used between the three studies. In all three studies the majority of lumber was 1-common, followed by FAS & Selects, and then 2-common. The Hansen et al. grades were skewed slightly more toward 1 and 2 common. This would be expected since it is specific to stock cabinet producers, which are typically larger and have production characteristics

that lend themselves to those grades. There did appear to be a decrease in the amount of 2-common lumber that was purchased between the two early studies and this study. This may be due to medium size producers increasing the customization of their operations, thus requiring a higher grade mix (i.e., 1-common and better). All studies showed virtually no below 2-common lumber being used. This is shown below in Table 3.27.

Table 3.27. Lumber grade comparison for past cabinet studies

Grade	Percent of Total Hardwood Lumber		
	Punches 1991	Hansen et al. 1993 (1)	Olah 1999
FAS & Selects	34.8	20.0	32.9
No. 1 Com	52.9	63.8	61.9
No. 2 Com	11.9	14.7	5.0
Blw No. 2 Com	0.4	1.6	0.2

1. Study only for stock cabinet manufacturers

Material purchases have shown some change from Punches study to this study. Over 80% of both lumber and panel products were purchased from wholesalers/distributors in 1991 according to Punches. This study has indicated that small and medium size companies (Group 2) still purchase the majority of their lumber and panel products through wholesalers/distributors. Larger companies (Group 1), however, appear to now purchase the largest percentage of their lumber and panel products direct from the manufacturer. Wholesalers/distributors are now the second most common source for Group 1 company's lumber and panel products. This may be a result of large companies, which typically buy in larger volumes, trying to save money by bypassing the middle men. With all of the consolidation that has occurred in the industry over the past decade there are a number of conglomerates that have substantial buying power to do just that. Also, a higher percentage of primary processors may be drying their own lumber to add more value to the product.

Due to differences in the reporting of sales channel data it is difficult to make direct comparisons between Punches study and this study. However, the biggest change appears to be increased sales through home improvement/building supply centers. In 1991 Punches showed 11% of stock cabinet sales going through this channel. This study showed that Group 1 companies are selling approximately 37% of their products through this channel. This is most likely the result of the increase in the repair and remodeling market over the past decade. This has fueled the growth of these types of stores. The Home Depot, the industry leader, has increased the number of stores they operate from 145 in 1990 to 761 in 1998, and hope to have over 1,600 stores in operation by 2002 (The Home Depot Annual Report 1998). These types of stores give manufacturers the opportunity to get their product in front of large numbers of people. As this market continues to grow cabinet producers will likely increase the amount of products they sell through this channel.

Cabinet sales by type continue to be primarily face-frame kitchen cabinets. This was the case for both Punches study and this study. Only a slight change was seen as other room and other cabinets held a higher percentage of sales in this study. The majority of this change was exhibited by Group 2 manufacturers, which indicated that 25% of sales were in the form of other room or other cabinet types. Punches only showed 6% of stock and 15% of custom cabinet sales designated as other cabinets. This is likely due to increased customization being offered by these medium and smaller Group 2 companies. They are branching out from the typical kitchen and bath segments to help create a niche and compete effectively against larger more efficient producers.

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Chapter 4

Research Summary

The objectives of this project were to assess wood based material use by the U.S. cabinet industry and evaluate current management issues facing the industry. The sample frame was stock and custom cabinet manufacturers. For this study the population was separated into two groups. Group 1 was cabinet manufacturers having over \$20 million in annual sales. Group 2 was cabinet manufacturers having less than \$20 million in sales and over ten employees. A census was attempted for Group 1 and a random sample of 1,034 companies was drawn from Group 2. A three page questionnaire was developed based on the objectives of the project. Group 1 companies were contacted by phone and sent the questionnaire via fax. Group 2 companies were sent the questionnaire via direct mail. Of the Group 2 sample frame, one-half received a condensed one page questionnaire and one-half received the original questionnaire. This was done for the purpose of increasing the response rate from Group 2 companies.

