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**AN ANALYSIS OF THE RETAIL CUSTOMER OF CCA PRESSURE TREATED  
LUMBER, TIMBERS AND PLYWOOD**

by

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in

Forest Products

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(ABSTRACT)

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Professional builders (PRO's) and do-it-yourself (DIY) households throughout the U.S. were surveyed individually to assess their overall knowledge/awareness, product and service attribute preference and the general product quality and risk perceptions of CCA pressure treated lumber products. Primary data were acquired via two separate nationwide mail surveys; one included 3,361 PRO's, the other was administered to 3,224 households.

Findings indicate that each of these retail customer groups is comprised of distinct subsegments that may be distinguished in various ways. These meaningful PRO segmentation strategies emerged from analysis of 543 PRO respondents portraying treated lumber customers according to the following: (1) geographic region as characterized by product and service attribute preferences, opinions, knowledge and demographics, (2) quality perceptions in terms of the relationship between benefits sought and product quality perception opinions and (3) physical risk or safety perceptions based on a risk personality type as delineated further according to three sets of psychographic predictor variable sets.

The 491 responding DIY'ers were segmented according to risk perception orientation similarly to the builders. In addition, the DIY'er was profiled with regional breakdowns for treated lumber usage, applications and purchase intent, the husband/wife involvement in treated lumber buying decisions, knowledge, and product and service attribute importance.

Consumer knowledge and awareness of pressure treated lumber products, in general, is very low. Only one-third of PRO's and 21% of DIY'ers could recall, unaided, at least one brand of treated lumber. Moreover, approximately one-third of all PRO and DIY respondents are knowledgeable about the preservative chemicals and a mere 38% of the 436 PRO respondents and 23% of the DIY respondents who have used treated lumber products from 1985-1987 could successfully identify the correct response from a multiple choice question which described the contents of Consumer Information Sheets (CIS's). Primarily through reading materials, Permanent Wood Foundations (PWF's) are well known among builders with 70% aware. However, only one-fourth of DIY'ers have ever heard of PWF systems.

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*"You can't motivate people. That door is locked from the inside. You can create a climate in which most of your people will motivate themselves to help the company reach its objectives."*

--Robert Townsend, Further Up the Organization

## PREFACE

This dissertation is organized into six separate chapters, each representing a different aspect of the research effort. Since each section is designed as a complete manuscript, a certain amount of duplication, primarily in the background material and methodology sections, was unavoidable. The author hopes that redundancies will not detract from the work or confuse the reader.

The six manuscripts, in essence, address three major theoretical areas within the field of consumer behavior which facilitates the development of marketing strategy. The first area of emphasis, chapters one and two, profiles the PRO and DIY retail customer of CCA treated lumber products. These two chapters provide regional descriptions of these consumers in terms of various demographic and psychographic variables in order to explain who they are, what they buy, what they desire and what they know and think.

The second major theoretical emphasis involves the builder as a perceiver of quality. Chapters three and four address PRO quality perceptions in terms of a multivariate relationship between the two canonical variates of product and service attributes, that is benefits, and product quality opinions.

The last two chapters, five and six, utilize the two related concepts of perceived risk and hazard management. Manuscript five examines risk acceptability in terms of product awareness and safety. This chapter incorporates the effectiveness of the Consumer Awareness

Program (CAP) to inform consumers as to the proper use, handling and disposal precautions of the preservative treated lumber products. The sixth article deals with methodology to distinguish among a risk averse and a risk taking PRO and DIY treated lumber customer. These risk personality types are then characterized in terms of attitudes/opinions, knowledge/awareness and demographic items.

*"Research often starts from an idea, a question or an extension of a previous line of enquiry. The first thoughts are often vague and rather grandiose, tending to overestimate the resources available and the time needed to complete the project. However, without optimism, much research would never be started."*

--Martin J. Kendall  
--Clifford Hawkins

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## PROBLEM STATEMENT AND STUDY OBJECTIVES

### Problem Statement

The wood preserving industry in the U.S. is one of the most dynamic segments of the lumber industry. "Treated Lumber," in the context of this study, refers to pressure treated lumber, timbers and plywood. This segment of the treated wood industry has grown from 14% in 1953 to 60% of the total treated wood market in 1986 (Micklewright 1988). During the recent recession in the U.S. lumber industry from 1978 to 1982, total U.S. consumption of softwood lumber declined about 27% while the use of treated lumber grew by 40% (Fuller and Walsh 1983; APA 1985). This illustrates the remarkable resiliency of the treated lumber market.

Much of the recent success of treated lumber can be attributed to the following major factors:

1. The development of relatively new chemicals for treating wood. Chromated copper arsenate (CCA), a waterborne preservative composed of metallic oxides or salts constitutes nearly 95% of treated lumber today (Micklewright 1988). Most lumber treating plants consider CCA treatment as the best available protection against rot or decay and insects, with few, if any, process problems. It requires less investment than other major preservatives and is easier to handle (Walsh 1985). In 1953, 90% of the chemicals used in the wood treating industry were creosote, creosote-coal tar and creosote petroleum. By 1973, pentachlorophenol (penta) and CCA had achieved a 31% and 12% treated wood market share respectively. In 1986, CCA was used in over two-thirds of all pressure treated wood products (Micklewright 1988).
2. The increased demand for weather-exposed home improvements (predominantly decks) has dramatically increased the demand for treated lumber. Residential remodeling accounts for over half of the market for treated lumber. Another 28% of the market is made up of new residential construction mainly for the same outdoor uses as residential remodeling (RISI 1987).

3. Consumer awareness and acceptance of treated lumber has increased. Marketing services and materials have been provided by wood preservative suppliers and home center and building material retailers have promoted treated lumber. Over 86% of all treated lumber moves through retailers to the end user (Fuller and Walsh, 1983).

The individual consumer of treated lumber has been targeted by industry as the dominant demand segment. The Do-It-Yourself (DIY) consumer accounts directly for nearly 40% of the treated lumber demand (or about 50% of the treated lumber sold by retailers). Indirectly, much of the demand by home improvement and new residential contractors is derived from the homeownership consumer. Thus, as much as 70% of the treated lumber demanded can be traced to the consumer.

However, consumer level research is virtually non-existent in the important area of treated lumber retail sales. Others have examined the markets for treated lumber, timbers and plywood in terms of an industry profile with econometric modeling to develop demand projections (Fuller and Walsh 1983). Additionally, market research has been conducted by the Home Center Research Bureau, and the DIY Research Institute to address, profile and segment retail customers of all home center products.

### **Objectives**

This study consisted of two distinct populations: Phase I, the professional contractor/remodeler (PRO) and Phase II, the Do-It-Yourself homeowner (DIY'er). All five research objectives involved both populations which comprise over 86% of retail sales of

CCA pressure treated lumber, timbers and plywood (Fuller and Walsh 1983).

This consumer research project was developed primarily as fundamental market research targeted for and funded by nine industrial sponsors. The working plan objectives outlined this sponsored research project, the applied portion, such that a solid data base on the retail customer of CCA pressure treated lumber, timbers and plywood was developed. This data base included both demographic (objectively measured characteristics such as age, income, education, sex, etc.) and psychographic (relatively intangible variables such as knowledge, opinions, attitudes and values) profiles of the buyer segments for treated lumber.

The other principal goal addressed in the sponsored study was to assess the risk that buyers associated with treated lumber products and determine the effectiveness of the recent Consumer Awareness Program (CAP) designed to educate the user as to the proper use, handling and disposal precautions for CCA lumber products. The five objectives, outlined in the working plan, were addressed in full in a 240 page report to sponsors mailed May 17, 1988. Specifically these objectives include:

- (1) To identify and profile the retail customer for CCA pressure treated lumber, timbers and plywood through the collection of demographic data on the two major customer segments for treated lumber; the DIY'er and the PRO.
- (2) To segment these large retail customer groups into smaller, more manageable target markets and to define distinctive traits of each subsegment.

- (3) To assess the buyer's technical and end-use knowledge and awareness of treated lumber products and applications regarding new residential and home improvement uses.
- (4) To examine the relative importance of various CCA treated lumber product attributes from the buyer's perspective to enable the development of better merchandising/promotion programs.
- (5) To determine the degree of risk that buyers of treated lumber products associate with the pesticide, CCA. Also to evaluate the effectiveness of the current Consumer Awareness Program implemented by the EPA in late 1985.

All survey questions and study objectives were fully incorporated into a Final Report to Sponsors, entitled "The Retail Customer of CCA Pressure Treated Lumber Products," thus providing a valuable data base for the study as a whole.

The actual dissertation, consisting of six separate manuscripts, was developed in response to a desire to publish results in more theoretical and academically recognized vehicles. As a consequence, specific areas of the gathered data were examined very intimately; others were not closely addressed in the context of the dissertation chapters.

"Knowledge is of two kinds. We know a subject ourselves or we know where we can find the information about it."

--Dr. Samuel Johnson

## LITERATURE REVIEW

### Introduction

#### Treated Wood

There are three major methods of wood preservation. The simplest is to keep the wood product dry. This is achieved by structural design primarily, such as the incorporation of overhanging eaves, gutters and damp-proof membranes to avoid condensation and leakage problems. However, in certain situations, generally exposed or high moisture conditions, deterioration is unavoidable unless naturally durable or adequately treated wood is used.

In the U.S., the availability of naturally durable wood is confined to the heartwood of a few species such as redwood, cedar, cypress, chestnut and white oak. Because of the limited availability and resultant high cost of these woods, this application is most suitable where both durability and appearance is important. The degree of natural decay resistance varies considerably within a species, location in a tree, age and rate of growth and depends on the nature and quantity of fungitoxic extractives (Haygreen and Bowyer 1982). Generally, the more realistic approach employed to avoid wood deterioration in severe hazard circumstances is to select the wood species for its physical properties and then preservatively treat it.

