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AN ANALYSIS OF COMPETITION AND DISTRIBUTION IN THE TENNESSEE STRUCTURAL COMPOSITE MARKET

A Thesis

Presented for the

Master of Science

Degree

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ABSTRACT

The Tennessee hardwood timber resource has opportunity for increased use. Establishment of a structural composite panel plant in Tennessee would provide new markets for Tennessee hardwoods. The purpose of this study is to begin a Market Opportunity Analysis (MOA) to assess the opportunity of success for a structural composite panel plant in Tennessee. A channel and competition analysis were the two parts of a MOA completed for this study.

The market share of structural composite panels at the retail and intermediary level of the Tennessee market is approximately 31 percent. A majority of the panels produced and distributed to the Tennessee market were in the 7/16" thickness category. Nineteen manufacturers sold panels in Tennessee markets. Of the structural composite panels produced 75.9 percent were Oriented Strandboard (OSB) and the remainder (24.1 percent) waferboard.

Rail is the major mode of transport manufacturers use to ship structural composite panels (58.2 percent), and a majority of panels (63.1 percent) are shipped to intermediaries via the same mode. However 94.3% of retailers receive their panels via truck.

As the go-between for manufacturers and retailers, intermediaries perform two important functions in the channel: 1) facilitate the transport of structural composite panels and 2) reduce bulk loads from manufacturers into smaller shipment for distribution to retailers (break-bulk).

It is concluded that the marketing scheme of a potential

Tennessee manufacturer should target intermediaries. Very few panels are shipped directly from manufacturers to consumers. Most panels (89.9%) are shipped to intermediaries for distribution.

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CHAPTER I

INTRODUCTION

The Tennessee Resource

The state of Tennessee has an abundant hardwood resource. Approximately 85 percent of Tennessee timber is hardwood and consists mainly of white and red oaks, hickories, hard and soft maples, gums, yellow-poplar and beech (Birdsey, 1983).

There are a total of 12,879,000 acres of forest land in the state (Figure 1). Publicly-owned land accounts for nine percent of the forest land; nine percent is owned by industry; 35 percent by farmers and; the remainder, 46 percent, by miscellaneous private forest landowners (Birdsey, 1983).

The growing stock in the state consists of 10.4 billion cubic feet of hardwoods and 2.4 billion cubic feet of softwoods.[1] Approximately 50 percent of the hardwood growing stock and 61 percent of the softwood growing stock is sawtimber (Figure 2) (Birdsey, 1983).[2]

Currently the growing stock in the state is increasing by 40 cubic feet per acre annually or by 511.4 million cubic feet state-wide (Birdsey, 1983).

---

[1]Growing stock is defined as sawtimber trees, poletimber trees, saplings, and seedlings; all live trees of commercial species except rough and rotten.(Source: Birdsey, 1983)

[2]Sawtimber trees are defined as live trees of commercial species, 9.0 inches and larger in dbh for softwoods and 11.0 inches and larger for hardwoods, containing at least one 12-foot saw log.(Source: Birdsey, 1983)

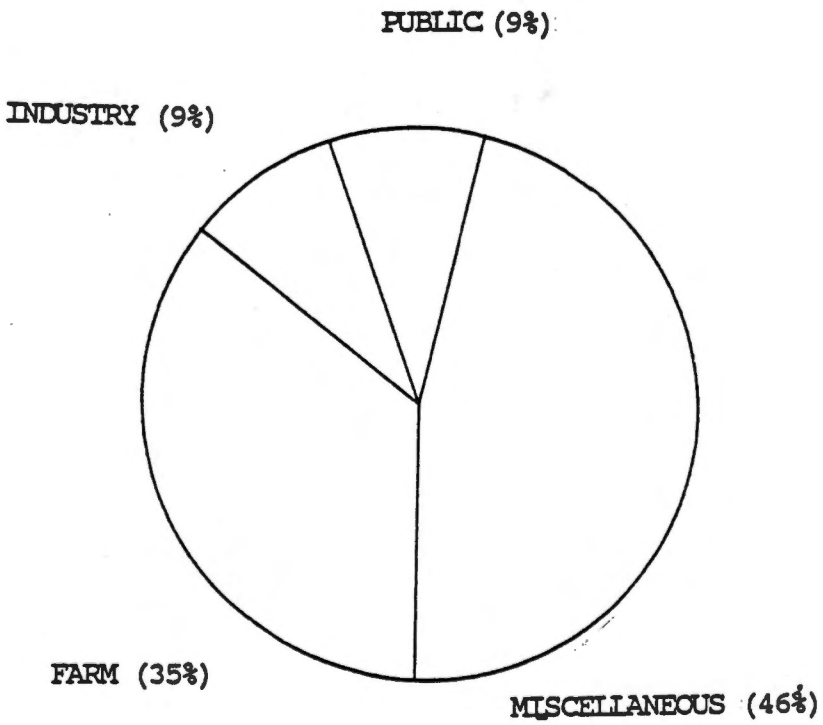


Figure 1. Tennessee land ownership.

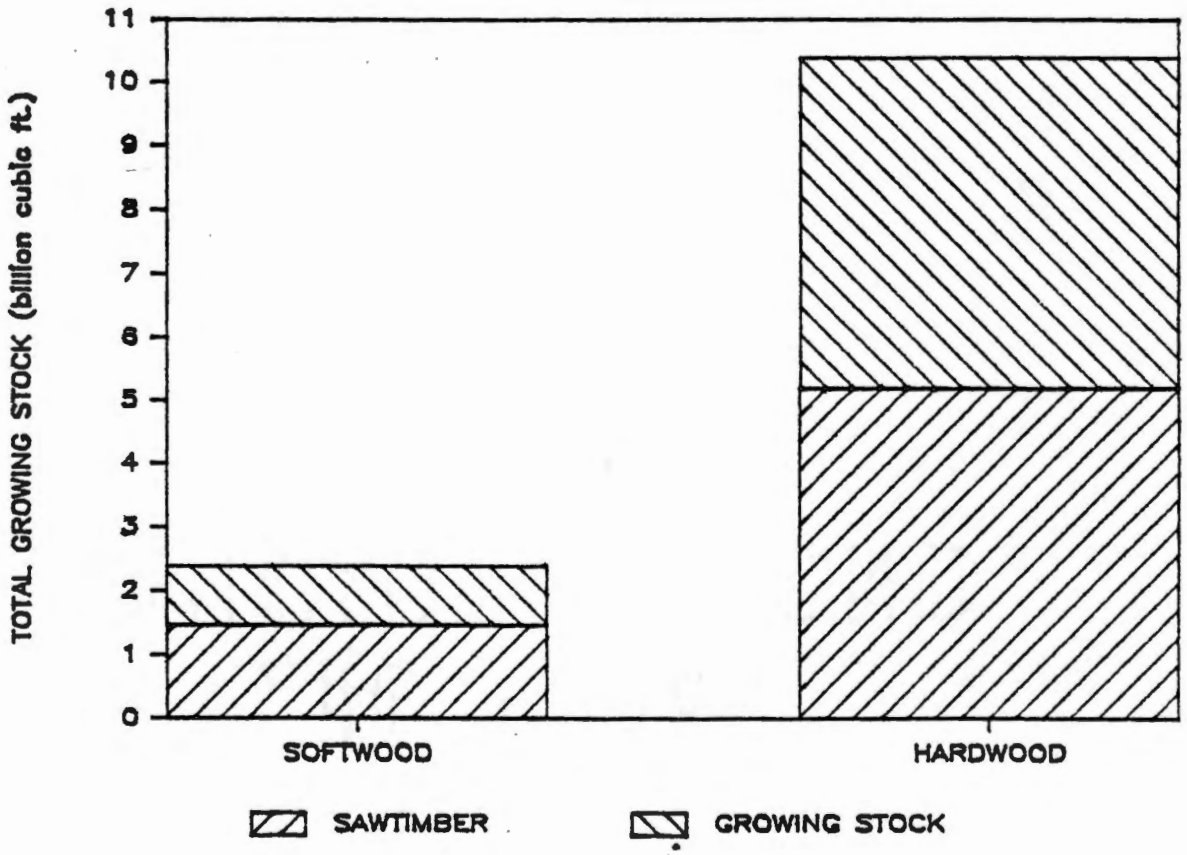


Figure 2. Softwood and hardwood growing stock in Tennessee.

The ratio of sawtimber growth to harvest is 2.1 to 1 (Tennessee Statistical Abstract, 1984).

These resource statistics indicate that the hardwood timber resource in Tennessee has opportunities for increased use. Birdsey states:

> Statewide, the large excess of growth over removals indicates that the timber harvest could be greatly increased while sustaining current annual volume increment.

Current markets for hardwood consist of lumber, veneer, pulpwood and fuelwood. However, a significant amount of the Tennessee timber resource is not of adequate grade quality to meet the standards of the high valued lumber and veneer markets. For example, 18% of the hardwood growing stock is in the rough and rotten category (Birdsey, 1983). Most forest landowners would welcome new markets for low quality hardwood timber.

Structural composite panels produced from hardwoods could possibly provide additional markets for the relatively plentiful hardwood resource. The technology is available to produce structural composition panels from hardwoods (Koch and Springate, 1983).

There are several metropolitan areas within and near the state where structural panels, produced outside the region, are traded. Hence, a local/regional market seems to be present. However, there are no structural panel producers in Tennessee.

Due to the abundant hardwood resource and lack of structural panel producers, there appears to be a opportunity for the

establishment of a successful structural composite panel producer in Tennessee. An analysis of the structural composite panel market is needed to assess the opportunity in Tennessee.

A Market Opportunity Analysis (MOA) can provide needed information to help turn potential sales into actual sales, or in this case, to turn potential sales of Tennessee produced structural composite panels into actual sales (Forester, 1984). There are five sections of a MOA: demand analysis, market segmentation analysis, industry analysis, competitor analyis and channel analysis.

Only the competition analysis and channel analysis were completed for this study. Although there has been some study of the industry and market demand and requirements, little analysis has been done of the competitive and distributive characteristics of the structural composite panel market in Tennessee. A competition and channel analysis contribute greatly to a MOA and provide valuable information on the characteristics of the structural composite panel market in Tennessee. The purpose of a competition analysis is to determine the strengths and weaknesses of competitors and to identify the most active competitors. The channel analysis is designed to identify distribution channels common to the industry and assess their characteristics.

Study Objectives

There are five objectives of this study; the first three support the competition analysis while the last two support the channel analysis. The three objectives of the competition analysis are:

1. to determine why retailers and intermediaries purchase and distribute a particular brand of structural composite panels;

2. to determine the market share of structural composite panels in the Tennessee structural panel market, and;

3. to disclose the location of manufacturers whose structural composite panels are sold in Tennessee.

The objectives of the channel analysis are:

1. to establish how structural composite panels flow from manufacturer to retailer and document the means of transportation used and;

2. to determine the types of intermediaries involved and transportation used.

The major factors that motivate retailers and market intermediaries to buy structural composite panels will be disclosed in the competition analysis. Also, market share information will help to determine if structural composite panels have a significant share of the Tennessee structural panel market and, knowing who the producers are and their location will help to assess the strength of competition. Furthermore, assessment of the distribution channel can provide decision makers with correct channel information and should help determine if new opportunities exist. distribution channels are adequate or new opportunities exist.

CHAPTER II

REVIEW OF THE STRUCTURAL COMPOSITE PANEL INDUSTRY

Structural Composite Panel Products

Structural reconstitiuted wood panels, commonly known as structural composition panels, now play a significant role in the American structural panel market. Structural composition boards compete directly with softwood plywood and other building materials for a share of both the residential and industrial structural markets (Fuller, 1985)

There are various names given to structural composition boards, including waferboard, flakeboard and oriented strandboard (OSB). However, like many new products, there has been confusion with nomenclature (Dickerhoof, 1985).

Waferboard is produced from wood wafers approximately one inch long and .025 inches thick, while flakeboard is fabricated using flakes which are 5/8 inches long and .018 inches thick (Bowyer and Haygreen, 1982). Both products are produced using the mat forming process. Wafers and flakes are placed in the mats in random directions. The randomness of the orientation of the flakes or wafers gives the board equal strength in all directions (Glover, 1985).

Strands are used in the production of OSB. Bowyer and Haygreen (1982) state: "A strand is a long shaving but flat with parallel surfaces." The electostatic process is used to align the strands in one direction. Often, OSB panels are formed in layers with the middle layer oriented perpendicular to the two face layers.

OSB has superior structural properties in the direction the strands are orientated (American Plywood Association, 1983). OSB panels have a higher modulus of elasticity and can withstand a greater maximum load than flakeboard or waferboard panels.

Although there is one specific definition for flakeboard, waferboard or OSB, confusion regarding nomenclature still exists in the market place. For example, the dimensions of a wafer or a flake is still an issue for debate within the industry (Dickerhoof, et al. 1982). As a result, proper nomenclature of composition boards remains a problem.

There are two factors that separate reconstituted structural wood panels from the traditional nonstructural particleboards. First, the wood particles in structural composite panels are glued together with a moisture resistant phenol-formaldehyde. The traditional nonstructural particleboard was glued together with urea-formaldehyde resins. Structural composition boards have been given both the exposure one and two ratings by the American Plywood Association (APA). Both exposure one and two panels can be used for protected construction applications.

The second major difference between the new structural composite boards and traditional particleboards is that they can be used for structural purposes. Younguist, et al. (1982) define structural as:

> ... being more resistant to strength reduction over long periods and better able to withstand weathering than panels used for underlayment or corestock.

Structural composite panels are both APA-approved sheathing and APA-approved Sturd-i-floor. Panels having these ratings can be used for light frame construction purposes (APA, 1984).

History

Dr. James Clark, Sand Point, Idaho (1957), developed the waferboard production process. The first waferboard plant was built in 1962 and was designed to take advantage of the abundant aspen resource in the Northern United States (Glover, 1985). However, waferboard was not accepted by the American market as a strucural panel product until the late 1970's.

It is well known that substitute products must be significantly lower in price or have superior quality to penetrate a given market. Composite panels are substitutes for softwood plywood and therefore, must have a lower price or superior quality to break into the structural panel market (Fuller, 1985).

During the introduction of composite panels to the structural market through the sixties and early seventies, their price was not significantly lower than plywood, as a result, they did not penetrate the market (Koch and Springate, 1983). However, by the late 1970's, composition panels had become increasingly price competitive with softwood plywood.

Several factors played a key role in the price competitiveness of structural composition panels. Probably most important was the increased price of peeler logs for softwood plywood in the West. Anderson and Hutton (1985) state:

> The advent of waferboard and oriented strandboard as important panels in the structural panel arsenal started about 1978 in answer to the timber cost crisis for veneer panel producers.

As a result of high priced western timber, structural composition boards became more established as competitors in the structural panel market.

While the cost of timber in the West was increasing, advances in technology made it possible to utilize the relatively inexpensive hardwood timber resource in the East for the production of structural composition panels. The eastern hardwood resource is very abundant and continues to gain in volume (Jarck, 1985). Technology is now available to convert a variety of species into composite panels (Chase, 1985).