Usable questionnaires were received from nineteen Group 2 companies. Average sales and employment from these respondents was \$125.8 million and 1,108 respectively. Group 2 companies returned 215 usable questionnaires. Approximately one-third were long questionnaires and two-thirds were short questionnaires. This resulted in an adjusted response rate of 24%. Average sales and employment for Group 2 companies were \$2.3 million and 27 respectively.

Total hardwood lumber consumption by the cabinet industry was estimated to be approximately 484 million board feet. This was divided almost evenly between Group 1 and 2. The South accounted for the majority (38%) of this use. Most (95%) of the hardwood lumber purchased was grade 1-common or better. Group 1 companies used more 1-common, and Group 2 companies used more FAS & Selects. The most commonly used species was red oak, followed by hard maple and cherry. Group 1 companies used primarily red oak and hard maple, which accounted for over 80% of purchases. Group 2 companies used a wider variety of species, with red oak, hard maple, cherry, and ash comprising 77% percent of purchases. Regionally, red oak was followed by hard maple as the most common species (in all cases). The South had the greatest volumes of all major species except for hard maple, in which case the Midwest consumed the most. Softwood lumber consumption was small in comparison to hardwood lumber, with 1999 use estimated at about 25 million board feet. Most of this consumption was by Group 2 companies, with white and southern yellow pine being the most common species.

Cabinet producers purchased an estimated 68,344 cabinet doors and 58 million board feet of edge-glued-panels, cut-to-size blanks, and other cabinet parts. Most of these component purchases were by Group 2 companies. Regionally, the South and West accounted for most (70%) component use. Using assumptions outlined in chapter 3 it is possible to estimate the volume of hardwood lumber that was used to produce these components. Based on these assumptions it was estimated that 358 million board feet of hardwood lumber went into the production of components purchased by the cabinet industry in 1999. When combined with the volume of hardwood lumber directly

purchased by the industry it can be estimated that the cabinet industry accounts for the consumption of roughly 843 million board feet of hardwood lumber.

Panel products were also used in large volumes by the cabinet industry. An estimate one billion square feet of particleboard (1/2" basis) was purchased in 1999. Other panel products used by the industry were hardwood plywood (279 million, 3/8" basis), medium density fiberboard (116 million, 1/2" basis), hardboard (107 million, 1/8" basis), and softwood plywood (46 million, 3/8" basis). Oriented strandboard use was minimal. Additionally, 156 million square feet (all thicknesses) of veneer was purchased. Group 1 companies used more particleboard and veneer, while Group 2 companies used the majority of hardwood plywood, softwood plywood, and hardboard. Medium density fiberboard use was nearly equal between both groups. The South accounted for the highest volume of panel product consumption, while the Midwest used the largest amount of veneer.

Groups 1 and 2 exhibited different buying patterns for materials. Purchases direct from the manufacturer was the most common source for both lumber and panel products for Group 1 companies. In both cases wholesalers and distributors followed this as the next common source for Group 1 companies. Group 2 companies purchased the majority of their lumber and panel products from wholesalers and distributors.

The most common used sales techniques for companies in both Group 1 and 2 were factory sales people. Home improvement/building supply centers and dealers were the most frequently used sales channels by Group 1 companies. Group 2 companies sold their products primarily through builders and remodelers. Sales by cabinet type were primarily face-frame kitchen cabinets for Group 1. Group 2 sold predominately face-

frame kitchen cabinets as well, but also showed a substantial percent of frame-less kitchen and other cabinets. Bath cabinet sales were over ten percent for both groups. The most common sold cabinet box size was in the 29-39” range.

Thirty-one percent of Group 1 and 10% percent of Group 2 respondents reported producing certified (green) products. For both groups the relative percentage of firms producing certified products seemed high. It is possible that respondents did not fully read the question and thought it referred to product quality certification (i.e, KCMA certified products). It would be expected however, that a higher percentage of Group 1 companies were producing certified products.