Ideally, a wood preservative should possess the following characteristics (Haygreen and Bowyer 1982):

1. Toxic to wood-destroying organisms
2. Permanent (chemically stable and non-leachable)
3. Penetrates wood readily
4. Non-corrosive to metals and non-injurious to wood
5. Safe to handle and use
6. Economical

The effectiveness of a preservative treatment depends not only on the toxicity of the chemical to the types of biological agents that cause wood deterioration (fungi, marine borers, insects (including beetles) and bacteria), but also on depth of penetration and retention levels of the preservative in the wood. The American Wood Preservers' Association (AWPA) issues treatment standards which specify the quality of the various preservatives, the retention levels and the penetrations required to protect wood for different end uses. The American Wood Preservers' Bureau (AWPB) quality mark (stamp) on each piece of treated lumber and plywood is the consumer's assurance that the treatment complies with established standards.

Chromated Copper Arsenate (CCA), a waterborne preservative composed of metallic oxides or salts, is considered by many to be the best available protection against rot or decay and insects, with minimal process problems (Walsh 1985). Detailed discussions of the chemical and physical properties of various wood preservatives can be found in the literature (Hartford 1973; Nicholas 1982; Richardson 1978).

## Effectiveness of the Preservative Systems

The effectiveness of the wood-preservative treatment depends on the "results" of the treatment, as well as the preservative chemicals. Results include penetration, retention and distribution. There are a number of factors that affect penetration such as dryness, sap stain, pit aspiration, cleanliness of solution, sapwood depth, incising technique, species, season of the year, and others (Nicholas 1973). The variability of penetration, in general, is due primarily to species and sapwood depth whereas the variability related to treatment practices consists mainly of treating lumber of different moisture contents. Penetration is measured according to AWPB Standards in inches or percent of total sapwood penetrated.

Retention levels of preservative in the wood product are dictated by AWPB Standards. Due to the variable nature of wood, this material accepts preservative treatment more or less depending on its permeability, density, resin content, size, moisture content, wood structure, sapwood depth, etc. (Nicholas 1973). Retention is measured in pounds of preservative chemical per cubic foot of actual volume of wood.

The distribution of a wood preservative is influenced by its macrodistribution (distribution throughout the cell lumens) and the microdistribution (distribution within the cell wall). Macrodistribution is affected by the wood characteristics, the treating process and the treating solution. Microdistribution of the CCA oxides or salts involves the chemical reactions that "fix" the

chemicals to the cell wall components. The excellent performance of CCA treatments is attributed largely to the fact that they are absorbed into the cell wall and uniformly distributed in the wood.

Mechanical preparation, such as incising, may be required in order to achieve adequate treatment results for some species of wood. Impermeability and a lack of natural durability constitute an undesirable situation for CCA preservative treatment due to the rapid fixation of the chemical with the wood. This is exhibited to a varying degree with Douglas fir (Pseudotsuga menziesii), hemlock (Tsuga spp.), spruce (Picea spp.), and the true firs (Abies spp.) among others. These woods, referred to as refractory, may require mechanical preparation, such as incising (small holes punched in the wood surface), in order to conform to AWPB standards. These AWPB standards require that all species except southern, red and ponderosa pines (Pinus spp., Pinus resinosa and Pinus ponderosa respectively) with a nominal thickness of 2 inches or greater be incised on four sides to a depth of .4 inches or more. Graham and Helsig (1979) examined various deep incising, boring and kerfing techniques to improve the treatability of refractory species.

### **History**

The modern wood preservation era in the U.S. began in 1875 in Pascagoula, Mississippi. Much of the early growth in the industry, including the first plant, was in response to the growth of the railroad and utilities (Barnes 1985). From 1875 until about 1925,

creosote was the sole chemical used in treating wood. Around 1930, Pentachlorophenol (Penta) was introduced in the U.S. and enjoyed rapid acceptance. In the early 1950's Chromated Copper Arsenate was in use commercially in the U.S. Richardson (1978), provides an excellent historical perspective in his book on wood preservation as does the classic text of Hunt and Garratt (1953).

### **Utilization**

The savings in timber made possible by use of wood preservatives makes more forests available for the future. A study conducted by Josephson (1977) estimated that the use of treated wood products saved 1.5 billion cubic feet of timber harvests annually or a 12% savings of round wood production.

Another key aspect related to the utilization of treated lumber products involves the substitution of non-wood products and the resultant environmental impacts. Substitute products such as concrete, steel, cement block and others require more non-renewable forms of energy and cause greater pollution and impacts on the environment than does treated wood (Josephson 1977).

### **The Treating Industry**

#### **Products**

Since 1977, about the time treated lumber sales began to take off, the market has grown from 1.5 billion board feet (bbf) of pressure treated lumber to 5.5 bbf in 1986 (Micklewright 1988) (Figure

1). This represents a phenomenal growth rate of over 14% per year over the last decade (Micklewright 1988). Lumber, timbers and plywood accounted for 330,200,000 cu. ft. or 60% of all treated products produced in 1986. Of this volume, 95% was treated with waterborne preservatives. Waterborne preservatives consist of four major chemicals. They are: (1) Chromated Copper Arsenate (CCA - three types: A, B and C), (2) Ammoniacal Copper Arsenate (ACA), (3) Acid Copper Chromate (ACC) and (4) Chromated Zinc Chloride (CZC). CCA accounted for 97% of the waterborne preservatives used in 1986 (Micklewright, 1988).

In terms of board feet (and square feet (3/8-inch basis) for plywood), production of treated lumber, timbers and plywood in 1986 by chemical type is illustrated in Table 1. Treated lumber, timbers and plywood now account for approximately 12% of softwood lumber demand in the U.S. which represents three times the 4% market share of 1977 (Walsh 1985).

### **Markets**

The treated lumber and timber share of the treated wood market has grown rapidly since 1953 (Figure 2) (Fuller and Walsh 1983; Micklewright 1988). From 1977 to 1984, market share of lumber and timbers more than doubled from 25% to 52% of total treated wood produced. In 1986, lumber and timbers represented 60% of the treated market while ties were only 16%. Overall treated wood forecasts for the balance of the century call for continued growth in lumber,

timbers and plywood demand though at a slower rate than during the past decade.

In 1986, residential repair and remodeling accounted for 52% of the total market for treated lumber. Another 28% of treated lumber was used in new residential uses (Figure 3) (RISI 1987). The applications of these two major end uses of treated lumber are very similar. They are as follows:

Outdoor Uses... such as decks, patios, gazebos, porches, balconies, pool enclosures, fences, landscaping timbers, sheds, garages, carports, boat docks, etc.

Home Exteriors... such as siding, sheathing, soffits, etc.

Home Framing... such as wall studs, sills, plates, roof and floor joists, rafters, beams, flooring, etc.

The "Other" category, which constitutes about one-fifth of the treated wood market, includes such uses as:

Farm use... for pole buildings, fences, grape stakes, etc.

Non-Residential Construction... for marinas, bridges, commercial buildings, etc.

Government and Industrial use... for highway guard rail posts, playground equipment, etc.

## Chemicals

Wood preservatives in commercial use today are often categorized into four major classes (Table 2). In 1986, 588 wood preserving plants treated wood and were owned by 471 companies (Micklewright, 1988).

The types of chemical treatments employed in the wood treating industry have changed dramatically during this same time period. In the 1960's and 1970's the use of CCA as a treating chemical, coupled with an increase in demand of decks, porches, and other outdoor weather-exposed structures, led to the rise in the lumber and timbers treating business. In 1953, creosote dominated this industry with a 90% market share, and CCA was not even reported as a separate category (Figure 4) (Fuller and Walsh 1983; Micklewright 1988). By 1986, CCA accounted for 67% of the total wood treating market and 96% of the 5.5 billion board feet of lumber and timbers produced.

Fire retardant treated lumber is used primarily in commercial and institutional interior building construction. This segment of the market is viewed by many as a potential area of growth. The use of treated lumber and plywood for Permanent Wood Foundations (PWF) is growing, but still represented only about 2% of treated wood sales in 1983 (Fuller and Walsh 1983).

### **Supply and Demand**

Inorganic arsenical treated lumber enjoys many practical advantages over Penta and Creosote products. CCA is clean, odorless, paintable, easy to handle and harmless to plants (EPA p. 28, 1984). In contrast, pentachlorophenol and creosote treated lumber have limited uses and are considered as unacceptable alternatives due to odor, and generally less desirable surface characteristics (EPA pp. 28-32, 1984).

In 1986, approximately 81% of the volume of all products except ties (ties were 90% oak (Quercus spp.) and mixed hardwoods) produced in the U.S. and two-thirds of the volume of all treated wood products were of southern yellow pine (Pinus spp.) (Micklewright 1988).

In 1983, Douglas fir (Pseudotsuga menziesii) was the next most significant species constituting eight percent of the treated lumber and timbers market. Other significant species include hemlock (Tsuga spp.) (1.6%), fir-larch (Abies spp. and Larix spp.) (0.9%), ponderosa pine (Pinus ponderosa) (0.8%), and oak (Quercus spp.) (0.5%) (Fuller and Walsh 1983).

Extensive research has been conducted regarding the effect of drying on the properties of CCA treated wood (Winandy et al. 1983; Barnes and Mitchell 1984). Significant reductions in modulus of rupture have been found for full sized material kiln dried after treatment. Additional data are needed for specifying proper design values for both CCA treated wood and fire retardant treated wood (Barnes 1985).

Treating Service Only (TSO) involves a treater who will treat wood owned by another for a fee. About 20% of all CCA pressure treated lumber, timbers and plywood was produced on a TSO basis in 1982 (Fuller and Walsh 1983).

Over 80% of all treated lumber is No. 2 grade (Fuller and Walsh 1983). Approximately 20% of treated lumber that same year (1982) was kiln dried after treatment (KDAT). This service improves the quality and appearance while reducing weight and thus, transportation costs.

The cost/benefit analysis of this treatment is controversial at present.

In 1986, 41% of the total volume of southern pine lumber was treated (RISI 1987). By census region (Figure 5), the South consumed 38% of U.S. demand for treated lumber in 1986 and the West consumed 13% in 1986 (RISI 1987) (Figure 6).

### The Retail Environment

#### **Distribution**

Approximately 87% of the treated lumber, timbers and plywood production goes to "distribution" whereas about 5% moves direct to contractors and the balance is sold direct to other end users such as farm, government, utilities, etc. (Figure 7). About 83% of treated lumber, timber and plywood sales go through retailers (Walsh 1985). Approximately 46% of these retail sales go directly to residential consumers (homeowners) for repairs and alterations and nearly 40% are to home improvement and residential contractors (Fuller and Walsh 1983). The balance (about 15% of retail sales) go to non-residential building and non-building construction, farm use, industry and government (Fuller and Walsh 1983).