High energy costs through the 1970's and early 1980's have led to the regionalization of the structural panel industry. During this era it became inefficient to transport panels inter-regionally. Although there has been a recent decline in energy costs, manufacturers close to final consumers still enjoy a competitive advantage over manufacturers that must transport their product a greater distance. For example, Minnesota's composite panel manufacturers enjoy a competitive advantage in the North-Central market over panel producers located in other areas of the country (Glover, 1985). Dickerhoof, et al. (1982) state:

> The proximity of these new plants to large markets in the North Central United States will minimize transportation costs and provide a further competitive edge for these new structural board manufacturers.

The last factor that has played a significant role in the acceptance of composite panels into the structural panel market is the establishment of a performance-rating system by the APA (Maloney, 1985). Panels that meet the APA's performance standards are given an APA stamp. The stamp signifies that the panel can be used for specific structural purposes and also provides information on the panels' thicknesses, span rating and bond durability (APA, 1984). Performance standards have made it possible to compare different panels used for the same purpose. As one APA advertisement states, "these panels say what they do and do what they say."

APA acceptance is a significant step in the penetration of composite panels in the structural panel market. Carll, et al. (1982) state:

> Standards for wood-based panels are essential for product acceptance in major U.S. markets because standards give distributers and wood users some assurance of specific quality products. Model building codes used in most major metropolitan markets make reference to standards, thus giving standards legal status.

In 1984 structural composition boards accounted for approximately seven to eight percent of the American structural panel market and 50 percent of the Canadian structural panel market (Maloney, 1985). There are approximately 30 waferboard and OSB plants in North America producing 5 billion square feet (3/8" basis) per year (Glover, 1985).

Capital Investment and Operating Costs

Table 1 shows the capital investment required to construct a softwood plywood mill, a waferboard mill and an OSB mill. Research

Table 1. Capital Investment needed to construct softwood plywood, waferboard, and OSB mills in the Southeast.*

	Softwood Plywood	Waferboard	OSB
		Dollars ($)	
Site preparation	2,500,000	2,500,000	2,500,000
Buildings	3,900,000	4,500,000	4,500,000
Machinery	15,000,000	20,000,000	21,000,000
Installation	2,500,000	6,000,000	6,000,000
	23,000,000	33,000,000	34,000,000
Project Management	1,700,000	2,500,000	2,600,000
Contingency	2,300,000	3,400,000	3,400,000
	27,000,000	39,000,000	40,000,000

* The consumption and production figures are based on a softwood plywood mill producing 100 million sq.ft. (3/8" basis), waferboard mill producing 320 million sq.ft. (3/8" basis), and an OSB mill producing 320 million sq.ft. (3/8" basis).

Source: Pennington, William H. 1984. Market expansion forecast for reconstituted boards. Forest Ind. 111(4):40-43.

has shown that it costs approximately 39 million dollars to construct a waferboard plant producing 320 million square feet (3/8" basis) per year and 40 million dollars to construct an OSB plant that will produce the same amount (Pennington, 1984). Although these plant sizes would be profitable in many areas of the Southeast, a smaller plant may be more feasible in other locations. The amount of capital investment can be lowered by reducing the size of the plants.

The operating costs of manufacturing softwood plywood may be 30 percent greater than producing structural composite panels. The cost of raw materials account for 60 percent to 70 percent of the total cost of producing a softwood plywood panel. However, raw materials may account for only 30% of the total cost of producing a structural composite panel (Pennington, 1984).

It appears that the capital and operating costs of producing structural composite panels are competitive with softwood plywood. Pennington states:

> ..... Capital and operating costs for a new waferboard or OSB plant using today's technology will be roughly the same. Both are very competitive in terms of cost when compared to new plywood plants.

End Use Markets

Structural composite panels are targeted to several different end use markets, including: new residential construction, residential remodeling and repair, non-residential construction, material handling and exports. New residential construction is the most common use for structural panel products and consume approximately one-third of

production. The residential remodeling and repair market accounts for approximately one-third to one-fifth of production. Non-residential construction, material handling and exports, in decreasing order, account for the remainder of structural panel production (Anderson and Hutton, 1985).

Composite panels will compete directly against softwood plywood for a share of the projected growth in structural panel markets (Table 2). Two factors, the overall strength of the structural panel market and the costs of sawlogs will have a direct affect on the substitution of structural composite panels for softwood plywood. Fuller (1985) states:

> The rate of substitution will depend heavily on the overall strength of structural panel markets (plywood and composites) and the relative costs of production of veneered versus non-veneered panels.

Fuller believes that a strong market will cause an increase in structural composite panel producers and therefore cause more structural composite panels to be produced. As a result, structural composite panels would gain an increased share of the American structural panel market. A weak market will stagnate the expansion of composite panel manufacturers and allow softwood plywood to remain the dominant competitor (Fuller, 1985).

Also, high sawlog prices will create higher raw material costs for softwood plywood manufacturers, and will give a competitive advantage to structural composite producers who produce panels from lower priced timber.

Table 2. Structural panel market projections.*

	1984	1985	1986	1987	1988	1989	1990
	Million sq.ft. (3/8" basis)						
Housing Starts	1750	1750	1785	1820	1850	1890	1930
Residential Construction							
Single-family	4980	5040	5100	5150	5220	5280	5340
Multi-family	2390	2445	2500	2555	2610	2665	2720
Mobile homes	230	235	240	245	250	255	260
Total	7600	7720	7840	7960	8080	8200	8320
Remodeling	7400	7640	7880	8120	8360	8600	8840
Nonresidential Construction	3080	3180	3280	3380	3480	3580	3680
Industrial	2920	3010	3100	3190	3280	3370	3460
Consumption	21000	21550	22100	22650	23200	23750	24300
Exports	750	800	850	900	950	1000	1050
Imports	210	220	230	240	250	260	270
Production	21540	22130	22720	23310	23900	24490	25080

*Source: Pennington, William H. 1984. Market expansion forecast for reconstituted boards. Forest Ind. 111(4):40-43.

In contrast, low sawlog prices will weaken the competitive advantage of structural composite panel producers (Fuller, 1985).

Distribution

Distribution plays a key role in the marketing of forest products. High energy costs require producers to use distribution channels that are efficient and can deliver products to retailers at low prices.

There are several different types of intermediaries involved in the flow of structural panel products from the manufacturer to the retailer. Intermediaries include: brokers, independent wholesalers and chain-store distributers (Barnes and Sinclair, 1986).

Obviously, there are many ways by which structural panels can flow from the manufacturer to the distributer. Structural panels can flow directly from manufacturers to retailers, or an intermediary can be used. Each manufacturer must select a method that is efficient and can best provide for the needs of the retailer. Barnes and Sinclair state (1985):

> ..... channel systems must capitalize on the skills and resources of their individual members, tailoring their system to meet the needs of their particular market segment

Brokers (sales agents or commission men) do not take title or possession of the goods that they distribute. Brokers are paid on a commission basis and are responsible for arranging the sale of products from manufacturers to retailers (Forester, 1984).

Independent wholesalers or merchant wholesalers take title and may

or may not take possession of the goods that they distribute. The use of independent wholesalers is the dominant means of distributing products from the manufacturer to the retailer (Barnes and Sinclair, 1985).

Independent wholesalers buy large volumes of products from manufacturers. They then break down the large volumes into smaller volumes for resale to the retailer. Often wholesalers will provide credit to retailers and therefore ease the flow of goods from manufacturer to retailer, and frequently, retailers are offered discounts for invoices that are paid within a given period of time.

Many forest products manufacturers have vertically integrated up the chain of distribution and have established captive distribution centers. Captive distribution centers distribute a wide variety of building products and often distribute products produced by other manufacturers (Cleaves and O'Laughlin, 1986).

There has been a trend in the forest products industry to increase the amount of captive distributers, and this trend is expected to continue in the future (Rich, 1981). In the early 1980's Georgia-Pacific, Weyerhaeuser, and Champion had 145, 67, and 76 captive distribution centers, respectively (Barnes and Sinclair, 1985).

Many retailers are calling upon distributers to provide marketing and inventory control services (Barnes and Sinclair, 1985). To remain competitive, it has become apparent that both independent wholesalers and captive distributers must provide more support in the marketing of building products, as well as become more active in the support of retailers.

Also quite prevalent in the forest products industry is the establishment of building product chain stores. Like many manufacturers, chain stores are vertically integrated. However, chain stores have integrated back into the distribution chain and have established their own distribution network. The same corporation that owns the chain store also owns the distribution network. Many chain retail outlets order all their products solely through a central distributer owned by the same corporation.

Transportation

The two most common ways to transport structural panels are truck and rail. The decision on which method of transport to use is dependent on several factors, including the volume and weight of the commodity, cost of transport and hauling distance.

Railroads are the dominant transporter of goods weighing 30,000 pounds or greater over distances exceeding 300 miles. The large capacity of railroad cars enables the railroad to move large volumes of low value commodities over great distances (Coyle, et al. 1986).

Trucks are the fastest means of delivering products less than 500 miles. One advantage of truck transport verses rail is that trucks are able to reach almost any access point, whereas rail has limited access to many areas. Although trucks cannot carry as much weight as rail cars, the smaller loads provide an advantage for the buyer because of lower inventory levels and lower inventory carrying costs (Coyle, et al. 1986).

Future of the Structural Composite Panel Industry

The price of timber and the overall condition of the structural panel industry will have a large affect on the future of structural composite panels. However, the present outlook is optimistic.

In 1985 the capacity of the strucural panel industry was 28.379 billion square feet (3/8" basis). Capacity is expected to increase to 30.850 billion square feet (3/8" basis) by 1990 (Anderson and Hutton, 1985). An increase in structural composite panel manufacturers is expected to fill capacity needs. Expected growth is supported by the fact that of the 18 structural panel mills announced to be constructed by the year 1990, 13 will be nonveneer, three will be laminated veneer lumber and two will be plywood (Anderson and Hutton, 1985).

As transportation costs increase, the structural panel industry will probably become more regionalized. Many areas of the country do not have the quality of timber to economically produce softwood plywood, and as a result, structural composite panels will enjoy a competitive advantage in these regions.

By the year 2000, structural composite panels are predicted to account for the majority of the structural panel market. Fuller (1985) stated:

> Waferboard and OSB used in the residential and nonresidential construction (and in other end-use markets) will climb to 60% of the total structural panel market by the end of the century.

These factors inicate that structural composite panels will challenge softwood plywood for an increased share of the structural composite panel industry.

CHAPTER III

METHODS

Markets Studied

A market can be defined as those consumers able and willing to buy a product and businesses willing to supply the product. Retailers of lumber, plywood, and building products purchase large volumes of structural panels, and therefore, the market study began at the retail level. The study progressed to intermediaries that distribute structural composite panels to the retailers and finally to manufacturers that produce the panels.

The three market areas chosen were Memphis, Nashville and Chattanooga. Due to their geographic distribution, (Figure 3) it was assumed that these three areas would characterize the overall structural composite panel market in Tennessee. Also these areas are among the largest cities in the state and would represent a wide range of consumers.

The population for the first phase of the survey included all retailers under the headings "Lumber", "Plywood" and "Building Products" in the Nashville, Memphis and Chattanooga yellow pages (1986). The population of the second phase included independent wholesalers, captive distributers, and chain store distributers that distributed structural composite panels to the retailers in the first phase of the survey. The manufacturers that produce panels for the populations of the first two phases were the population of the third section.

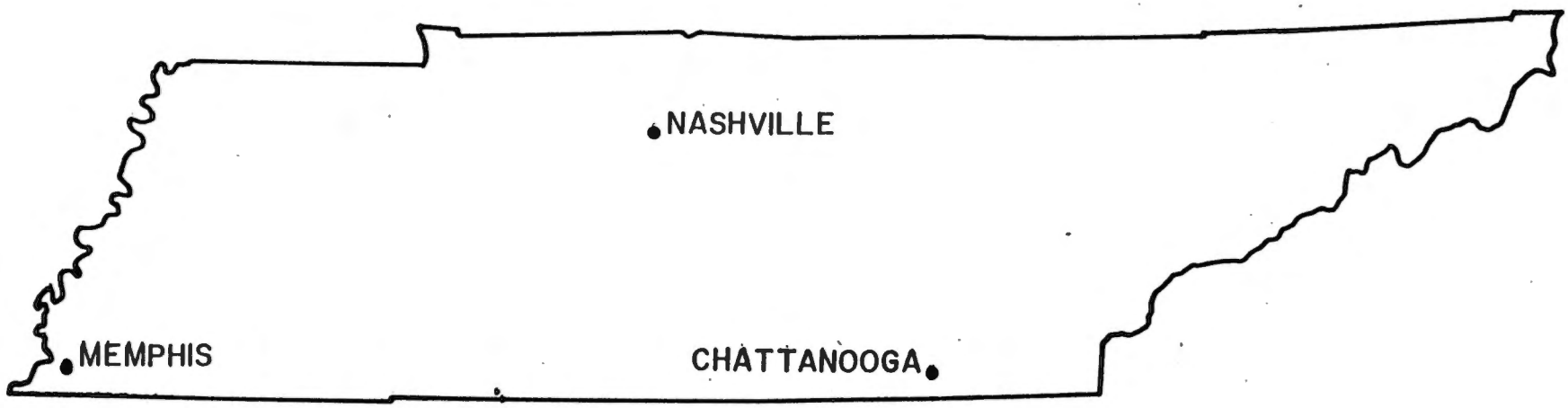


Figure 3. Geographic distribution of Tennessee sample points.

Survey Instrument

The telephone survey instrument was used to gather data. Retailers were surveyed intially, followed by market intermediaries and manufacturers. A telephone survey was chosen over other survey designs because telephone surveys have a higher response rate than mail surveys (Dillman, 1978). The use of a telphone as a mode of communication creates a greater opportunity of getting in contact with the proper respondent. Also, it takes less time to conduct a telephone survey than mail or personal interview surveys.

The three-phase survey was constructed using the Total Design Method developed by Dillman (1978). There are two facets of the Total Design Method: 1) to shape the survey to maximize quantity and quality of results, and 2) to design the survey so that the objectives of the study are achieved (Dillman, 1978). Appendix A contains a copy of each phase of the survey.

Pretests were conducted for each phase of the survey. The retail pretest included Knoxville retailers of structural composite panels, and the intermediary pretest was directed to market intermediaries that serve Knoxville retailers. The pretest of manufacturers included those manufacturers not producing structural composite panels for the Tennessee market area. Manufacturers not distributing to Tennessee were identified after phase one and two were completed. After each pretest, the surveys were analyzed and restructured to obtain improved results.

An attempt to contact each potential respondent was made until a response was achieved or until five call attempts had been made. If a

successful response was not made in five attempts, the nonrespondent was eliminated from the survey population (Backstrom and Hursh-Cesar, 1981). A record was kept of each call made. The record was valuable in reminding the interviewer of what portions of the population were still eligible to be called.