When asked about wood substitutes, 39% of Group 1 and 28% of Group 2 companies replied they had considered using alternative materials to substitute for wood. The most commonly listed examples were strawboard, urban waste MDF, and plastic mouldings. Several Group 2 companies actually listed products such as plywood and particleboard, indicating they consider these wood composite products to be wood substitutes.

Every Group 1 respondent indicated that they outsource for some parts, while 70% of Group 2 companies reported they outsource for some parts. Roughly one-half of these from each group said they plan on increasing the amount of parts they purchase from outside sources (outsource) in the future.

Companies from both groups were asked to rate their concern on twelve different management issues currently facing the cabinet industry. Top concerns were finding and keeping qualified employees, increasing raw material prices, wood quality, and air quality

regulations. The only significant difference found between groups on any issue was for air quality regulations, in which case Group 1 companies were more concerned.

Changes and Trends From Past Studies

Due to similarities in sampling and extrapolation techniques, material estimations from this study are most comparable to the Hansen et al. (1995) study done for the year 1993. Although it is specific to the stock cabinet industry, it is still useful for indicating trends since stock manufacturers comprise the majority of cabinet production (83% by sales in 1991 based on Panches study). Estimated volumes for all materials in this study except softwood lumber, hardwood plywood, and softwood plywood showed substantial increases from the Hansen et al. (1995) study. It is likely that particleboard and medium density fiberboard, both of which more than doubled in consumption, are being used for some applications that hardwood and softwood plywood were being used for. The decrease in softwood lumber consumption is likely due to changes in consumer preferences and increased use of soft hardwoods (i.e., poplar) in applications such as shelving and internal framing.

Significant changes in species mix were identified between the earlier study done by Panches (1993) and Hansen et al (1995). For these earlier studies red oak was the dominant species, comprising roughly 74% of use. This study showed red oak use at 44%. It also estimated hard maple and cherry use at 24% and 10% respectively. This was more than twice as high as the figures cited in both previous studies. This is likely attributable to changes in consumer preferences and a desire for more customized appearances in cabinets. Lumber grades remained similar between all studies with the

majority being grade 1-common or better. However, this study did indicate a slight shift away from 2-common lumber.

Material purchases were similar between past studies and Group 2 companies from this study, with both lumber and panel product purchases coming primarily from wholesalers/distributors. In this study Group 1 companies showed a shift toward purchasing materials (both lumber and panel products) direct from the manufacturer. This is likely due to the higher volumes that larger (Group 1) companies purchase. Also, many Group 1 companies now dry their own lumber. The most significant change in sales channels also occurred with Group 1 companies, which tripled the percentage of products they sell through home improvement/building centers to 37%. This is likely due to the increase in size of the repair and remodeling market, which has fueled recent growth in these types of stores. All studies showed face-frame kitchen cabinets as the most commonly sold cabinet type. This study did show other room and other cabinets as having increased proportions of sales for Group 2 companies when compared to the past two studies.

Conclusions

1999 was a great year for cabinet producers. Fueled by recent economic prosperity cabinet production was nearly eighty million units (Table 1.1, Figure 3.1). The materials purchased most often for the production of cabinets were hardwood lumber, particleboard, and hardwood plywood. Other materials used in large quantities by the industry were veneer, medium density fiberboard, and hardboard. Additionally, large volumes of components (doors, edge-glue-panels, cut-to-size blanks, and other cabinet

parts) were purchased in 1999. The majority of the hardwood lumber used was grade 1-common or better and the most common used species was red oak at 44% percent. Other species used in considerable quantities were hard maple (24%) and cherry (10%). Most companies showed optimism towards the future. Purchases for all materials previously mentioned, except for medium density fiberboard, were predicted to increase at least 10% for 2001.