#### **Retail Sales**

By product category, retail sales (86% southern yellow pine) consisted of 64% two-inch dimension, 8% boards, 23% timbers (of which 4% are fence posts), 3% plywood and 2% fire retardant treated material

in 1983 (Fuller and Walsh 1983). The dominance of two-inch dimension lumber and timbers is related to its application in outdoor home improvement projects such as decks, as well as other factors.

The two major retail customer groups of treated wood, the Do-It-Yourself (DIY) consumer and the Professional Contractor/Remodeler (PRO), accounted for 85% of retail sales in 1986 (Figure 8). Home improvements (46% DIY and 12% PRO) represent 58% and new residential construction constitutes 27% of retail sales. The major applications for these two end uses are shown in Table 3 (Fuller and Walsh 1983).

#### **Home Center Market**

According to the most recent Profile of the Home Center Market (Franta and Johnson 1986), a healthy 94% of home centers carry treated lumber. This is up 12 percentage points from the 82% of home centers that carried treated lumber in 1984 (HCRB 1984).

Treated wood is considered part commodity and part specialty by many home centers. Active programs such as in-store presentations, advertising, and improved service have been implemented to maintain share of treated wood sales. Increased competition among wood treaters has led to the addition of new products such as radius edge decking, deck kits, PWF's, fire retardant treated lumber, the addition of weathering agents to wood preservatives, more attractive deck and outdoor project designs, the Wood Slab system, color tints, etc. to gain competitive advantage and increased margins.

## **The Growth of the Repair and Remodeling Market**

In 1985, homeowners spent \$80.3 billion on remodeling and repairs --78% more than they did in 1982 (Guenther 1986). Over 30% of the 92 million permanent residences in the U.S. are more than 45 years old, which make them prime candidates for spending on upkeep and improvement (Guenther 1986). According to the National Association of the Remodeling Industry (NARI), remodeling is expected to grow at an average annual rate of 14% from 1985 thru 1990 (NARI 1986). Major categories of the repair and remodeling market include: exterior remodeling, room additions, room remodeling, garage/porch conversion or additions and room furnishings (Rich 1982).

Evolving from the repair and remodeling market are the one-stop home improvement centers which cater specifically to the Do-It-Yourself (DIY) customer and the Professional Contractor/Remodeler (PRO). The home improvement retailer is one of the strongest retail segments in the U.S. economy. This retail segment grew in sales from \$50.2 billion in 1983 to \$62.2 billion in 1985 (Franta and Johnson 1986) (Figure 9). This dramatic increase was driven by whopping gains in the sale of lumber, building materials and millwork product lines which increased by nearly \$12 billion during 1984-1985. The DIY market segment in 1985 represented approximately 60% of the total home improvement expenditures (Payless 1986).

Lumber and building materials represented the greatest contribution to home center sales in 1985 comprising 54% of total sales (Franta and Johnson 1986). Lumber alone accounted for 29% of

total home center sales. According to the 1986 Profile of the Home Center Market, (Franta and Johnson 1986) lumber tops the list as the department that retailers expect to experience the fastest growth in the future. According to a marketing study conducted by the DIY Research Institute (Green and Farnsworth 1983), lumber products used for home improvement and repair projects are purchased at the following retail outlets: home centers (51%), lumber/building material outlets (42%), and others (7.0%).

### Market Segmentation

To date, very little work has been done to subsegment the very important retail market beyond DIY and PRO sales where PRO sales are viewed as "credit" accounts and DIY sales as "cash" accounts. Therefore, one of the major goals of this research effort is to delineate submarkets within these two main retail groups.

The rationale behind market segmentation is to gain competitive advantage thru consumer preference against competitors. In fact, the primary reason for studying consumer behavior is to identify basis for effective segmentation. From a marketing strategy perspective, segmentation is critical for developing successful marketing programs.

Before the widespread adoption of the marketing concept, the prevailing method of doing business with consumers was through mass marketing, defined as a single demand curve for target markets. This concept may be illustrated by entrepreneur Henry Ford, who offered the Model T automobile to the public "in any color it wanted, as long as

it was black".

Market segmentation, on the other hand, is viewed as one demand curve for each sub-market. This approach may be illustrated by General Motors slogan of "a car for every price, purpose and personality." The strategy of segmentation permits producers and "sellers" to avoid direct competition through product differentiation, which may include specialty products and/or brand naming strategies.

It is important to be very clear about what market segmentation is and what it is not. In particular, segmentation is more than "mere variety" (Reynolds 1965). Segmentation is based on developments on the demand side of the market and represents a rational and more precise adjustment of product and marketing effort to consumer or user requirements (Smith 1956). Figure 10 graphically illustrates the two concepts. A mass marketer sees one demand curve; a segmenter views the market as a series of demand curves, one for each sub-market.

Segmentation studies have multiple uses including new product development and redesign or repositioning of old products. Repositioning can be accomplished by product redesign or by changing promotion and/or pricing strategies (Schiffman and Kanuk 1983). In order to successfully implement a segmentation scheme, four criteria must be met: (1) heterogeneous demand functions; (2) identifiable and measurable submarkets; (3) the ability to access identifiable submarkets; and (4) substantial size for each market segment (Horton, 1984).

## U.S. Demographics

The past decade has seen dramatic changes in long-established regional demographic trends. As John Naisbitt noted in his best-selling book, "Megatrends" (1984), the 1980 census showed that for the first time in U.S. history, the South and West had more people than the Northeast and North Central. Projections by Chase Econometrics indicate the following population gains by region from 1985 through 1990: West +10.58%; South +10.92%; North Central +1.56% and; Northeast +1.21%. Another significant demographic factor is the declining population growth rate over the last four decades from 1.7% growth in the 1950's to 1.3%, 1.1% and 0.9% population growth rates in the 60's, 70's and 80's, respectively (Wright and Melnick 1985).

According to Steven R. Brown (Professional Builder 1985) of Alcan Building Products, Warren, Ohio, today's consumer is changing. These trends have implications to the remodeling industry in terms of tailoring a sales strategy to meet the market. In general, Brown speaks of four trends:

- (1) Today's consumer is more affluent.
- (2) The rise of the two-income family.
- (3) Higher education levels.
- (4) Women are more active in remodeling decisions.

## **The DIY Customer**

DIY home center sales have grown from \$16.1 billion to \$31.2 billion from 1977 to 1985 (Franta and Johnson 1986). This DIY boom has created a favorable market segment for treated lumber. One reason for homeowners to conduct repair and remodeling projects (that may involve DIY activity) includes the need for more living space and renovations of older homes purchased to make the house feel more like the purchaser's own (Rich 1982). Most DIY'ers are eager to expand their abilities and expressed an interest in learning additional skills. They look to manufacturers' instructions and store personnel for help in learning how to complete a project (HCRB 1984).

Between 1970 and 1983, the DIY market grew much faster than the total home improvement market (Green and Farnsworth 1983). Payless Cashways states that lumber is their most important offering. Besides accounting for over 25% of sales, lumber products drive the sale of other higher margin merchandise (Payless 1986). Payless considers the DIY customer to be two distinct segments: the "serious" DIY'er who spends over \$500 per year and the "other" DIY'er.

A major factor that will substantially impact the growth of tomorrow's DIY market is the ripple effect of the baby boom. Baby boomers, now 22-40 years old, make up 40% of the U.S. population (Francese 1986). As this generation ages, it will continue for another 20 years to pass through age brackets which enjoy heavy DIY participation rates. Baby boomers between the ages of 25 and 39 earn about half of the U.S. personal income and represented nearly 70% of

home purchases in 1983 (Kitzke 1985). These highly educated customers are increasingly demanding both service (knowledgeable salespeople) and services (warranties and guarantees). According to Cahners's Bureau of Marketing Research, the total home improvement market is projected to reach \$124 billion by 1990 with the DIY home improvement share representing \$73 billion (Kitzke 1985).

### **The PRO Customer**

Home center DIY sales grew by \$3.5 billion from 1983 to 1985 and accounted for 50% of total home center sales; this segment is maturing. The PRO customer segment, however, exhibited growth of \$6.7 billion during this same period and achieved a record high 41% of home center sales in 1985. The sales increase to remodelers and builders is magnified due to the collapse of homebuilding activity during the 1980-1983 period.

A 1983 survey by Payless Cashways provided a breakdown of its tradesmen (PRO) customers who represented approximately 32% of their total sales. Only 6% turned out to be "pure" contractors, people who earned 91-100% of their income doing jobs for others. Ten percent earned between 50 and 90% of their income in this manner, and the remaining 16% earned 50% or less (Jenks 1986). What this basically told management was that the majority of Payless' PRO's held other jobs in addition to being remodelers or builders.

Quality, availability of product and knowledgeable salesmen are the most important attributes that PRO's look for in a home center

(Dunn 1985). Contractors in large part shop at home centers not out of store preference, superior product offering or service, but out of sheer convenience. Because their time is money, they buy from the closest source, even if it means enduring an aggravating shopping experience (Dunn 1985).

### Consumer Behavior

Most businesses are familiar with the marketing concept --focusing all marketing activity to satisfy consumer needs (Berkman and Gilson 1986). Implicit in this concept is the central role of the consumer, because meeting his or her needs requires some accurate knowledge of who he or she really is and what he or she really wants.

Consumer behavior can be defined as the behavior that consumers display in searching for, purchasing, using, evaluating and disposing of products, services and ideas which they expect will satisfy their needs (Schiffman and Karnuk 1983). Knowledge of consumer behavior facilitates development of successful marketing strategies. The American consumer market is made up of over 225 million consumers who consume over \$1.6 trillion worth of products and services each year (Schiffman and Kanuk 1983). Due to this vast market, most marketers segment the consumers into homogeneous subgroups by relevant product or usage characteristics, demographics, attitudes, values/lifestyles, and many other segmentation techniques. Consumer behavior studies identify meaningful variables upon which to segment markets. A market segmentation strategy requires insight into the consumptive patterns

of selected market segments. The collection and analysis of this data is the domain of the field of consumer behavior. Consumer behavior research includes three consumptive phases: pre-purchase (need awareness and motivation), purchase decision (product and store choice and payment method) and post-purchase (satisfaction, repurchase).