Retailer Survey

The questions in the retail phase focused on the total amount of structural panels ordered by retailers and the bundle amount of waferboard, OSB, and flakeboard ordered in the categories, 3/8" to 11/16", 1/4" and 3/4". During the study, a bundle was defined as being composed of four by eight foot panels and approximately 32 inches in height.

Retailers were also asked questions concerning the distribution channel of structural composite panels. They were asked their opinion on favorite distributer and percentage of structural composite panels delivered by truck, rail, or barge. They were also asked percentage of structural composite panels ordered from independent wholesalers, captive distributers, or manufacturers, and percentage of the cost of transportation of structural composite panels for which they arranged and pay.

Intermediary Survey

Phase two of the survey was similar to phase one. Intermediaries were asked how many bundles of structural composite panels they ordered, and why they ordered from certain manufacturers. To disclose their role in the distribution of structural composite panels,

intermediaries were asked if their firm took physical possession and/or title of the structural composite panels.

Manufacturer Survey

Manufacturers were interviewed in the third phase of the study. Phase three of the survey was divided into two parts. In part one, manufacturers were questioned about the types of panels they produced, what their average distribution distance was and what percentage of structural composite panels were shipped to various intermediaries. In part two information was sought that would determine were the selling function took place. The sales office was usually responsible for the sale of products of more than one manufacturer. In this part of the survey, the sales office for each manufacturer was located. The sales staff were asked questions concerning the role of both the office sales staff and the field representatives. They were also questioned about how a typical sale was made.

Response Rate

The response rate for each section of the survey was calculated using the following formula:

$$\text{RESPONSE RATE} = \frac{\text{\# OF SUCCESSFUL RESPONSES} \times 100}{\text{POPULATION} - (\text{NONELIGIBLE} + \text{NONREACHABLE})}$$

Where:

Successful response - was any call in which the respondent agreed to participate in the survey.

Population - was the retailers, intermediaries and manufacturers identified to be active in the Memphis, Nashville, and Chattanooga markets.

Noneligible - were members of the population not in the market area or in business.

Nonreachable - were those members of the population that could not be contacted.

The response rate for the retail phase was 74.7 percent. There was an eligible survey population of 83 retailers, and there were 62 responses (eligible = population - nonreachable - noneligible). The response rate of the Intermediary phase was 81.8 percent. There was an eligible population of 22, and there were 18 responses. The manufacturer phase of the survey had a response rate of 84.2%. There were 16 responses of an eligible population of 19.

Statistical Techniques

Means, standard deviations (STD), and weighted means were calculated for each quantitative question in the survey. Weighting emphasizes the bundle unit and therefore gives more value to those respondents producing or distributing a greater number of bundles. The weighted formula is presented below:

$$X_w = \frac{w_i \ (x_i)}{w_i}$$

The symbol "w_i" represents the bundles of structural composite panels ordered per month by retailers.

At only one point (retailer transportation) in the study did weighting provide a meaningful differences from the common mean formula.

A simple correlation was the statistical tool used to test the probilbility of a linear relationship between two variables. Correlation coefficients were calculated using the formula below:

$$R = \frac{(X_i - X)(Y_i - Y)}{(X_i - X)^2 \quad (Y - Y)^2}$$

The closer the correlation coefficient (R) is to one or negative one, the stronger the relationship. However, as the correlation coefficient nears zero, a weaker relationship is indicated.

CHAPTER IV

RETAILER SURVEY RESULTS

Response

The results of the retailer phase of the survey will be presented in this chapter. The results of the intermediary and manufacturer phase of the survey will be presented in chapters V and VI. For a better understanding of the results, each phase of the survey in Appendix A should be reviewed.

Retailers in this survey were those businesses listed under the headings, "Building Product Retailers," "Lumber Retailers" and "Plywood Retailers" in the Memphis, Nashville and Chattanooga yellow pages (1986). Out of a total of 148 retailers, 42 did not sell waferboard, six were not in the market area, eight could not be reached in five calls, 17 numbers had been disconnected, and 13 refused. Out of an eligible population of 83 retailers 62 were interviewed resulting in a 74.7% response rate.

Market Share

Retailers were asked to categorize the structural composite panels and softwood plywood which they had ordered into one of 14 categories. The quantity (bundles) ordered was recorded as the lower limit of each category. For example, if a retailer stated that one to five bundles were ordered per month, it was recorded as one bundle.

Bar graphs representing the frequency of structural composite panels and softwood plywood ordered per month by retailers are illustrated in Figures 4 and 5. The bar graphs, indicate that retailers generally order more softwood plywood panels than structural composite panels.[3]

Market share can be defined as the percent of the total market controlled by a particular product. For this study market share is the percent of the Tennesseee retail structural panel market controlled by structural composite panels. Market share was calculated using the formula below:

$$\text{Market Share} = \frac{x_i}{y_i + x_i}$$

x_i = structural composite panels

y_i = softwood plywood

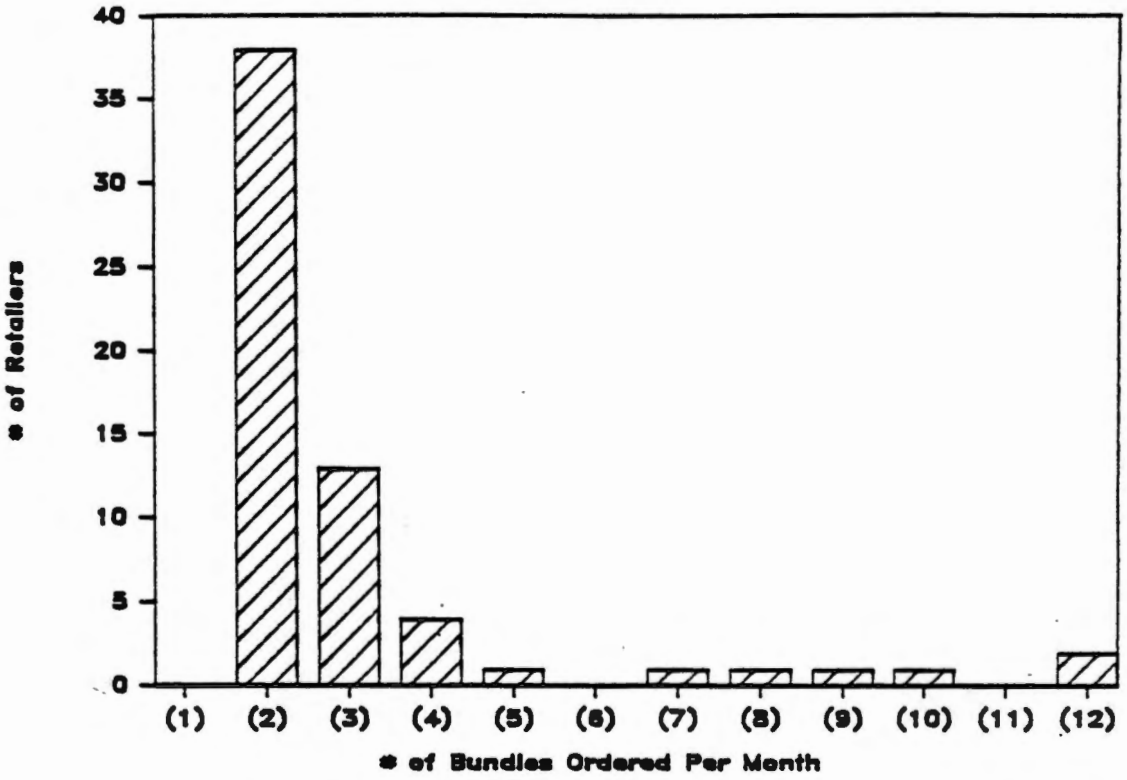
Retailers ordered a total of 1643 bundles of softwood plywood and 815 bundles of structural composite panels per month. Therefore, market share in phase one of the study was 33.2 percent.

Major Factors Influencing the Purchasing Decision

An open ended question was used to disclose the major factors influencing retailers to buy structural composite panels. Retailers

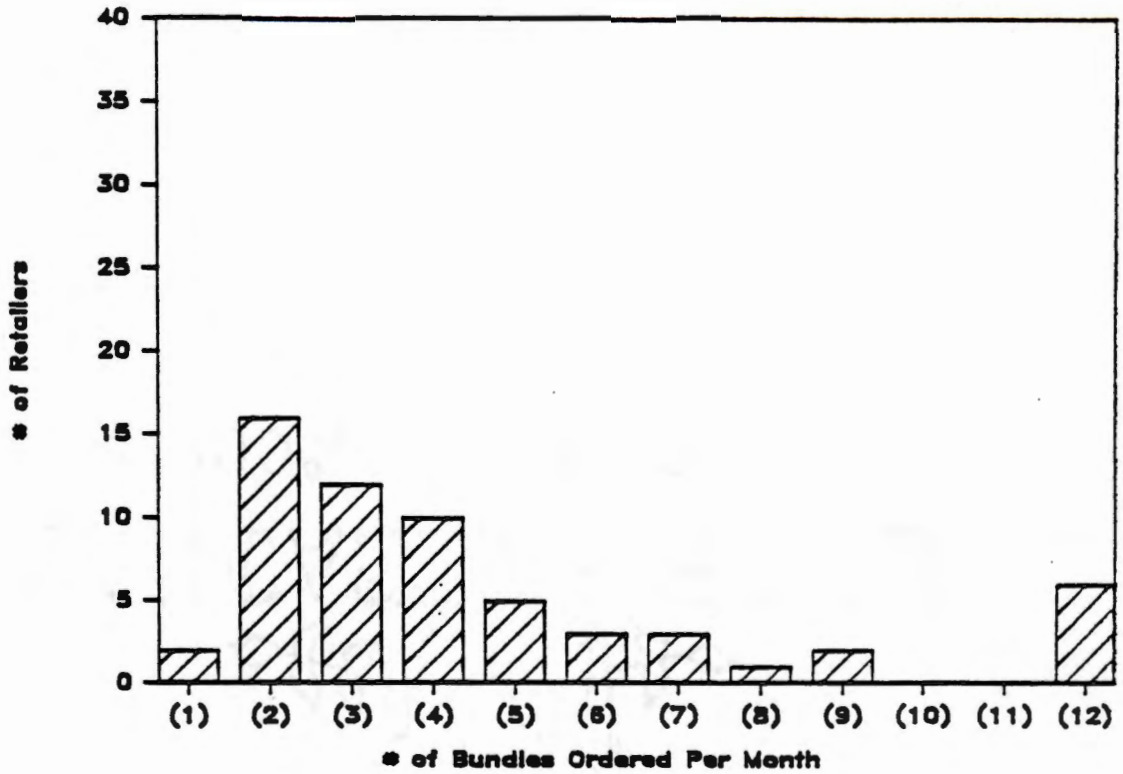
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[3]The average amount of structural composite panels and softwood plywood ordered per month by retailer was 13.7 and 27.5 bundles respectively. However the standard deviations for the means were 23.0 for structural composite panels and 30.3 softwood plywood. The standard deviations indicated a high degree of variability.



(1)	0 bundles	(7)	51-60 bundles
(2)	1-10 bundles	(8)	61-70 bundles
(3)	11-20 bundles	(9)	71-80 bundles
(4)	21-30 bundles	(10)	81-90 bundles
(5)	31-40 bundles	(11)	91-100 bundles
(6)	41-50 bundles	(12)	> 100 bundles

Figure 4. The number of bundles of structural composite panels ordered per month by retailers.



(1)	0 bundles	(7)	51-60 bundles
(2)	1-10 bundles	(8)	61-70 bundles
(3)	11-20 bundles	(9)	71-80 bundles
(4)	21-30 bundles	(10)	81-90 bundles
(5)	31-40 bundles	(11)	91-100 bundles
(6)	41-50 bundles	(12)	> 100 bundles

Figure 5. The number of bundles of softwood plywood ordered per month by retailers.

were asked to state "who their favorite distributer was and why?". If there was not one favorite distributer, the retailer was asked "what was the most important reason for ordering structural composite panels from the distributer or distributers that they presently ordered from?".

Due to the fact open ended questions are much more difficult to answer than close ended, the response rate of these questions were poor. Often respondents could not give the one most important reason for ordering from a particular distributer and did not answer the question. In other cases, respondents had more than one reason and gave two or three responses.

There were only 36 respondents that answered this question but there were 47 responses. Eleven respondents gave two responses. Those respondents believed two factors were of equal importance in their purchase decision and could not rank one factor as being most important (Table 3).

Table 3. Frequency tabulation of most important factors motivating retailers to buy structural composite panels.

Category	Frequency of Response	Relative Frequency
1) Price	21	44.7%
2) Quality	9	19.1
3) Service	15	31.9
4) Miscellaneous	2	4.2
TOTAL	47	99.9

All of the responses were placed into one of four categories price, quality, service, or miscellaneous. The price category included price of panels and shipping costs. Remarks about the panels characteristics (strength or appearance) were placed in the quality category. The service category was comprised of all responses of convenience of ordering, availability of panels needed, and salesmanship. All responses that could not be categorized in the above categories were considered miscellaneous responses.

There were 21 responses indicating that price was most important in the decision to order structural composite panels from a particular intermediary. Quality of panels had nine responses, service had 15, and there were two miscellaneous responses (Table 3).

Common Methods of Transport

The percentages of types of transport used to deliver structural composite panels to the average retailer are illustrated in Figure 6. The majority of structural composite panels were transported to retailers by truck. An average of 94.3 percent (n=63) of structural composite panels were delivered by truck and 5.7 percent (n=63) by rail.

Weighted means were considerably different. A weighted average of 64.8 percent were delivered by truck and 35.8 percent by rail (Figure 7).

Further investigation was conducted to see if there was a relationship between the number of structural composite panels ordered per month and the percentage use of truck and rail.

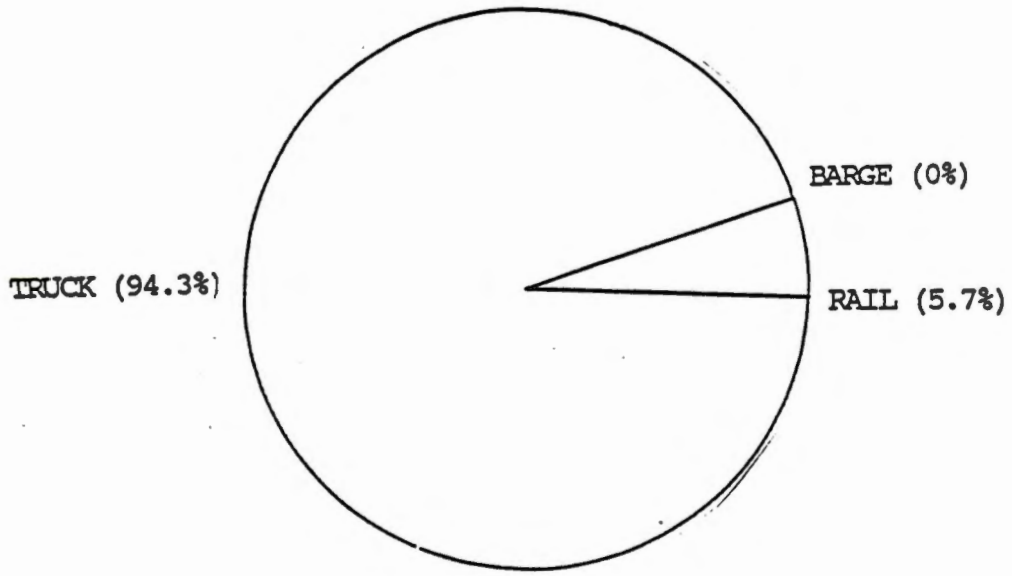


Figure 6. Percent of structural composite panels delivered to retailers by truck, rail and barge.