Groups 1 and 2 exhibited interesting, but not surprising differences in the following areas: material use, material sources, sales channels, and cabinet production type. Both groups 1 and 2 used approximately the same volume of hardwood lumber. The grades and species of this lumber, however, showed some differences. Group 2 companies used primarily FAS & Selects as opposed to 1 common that was predominately used by Group 1 companies. Group 2 companies also used a wider range of species than Group 1. This is likely attributable to the production characteristics of the manufacturers. Group 2 companies generally offer a more customized product than Group 1 companies. A higher grade of lumber yields them more flexibility and is easier to work with for customized orders. The higher variation in species mix is also result of this, as well as consumer preferences. Generally, when consumers want a highly customized set of kitchen cabinets, they go to the smaller and medium size shops (Group 2 companies). With regard to other material use, Group 1 companies appeared to use larger volumes of particleboard and veneer. Group 2 companies appeared to use higher volumes of hardwood plywood, softwood plywood, medium density fiberboard, hardboard, and components.

Differences between groups were also present when analyzing their sources of materials. Group 1 companies primarily purchased their materials (both lumber and panels) direct from the manufacturer. Group 2 companies purchased the largest percentage of their materials (both lumber and panels) from wholesaler/distributors. This difference is largely due to the volume of materials that are being purchased. Group 1 companies purchase their products in higher quantities than Group 2 companies. Also, many group 1 companies are now drying their own lumber.

This type of information regarding the material purchasing behavior of cabinet manufacturers is important to companies that supply this industry with materials. It can be used to strategically market products to cabinet manufacturers. For instance, a wholesaler/distributor that sells mostly high grade lumber of various species in smaller quantities would want to consider targeting Group 2 cabinet manufacturers. Conversely, manufacturers that sell particleboard or lumber in large quantities might want to target Group 1 cabinet manufacturers. By analyzing the information gathered in this research, suppliers to the industry can see where opportunities may be present to increase their sales.

The sales channels used by Groups 1 and 2 were also different. Home improvement/building supply centers were the most frequently used sales channel by Group 1 companies while Group 2 companies sold their products primarily through builders and remodelers. This could have something to do with the volumes these companies are selling. Home improvement/building supply centers typically like to deal with companies that are in a position to supply them with large volumes, as is the case with Group 1 companies. Also, this channel gives Group 1 companies the opportunity to

get their product directly in front of consumers. Group 2 companies typically fill custom orders, which is often done through builders and remodelers. Sales by cabinet type were primarily face-frame kitchen cabinets for Group 1. Group 2 sold predominately face-frame kitchen cabinets as well, but also showed a substantial percent of frame-less kitchen and other cabinets. The larger variation in cabinet type for Group 2 companies is likely attributable to the higher degree of customization offered by these companies.

Certified (green) products were reportedly produced by a limited number of firms in both Groups 1 and 2, with a higher percentage being reported by Group 1 companies. Currently there is not much demand for this type of product. However, there is a push by some large home improvement/building supply centers (i.e., Home Depot and Lowes) to begin increasing the amount of certified products they offer. This may lead to increased production of certified cabinets in the future, particularly by Group 1 companies, which sell a large percentage of their product through this channel.

Wood substitute materials are being looked at by the cabinet industry. This is most likely a result of increasing raw material prices, which was cited by both groups as being a top concern. Some of the materials mentioned by companies were wheatboard, urban waste MDF, and plastic mouldings. Alternative materials will continue to get more consideration from producers in the future as the price of raw materials increase.

Based on respondents, the majority of wood cabinet producers are outsourcing for at least some of their parts. Many indicated that they intend to increase this practice in the future. As consumers continue to demand more styles and variety, outsourcing is a way for companies to expand their selection and production capabilities without making

large capital expenditures on new equipment. It is a practice that will likely increase in the future.

Major concerns of cabinet producers included finding and keeping qualified employees, increasing raw material prices, air quality regulations, wood quality and supply, employee benefits, and the economy. These are shared by both Group 1 and 2 companies. It appeared that Group 1 companies were more concerned with air quality regulations than Group 2 companies. This is probably because they are more abreast of the possibility of new and future regulations that could affect their company.