CCA pressure treated lumber, timbers and plywood have enjoyed tremendous growth over the last two decades. However, as growth slows, practitioners of the marketplace will meet greater success by predetermining what consumers will buy and thus, focusing on the consumer's needs. This consumer oriented marketing philosophy is often known as the "marketing concept".

### **Consumer Decision Process**

Problem recognition is the essential step in the consumer decision process and involves a discrepancy between the consumer's desired state and the existing state and is the essential step in the consumer decision process. Both the desired state and the existing state are influenced by the consumer's life style and current situation (Hawkins, Best and Coney 1983).

A simple model of consumer decision making has three major components: input, process and output. Input variables include commercial marketing efforts as well as non-commercial influences from the consumer's social/cultural environment. The decision process variables are influenced by the consumer's own psychological fields, which affect their recognition of a need, their pre-purchase search

for information and their evaluation of alternatives. The output phase includes the actual purchase and post-purchase evaluation, which in turn, modifies future decision process (Schiffman and Karnuk 1983).

The importance of understanding the purchase behavior of CCA pressure treated lumber buyers involves the following premises (Berkman and Gilson 1986):

1. Two or more alternatives exist.
2. Each alternative represents forecastable consequences.
3. The chosen alternative is determined by an evaluative procedure.
4. Information about the alternatives is sought.

In the case of treated lumber products, the alternatives are represented by untreated lumber, naturally durable species, non-wood products and alternative brands of treated lumber. Evaluation of consequences may involve the risk associated with the use of pesticide treated lumber among other factors. Information is generally transmitted through various media at the retail level, through word-of-mouth and by industry sponsored seminars and/or workshops.

### **Brand Naming**

Over 50% of all lumber treaters are licensees of Koppers Co. or Osmose Wood Preserving Co. (Walsh 1985). These two companies feel strongly that pressure treated wood has brand appeal and are sustaining drives to keep their registered brands out of commodity status through national marketing programs (Kelleher 1986). Extensive warranty programs and diversification into other wood protection products are evidence of the market share battle between these two

industry giants.

On the other hand, J. P. Przybylinski, Wood Treatment Division Manager, Rentokil, Inc., questions the value of a brand name and feels that retailers often look for an inspection stamp instead of a brand name when buying treated lumber (Kelleher 1986).

### **Competitive Advantage**

Traditionally very little research has been done on the buying habits of the final consumer of the largest portion of lumber and wood products (Rich 1970). Much of the demand for treated lumber depends ultimately on demand by final household consumers and, thus, is "derived". It is important that manufacturers understand this consumer in order to gain competitive advantage.

There are essentially three generic strategies a firm can employ to gain a competitive advantage (Porter 1985). These strategies are cost leadership, differentiation and focus. In the treated lumber industry, cost leadership could involve the location of treating facilities closer to demand markets or acquisition of lower cost raw materials.

The second generic strategy, differentiation, can be accomplished through the selection of attributes that many buyers perceive as important, then the firm uniquely positions itself to meet those needs. Consumer research is valuable in identifying those attributes. Focus, the third generic strategy, requires the selection of target segments in the industry and then tailoring a strategy to serve them

to the exclusion of others. This market research effort aims to delineate the knowledge and attitudes of various treated lumber buying segments. By identifying and defining distinctive traits of each subsegment, manufacturers can develop market oriented programs to focus on these specific characteristics.

In a study by Rich (1986), forest products firms adopting a differentiation and/or focus strategy were more profitable than those following a low cost strategy. Additionally, market related strengths such as advertising, promotion, and product/market planning were strongly associated with a differentiation or focus strategy.

### Quality

The concept of quality as a competitive weapon has been examined in terms of profitability, productivity, costs, prices and market share (Garvin 1984a; Shetty 1987; Peters and Waterman 1982; Jacobson and Aaker 1987). Quality perceptions have received less attention than warranted in the literature. No well developed theory exists to explain how consumers judge the perceived quality of a product (Purwar 1984). For the average consumer, objective quality is a difficult concept; perceived quality is typically substituted (Olson 1972). Perceived quality involves the subjective feeling, impression or judgement of the relative quality of the product (Olson 1972). It is this buyer's perception of quality that must be addressed (Kotler 1980).

Quality has become a major issue and important factor for wood products sold in home centers. Buyers generally have limited objective knowledge of product quality and tend to substitute aesthetics as a measure of perceived quality. With CCA treated products, knowledge is even more limited and perceived quality is even more critical because the products are often on display in homeowner's backyards and may provide reference group influences. Retailers generally feel that customers are willing to pay for quality wood, and will penalize stores that don't provide it (Kelleher 1986). Kelleher (1986) has hypothesized that appearance is a major factor that equates to quality in consumer's purchase decisions.

Standard softwood lumber grades have served for decades as the traditional objective measure of quality for structural lumber. These grades incorporate straightness criteria and, in general, a base line appearance through restrictions on knot size, discoloration, checks, shakes, splits, slope of grain and wane. When lumber is on display, such as decks, many builders purchase the more expensive No. 1 grade simply to obtain a better looking product even though a No. 2 grade may meet building code requirements (Kelleher 1986; Walsh 1985).

Three different approaches may be employed when defining quality (Garvin 1984b). The traditional path in the forest products industry involves a manufacturing perspective and focuses on the supply side. These manufacturing-based definitions rely on "conformance to specifications" (Crosby 1979) and emphasize engineering and quality control to achieve cost reduction.

The second, and perhaps less utilized means of defining quality in the forest products sector, is the customer or user-based orientation. This highly subjective marketing orientation views quality in terms of consumer preferences -- determinants of demand -- where those goods that best satisfy the wants and needs of individual consumers are those they regard as having the highest quality (Garvin 1984b; Kuehn and Day 1962). In other words, this user-based approach implies a "fitness for use" (Juran 1979) and "a means through which the product and service in use will meet the expectations of the customer" (Whiting and Walsh 1986) where the expert is the customer and quality relates to the specific end use of the product in question.

The third approach considers value in terms of costs and prices. According to Broh (1982), quality products provide conformance at an acceptable cost and/or performance at an acceptable price. This view relates the two previous quality approaches and provides the foundation of the quality perception measurement statements used in this study.

#### The Safety Issue (and Consumer Protection)

Laws and regulatory agencies are needed to protect basic consumer rights. But beyond protection, consumers need information and education to enable them to make better buying decisions (Schiffman and Karnuk 1983).

In 1978 the Environmental Protection Agency (EPA) initiated its formal Rebuttal Presumption Against Registration (RPAR) review of the major wood preservatives under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). The USEPA final position on wood preservatives was issued in Position Document (PD) 4 in July, 1984 (EPA 1984). In September 1985, the EPA and the wood preserving industry signed a settlement agreement regarding the use and sale of wood treatment chemicals. This agreement restricts the chemicals to certified applicators, however, pressure treated wood products will continue to be sold without warning labels affixed to the items. Consumer Information Sheets (CIS's) that outline the use, handling and disposal precautions in matter-of-fact terminology for treated wood will be made available to consumers. In the fall of 1986, the EPA tested the effectiveness of the Consumer Awareness Program (CAP) through a third-party study (the Techlaw study). Preliminary results are shown in Table 4. The Techlaw study, however, failed to survey the actual consumers awareness of the CAP. This oversight will be addressed in our study.

According to an article by Home Center Managing Editor, Jack Kelleher (April 1986), many retailers are still uninformed and/or confused about the issue and their customers know even less. Mike Coleman, lumber buyer for Busy Beaver Building Centers, Pittsburg, PA. states "I feel confident this safety question will not stop or slow down treated wood sales in our market" (Kelleher 1986).

## **Risk Assessment and Hazard Management**

The modern era of consumer protection can be traced to President John F. Kennedy's Declaration of Consumer Rights in 1962. This declaration described four rights: the right to be informed, the right to choose, the right to safety and the right to be heard (Jacoby 1981).

People respond to hazards they perceive (Slovic et al. 1981). Any hazard management system developed to protect consumers from the risks associated with products must take into consideration consumer psychological (that is, internal subjective) factors as well as technical factors (Jacoby 1981).

Hazard management frame works have been developed by Jacoby (1981) that involve two major fundamental components: technical (objective) and social (subjective) issues (Table 5). Technical issues involve the identification of hazards and the measurement of these hazards in terms of their probability of occurrence and the severity of their consequences. The social aspects include risk perception (that is the probabilities and consequences as perceived by the respondents) and risk acceptance.

For pesticides such as CCA, identification of hazardous conditions can be of two types -- those associated with the lumber product and those that occur with the interaction between the product and the environment. For example, the product contains potentially hazardous ingredients such as toxic metals (copper and chromium) and arsenic (an alleged carcinogen). Furthermore, the labeling and

instructions (CIS's) may not be reaching the consumer. Upon interaction with the environment (the consumer), this lumber, or the sawdust that results from various applications, may be inhaled or ingested by humans and/or animals. Measurement involves the assessment of the probability of occurrence of each of the hazardous conditions and the severity of the consequence should they occur (Jacoby 1981).

On the other side of the ledger are the subjective factors which include the consumer's awareness or perception of the hazard; in our case, the risk associated with the CCA treated products, and the acceptability of these risks. Consumers may feel that the risks are acceptable in light of the benefits attributed to the product (relative to the alternatives available). The social issues also warrant consideration of risk coping strategies or behaviors such as risk avoidance (shunning the product entirely), risk reduction (reducing one's vulnerability while maintaining some product usage) and continuing full use of the product while acquiring information regarding safer product use (Jacoby 1981). Researchers who wish to influence public policy should attempt to identify the types of information that consumers do use and the sources to which they turn in order to obtain this key information.

In a study by Slovic, Fischhoff and Lichtenstein (1981), four different groups of people were asked to rate 90 activities and technologies according to the mean risk and benefit judgement as rated on a 0 - 100 scale (from "not risky" to "extremely risky" and from "no

benefit" to "very great benefit"). Pesticides were ranked seventh (with one as the riskiest and the most beneficial) based on a four group average rating for perceived risk and fifty-seventh for perceived benefit. This concurs with a consistent finding in Slovic et al.'s (1980) study, that is, that perceived risk was inversely related to perceived benefit.