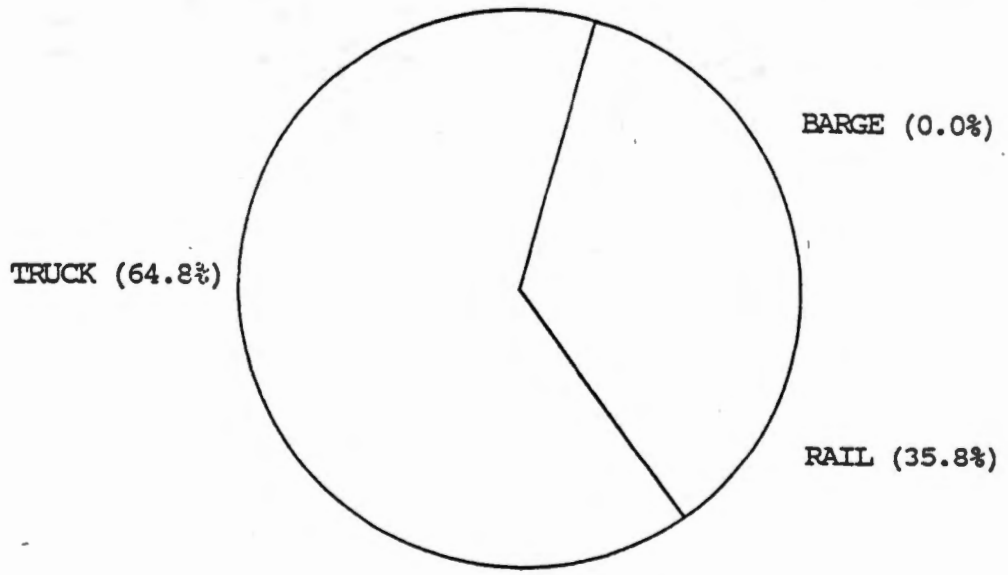


Figure 7. Weighted percentages of structural composite panels delivered to retailers by truck, rail and barge.

Correlation coefficients of -.88 (p = .0001) and .88 (p = .0001) (n = 62) indicate that there is a significant correlation between the number of structural composite panels ordered per month by retailers and the percentage use of truck and rail respectively. As the number of bundles ordered per month by retailers increases, truck is used less and rail is used more frequently.

Channels of Distribution

To describe the channels of distribution, retailers were asked what percentage of structural panels were bought from independent wholesalers, captive distributers or manufacturers. An average of 15.3 percent (n=50) were ordered from independent wholesalers, 49.0 percent from captive distributers (n=50), and 5.0 percent from manufacturers (n=50). Many of the chain stores ordered their products through a central distribution yard. Such distributers accounted for delivering an average of 24.6 percent (n=57) of the structural composite panels (Figure 8). Retailers were not asked if they had ordered products from brokers because a pretest of this section of the survey indicated that few panels were distributed through brokers.

Tables 4, 5 and 6 contain a presentation of the various locations of market intermediaries and manufacturers that distribute structural composite panels directly to Memphis, Chattanooga, and Nashville retailers. It can be seen that approximately half of the intermediaries are located in the same city as the retailers they serve.

Retailers arrange for only 11.1% (n=61) of the transport of

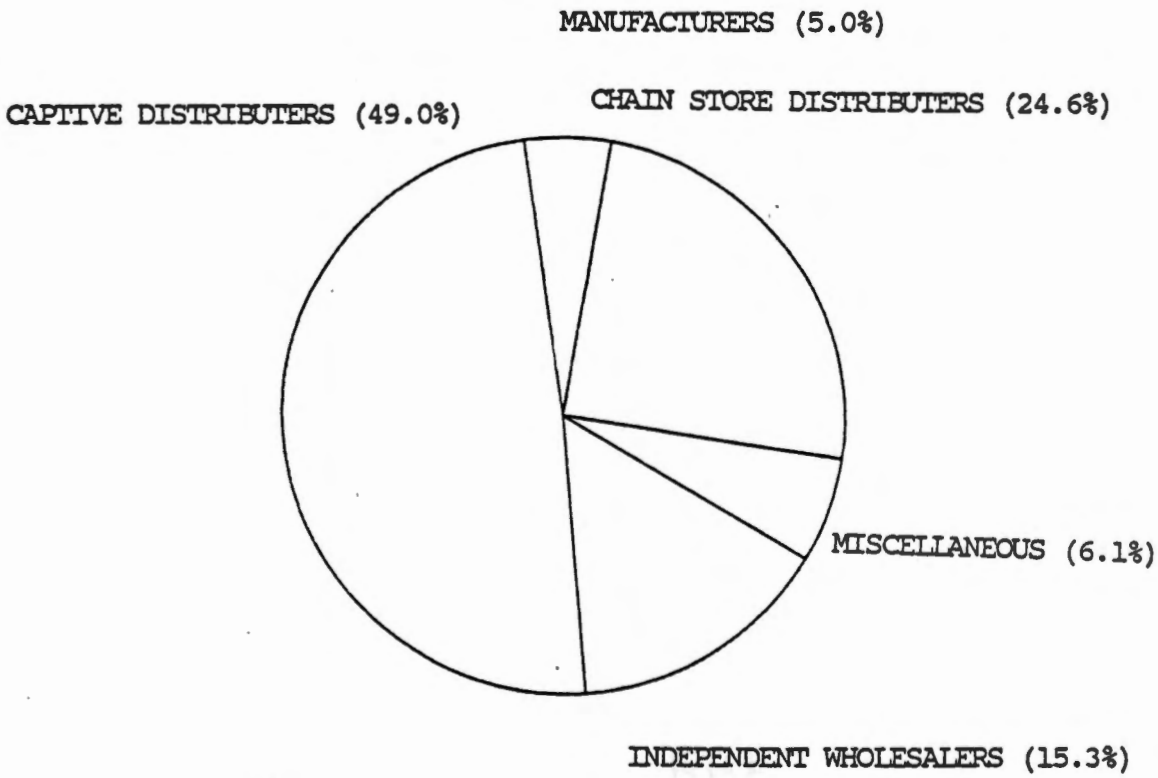


Figure 8. Percentage of structural composite panels ordered by retailers from various firms.

Table 4. Intermediaries distributing structural composite panels to Memphis retailers.

Retailer Code #	Independent Wholesaler	Captive Distributer	Manufacturer	Chain-store Distributer
2	0	*	0	0
3	* Lake Charles LA	0	0	0
4	0	0	0	0
5	0	Memphis Memphis	0	0
6	0	0	0	Jacksonville FL
7	0	Memphis Memphis Memphis	0	0
8	* Memphis	Memphis Memphis Memphis	0	0
9	0	Memphis	0	0
11	0	0	Grenada MS Urania IA	0
12	* *	0	Grenada MS Conroad TX Bemidji MN	0
13	0	Memphis Memphis	0	0
15	0	0	0	Jacksonville FL
18	0	Memphis Memphis	0	0
19	0	0	Grenada MS * Corrigan TX	0
20	0	0	0	Wilkesboro NC

Table 4 (Continued)

Retailer Code #	Independent Wholesaler	Captive Distributer	Manufacturer	Chain-store Distributer
21	0	Memphis	0	0
22	0	Memphis Memphis	0	0
23	Memphis	Memphis Memphis	Urania LA	0

*City and state were not given or incorrect locations were given by respondent.

Table 5. Intermediaries that distribute structural composite panels to Chattanooga retailers.

Retailer Code #	Independent Wholesaler	Captive Distributer	Manufacturer	Chain-store Distributer
2	Fortwayne IN	0	0	0
3	0	Chattanooga	0	0
4	Knoxville *	Atlanta Chattanooga	0	0
5	0	Chattanooga Atlanta	0	0
6	0	Chattanooga Atlanta	0	0
7	*	*	0	0
8	0	Chattanooga	0	0
9	0	0	0	Jacksonville FL
10	Knoxville	Chattanooga Chattanooga	0	0
11	0	Chattanooga	0	0
12	0	Chattanooga	0	0
14	0	Chattanooga	0	0
15	0	0	0	Wilkesboro NC

*City and state were not given or incorrect locations were given by respondent.

Table 6. Intermediaries that distribute structural composite panels to Nashville retailers.

Retailer Code #	Independent Wholesaler	Captive Distributer	Manufacturer	Chain-store Distributer
2	0	Nashville Nashville	Grayling MI	0
3	0	Nashville Nashville Nashville	0	0
4	0	Nashville * Tuscombia AL Buringham AL	0	0
5	0	0	0	San Antonio
6	Nashville	0	0	0
7	0	Nashville Burmingham AL Nashville	0	0
8	0	0	0	Charlotte NC
9	0	0	0	Charlotte NC
10	0	0	0	Charlotte NC
11	0	0	0	San Antonio
12	Nashville Nashville	Nashville	0	0
13	0	0	Hayward WS Grenada MS	0
14	* *	0	0	0
15	0	0	0	Wilkesboro NC
18	0	0	0	Wilkesboro NC

Table 6 (Continued)

Retailer Code #	Independent Wholesaler	Captive Distributer	Manufacturer	Chain-store Distributer
20	Nashville Nashville Nashville	Nashville Nashville	0	0
21	Nashville	Nashville	0	0
24	Nashville Nashville Nashville	Nashville	0	0
25	0	Nashville	0	0
26	0	0	0	Wilkesboro NC
28	0	Nashville	0	0

* City and State were not given or incorrect locations were given by respondent.

structural composite panels to their own distribution yards. Intermediaries perform this function in the distribution channel.

Product Mix

The majority of structural composite panels that a retailer orders are in the OSB and waferboard categories. The average retailer ordered 42.9 percent waferboard panels and 40.6 percent OSB panels (Table 7). Very little flakeboard (16.4 percent) was ordered.[4]

Table 7 indicates that a large majority of the panels were 3/8" to 11/16" in thickness. Approximately 56.8 percent of the panels retailers ordered were in this category. Panels in the 3/8" to 11/16" category are APA approved and can be used for roofing or other sheathing purposes.

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[4] As a result of phase one it became apparent that the retail market perceives waferboard and flakeboard to be the same product.

Table 7. Average mix of structural composite panels ordered by retailers.

Thickness Category	Waferboard	Flakeboard	OSB	Total
1/4"	10.3%	5.4%	5.7%	21.4%
3/8" to 11/16"	23.8	5.9	27.1	56.8
3/4"	8.8	5.1	7.8	21.7
TOTAL	42.9%	16.4%	40.6%	99.7%*

* Percentages do not total 100% due to rounding error.

CHAPTER V

INTERMEDIARY SURVEY RESULTS

Response

Although 41 different intermediaries distributed structural composite panels to retailers, only 18 intermediaries were located and interviewed. Fourteen potential respondents could not be located, three could not be reached in five call attempts, four were out of business, one refused and one was not in the market area. Therefore out of an eligible population of 22, 18 responded resulting in a response rate of 82%.

The types of intermediaries that formed the population for this phase of the study were independent wholesalers, captive distributers and chain store distributers. Chain store distributers are defined as those intermediaries that distribute structural composite panels solely to one specific chain of retail outlets. Both the intermediary and the retailer are owned by the same firm. The chain store distributors and retailers involved in the study were "Eighty-Four Lumber","Lowe's" and "Handy City".

In the first phase of the study it was disclosed that brokers distribute less than 7% of the structural composite panels to retailers. Because brokers did not have a significant role in the distribution of structural composite panels, they were not interviewed in this phase of the study.

Market Share

The market share for structural composite panels at the intermediary level was 31.4%. This figure is very similar to the market share calculated in phase one. There is a wide distribution in the amount of softwood plywood and structural composite panels ordered by intermediaries (refer to Figures 9, 10). More softwood plywood than structural composite panels are ordered by the average intermediary (Figures 9, 10).[5]

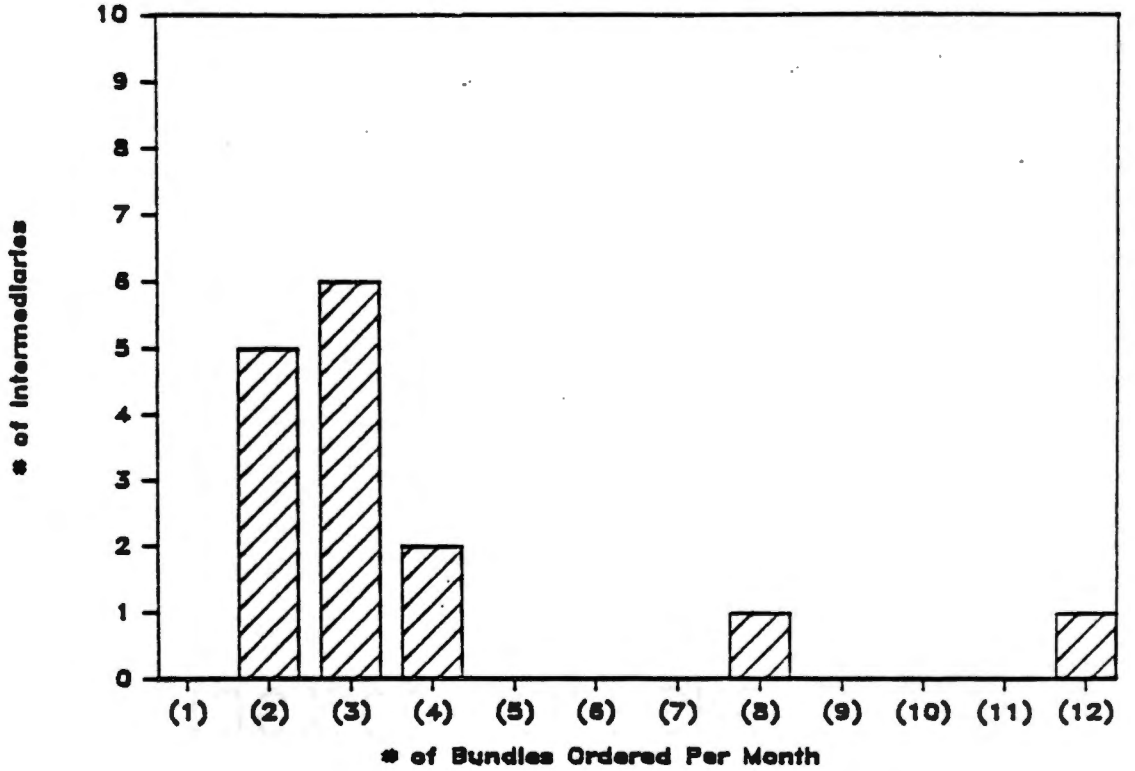
Factors Influencing the Purchasing Decision

Intermediaries were asked what factors were most important in their decision to buy structural composite panels. Two repondents stated that availability was most important, six price, three quality and zero reliability of delivery. A frequency tabulation of the results is contained in Table 8.