Employment problems were rated highly by both groups. This is attributable in some part to the recent economic prosperity, which has subsequently increased wages and decreased unemployment, which makes it difficult to find labor. Also, as companies are incorporating more technology driven equipment (i.e., programmable CNC routers) it is difficult to find employees who possess the necessary skill level to operate this machinery efficiently. As concern over increasing raw material prices rise, companies will begin to look at less expensive products to substitute for wood. This study has shown that some companies from both Groups 1 and 2 have already begun to give these consideration.

Wood supply and quality are concerns shared by any manufacturer that works with higher grades of lumber, as is the case with the cabinet industry.

Limitations to the Study

Estimations based on survey data from a large population should be looked at cautiously. A number of factors can affect the results. These include, but are not limited to, the characteristics of the population, response rate, and extrapolation methods. For

this study kitchen cabinet manufacturers were being analyzed. This is a fragmented industry where there are a relatively small number of large manufacturers and a relatively large number of small to medium size manufacturers. For this reason the population was stratified based on size and sampled accordingly.

Measures were taken by the researcher to try to increase the response rate, which ended at 24%. Non-response tests indicated that Group 2 respondents may use lower volumes (per employee) of hardwood plywood than non-respondents. This may cause the study to underestimate hardwood plywood consumption. Overall, however, non-response bias was not viewed as a serious problem in this study.

The extrapolation method used for this study was based on employment. That is, material consumption per employee was determined for respondents and extrapolated based on estimated total employment for each group. Group estimates were then summed to determine overall material consumption. Past studies of this type have used different methods to determine material use (i.e., Panches 1993, Hansen and West 1998). This may explain some of the variation in estimates between studies. In general, estimates of overall market consumption can be made with greater precision than estimates related to a particular segment. The same is true for this study, where overall industry estimates should be viewed as more reliable than regional estimates.

Literature Cited

Hansen, B. and C. West. 1998. Trends in Domestic Hardwood Markets. Hardwood Symposium Proceedings. May 6-9, 9 pages.

Hansen, E., V. S. Reddy, J. Punches, and R. Bush. 1995. Wood Material Use in the US Cabinet Industry: 1993-1995. Center for Forest Products Marketing, Virginia Polytechnic Institute and State University. 18 pages.

Punches, J. W. 1993. Wood Materials Use in the US Cabinet Industry: 1991-1993. Masters Thesis. September, Virginia Polytechnic Institute and State University, Blacksburg. 92 pages.

Appendix: Survey Questionnaires and Cover Letters

**Virginia Tech Center for Forest Products Marketing
Cabinet Manufacturer Study**

This questionnaire is designed to gain a better understanding of exactly how much and what kind of wood based materials the cabinet industry uses. This type of information is important not only for you and your suppliers, but it also helps to demonstrate the significance of the cabinet industry to local economies. It will also aid in identifying and addressing some current issues and challenges that are going to affect you in the future. Please take a few minutes to answer the following questions. Your participation in this study is very important and greatly appreciated. *Thank you.*

1. Is your company involved in the production of wood cabinets?

- yes ⇒ please continue on with questionnaire.
- no ⇒ please fold, tape, and return questionnaire, the postage is pre-paid. Thank you.

2. Please check the one box that best describes what type of cabinets your firm manufactures.

- stock cabinets
- custom cabinets
- semi-custom cabinets
- other: _____

For all questions relating to material use, production, sales, and company information please respond only for your individual facility.

3. Please estimate the volumes of the following materials purchased by your company for the manufacture of cabinets in 1999, and predict those volumes for 2001. (Please treat laminated products as their substrates, i.e. list laminated particleboard as particleboard.)