Among 18 characteristics of risk hypothesized to be important by Slovic et al. (1981), three factors, labeled Dread, Familiarity, and Exposure, seem able to account for most of the interrelationships. Application of a statistical technique known as factor analysis showed that the pattern of intercorrelations could be represented by these three factors. Pesticides received the tenth, fifty-ninth and ninth highest ranking for the factors dread, familiarity and exposure respectively (Slovic et al. 1981). In summary, pesticides are considered as highly dreaded, exposing large numbers of people and are relatively unfamiliar as compared to 89 other hazards studied.

#### **CCA Treated Lumber Cost/Benefit**

The costs of using wood products treated with inorganic arsenicals represent the risks to public health, whereas the benefits are economic. Therefore, due to the aforementioned advantages of inorganic arsenical treated wood as compared to penta and creosote treatments, the EPA concluded in PD-4 (Position Document - 4, July, 1984) that:

- (1) If inorganic arsenicals were cancelled, non-wood materials such as plastic, steel or concrete would be substituted for treated wood, and that these materials would have a higher cost than wood.
- (2) Due to the wide variety of uses for treated lumber, timbers and plywood, the Agency was not able to quantify the economic impact of cancelling the inorganic arsenicals. However this impact would be major in terms of:
  - the dollar impact
  - the total market impact
  - disruption due to change to alternatives
  - aesthetic considerations
  - cost and availability of alternatives (EPA, 1984 pp. 31-32)

#### **Modifications To Reduce Risk**

The Agency's basis for issuing an RPAR for the inorganic arsenicals were oncogenic, mutagenic and reproductive or feterotoxic effects (EPA 1984). After carefully evaluating the risks (costs) along with the significant economic benefits resulting from the use of inorganic arsenicals, the EPA decided on the following general requirements:

- (1) Restricted use classification
- (2) Protective clothing requirements
- (3) Prohibitions against eating, drinking and smoking during application
- (4) Work clothing disposal regulations
- (5) Pesticide waste disposal regulations
- (6) Respirator use specifications
- (7) Wood surface deposit standards
- (8) Closed emptying/mixing system requirements for powder formulations
- (9) Mandatory participation in a Consumer Awareness Program (EPA, 1984 pp. 204-229)

## **Industry Position**

As is typically the case with most important issues, there is more than one side of the story. According to an AWWPA article (Arsenault 1977), inorganic pentavalent arsenical compounds have been used as wood preservatives for more than 35 years with no reports of adverse effects. Furthermore, due to the chemical fixation process with the wood substrate, the treated wood products are extremely durable, non-phytotoxic and safe to handle in all applications.

The carcinogenic properties, suggested by some laboratory tests, failed to differentiate between the more toxic trivalent forms of arsenic and the substantially less toxic pentavalent forms used in arsenical treated wood. Furthermore, these tests also generally used dosage levels and other procedures that were inconsistent with actual use and environmental exposure.

The industry feels that the dangers have been publicized in exaggerated form by the cement and concrete industries, which feared the competitive threat posed by permanent wood foundations. On the basis of all the available test data, it can reasonably be concluded that none of the pentavalent arsenic forms used in arsenical wood preservatives have been shown to cause unreasonable risks to man or the environment (Arsenault 1977).

## **Trends**

A review of the literature provides little insight to the retail customer for CCA pressure treated lumber, timbers and plywood. This

data search revealed a void in published market research in this general area. The CCA treated lumber industry has been profiled by DRI and biannual studies by Home Center Research Bureau entitled "Profiles of the Home Center Retailer" have examined demographic variables of the home center retail customer, in general. Additional market research studies conducted by the DIY Research Institute and various leading home center retail chains have described the home improvement customer. The following trends have been emerging in the 1980's:

- (1) The increased cost of buying a new home encourages more homeowners to improve their current residences rather than move.
- (2) The high costs of professional labor encourage DIY'ers to do the home improvement work themselves
- (3) There is a growing interest in renovation and restoration which indicates a new respect for old homes and stimulates improvement expenditures.
- (4) Consumers' desire to improve their DIY home improvement skills.
- (5) Women are an increasingly influential segment for home improvement purchases and DIY project involvement.

According to <sup>1</sup>Mel Walsh, Marketing Consultant for treated wood products and co-author of the DRI study, research at the consumer level (for treated lumber) is non-existent at this time. <sup>2</sup>Judy Klauseger of the Home Center Research Bureau states that she knows of

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<sup>1</sup> Personal communication. Mel Walsh, M. R. Walsh Consultants, Inc., Oakbrook, Il. July, 1986.

<sup>2</sup> Personal communication. Judy Klauseger, Home Center Research Bureau, Chicago, Il. July, 1986.

no market research studies regarding the consumer of building materials. Whereas in-house marketing research studies have been conducted on a proprietary basis, no publications have been found to substantiate studies in this area.

*"There is no such thing as a commodity. All goods and services can be differentiated and usually are. The only exception to this proposition is in the minds of the people who profess that exception."*

--Theodore Levitt, The Marketing Imagination

## LITERATURE CITED

- Adams, J. Stacy (1956), "An Experiment on Question and Response Bias," *Public Opinion Quarterly* 20 (Fall): 593-598.
- Alvin B. Zeller, Inc. (1986), 475 Park Ave. South, New York, N. Y. 10016.
- American Business Lists, Inc. (1986), 5707 South 86th Circle, Omaha, NE.
- American Plywood Association (1987), "APA Design/Construction Guide. Permanent Wood Foundations," Tacoma, WA.
- Berkman, Harold W. and Christopher Gilson (1986), "Consumer Behavior Concepts and Third Edition, Kent Publishing Company, Boston, MA.
- Best Mailing Lists and Printing Corp. (1986), 34 West 32nd St., New York, N. Y. 10001.
- Boyd, Jr., Harper W., Ralph Westfall, and Stanley F. Stasch (1981), "Marketing Research Texts and Cases," Richard D. Irwin, Inc., Homewood, IL.
- Broh, R. A. (1982), "Managing Quality For Higher Profits," Ch. 1, McGraw Hill, New York, NY.
- Camerano, Anthony M. (1980), "Marketing Impact of the All Weather Wood Foundation on Forest Products Industries," *Forest Products J.* 30(11):38-41.
- Churchill, Jr. Gilbert A. (1983), "Marketing Research: Methodological Foundations," The Dryden Press, Chicago IL.
- Crosby, Philip B. (1979), "Quality Is Free," *New American Library*, New York, NY., 14-15.
- Dillman, Don A. (1978), "Mail and Telephone Surveys. The Total Design Method," John Wiley & Sons, Inc., New York, NY.
- Donald, Marjorie N. (1960), "Implications of Non-Response for the Interpretation of Mail Questionnaire Data," *Public Opinion Quarterly* 24(Spring):99-114.
- Dunn, Cori (1985), "More Comments from Remodeling Contractors," *Home Center Mag.* (December):40-42.

Environmental Protection Agency (1984), "Creosote, Inorganic Arsenicals, Pentachlorophenol," Position Document No. 4, Office of Pesticides and Toxic Substances, U.S. Environmental Protection Agency, Washington, DC.

Francesse, Peter K. (1986), "Selling the Baby Boomers," Lawn & Garden Mktg. (January):8-9.

Fowler, Floyd J. Jr. (1984), "Survey Research Methods," Sage Publications, Inc., Beverly Hills, CA.

Franta, Harry and Mark L. Johnson (1986), "Home Center Magazine's 1986 Market Profile," (September)19-33.

✓ Fuller, Bernard and Mel R. Walsh (1983), "Treated Wood Study. The Markets for Treated Lumber, Timbers and Plywood: Recent Developments and Prospects for the Future," Data Resources Inc. (changed to: Resource Information Systems, Inc.), Bedford, MA.

Garvin, David A. (1984a), "Product Quality: An Important Strategic Weapon," Business Horizons, 27 (May/June)40-44.

Garvin, David A. (1984b), "What Does Product Quality Really Mean?" Sloan Management Review, Fall 24-43.

Green, Freida L. and Bradley T. Farnsworth (1983), "The DIY Consumer Outlook. A Psychographic Segmentation," DIY Research Institute, Indianapolis, IN.

Guenther, Robert (1986), "Remodelers Post Record Year as Rates Sink and Sales Rise," Wall Street Journal (August 13):25.

✓ Hartford, Winslow H. (1973) "Chemical and Physical Properties of Wood-Preserving Systems," In: Wood Deterioration and Its Prevention by Preservative Treatments. Vol II. Preservatives and Preservation Systems, D.D. Nicholas, ed. Syracuse University Press (Syracuse, NY):1-120.

Haygreen, John G. and Jim L. Bowyer (1982), "Forest Products and Wood Science," The Iowa State University Press, Ames, Iowa.

Hochstim, Joseph R. (1967), "A Critical Comparison of Three Strategies of Collecting Data From Households," Journal of the Statistical Assn. 62 (September 1967):976-989.

Home Center Research Bureau (1984a), "Home Improvement Consumers: A Comprehensive Analysis," Home Center Magazine, Lincolnshire, IL.

Home Center Research Bureau (1984b), "1984 Profile of the Home Center Market," Home Center Magazine, Lincolnshire, IL.

Hunt, George M. and George A. Garrett (1953), "Wood Preservation," McGraw-Hill (New York):417 pp.

Jacoby, Jacob (1981) "Some Perspectives on Risk Acceptance," Adv. in Consumer Res., Vol. 8. (In K. B. Monroe Ed.):506-510.

Jenks, Holly (1985), "Segmentation... Merchandising to the Tradesman," Home Center Mag. (December):28-30.

Jacobson, Robert and David A. Aaker (1987), "The Strategic Role of Product Quality," Journal of Marketing 51 (October)31-44.

Jenks, Holly (1985), "Segmentation... Merchandising to the Tradesman," Home Center Mag., (December)28-30.

Josephson, H. R. (1977), "Economic, Social and Environmental Benefits From Use of Wood Preservatives," AWWPA Proceedings, Vol. 73.