Price is the most important factor in the purchase decision. However, quality and availability are also critical factors. Five intermediaries could not name one most important factor. Many times the respondent stated that all the factors were important and could not rank one factor above the others.

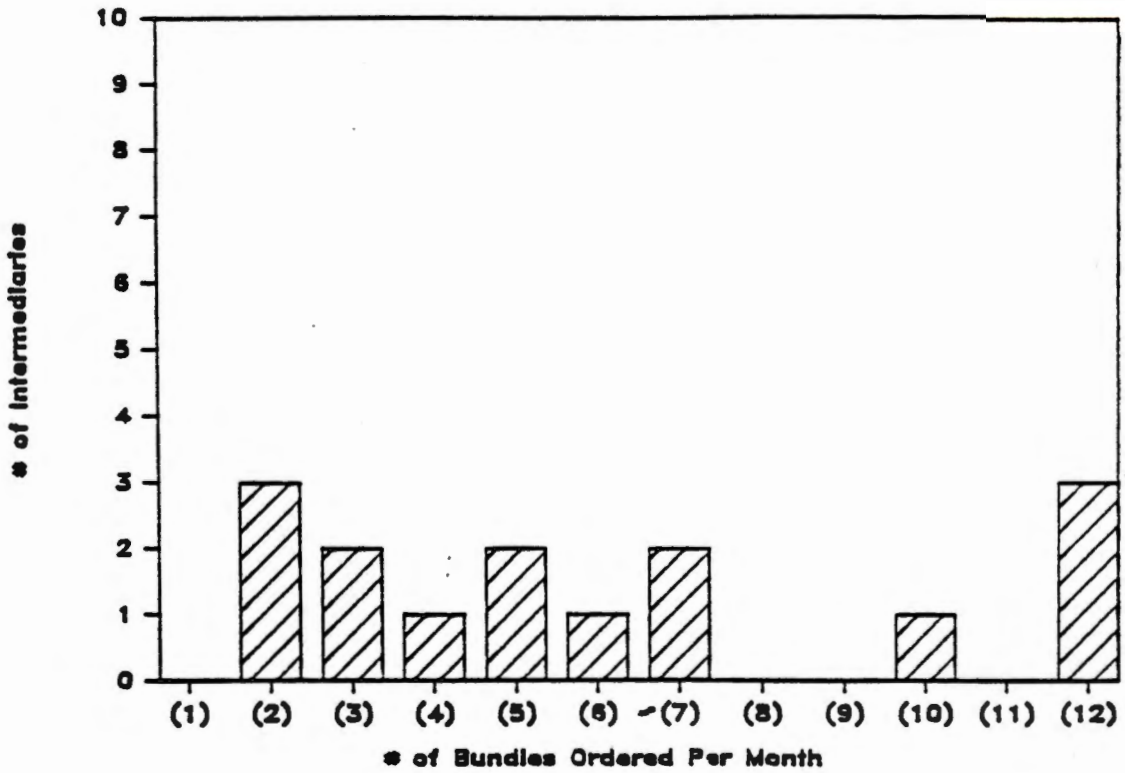
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[5] An average of 197.667 (n=15) (STD = 264.215) bundles of structural composite panels and 431 (n=15) (STD = 374.07) bundles of softwood plywood were ordered per month.



(1)	0 bundles	(7)	501-600 bundles
(2)	1-100 bundles	(8)	601-700 bundles
(3)	101-200 bundles	(9)	701-800 bundles
(4)	201-300 bundles	(10)	801-900 bundles
(5)	301-400 bundles	(11)	901-1000 bundles
(6)	401-500 bundles	(12)	> 1000

Figure 9. The number of bundles of structural composite panels ordered by intermediaries per month.



(1)	0 bundles	(7)	501-600 bundles
(2)	1-100 bundles	(8)	601-700 bundles
(3)	101-200 bundles	(9)	701-800 bundles
(4)	201-300 bundles	(10)	801-900 bundles
(5)	301-400 bundles	(11)	901-1000 bundles
(6)	401-500 bundles	(12)	> 1000

Figure 10. The number of bundles of softwood plywood panels ordered by intermediaries per month.

Table 8. Frequency of responses of each factor important in the purchase decision.

Category	Frequency of response	Relative Frequency
1) Availability	2	18.2%
2) Price of product	6	54.5
3) Product quality	3	27.3
4) Reliability of delivery	0	0.0
TOTAL	11	100.0

Common Methods of Transport

Figure 11 is an illustration of the common methods of transporting structural composite panels to the average intermediary. An average of 36.9% (n=13) of structural composite panels were shipped to intermediaries by truck, and 63.1% (n=13) by rail.

Channels of Distribution

The proportions of structural composite panels ordered by intermediaries from manufacturers and other distributers are shown in Figure 12. Intermedaries order 83.2 percent (n=16) of structural composite panels directly from manufacturers. The remainder were ordered from captive distributers 9.4 percent (n=14), independent wholesalers 1.7 percent (n=14), and brokers 5 percent (n=15).

On the average, intermediaries ordered structural composite panels from 3.8 (n=15) (STD = 12.8) different manufacturers, 1.9 (n=14) (STD = 4.2) captive distributers, and 1.7 (n=15) (STD = 3.7) independent wholesalers.

It was assumed before this study began that intermediaries played an important role in the distribution of structural composite panels. In order to gain a broader knowledge of their role, specific questions were asked regarding whether intermediaries took title and/or physical possession of the structural composite panels they distributed.

Of the intermediaries, 13 (n=16) stated they owned title to 100% of the structural composite panels they distributed, one owned title part of the time, and two stated they did not own title. Eleven (n=17) of the respondents took physical possession of the panels 100%

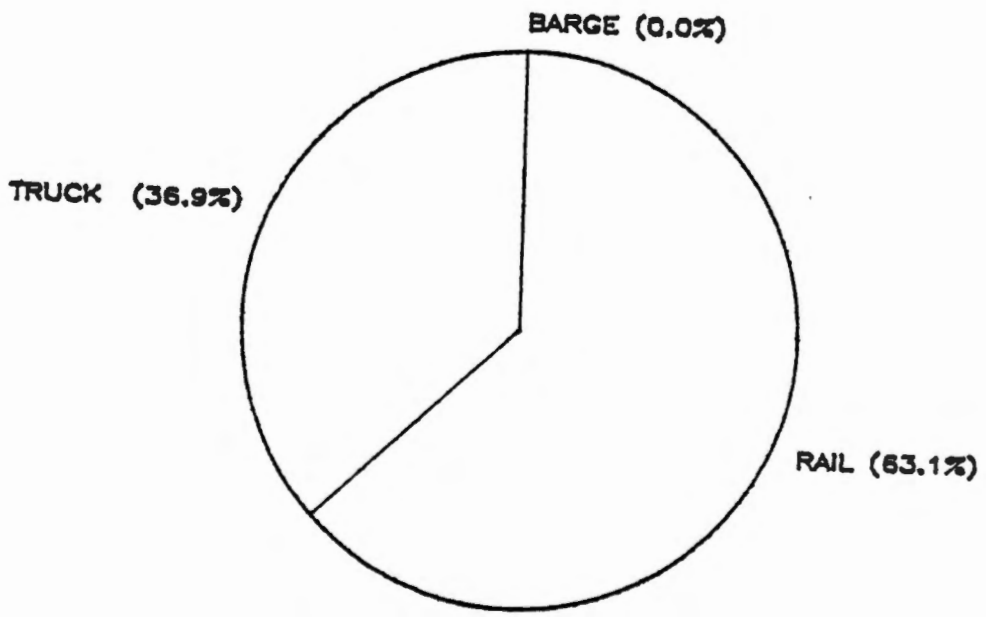


Figure 11. Percent of structural composite panels delivered to intermediaries via truck, rail or barge.

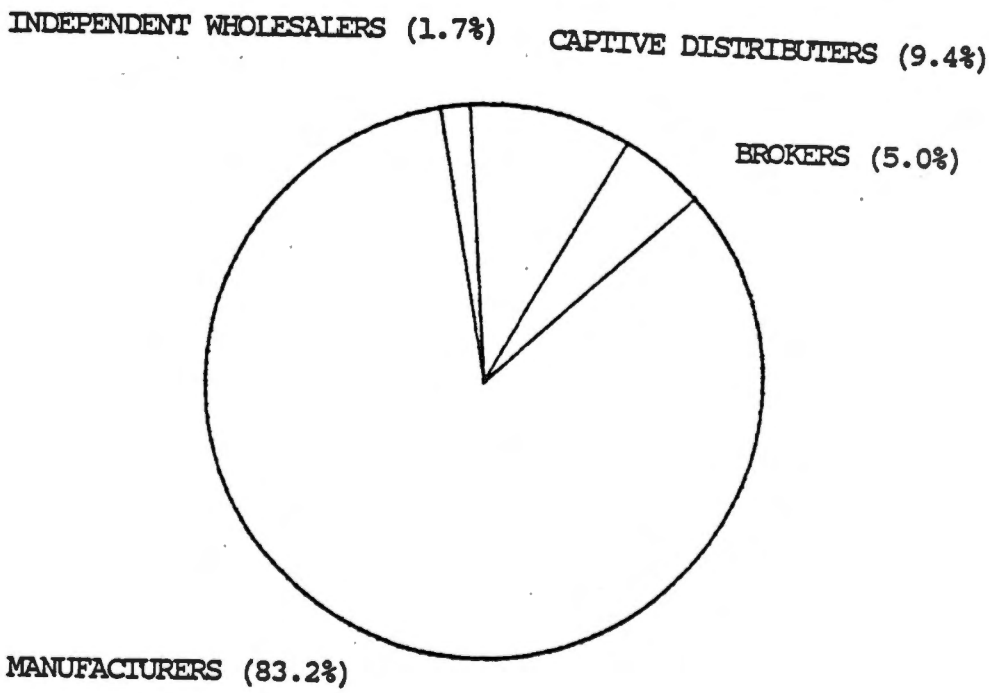


Figure 12. Percent of structural composite panels ordered by intermediaries from distributers and manufacturers.

of the time, three respondents part of the time, and three respondents did not take physical possession.

Intermediaries were also asked if they arranged and paid for the transport of structural composite panels from the manufacturer to their own distribution yards and secondly if they arranged and payed for the transport of panels from the distribution yard to their customers. When ordering from the manufacturers, the average intermediary was responsible for arranging and paying for 22.2% (n=14) of the transportation. However, when distributing panels to customers, the average intermediary was responsible for arranging and paying for 82.3% (n=17) of the transportation.

The average intermediary arranges for the transport of structural composite panels to retailers. However, manufacturers are responsible for the transport of structural composite panels to the intermediary.

Product Mix

The total structural composite panel product mix of the average intermediary is contained in Table 9. Intermediaries order slightly more OSB than waferboard, and 1/4", 7/16" and 3/4" appear to be the most popular thicknesses.

Table 10 indicates over half of the waferboard panels are in the 1/4" thickness category and more than a third are in the 7/16" thickness category (Table 10). Nearly all the OSB panels (81.8%) are in the 7/16" thickness category (Table 11).

Table 9. Product mix of average intermediary

Thickness Category	Percent Waferboard	Percent OSB	TOTAL
1/4"	24.5%	2.9%	27.4
3/8"	1.4	0.3	1.7
1/2"	0.0	0.0	0.0
7/16"	18.8	43.8	62.6
5/8"	0.6	2.1	2.7
11/16"	0.0	0.0	0.0
3/4"	1.5	6.3	7.8
TOTAL	46.8	55.4	102.2

*Figures do not total 100% due to rounding and survey error.

Table 10. Product mix of waferboard panels

WAFERBOARD							
1/4"	3/8	1/2	7/16	5/8	11/16	3/4	TOTAL
57.5%	1.8%	0.1%	39.5%	1.2%	0.1%	4.5%	104.7%*

*Figures do not total 100% due to rounding and survey error.

Table 11. Product mix of OSB panels.

OSB							
1/4"	3/8	1/2	7/16	5/8	11/16	3/4	TOTAL
5.8%	0.5%	0.1%	81.8%	3.5%	0.1%	8.9%*	100.6%

*Figures do not total 100% due to rounding and survey error.

CHAPTER VI

MANUFACTURER SURVEY RESULTS

Response

Manufactuers that produce panels for respondents surveyed in the first two sections of the study were interviewed. Table 12 contains the names and locations of composite structural panels producers whose products were sold in Memphis, Nashville and Chattanooga.

There were 16 manufacturers that responded to this phase of the survey. Two manufacturers could not be reached in five calls, one refused to be interviewed and three were not producers of structural composite panels.[6] Therefore, of an eligible population of 19 manufacturers, 16 were interviewed resulting in a response rate of 84.2 percent.

Average Annual Production

A majority of the manufacturers produce 51 to 250 million square feet (3/8" basis) per year (Table 13). The mean annual production of structural composite panel manufacturers was 178,769,000 (n=13) (STD = 83,457,500) square feet (3/8" basis) per year. However, waferboard accounted for only 24.1 percent (n=16) of the average manufacturers production and OSB the remainder. Although waferboard was the original structural composite panel it appears the trend is toward greater OSB production.

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[6]Three respondents mistakenly stated they ordered structural composite panels from manufacturers that did not produce such panels.

Table 12. List of Structural Composite Panel Manufacturers that have sold panels in Tennessee.

Manufacturer	Location	Product Trade-name
Georgia-Pacific	Grenada MS	(OSB)
Georgia-Pacific	Dudley NC	Blue Ribbon (OSB)
Georgia-Pacific	Skippers VA	Blue Ribbon (OSB)
Louisiana-Pacific	Corrigan TX	Waferwood (wafer)
Louisiana-Pacific	Urania LA	*
Louisiana-Pacific	Hayward WS	Waferwood (OSB)
Louisiana-Pacific	New Limerick ME	Waferwood (OSB)
Louisiana-Pacific	Dungannan VA	*
Blandin Wood Prod.	Grand Rapids MN	Blandex (OSB)
Martin Lumber Co.	Lemoyen LA	Tuftstrand (OSB)
Weldwood	Slave Lake Alberta	*
Northwood	Solway MN	Norboard (OSB)
Huber Corp.	Easton ME	Weldboard (OSB)
Weyerhaeuser	Grayling MI	Structurewood (OSB)
U.S. Plywood	Lonlac Ontario	Waferweld (wafer)
McMillan Bloedel	Thunderbay Ontario	Aspenite (wafer)
McMillan Bloedel	Hudsonbay Sask.	Superstrand (OSB) Aspenite (wafer)
Potlatch	Bemidji MN	Oxboard (OSB)
Potlatch	Cook MN	Oxboard (OSB)

* Manufacturer was not interviewed.

Table 13. Frequency tabulation of manufacturer production per month.