<u>Wood Material</u>	<u>Purchased in 1999</u>		<u>Predicted purchases in 2001</u>
Hardwood Lumber	_____	MBF (1000 board feet)	_____
Softwood Lumber	_____	MBF (1000 board feet)	_____
Particleboard	_____	MSF (1000 sq. feet) 1/2" basis*	_____
Medium Density Fiberboard	_____	MSF 1/2" basis*	_____
Hardboard	_____	MSF 1/8" basis*	_____
Oriented Strandboard	_____	MSF 1/2" basis*	_____
Hardwood Plywood	_____	MSF 3/8" basis*	_____
Softwood Plywood	_____	MSF 3/8" basis*	_____
Cabinet Doors	_____	Thousand Doors	_____
Edge-Glued Panels or Cut-to-Size Blanks	_____	MBF (1000 board feet)	_____
Other Cabinet Parts	_____	MBF (1000 board feet)	_____
Veneer	_____	MSF (any thickness)	_____

* Basis refers to the thickness of the material. If the material you purchase does not match the basis shown, please indicate the basis you are using.

4. Please indicate what percentage of total lumber volume your firm purchased for the production of cabinets for each of the following species of hardwoods and softwoods for this past year and predicted percentages for the year 2001.

Species	1999 %	expected 2001 %
Red Oak	_____ %	_____ %
White Oak	_____ %	_____ %
Ash	_____ %	_____ %
Hard Maple	_____ %	_____ %
Soft Maple	_____ %	_____ %
Cherry	_____ %	_____ %
Birch	_____ %	_____ %
Hickory/Pecan	_____ %	_____ %
Walnut	_____ %	_____ %
Alder	_____ %	_____ %
Imported Hardwoods	_____ %	_____ %
Other: _____	_____ %	_____ %
Total Hardwoods =	100%	100%
Southern Yellow Pine	_____ %	_____ %
White Pine	_____ %	_____ %
Imported Softwoods	_____ %	_____ %
Other: _____	_____ %	_____ %
Total Softwoods =	100%	100%

5. What was the grade mix of the *Hardwood Lumber* you purchased for cabinet production in 1999?

_____ % FAS & Selects _____ % No. 1 Common
 _____ % No. 2 Common _____ % Below No. 2 Common
 Total = 100%

6. Please indicate the percentage of your wood material purchases (\$) made through each of the following sources.

Lumber Purchases

_____ % Lumber Wholesaler/Distributor
 _____ % Lumber Retailer
 _____ % Lumber Broker
 _____ % Direct from Sawmill
 _____ % Lumber Importer
 _____ % Other: _____
 Total = 100%

Panel Product Purchases

_____ % Panel Products Wholesaler/Distributor
 _____ % Panel Retailer
 _____ % Panel Products Broker
 _____ % Direct from Manufacturer
 _____ % Panel Products Importer
 _____ % Other: _____
 Total = 100%

7. Please estimate the percentage of your total sales made through the following sales people from the factory to the next step in the distribution channel?

_____ % Factory Sales-People
 _____ % Manufacturer's Representatives
 _____ % Other: _____
 _____ % Other: _____
 Total = 100%

8. Please estimate the percentage of your company's total cabinet sales (\$) made to each of the following.

_____ % Home Improvement/Building Supply Centers
 _____ % Independent Stocking Distributors
 _____ % Dealers
 _____ % Interior Designers
 _____ % Builders and Remodelers
 _____ % Direct to Homeowners (mail/phone order, etc.)
 _____ % Mass Merchants (Sears, J.C. Penny's, etc.)
 _____ % Discount Mass Merchants (Wal/K-Mart, etc.)
 _____ % Company Owned Store or Factory Outlet
 _____ % Other: _____
 Total = 100%

9. Please indicate the percentage of your company's total sales (\$) in 1999 and predicted sales in 2001 that fall into the following categories.

	1999	expected 2001
Face Frame Kitchen Cabinets	_____ %	_____ %
Frameless Kitchen Cabinets	_____ %	_____ %
Bath Cabinets	_____ %	_____ %
Other Room Cabinets	_____ %	_____ %
Other: _____	_____ %	_____ %
Total = 100%		

10. How many total cabinet units did your company produce in 1999?

_____ units

11. Please estimate the percentage breakdown of cabinet unit widths produced by your company in 1999.

9"-18" _____%

19"-28" _____%

29"-39" _____%

40"-49" _____%

50"-60" _____%

Total = 100%

12. Does your company produce any certified cabinet products? (certified products are those which are produced using wood materials that are certified as being grown and harvested in a sustainable and environmentally friendly manner)

- yes
 no

13. Do you see your company either beginning to produce or increasing the current production certified products in the future?