Juran, J. M. (1974), "Quality Control Handbook," McGraw-Hill, New York, NY., 2-3.

Kelleher, Jack (1986), "Treated Lumber: Industry Settles Safety Issues," Home Center Mag., (April)75-81.

Kitzke, Paul S. (1985), "Who Are These People, and Why Should You Care?" Bldg. Supply and Home Ctrs. (August):150-152.

Kotler, Philip (1980), "Principles of Marketing," Prentice Hall, Englewood Cliffs, NJ.

Kotler, Philip (1984), "Marketing Management," 5th ed., Prentice Hall, Englewood Cliffs, NJ., pp. 273-275.

Kuehn, A. A. and R. L. Day (1962), "Strategy of Product Quality," Harvard Business Review (November-December):100-110.

Lindberg, Karl W. (1986), "Is Lumber Quality Part of the Problem?" Proceedings of the Sixteenth Forestry Forum. Virginia Tech (April)35-39.

Markin, R. J. (1979), "Marketing," John Wiley & Sons, Inc., New York, NY.

Mendenhall, William, Lyman Ott and Richard L. Scheaffer, (1986), "Elementary Survey Sampling", Wadsworth Publishing Company, Inc., Boston, MA.

- Micklewright, James T. (1988), "Wood Preservation Statistics, 1986: A Report To The Wood-Preserving Industry In The United States," (January).
- Naisbitt, John (1984), "Megatrends: Ten New Directions Transferring Our Lives," Warner Books, Inc., New York, NY
- Nicholas, D. D. (1982), "Preservative Treated Wood." In: Encyclopedia of Materials Science and Engineering. M.B. Bever, ed., Pergamon Press (New York).
- Nicholas, Darell D. (1973), "Wood Deterioration and Its Preventative Treatments," Syracuse University Press, Syracuse, NY.
- Olson, Janet C. (1972), "Cue Utilization in the Quality Perception Process: A Cognitive Model and an Empirical Test." Unpublished Ph.D. Dissertation, Purdue University.
- Payless Cashways, Inc. (1986). 1985 Annual Report. Kansas City, MO.
- Peters, Thomas J. and Robert H. Waterman (1982), "In Search of Excellence: Lessons From America's Best Run Companies," Harper & Row, New York.
- Porter, Michael E. (1985), "Competitive Advantage Creating and Sustaining Superior Performance," The Free Press. A Division of Macmillan, Inc., New York, NY
- Purwar, Prem Chandra (1984), "The Role of Price Cues in Product Quality Perception: A Comprehensive Model and An Empirical Investigation." University Microfilms International, Ann Arbor, Mich. Ph.D Dissertation, State University of New York at Buffalo (1981).
- Reynolds, W. H. (1965) "More Sense About Market Segmentation," Harvard Business Review, 43 (September-October):107-114.
- Rich, Stuart U. (1970), "Marketing of Forest Products," McGraw-Hill, Inc., New York, NY
- Rich, Stuart U. (1982), "Opportunities in the Repair and Remodeling Market," Forest Products J. 30(8):9.
- Rich, Stuart U. (1986), "Recent Shifts in Competitive Strategies in the U.S. Forest Products Industry and the Increased Importance of Key Market Functions," Forest Products J. 36(7/8):34-44.
- Richardson, Barry A. (1978), "Wood Preservation," The Construction Press, Lancaster, England.

RISI (Resource Information Systems, Inc.) (1987), "Treated Lumber A Treat For Southern Pine," (In Crow's Newsletter, January):2

Schiffman, Leon G. and Leslie Lazar Kanuk (1983), "Consumer Behavior," Prentice-Hall, Inc., Englewood Cliffs, NJ

Shetty, Y. K. (1987), "Product Quality and Competitive Strategy," Business Horizons (May/June)46-52.

Sinclair, Steven A. and Kevin E. Seward (1988), "Effectiveness of Branding a Commodity Product," Industrial Marketing Management, 17, 23-33.

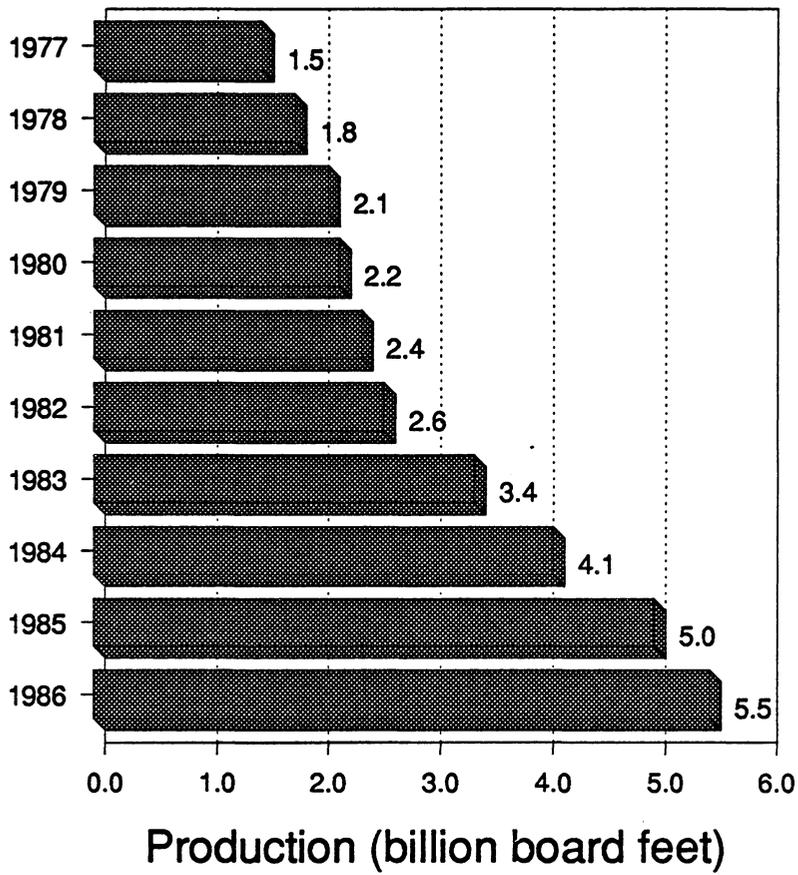
Slovic, Paul, Baruch Fischhoff and Sarah Lichtenstein (1981), "Facts and Fears: Societal Perception of Risk," Adv. in Consumer Res., Vol. 8.(In K. B. Monroe Ed.):497-502.

Smith, Wendell (1956), "Product Differentiation and Market Segmentation as Alternative Marketing Strategies," Journal of Marketing, 21(July):3-8.

Walsh, Mel R., (1985), "Treated Lumber: Bright Spot in Wood Economy", Forest Indust., (November)36-38.

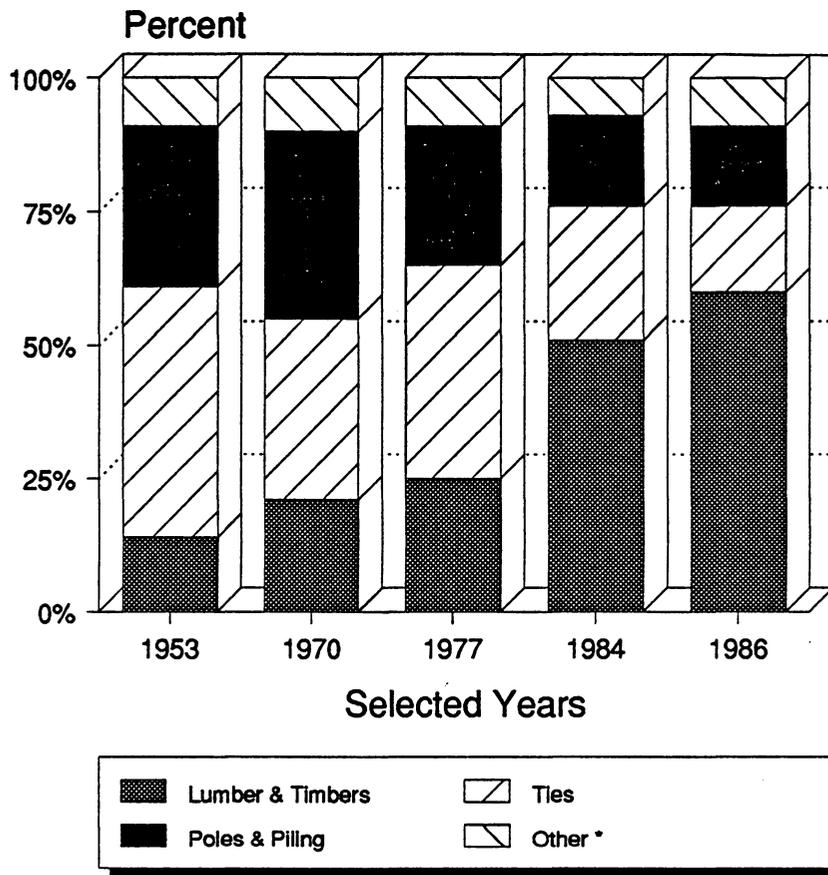
Whiting, Edwin and Malcolm Walsh (1986), "What Is Quality and How Much Does It Cost?" Accountancy, 97 (February)146-149.