Avg. Production per month (million sq.ft. 3/8" basis)	Frequency	Relative Frequency	Cumlative Frequency
0	0	0.0000	0
1-50	0	0.0000	0
51-100	3	0.2308	3
101-150	3	0.2308	6
151-200	2	0.1538	8
200-250	3	0.2308	11
251-300	1	0.0769	12
> 300	1	0.0769	13

Common Methods of Transport

Manufacturers ship a majority of the panels they produce by rail and the remainder by truck. An average of 41.8 percent (n=14) of structural composite panels were transported by truck and 58.2 percent (n=14) by rail (Figure 13).

Manufacturers were asked what percentage of panels are shipped an average of 1 to 200 miles, 201 to 400, 401 to 600, 601 to 800, 801 to 1000 and greater than 1,000 miles. The percentages of panels shipped in each distance category are shown in Figure 14.

A majority of the panels were shipped 1 to 200 miles. Approximately 50.3 percent (n=10) of the structural composite panels were shipped 1 to 200 miles. Of the remaining panels, 24.2 percent (n=9) were shipped 201 to 400 miles, 9.1 percent (n=9) 401 to 600 miles, 4.2 percent (n=9) 601 to 800 miles, 2.6 percent (n=9) 801 to 1,000 miles, and 16.2 percent (n=9) greater than 1000 miles (figure 14).

Channels of Distribution

Manufacturers were questioned about the percentage of panels shipped to independent wholesalers, captive distributers, brokers, chain store distributers, specialty product producers and retailers. A description of the results is contained in Figure 15.

A typical manufacturer shipped 32.9 percent (n=15) of structural composite panels to independent wholesalers, and 43.5 percent (n=15) to captive distributers. The remainder of the panels were shipped to brokers 3.8 percent (n=15), chain store distributers 13.5 percent

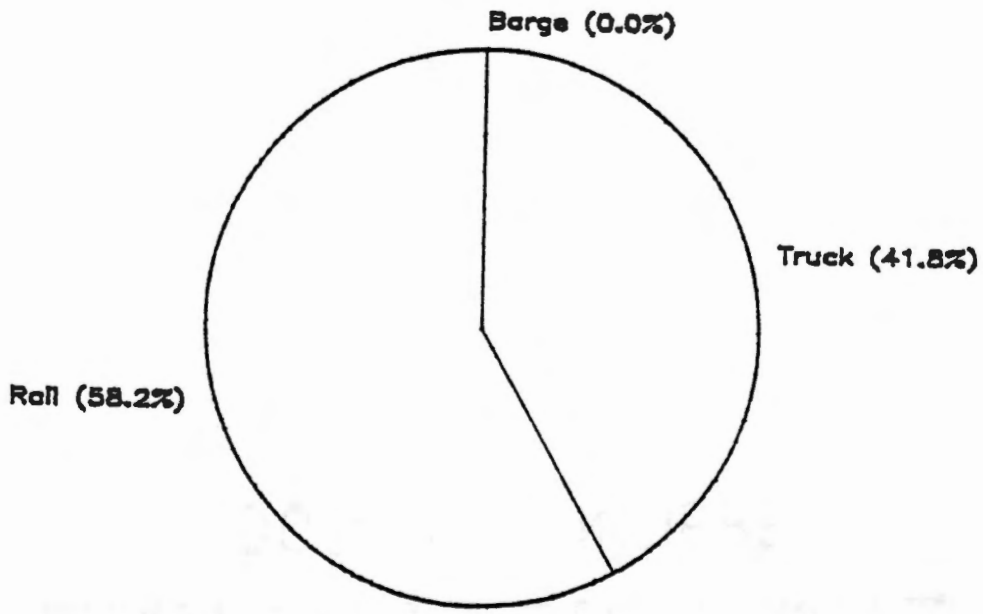


Figure 13. Percent of structural composite panels shipped by manufacturers via truck, rail, or barge.

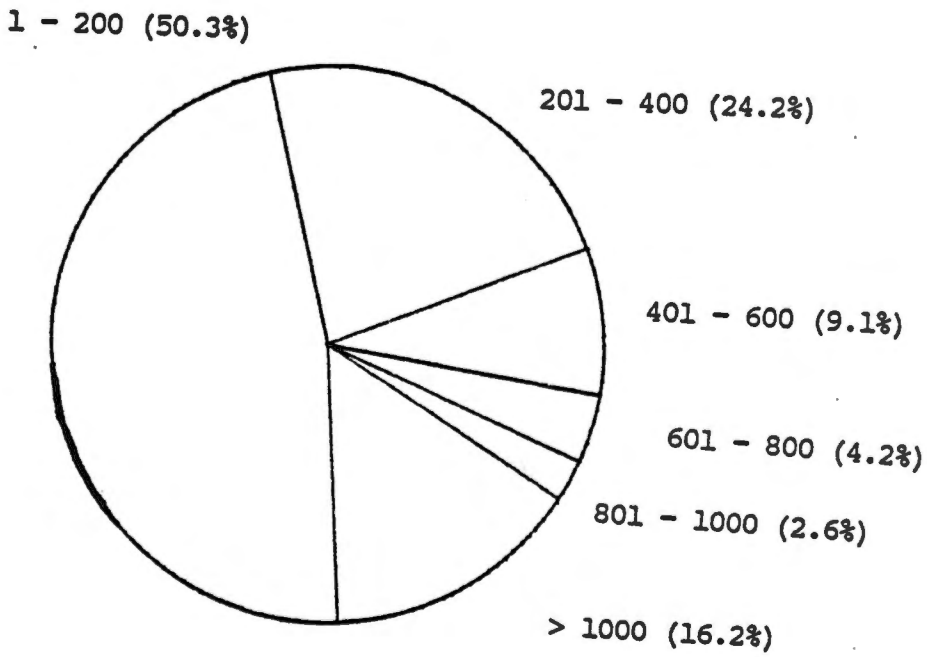


Figure 14. The average percentage distance (miles) structural composite panels are shipped by manufacturers.

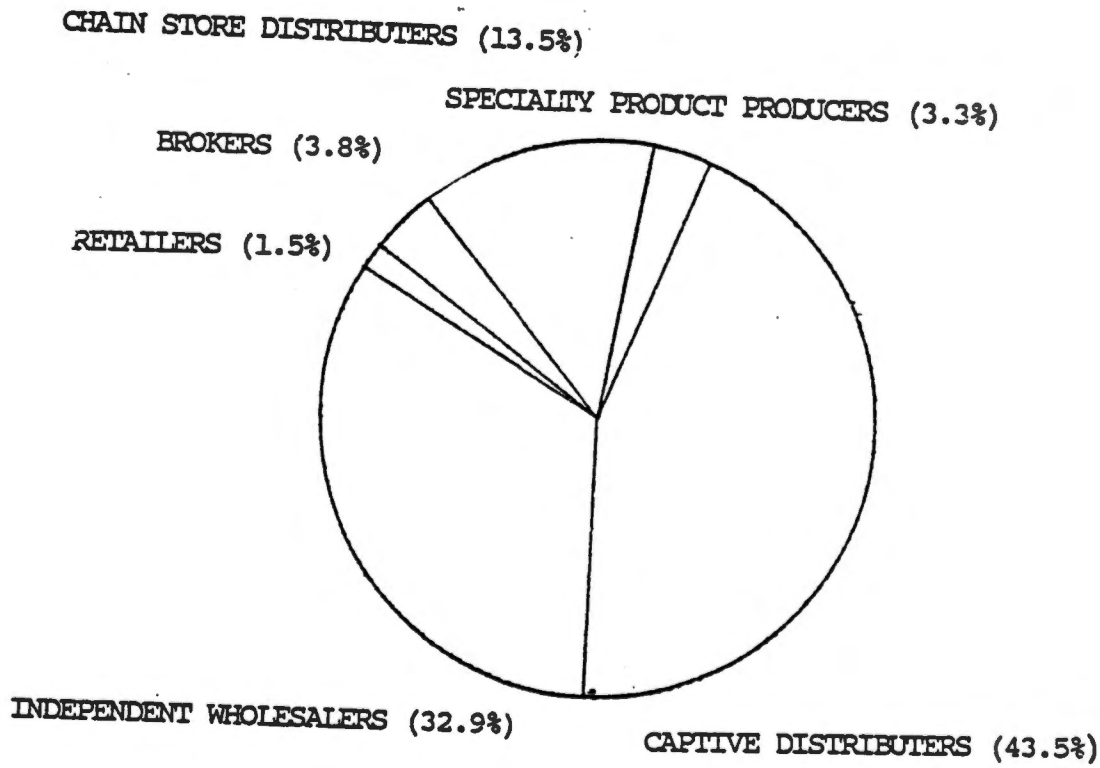


Figure 15. Percentage of structural composite panels bought by various customers of manufacturers.

(n=15), and specialty product producers 3.3 percent (n=13). Only 1.5 percent (n=13) were shipped to retailers.

Product Mix

The structural composite panel mix of the average manufacturer is illustrated in Table 14. A large majoritity of the panels (79.1 percent) were OSB and only 22.1 percent were waferboard. The most often produced thicknesses were 1/4",7/16", and 3/4".

The average waferboard and OSB product mix are contained in Tables 15 and 16 respectively. A large majority of waferboard and OSB production is in the 7/16" thickness category.

Table 14. Product mix of the average manufacturer.

Thickness Category	Percent Waferboard	Percent OSB	TOTAL
1/4"	2.2%	5.1%	7.3%
5/16"	0.9	0.1	1.0
3/8"	1.0	2.5	3.5
1/2"	0.7	5.4	6.1
7/16"	16.9	55.5	72.4
5/8"	0.0	1.1	1.1
11/16"	0.0	0.0	0.0
23/32"	0.0	0.0	0.0
3/4"	0.4	9.4	9.8
TOTAL	22.1	79.1	101.2

*Figures do not total 100% due to rounding and survey error.

Table 15. Waferboard product mix of average manufacturer.

WAFERBOARD									
1/4	5/16	3/8	1/2	7/16	5/8	11/16	23/32	3/4"	TOTAL
11.3%	6.5%	7.0%	3.3%	67.5%	0.0%	0.0%	0.0%	1.5%	97.1%*

*Figures do not total 100% due to rounding and survey error.

Table 16. OSB product mix of average manufacturer.

OSB									
1/4	5/16	3/8	1/2	7/16	5/8	11/16	23/32	3/4"	TOTAL
5.9%	0.1%	3.2%	6.8%	70.6%	1.4%	0.0%	0.0%	12.0%	100

CHAPTER VII

DISCUSSION

The Channel

Structural composite panels flow from manufacturers to intermediaries and finally to retailers. Manufacturers ship 89.9 percent of their panels to intermediaries (independent wholesalers, captive distributers, and chain-store distributers) and retailers receive 88.9 percent of their panels from intermediaries.

Complexity of the Channel

Although the flow of panels appears to be simple in reality it is complex. The complexity of the channel is rooted in the fact that retailers and intermediaries order structural composite panels from more than one source, and manufacturers ship panels to more than one destination. Therefore it is very difficult to follow the flow of panels from a manufacturer through an intermediary to a retailer. For example, the average intermediary receives panels from 4.38 different manufacturers and the average retailer from 1.71 different intermediares. As a result, it is difficult to determine the origin or destination of structural composite panels.

Manufacturers

Manufacturers surveyed in this study produce an average of 178,769,000 sq.ft.(3/8" basis) of structural composite panels per year. Approximately 75.9 percent of production is OSB and the remainder waferboard.

Manufacturers are responsible for the distribution of structural composite panels to intermediaries. Intermediaries indicated 77.8 percent of the transport was arranged by manufactuers. Slighty more than half are shipped from manufactuers via rail (58.2 percent) and 41.8 percent via truck. At times, the inventory of intermediaries are low relative to their sales requests and they are willing to pay a higher price for structural composite panels. As a result, a manufacturer, that can supply panels when and where they are needed, may have a competitive advantage over other manufacturers.

Each manufacturer surveyed had a sales department (Appendix B). Most sales departments had both field and office representatives. In most cases, the field representatives were responsible for maintaining contact with customers and introducing products, and the office staff was responsible for processing telephone orders.

It is apparent that most sales staffs are not aggressive in their approach to sales. Approximately half the sales were initiated by customers and the other half by sales representatives. A more aggressive approach to sales may lead to a competitive advantage over other manufacturers. However more research is needed to assess the advantages and disadvantages of an aggressive sales effort.

Intermediaries

Intermediaries surveyed in this study order 197.7 bundles of structural composite panels per month. Approximately 36.9 percent are delivered to intermediaries via truck and the remainder (63.1 percent) by rail.

Intermediaries form the back-bone of the distribution channel.

They are the link between manufacturers and retailers. Manufacturers ship a majority of their structural composite panels to intermediaries, and retailers order the bulk of their panels from intermediaries. Very few panels are shipped directly from manufacturers to retailers.

As the go-between in the channel, intermediaries perform the break-bulk function. Break-bulk is defined as:

> The separation of a consolidated, bulk load into individual, smaller shipments for delivery to ultimate consignee. The freight may be moved in-tact inside the trailer or it may be interchanged and rehandled to the connecting carriers.

Three factors indicate that intermediaries are responsible for this function.

First, intermediaries facilitate the transport of structural composite panels. Manufacturers ship over half of their structural composite panels via rail, whereas a large majority of panels are shipped to retailers by way of truck. Intermediaries facilitate the transport of panels by allowing both retailers and manufacturers to use the types of transport that are most convenient. Intermediaries are able to receive shipment from manufacturers via rail and redistribute the structural composite panels to retailers on trucks.

Second, Intermediaries reduce large loads delivered from manufacturers into smaller loads for shipment to retailers. The break-bulk function of intermediaries allows manufacturers to save on distribution costs, and retailers to reduce inventory costs.

Third, intermediaries must maintain an inventory of structural composite panels in order to perform the above functions, and deliver to retailers the kind and quantity of products needed. Often

retailers request shipments of structural composite panels in combination with other types of building products. The mixed shipments provided by intermediaries, allow retailers to provide a wide variety of products to consumers without maintaining a large inventory.

Retailers

Retailers distribute structural composite panel products to the final consumer. They order 13.7 bundles of composite panels per month. Although most retailers (94.3 percent) have panels delivered via truck, as the quantity of panels they order increases the use of rail also increases. Retailers are dependent upon intermediaries for product distribution. Only 5 percent of the composite panels they order are shipped directly from the manufacturer.

Competition

Market Structure

A couple of elements indicate that the structural composite panel industry is highly competitive. Nineteen manufacturers, spread across the Eastern United States and Canada, manufacture structural composite panels sold in Tennessee. Competition among manufacturers is not limited to local regions. Although a majority of panels are sold within regional markets, approximately 23 percent of panels are shipped a distance greater than 400 miles from the mill. In addition manufacturers produced a relatively undifferentiated product and price was the major factor motivating both retailers and intermediaries to buy a particular brand of composite panels. It appears that the

market structure of the structural composite panel market is similar to a "standard" oligopoly. In such a market the individual firm has little or no market power (Low, 1970).