- yes
 no

14. Has your company considered using alternative materials to substitute for wood?

- yes
 no

If yes, what types of materials?

15. What percentage of parts does your company purchase from outside sources for the production of cabinets?

_____ %

16. Do you think your company will increase the amount of parts it purchases from outside sources in the future?

- yes
 no

17. How strong is your concern on the following issues facing the cabinet industry?

	Not Concerned	Some Concern	Very Concerned
Air Quality Regulations	1	2	3 4 5 6 7
Finding Qualified Employees	1	2	3 4 5 6 7
Keeping Qualified Employees	1	2	3 4 5 6 7
Employee Benefits (Workman's Comp./Health)	1	2	3 4 5 6 7
Price Cutting by Competitors	1	2	3 4 5 6 7
Foreign Competition	1	2	3 4 5 6 7
Industry Consolidation	1	2	3 4 5 6 7
Wood Supply	1	2	3 4 5 6 7
Wood Quality	1	2	3 4 5 6 7
Increasing Raw Material Prices	1	2	3 4 5 6 7
Economy	1	2	3 4 5 6 7
Certified Wood Products Movement	1	2	3 4 5 6 7
Other: _____	1	2	3 4 5 6 7

18. What was the total number of full-time employees (management, sales, manufacturing, etc.) in your company's cabinet operations during 1999?

_____ Full-time employees

19. What were the total sales of your company's cabinet operations in 1999?

\$ _____

20. If you feel there are any concerns or issues you have that were not addressed by this questionnaire please feel free to list them in the space below.

Thank you for your help! This information will be kept confidential. Please fold, tape, and return the questionnaire. The postage is pre-paid.

**Virginia Tech Center for Forest Products Marketing
Cabinet Manufacturer Study**

This questionnaire is designed to gain a better understanding of exactly how much and what kind of wood based materials the cabinet industry uses. This type of information is important not only for you and your suppliers, but it also helps to demonstrate the significance of the cabinet industry to local economies. Please take a few minutes to answer the following questions. Your participation in this study is very important and greatly appreciated. *Thank you.*

1. Is your company involved in the production of wood cabinets?

yes ⇒ please continue on with questionnaire.
 no ⇒ please fold, tape, and return questionnaire, the postage is pre-paid. Thank you.

2. Please check the one box that best describes what type of cabinets your firm manufactures.

stock cabinets custom cabinets
 semi-custom cabinets other _____

3. Please estimate the volumes of the following materials purchased by your company for the manufacture of cabinets in 1999. (Please treat laminated products as their substrates, i.e. list laminated particleboard as particleboard.)

<u>Wood Material</u>	<u>Purchased in 1999</u>
Hardwood Lumber MBF (1000 board feet)	_____
Softwood Lumber MBF (1000 board feet)	_____
Particleboard MSF (1000 sq. feet) 1/2" basis*	_____
Medium Density Fiberboard MSF 1/2" basis*	_____
Hardboard MSF 1/8" basis*	_____
Oriented Strandboard MSF 1/2" basis*	_____
Hardwood Plywood MSF 3/8" basis*	_____
Softwood Plywood MSF 3/8" basis*	_____
Cabinet Doors (Thousand Doors)	_____
Edge-Glued Panels or Cut-to-Size Blanks MBF (1000 board feet)	_____
Other Cabinet Parts MBF (1000 board feet)	_____
Veneer MSF (any thickness)	_____

* Basis refers to the thickness of the material. If the material you purchase does not match the basis shown, please indicate the basis you are using.

4. Please indicate what percentage of total lumber volume your firm purchased for the production of cabinets for each of the following species for this past year.