Year



**Figure 1. Pressure Treated Lumber and Timbers Production by Year (1977-1986).**

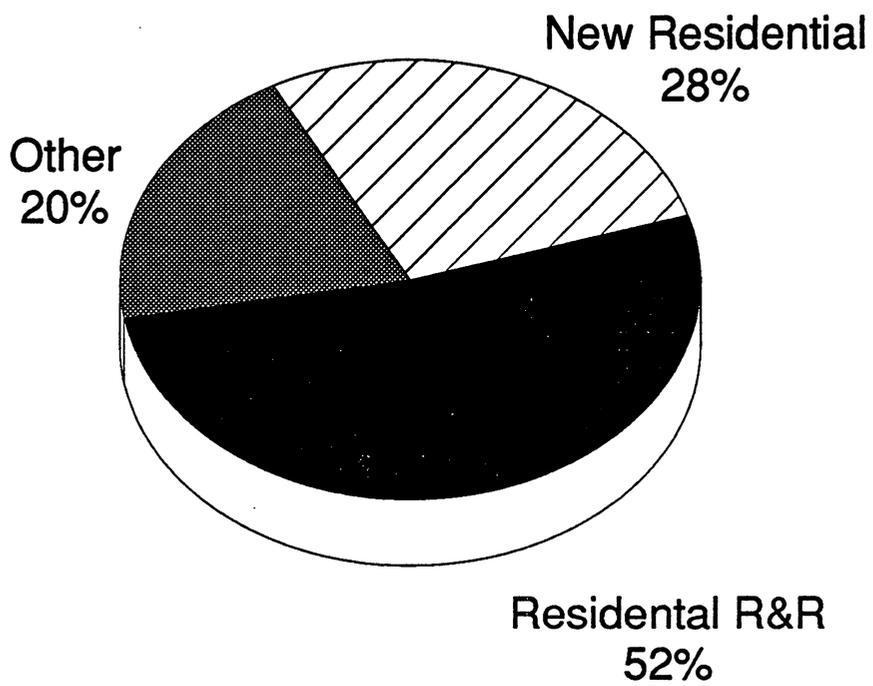
(Source: Micklewright 1988)



(\* Other includes fenceposts & plywood)

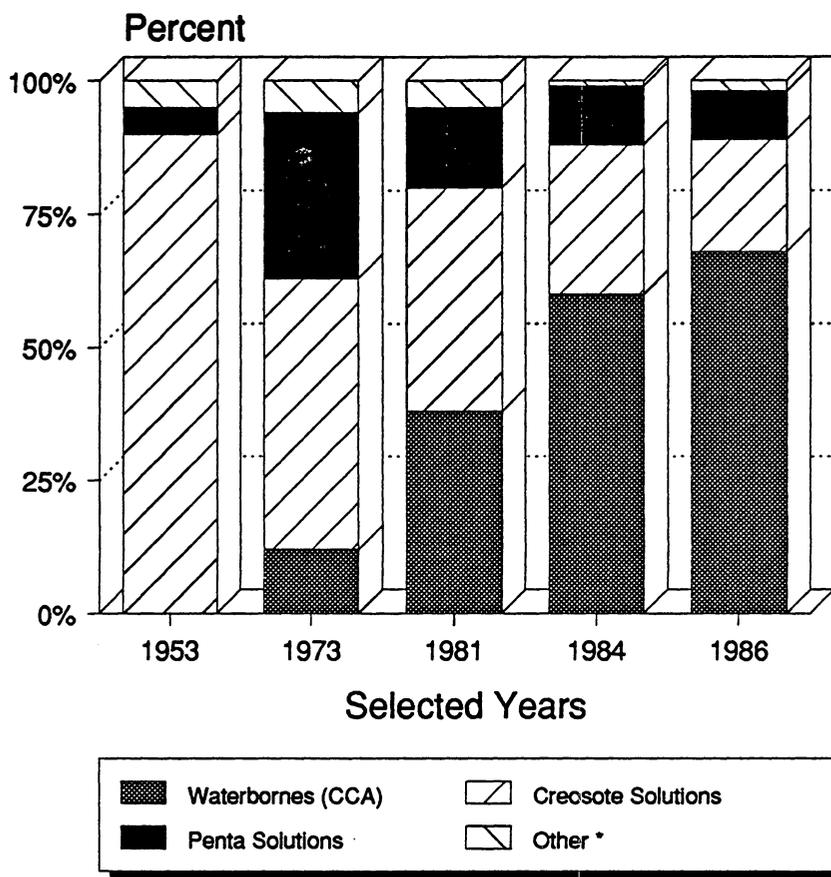
**Figure 2. Pressure Treating Market Share by Product Group.**

(Source: Fuller and Walsh 1983; Micklewright 1988)



**Figure 3: Markets for Pressure Treated Lumber (1986).**

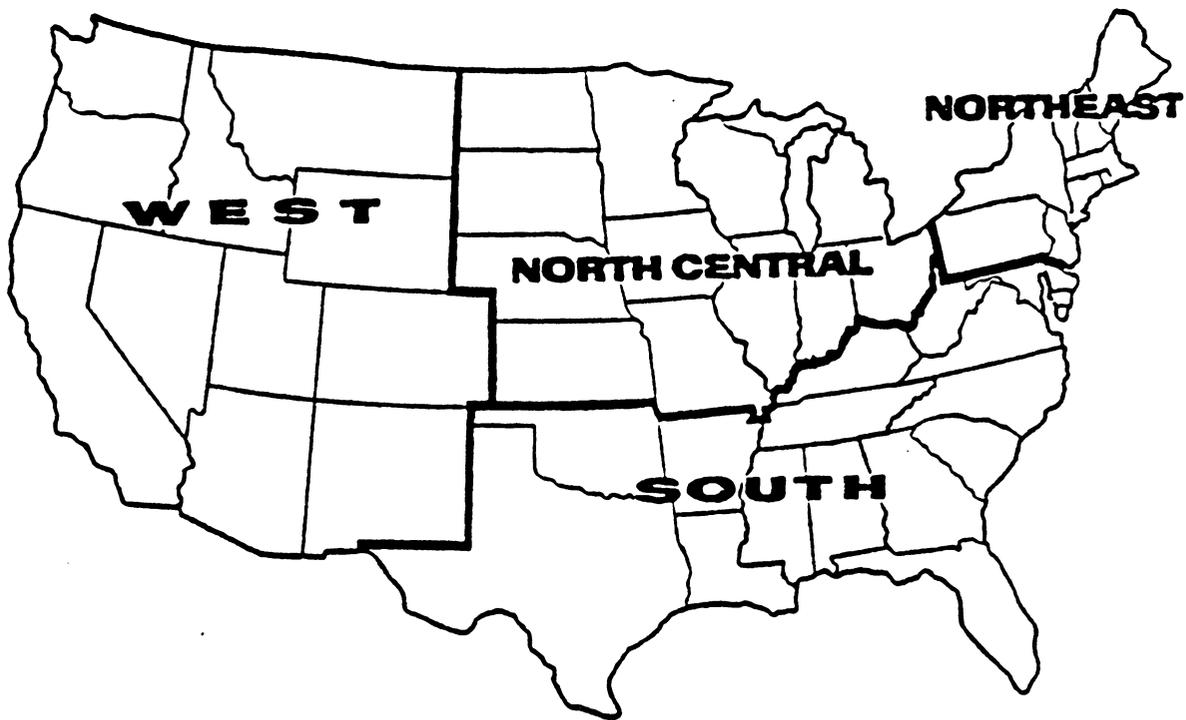
(Source: RISI 1987)



(\* Other includes fire retardants)

**Figure 4. Chemical Share of Treated Wood Market.**

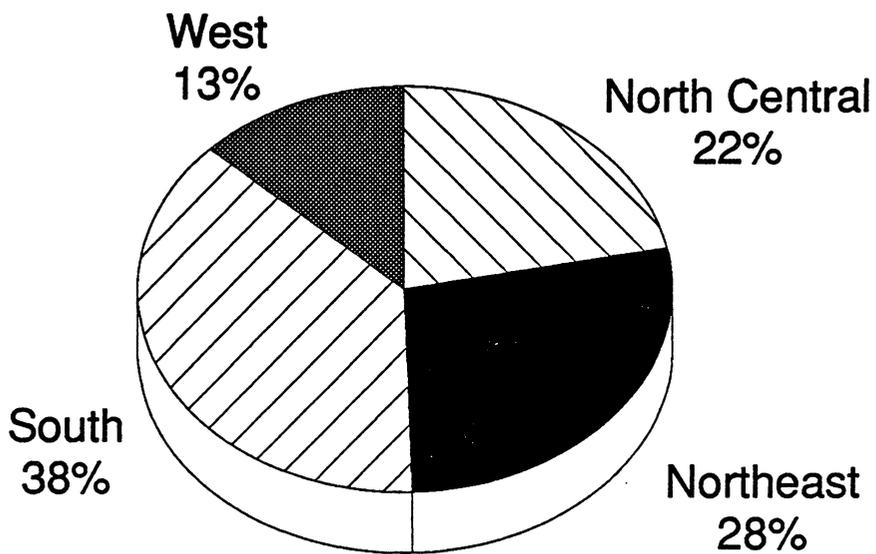
(Source: Fuller and Walsh 1983; Micklewright 1988)



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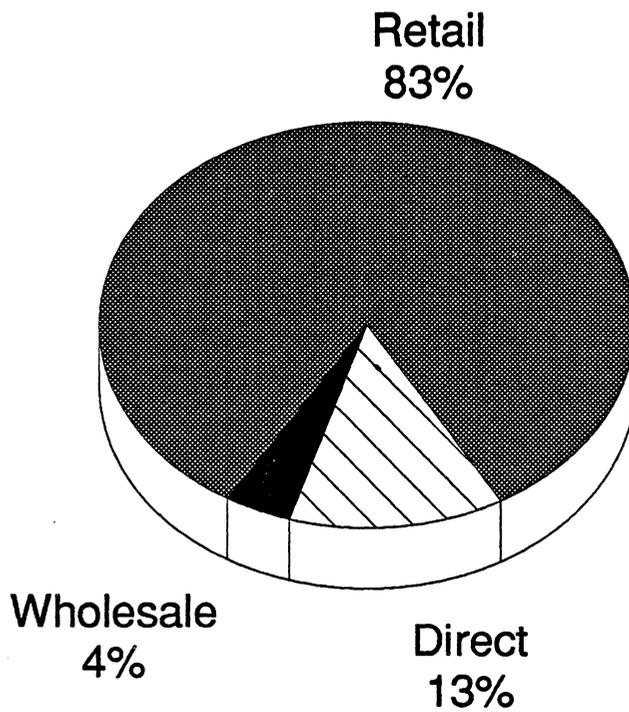
West includes Alaska and Hawaii.

Figure 5. Census Regions of U.S.