Although the structural composite panels are regarded as a commodity, it is possible for manufacturers to differentiate their product. Both quality of panels and service were important in the purchase decision of retailers and intermediaries.

Structural composite panels now have the structural qualities to meet APA product standards, and have been accepted by a large part of the American market. Approximately 19.1 percent of retailers and 27.3 percent of intermediaries stated that the quality of panels was the most important factor in their purchase decision. In addition 33.3 percent of intermediaries stated quality was the second most important factor involved in their purchase decision. Manufactuers must continue to improve the quality of their structural composite panel products. It has become apparent that if the quality needs of consumers are not met, it is unlikely that a manufacturer can successfully compete in the market.

Service has several characteristics such as convenience of ordering, availability of panels, and salesmanship. Salesmanship is the ability of salesman to communicate with consumers and meet the consumers individual needs. Approximately 31.9 percent of retailers and 18.2 percent of intermediaries stated service was the most important factor in their purchase decision. Furthermore 33.3 percent of the intermediaries stated that availability of panels and reliability of delivery were the second most important factors in

their purchase decision. Due to the small response of the purchase decision question, further investigation is needed to assess the types of service retailers and intermediaries require.

This study indicates that the structural composite panel market structure is most closely associated with a "standard" oligolopy and that manufacturers can differentiate their product through superior quality and/or service. Additional research is needed to determine the exact nature of quality and/or service required by intermediaries.

Market Share of Structural Composite Panels

In 1984 structural composite panels accounted for seven to eight percent of the American sheathing market (Maloney, 1985). Since these figures were released in 1985 there has been a large growth in the market share of composite panels.

This study indicates that market share of structural composite panels in Tennessee is at least 31 percent of the structural panel market. Market share was 33.2 percent at the retail level and 31.4 percent at the intermediary level. Two factors indicate that these figures can be applied to the nation as a whole.

First there is no producer of structural panels in Tennessee and as a result, market share is not affected by local production. Due to the cost of transportation, a local producer could affect market share of regional markets. However, since there is not a producer of structural composite panels in the state, this is not the case in Tennessee.

Second, because Tennessee does not have a manufacturer,

distribution channels have a significant affect on market share. Producers of structural composite panels that serve the Tennessee market are located across the eastern half of the United States and Canada. Distribution channels are therefore spread across most of the nation. Such a spread in the distribution channel would indicate that market share in Tennessee is not different from the rest of the nation but characteristic of it.

The trend of increased market share of structural composite panel producers appears to be continuing. Of the 18 structural panel mills announced to be constructed by the year 1990, 13 will be nonveneer, 3 laminated veneer lumber and two plywood (Anderson and Hutton, 1985). Furthermore Bernard Fuller, at the 39th annual meeting of the Forest Products Research Society, stated that structural composite panels are expected to account for 60 percent of the American strctural panel market by the year 2000.

Product Mix

In this study, three thickness classes dominated the product mix of structural composite panels. The thickness classes were 1/4", 7/16" and 3/4". However the 7/16" size category accounted for a majority of product mix in all three phases of the study. The size class 7/16" is most commonly used for structural sheathing purposes.

The mix between waferboard and OSB varied during each phase of the study. The variation may be explained by the nomenclature problem prevalent in the structural composite panel market. The market presently does not have solid definitions for the various types of structural composite panels. Therefore what one identifies as

flakeboard may be waferboard to another.

However, since manufacturers have superior knowledge about their product, the most weight shold be placed upon their responses concerning product mix. Waferboard was the original structural composite panel marketed in the United States, however, it appears the trend is toward increased OSB production. Approximately 75.9 percent of manufacturer production is OSB. OSB has a higher modulus of elasticiy and rupture than waferboard and costs relatively the same to produce.

CHAPTER VIII

CONCLUSIONS AND IMPLICATIONS

Summary

The state of Tennessee has a large under-utilized hardwood resource. A large majority (81.2) percent of the growing stock in the state is hardwood. The general purpose of this study was to investigate potential hardwood markets. Structural Composite panel production was identified as one possible market for Tennessee hardwoods.

Two parts of a market opportunity analysis (MOA) were completed for this study, channel and competition analysis. The channel analysis disclosed the types of transport most often used by retailers, intermediaries and manufacturers and how structural composite panels flow from manufacturer to retailer. In the competition analysis market share was determined, the purchase decision of retailers and intermediaries was analyzed, and the location of structural composite panel manufacturers was disclosed.

Conclusions

As a result of this study several conclusions can be made:

1. Intermediaries are the back-bone of the distribution channel.
2. Manufacturer's ship over half of their panels via rail and retailers receive a large majority by way of truck.
3. Price is the major factor motivating both retailers and intermediaries to buy a particular brand of structural composite panels.

4. Noncommodity factors such as quality and service, are also factors considered in the purchase decision.

5. Structural composite panels have at least a 31 percent share of the sheathing market, and the trend appears to be toward continued growth.

6. Seventeen manufacturers spread across the eastern United States and Canada sell structural composite panels in Tennessee.

7. Manufacturer's distribute a majority of their panels within local markets. Approximately 74.5 percent of the panels they produce are shipped 400 miles or less.

8. OSB 7/16" is the most commonly produced structural composite panel.

Implications

This study provides an excellent springboard toward the completion of a MOA. According to Forester (1984), the three determinants of market opportunity are:

1. Size of market
2. Marketing program reguirements to satify market wants
3. Extent and quality of service to market by other firms

A logical first step of a potential manufacturer would be to assess demand and competition within a 400 mile radius of the mill. In areas where geographic markets of manufacturers overlap competition may be intense. However in areas that do not overlap a local manufacturer may establish a competitive advantage. Figure 16 is an illustration of the geographic market areas of manufacturers presently active in Tennessee.

Intermediaries are the logical target market for manufacturers. Most structural composite panels flow from manufacturers through intermediaries to retailers. Demand for structural composite panels

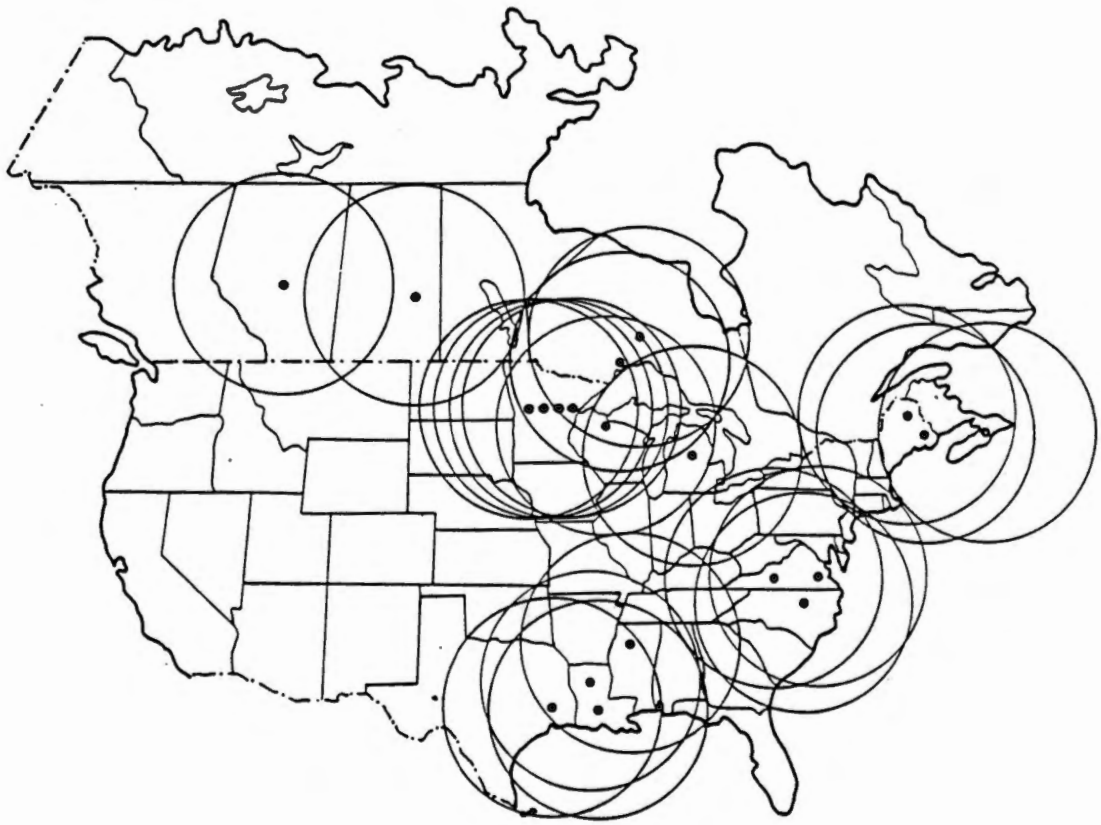


Figure 16. Geographic market areas of manufacturers presently active in Tennessee.

could be estimated by locating all intermediaries within a 400 mile radius of the production point and estimating the amount of panels they order in a particular time period.

Price was the major factor motivating intermediaries to buy a particular brand of structural composite panels. As a result, manufacturer's must be able to produce a price competitive panel to meet the requirements of the market.

One factor that is directly related to the price of a structural panel is the cost of transportation. Koch states; "Mill prices and delivered prices for sheathing are dependent upon the cost of transportation to market."

A majority of the Tennessee hardwood growing stock is has a specific gravity greater than .5. Panels produced from these "hard" hardwoods would weigh more than panels produced from "soft" hardwoods and/or softwoods. Koch states:

> ... flakeboards containing mostly oak and hickory may have shipping weights of 50 to 54 pounds per cubic foot. Slightly higher than that of boards made with a mix containing softwood and soft hardwoods.

As a result these panels may cost more per mile to transport than panels produced from "soft" hardwoods and softwoods.

Although panels produced from Tennessee hardwoods may cost more per mile to transport, the over-all transportation cost may be lower. This is due to the fact that a producer in Tennessee may be closer to several regional markets than other present producers (refer to Figure 16).

Other factors such as stumpage, manufacturing, and logging costs also affect the price of panels. Demand is low in Tennessee for the

type of hardwoods that would be used in the production of strands, flakes or wafers. Presently hardwood pulpwood stumpage in the state is sold at prices near two dollars and 50 cents per ton (Timber Mart South).

The capital and operating cost of establishing a structural composite panel mill are favorable when compared to plywood. The operating costs of manufacturing plywood may be 30 percent greater than producing structural composite panels. Raw materials account for 60 to 70 percent of the cost of producing softwood plywood but only 30 percent for structural composite panels. As a result, structural composite panels can compete with softwood plywood, in terms of capital and operating costs.

The cost of logging hardwood stumpage is dependent upon several factors such as tract size, tons of biomass per acre, and slope. Obviously there are a wide range of logging conditions across the state and logging costs will vary as a result.

Although a manufacturer must be price competitive in order to compete in the market, consumers also place importance upon panel quality and service. Cravens (1983) states:

> Over-reliance upon any one program component such as price can be dangerous. The parts of the program should function as a team working toward customer satisfaction.

This study has shown, that although price is the most important factor in the purchase decision of both intermediaries and retailers, panel quality and service are also important factors. If these two product requirements are not achieved a manufacturer will not be successful.

The next step may be for manufacturers to investigate market niches. Since a structural composite panel produced from "hard" hardwood weighs much more than softwood plywood a producer of structural composite panels may want to investigate the underlayment market. Koch (1978) states:

> Some manufacturers contemplating flakeboard production feel that floor underlayment provides easiest market entry, because the heavy falkeboard panels are more easily handled at floor level than on roofs.

Also consumers may feel a heavier panel is sturdier and therfore a better underlayment product.

Closing Comments

At present, competition in the Tennessee sheathing market is intense. Buyers are price motivated and therfore manufacturer's must be able to produce structural composite panels at a low cost. A manufacturer may have to forfeit profits in the short run, but in the long run may be able to realize profits by meeting consumer needs and/or exploiting a market niche.

Consumer needs and potential market niches were not investigated in this study. As a result, further research into these areas may be quite valuable to existing or future manufacturers.

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APPENDIXES

APPENDIX A

Code #_____(A)

Hello, my name is Bill Watson may I speak to the person in charge of buying waferboard and plywood for your company?

Hello, my name is Bill Watson. I am a graduate student at the University of Tennessee in the dept. of forestry. I am conducting a survey of all structural panel retailers in Chattanooga. The object of my survey is to find out what is involved in the transport of reconstituted wood panels from manufacturer to retailers. The survey takes few minutes and all information given is completely confidential and will be released only as composite data. The first question I would like to ask you is:

1. What is your name?_____ _____ (B)

---

2. Does your firm order? _____ (circle one or more)?

WAFERBOARD (C)	FLAKEBOARD (D)	OSB (E)
(yes/no)	(yes/no)	(yes/no)

2-A. Does your firm distinguish between: (circle answer)

Waferboard and Flakeboard? (yes/no) (F)
Waferboard and OSB? (yes/no) (G)

---

3. Approximately how many bundles of flakeboard, waferboard, and OSB does your firm order on a monthly basis? (A bundle is composed of panels 4 by 8 foot in dimesion and is approximately 32 inches high)

0	(1)	31-40	(7)	91-100	(13)	(H)
1-5	(2)	41-50	(8)	> 100	(14)	
6-10	(3)	51-60	(9)			
11-15	(4)	61-70	(10)			
16-20	(5)	71-80	(11)			
21-30	(6)	81-90	(12)			

---

4. Approximately how many bundles of softwood plywood does your firm order on a monthly basis?

0	(1)	31-40	(7)	91-100	(13)	(I)
1-5	(2)	41-50	(8)	> 100	(14)	
6-10	(3)	51-60	(9)			
11-15	(4)	61-70	(10)			
16-20	(5)	71-80	(11)			
21-30	(6)	81-90	(12)			

5. How many bundles of _____ does your firm order per month? (give ranges in multiples of 5)

	WAFERBOARD	FLAKEBOARD	OSB
Sheathing (3/8"- 11/16")	(J) _____	(M) _____	(P) _____
Flooring (3/4")	(K) _____	(N) _____	(Q) _____
(1/4")	(L) _____	(O) _____	(R) _____

---

8. What percentage of reconstituted structural wood panels are shipped by _____?

TRUCK	RAIL	BARGE
_____(S)	_____(T)	_____(U)

---

6. What percent of the transportation of structural wood panels does your firm arrange and pay for_____? (V)

(answer if firm arranges and pays for its own transportation)

7. What is the average cost per 100 wt. when panels are shipped by_____

TRUCK	RAIL	BARGE
_____(W)	_____(X)	_____(Y)

9. What is the name or names of independent wholesalers that your firm orders waferboard, flakeboard or OSB directly from? (Define independent wholesaler)

#1_____(Z) #2_____(AA) #3_____(AB)

9-A. Does your firm order _____ from _____?