Red Oak _____%	White Oak _____%
Ash _____%	Hard Maple _____%
Soft Maple _____%	Cherry _____%
Birch _____%	Hickory/Pecan _____%
Walnut _____%	Alder _____%
Other: _____%	
Total Hardwoods = 100%	
White Pine _____%	
Southern Yellow Pine _____%	
Other: _____%	
Total Softwoods = 100%	

5. What was the grade mix of the Hardwood Lumber you purchased for cabinet production in 1999?

_____ % FAS & Selects _____ % No. 1 Common
 _____ % No. 2 Common _____ % Below No. 2 Common

Total = 100%

6. How many total units did your company produce in 1999?

_____ units

7. What was the total number of full-time employees (management, sales, manufacturing, etc.) in your company's cabinet operations during 1999?

_____ Full-time employees

8. What were the total sales of your company's cabinet operations in 1999?

\$ _____

Thank you for your help! This information will be kept confidential. Please fold, tape, and return the questionnaire. The postage is pre-paid.



VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

**CENTER FOR FOREST PRODUCTS
MARKETING AND MANAGEMENT**

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March 21, 2000

Jack Daniels
JD's Cabinet Shop
111 Bourbon St.
Lexington, KY 12345

Dear Mr. Daniels,

As a producer of wood cabinets your company plays an important role in your local economy. It is also an integral part of the U.S. forest products industry. The cabinet industry consumes large volumes of wood based products in addition to employing thousands of people. Few individuals, including government decision-makers, understand the significance of your industry to both the local and overall U.S. economy.

The Center for Forest Products Marketing and Management at Virginia Tech is currently trying to change this by better understanding your industry. The enclosed questionnaire is part of a study examining the U.S. wood cabinet industry. It asks questions regarding material use and production information.

An improved understanding of the materials used by the wood cabinet industry will benefit you in several ways. First, it will help to quantify the significance of the industry to the U.S. economy. Second, it will enable suppliers to better meet your needs. Third, it will provide companies such as yours with industry information to serve as benchmarks for comparison.

Since we can only contact a limited number of producers your response is *very important* to the successful completion of this study. Please complete the entire questionnaire and return it as soon as possible. The information you provide will be held in strict confidence. The number on the questionnaire is for administrative purposes only and will allow us to remove you from the mailing list once we have received your questionnaire. The final report will contain only group averages and totals, with no mention of individual companies.

Thank you very much for your help. If you have any questions please contact me at (540) 231-5876 or dolah@vt.edu.

Sincerely,

David Olah
Graduate Research Assistant
Center for Forest Products Marketing and Management, Virginia Tech

*A Land-Grant University - The Commonwealth Is Our Campus
An Equal Opportunity / Affirmative Action Institution*

Cover Letter

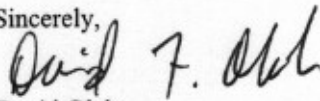
Dear Manufacturer:

I need your help! Approximately two weeks ago I mailed you a questionnaire which asked material use and production information for your company. This questionnaire is an important part of a study being conducted by the Center for Forest Products Marketing and Management. This study is designed to better understand the material requirements of the cabinet industry and demonstrate its importance to the economy.

I am contacting you to ask that you complete the questionnaire. If you have already returned it, please accept my appreciation and disregard this postcard. If not, please take a few minutes to fill the questionnaire out at this time.

Your response is critical to the successful completion of this study. Should you have any questions please contact me at (540) 231-5876. Thank you in advance for your participation.

Sincerely,



David Olah

Graduate Research Assistant

Center for Forest Products Marketing and Management, Virginia Tech

Reminder Post Card

Vitae

David Frank Olah, son of Frank and Susan Olah, was born in Washington, North Carolina on December 11, 1975. After graduating from Rustburg High School in Virginia in 1994, he earned his B.S. in Wood Science and Forest Products from Virginia Polytechnic Institute and State University in 1998. He continued his education by earning a M.S. in Wood Science and Forest Products from Virginia Polytechnic Institute and State University in 2000. Mr. Olah will begin his career in the industry with the Hardwood Division of Georgia Pacific Corporation in Atlanta, Georgia.