What is the brand name? _____

#1

Waferboard	(yes/no)	(AC)	_____	(AD)
Flakeboard	(yes/no)	(AE)	_____	(AF)
OSB	(yes/no)	(AG)	_____	(AH)

#2

Waferboard	(yes/no)	(AI)	_____	(AJ)
Flakeboard	(yes/no)	(AK)	_____	(AL)
OSB	(yes/no)	(AM)	_____	(AN)

#3

Waferboard	(yes/no)	(AO)	_____	(AP)
Flakeboard	(yes/no)	(AQ)	_____	(AR)
OSB	(yes/no)	(AS)	_____	(AT)

#4

Waferboard	(yes/no)	(AU)	_____	(AV)
Flakeboard	(yes/no)	(AW)	_____	(AX)
OSB	(yes/no)	(AY)	_____	(AZ)

9-B. What city and state is _____ located in?

#1		#2		#3		#4	
_____	(BA)	_____	(BB)	_____	(BC)	_____	(BD)
_____		_____		_____		_____	

9-C. What is the name of the personal contact that you have with_____?

#1		#2		#3		#4	
_____	(BE)	_____	(BF)	_____	(BG)	_____	(BH)

9-D. What percent of the waferboard, flakeboard or OSB that your firm purchases are bought directly from Independent Wholesalers?_____ (BI)

10. What is the name or names of manufacturers that your firm orders waferboard, flakeboard or OSB directly from?

#1_____ (BJ) #2_____ (BK)

#3_____ (BL)#4_____ (BM)

Does your firm order _____ products from a manufacturing plant or distributer of a manfacturer _____?

#1_____ (BN) #2_____ (BO)

#3_____ (BP) #4_____ (BQ)

10-A. Does your firm order _____ from _____?

#1

Waferboard (yes/no) (BR)
Flakeboard (yes/no) (BS)
OSB (yes/no) (BT)

#2

Waferboard (yes/no) (BU)
Flakeboard (yes/no) (BV)
OSB (yes/no) (BW)

#3

Waferboard (yes/no) (BX)
Flakeboard (yes/no) (BY)
OSB (yes/no) (BZ)

#4

Waferboard (yes/no) (CA)
Flakeboard (yes/no) (CB)
OSB (yes/no) (CC)

10-B. What city and state is _____ located in?

#1_____ (CD) #2_____ (CE)

_____ _____

#3_____ (CF) #4_____ (CG)

_____ _____

10-C. What is the name of the personal contact that you have with_____?

#1_____ (CH) #2_____ (CI) #3_____ (CJ)

10-D. What percent of the waferboard, flakeboard or OSB wood panels that your firm purchases are bought directly from distributers of manufacturers? _____ (CK)

10-E. What percent of the waferboard, flakeboard, OSB that your firm purchases are bought directly from manufacturing plants? _____ (CL)

---

11. In your opinion, which of your distributers do you like to deal with the most_____ (CM)

- What is the most important reason for _____ being your favorite distributer?_____

---

12. What is the average price that your firm pays for a peice of _____?

	WAFERBOARD	FLAKEBOARD	OSB
Sheathing (3/8"-11/16")	(CO) _____	(CR) _____	(CU) _____
Flooring (3/4")	(CP) _____	(CS) _____	(CV) _____
(1/4")	(CQ) _____	(CT) _____	(CW) _____

Code#_____

MARKET INTERMEDIARIES

Hello my name is Bill Watson. I am a research assistant at the University of Tennessee. May I speak to the person in charge of ordering plywood and waferboard for your firm.

Hello my name is Bill Watson. I am a research assistant at the University of Tennessee in the Department of Forestry. Presently we are surveying distributers of structural products to retailers of the state of Tennessee. Would you mind taking a few minutes to participate in the survey?

1. Does your firm order _____?

   Waferboard (yes/no) OSB (yes/no)

---

2. Approximately how many bundles of waferboard, and OSB does your firm order on a monthly basis?

0	501-550
1-50	551-600
51-100	601-650
101-150	651-700
151-200	701-750
201-250	751-800
251-300	801-850
301-350	851-900
351-400	901-950
401-450	951-1000
451-500	> 1000

2-A. What percent of the total waferboard and OSB that your firm orders is waferboard. _____

3. What thicknesses of _____ does your company order?
What percent of the total _____ is _____?

	Waferboard	OSB
1/4"	_____	_____
3/8"	_____	_____
1/2"	_____	_____
7/16"	_____	_____
5/8"	_____	_____
11/16"	_____	_____
3/4"	_____	_____

---

3. Approximately how many bundles of softwood Plywood does your firm order on a monthly basis?

0	501-550
1-50	551-600
51-100	601-650
101-150	651-700
151-200	701-750
201-250	751-800
251-300	801-850
301-350	851-900
351-400	901-950
401-450	951-1000
451-500	> 1000

---

4. Does your firm take title of the waferboard and/or OSB that it distributes.

(yes/no/part of time)
- percent _____

---

5. Does your firm take physical possession of the waferboard and/or OSB that it distributes?
(yes/no/part of time)
- percent_____

5-A. What percentage of reconstituted wood panels are received by _____?

Truck _____ Train _____ Barge _____

6. When ordering reconstitued wood panels, what percent of the transport does your firm arrange and pay for _____?

---

7. When distributing reconstituted wood panels to retailers what percent of the transport does your firm arrange and pay for _____?

---

8. How many manufacturing mills does your firm order waferboard and OSB directly from _____?

Please list the 3 manufacturing mills that your firm orders the majority of waferboard and/or OSB from and give their locations (city and state).

#1	#2	#3
_____	_____	_____
_____	_____	_____

What percent of the waferboard, OSB that your firm purchases is bought directly from manufacturing plants?_____

---

9. Which of the following is the most important factor in the decision to buy waferboard and or OSB from a particular manufacturer?

Availability of quantity needed _____

Price of product _____

Product quality _____

Reliability of delivery _____
(product is delivered on time and in good condition)

9-A. Of the remaining factors which is the second most imporant?

---

10. Approximately how many distributers of manufacturers does your firm order waferboard and/or OSB from?_____

10-A. What percent of the waferboard and OSB that your firm orders comes from distributers of manufacturers

_____

11. Approximately how many independent wholesalers does your firm order waferboard and/or OSB directly from?_____

What percent of waferboard and OSB is ordered from independent wholesalers_____?

---

12. Does your firm use the services of a broker to order goods from distributers? (yes/no)
- (if yes) percent _____

---

13. What is the average delivered price that your firm pays for a 1000 square feet of _____?

	Waferboard	OSB
3/8"	_____	_____
1/2"	_____	_____
7/16"	_____	_____
5/8"	_____	_____
11/16"	_____	_____
3/4"	_____	_____

Code# _____

MANUFACTURERS

Hello my name is Bill Watson. May I Speak to a salesperson please?

Hello my name is Bill Watson. I am a research assistant at the University of Tennessee in the Department of Forestry. Presently we are surveying manufacturers of waferboard or OSB panel products that market their products in the state of Tennessee. Would you mind taking a few minutes to participate in the survey?

1. Does your firm produce waferboard or OSB? (1.2.3)

   1-A. What is the average annual production of your mill on a 3/8" basis_____?

   1-B. If both what percent is waferboard_____?

---

2. What thicknesses of waferboard or OSB does your firm produce?

   What percent of the total _____ is _____?

	Waferboard	OSB
1/4"	_____	_____
3/8"	_____	_____
1/2"	_____	_____
7/16"	_____	_____
5/8"	_____	_____
11/16"	_____	_____
3/4"	_____	_____

---

3. What is the brand name of the waferboard and/or OSB that your mill produces?_____(waferboard) _____(OSB)

4. What percent of waferboard and/or OSB is shippped (miles)?

1-200 _____

201-400 _____

401-600 _____

601-800 _____

801-1000 _____

>1000 _____

---

5. What percent of waferboard or OSB is shipped by _____?

Truck _____ Rail _____ Barge _____

---

6. Does your mill have its own sales staff (yes/no)?

(if yes continue interview)

(if no) Where is the sales staff located for this mill?_____
(phone)_____(conclude interview)

MARKETING

****

7. What mills is your sales staff responsible for?

_____ _____ _____ _____

_____ _____ _____ _____

---

8. How many field representatives are responsible for reporting to your office location_____?

What is the role of a field representative?

9. How large is the remainder of the sales staff at your office location?_____

What is their role?

10. Who initiates a typical sale the buyer or your company's sales staff_____?

---

11. What percent of your products are sold to _____?

Independent wholesalers _____

Captive distributers _____

Brokers _____

Chain Store Distributers_____

Specialty products _____

Retailers _____

---

13. What is the mill price?

Waferboard		OSB	
1/4"	_____	1/4"	_____
3/8"	_____	3/8"	_____
1/2"	_____	1/2"	_____
7/16"	_____	7/16"	_____
5/8"	_____	5/8"	_____
11/16"	_____	11/16"	_____
3/4"	_____	3/4"	_____

APPENDIX B

NORTHWOOD

Northwood, located in Solway, Minnesota; is a producer of OSB panels, marketed under the trade name "Norboard." The sales office is located in Toronto. The three members of the office sales staff are responsible for responding to telephone inquiries of customers and field representatives.

Three field representatives are responsible for locating new customers, staying in touch with old customers, and keeping all customers supplied with information. A typical sale is intitiated by both field and office sales staff 50% of the time and by customers the other 50%.

WELDWOOD OF CANADA

Weldwood of Canada, located in Lonlac, Ontario; is a subsidiary of Champion International Corporation. The mill produces waferboard under the trade name "waferweld".

The sales staff is located in an office in Vancouver, and is responsible for the sale of structural panel products produced by two mills. However only the Lonlac mill was involved in phase three of the study.

There is an office sales staff of four people and there are no field representatives. One sales manager and one salesman are assigned to a mill. They are responsible for processing the telephone orders of customers. A typical sale was initiated 75% of the time by the buyer and the other 25% by the sales staff.

McMILLAN BLOEDEL

McMillan Bloedel has two mills that produce structural composite panels that are sold in Tennessee. One mill is located in Hudson Bay, Saskatchewon and the other in Thunder Bay, Ontario.

The Hudson Bay mill produces 100% waferboard and the Thunder Bay mill produces 85% OSB and 15% waferboard. The brand name of the OSB panels produced by McMillan Bloedel is "Superstrand" and the waferboard "Aspenite."

The sales office for both plants is located in Thunderbay. The office sales staff is composed of six members. Two are in charge of transportation, one accounts receivable, and two are liason with the field representatives.

There were are seven field representative that report to the Thunderbay office. The field representatives are responsible for educating retailers and taking orders.

BLANDIN WOOD PRODUCTS

Blandin Wood Products is located in Grand Rapids, Minnesota. They produce OSB panels and under the trade name "Blandex."

The sales office for Blandin Wood Products is also located in Grand Rapids. Three office sales staff personal work with field representatives, keep customers current on prices and promote sales. Three field representatives are responsible for calling customers, establishing customer needs, promoting products, and checking customers claims. Sixty percent of the sales are initiated by the sales staff.

WEYERHAEUSER

The only Weyerhaeuser structural composite panel mill that distributed to the Tennessee market is located in Grayling, Michigan. The mill produces OSB panels and under the trade name "structurewood."

The sales office for the Weyerhaeuser mill is also located in Grayling. The office sales staff is composed of five salesmen. They respond to telephone inquiries of customers and promote sales. Seven field representatives are responsible for initiating the sale of non-building related products. During the summer, when demand for building products is high, most sales of the OSB panels are initiated by the customer, however, in the winter the sales staff initiates sales.

POTLACH

Potlach has two mills located in Minnesota that produce panels sold in Tennessee. One is located in Bemidji and the other in Cook. Both mills produce OSB panels under the trade name "Oxboard."

The sales office for both mills is located in Spokan Washington. Three office representatives are assigned the responsibility of sales in a geographic territory. One field representative actively promotes and demonstrates products produced by Potlach. Sixty percent of the sales of OSB panels are initiated by customers and 40% by the sales staff.

MARTIN LUMBER COMPANY

Martin Lumber Company is located in Lemoyan Louisianna. They produce OSB panels under the trade name "Tuft Strand."

The sales office for Martin Lumber is also located in Lemoyan. Two office salesmen handle orders and coordinate shipping. One field representative establishes potential customers and makes courtesy calls. A typical sale is initiated by the customer.

GEORGIA-PACIFIC

Georgia-Pacific has three structural composite panel mills that produce structural composite panels sold in Tennessee. The mills are located in: Grenada, Mississippi; Dudley, North Carolina; and Skippers, Virginia. All three mills produce OSB panels. The OSB panels are marketed under the trade name "Blue Ribbon."

The sales office for all three mills is located in Atlanta, Georgia. The Atlanta sales office was also responsible for the sale of structural composite panels produced by the Georgia-Pacific mill in Woodland, Main.

The twelve members of the office sales staff are responsible for telephone sales. Nine are account managers for Georgia-Pacific distribution centers and three for outside accounts. The sales office did not have any field representatives but used its 140 distribution centers to represent Georgia-Pacific across the nation. A typical sale of Georgia-Pacific manufactured structural composite panels is made by an office salesmen selling panels to a Georgia-Pacific distribution center.

LOUISIANA-PACIFIC

Louisiana-Pacific has several mills that produce structural composite panels sold in Tennessee. The mills are located in: Corrigan, Texas; Urania, Louisiana; Hayward, Wisconsin; Dungannon, Virginia and Houlton Maine. However, only three of the mills were interviewed. The Corrigan mill produces waferboard and the Houlton and Hayward mills produce a structural composite panel made of oriented wood wafers. The oriented wafer panel was considered to be in the same class as OSB.

Louisiana-Pacific has two sales offices. One office located in Schaumberg, Illinois is responible for selling the panels of seven structural composite panel plants located in: Chilco, Idaho; Kremling, Colorado; Montrose, Colorado; Houlton, Main; Dungannon, Virginia; Two Harbors, Minnesota and Hayward, Wisconsin.

Five office salesmen are responsible for taking orders from field representatives and retailers and initiating sales. Nine field representatives are in charge of a specific area, stayed in touch with customers, and introduced new products to customers.

Conroad, Texas is the location of the other Louisiana-Pacific sales office. The Conroad office sells the panels produced by the Urania, Louisiana mill and the Corrigan, Texas mill.

The three member office sales staff handle incoming calls, and make telephone sales and travel. No field representatives report to the Conroad Texas sales office. Half of the sales are initiated by the sales staff and the other half by customers.

J.M. HUBER CORPORATION

The Huber Corporation OSB mill is located in Easton, Maine. "Weldboard" is the trade name of the structural composite panels produced at the Easton plant.

The sales office is located in Portland Maine. Two sales managers form the whole sales staff. A typical sale is initiated by the customer the customer.

VITA

William J. Watson was born in Willoughby, Ohio on June 13, 1962. He graduated from Willoughby South High June 1980. The following August he entered Carson-Newman College (Jefferson City, Tennessee) and in May 1984 he received a Bachelor of Arts degree in Biology. In the fall of 1984 he accepted a research assistantship at the University of Tennessee in the department of forestry and began to work toward an M.S. degree. This degree was awarded August 1987.

The author is a member of Blue Key, and Xi Sigma Pi. Mr. Watson is employed by Stewart Lumber Company in Morristown, Tennessee.