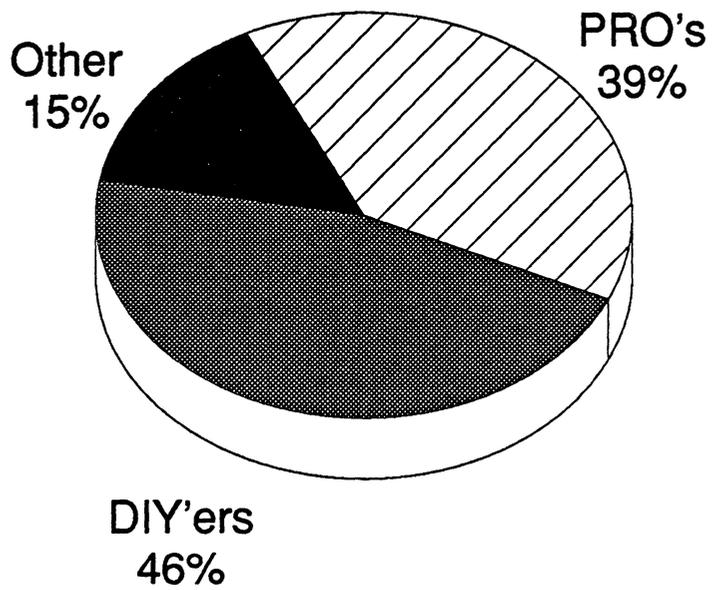
**Figure 6. Treated Lumber, Timbers and Plywood Demand  
by Region in 1986.**

(Source: RISI 1987)



**Figure 7. Channels of Distribution for Pressure Treated Lumber.**

(Source: Fuller and Walsh 1983)



**Figure 8. Retail Customers for Pressure Treated Lumber (1983).**

(Source: Walsh 1985)

Year

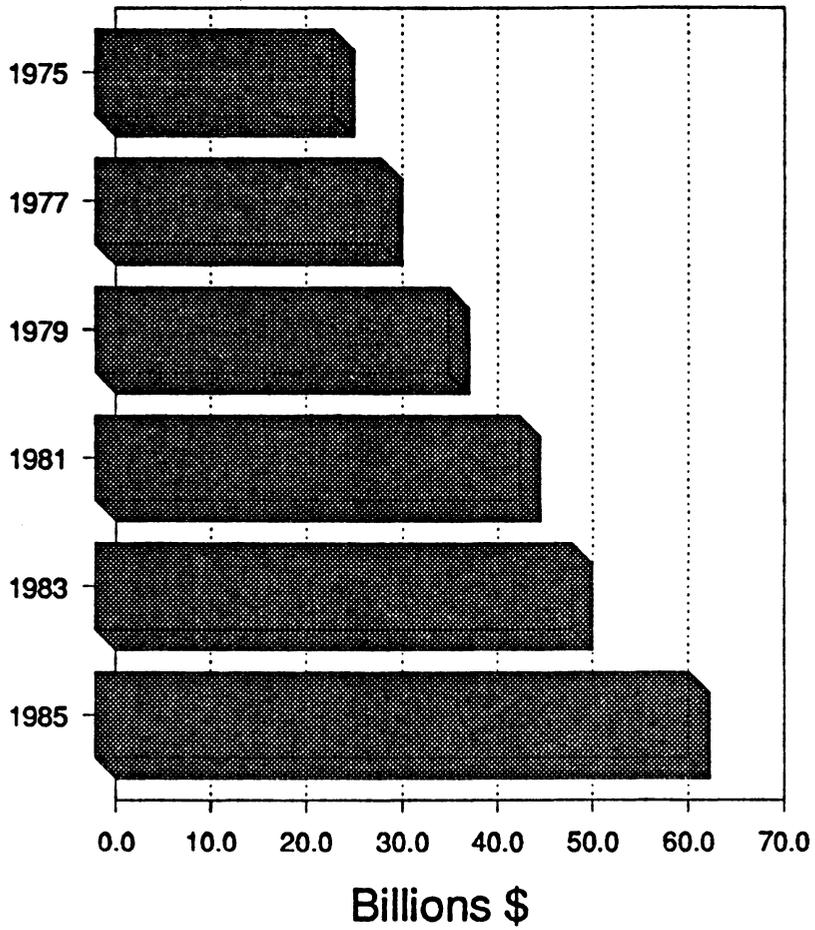
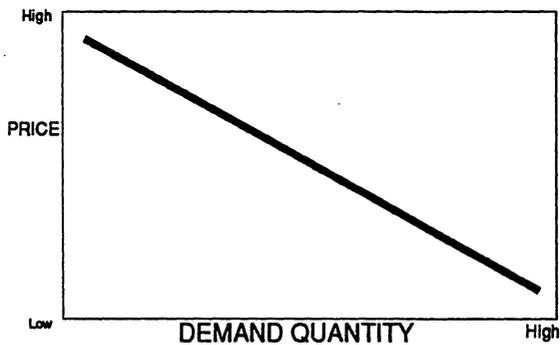


Figure 9: Growth in Home Center Retail Sales

(Source: Franta and Johnson 1986)

# TWO VIEWS OF A MARKET

**MASS MARKETING**  
Market is Single Entity



**MARKET SEGMENTATION**  
Market Niche

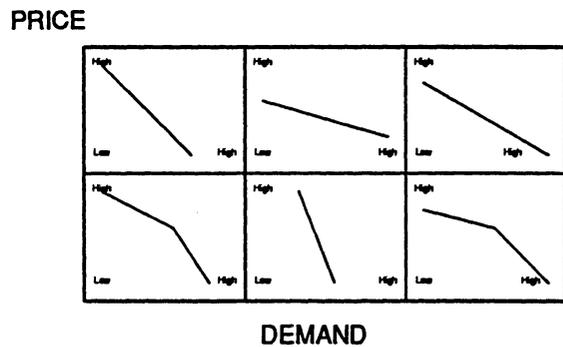


Figure 10. Graphic Representation of Mass Marketing vs. Market Segmentation.

Table 1. <sup>1</sup>Total Production of Lumber, Timbers and Plywood by  
Chemical Treatment in the U.S. (1986).

<u>Chemical Treatment</u>	<u>Lumber*</u>	<u>Timbers*</u>	<u>Plywood**</u>
Waterborne Salts	4,831,491	405,111	157,568
Creosote Solutions	47,057	35,960	-
Pentachlorophenol	40,976	11,853	1,088
Fire Retardants	<u>99,654</u>	<u>1,698</u>	<u>139,008</u>
All Chemicals	5,019,178	454,622	297,664

<sup>1</sup> All figures are for pressure treating plants and are based on production reports for 518 plants and estimates of production by 70 non-reporting plants.

\* 1,000 board feet (mbf)

\*\* 1,000 square feet (3/8-inch basis)

(Source: Micklewright 1988)

Table 2: Treated Wood Production by Preservative (1986).

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	<u>million cu. ft.</u>	<u>%</u>
Creosote Solutions <sup>1</sup>	118.7	21
Pentachlorophenol	49.5	9
Waterborne Preservatives <sup>2</sup>	375.5	68
Fire Retardant Chemicals	<u>10.4</u>	<u>2</u>
Total	554.1	100%

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<sup>1</sup> Creosote, Creosote-Coal Tar and Creosote Petroleum.

<sup>2</sup> CCA, ACA, ACC and CZC.

(Source: Micklewright 1988)

Table 3. Treated Lumber End Uses by Application in 1983.

	<u>Home Improvement</u>	<u>New Residential Construction</u>
* Outdoor Uses	87%	63%
** Home Exterior	2%	2%
*** <u>Home Framing</u>	11%	35%
	100%	100%

\*decks, patios, porches, gazebos, balconies, pool enclosures, fences, landscaping, sheds, garages, carports, boat docks, etc.

\*\*siding, sheathing, soffits, fascia, etc.

\*\*\*wall studs, sills, plates, posts, roof trusses, joists, rafters, beams, floor joists, flooring, etc.

(Source: Fuller and Walsh 1983)

Table 4. Techlaw Study Results (1986):

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Party Involved	% Aware of CAP	% Participating In CAP
Formulators	100	94
Treaters	100	97
Distributors	81	70

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(Source: Techlaw 1986)

**Table 5. Hazard Management Framework.**

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<u>Technical Issues</u>	<u>Social Issues</u>
A) Identification	A) Risk Perception
B) Measurement	- Perceived Consequences
- Probability	- Subjective Probability
- Consequence	B) Risk Acceptability

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(Source: Jacoby 1981)

**A Geographic Comparison of The Professional Contractor/Remodeler:  
Consumer Research for CCA Treated Lumber Products.**

(A manuscript prepared for submission to  
Forest Products Journal)

"Mass production industries are impelled by a great drive to produce all they can. The result is that marketing gets neglected. What usually gets emphasized is selling not marketing. The difference between marketing and selling is more than semantic. Selling focuses on the needs of the seller, marketing on the needs of the buyer."

--Theodore Levitt

**A Geographic Comparison of The Professional Contractor/Remodeler:  
Consumer Research for CCA Treated Lumber Products.**

**ABSTRACT**

The purpose of this paper is to empirically characterize the market for treated lumber products in terms of four sets of predictor variables. Professional Contractors/Remodelers (PRO's) were grouped into the four U.S. Bureau of Census regions. Then, both univariate ANOVA and multivariate Multiple Discriminant Analysis (MDA) were used to test for relationships between 20 product and service attribute items, 16 opinion statements, 5 demographic measures and 4 measures of respondents knowledge. In general, it was found that PRO's in the Western and Southern regions differ from Northeastern builders in terms of age, firm size, price sensitivity, risk perception, and chemical knowledge. Moreover, PRO's in the Western states are unique due to their treated lumber purchase level, educational level, safety orientation, and attribute importance for grades, general appearance and moisture content. North Central PRO's were atypical with respect to Permanent Wood Foundations and the service attribute of convenient location of the building supply retailer.

## INTRODUCTION

One of the fastest growing segments of the wood products industry over the last decade has been pressure treated lumber products. In 1977, treated lumber products consumed approximately 1.5 billion board feet (bbf). By 1987, this had grown to an estimated 6.5+ bbf with projections of 10 bbf by 1995 (Micklewright 1988; Eliades 1988). This rapid growth was made possible by consumer acceptance of Chromated Copper Arsenate (CCA). CCA, first available commercially in the 1950's, has grown from a 14% treated wood market share in 1953 to 60% of the wood preservation industry in 1986 (Micklewright 1988).

In 1986, residential repairs and remodeling accounted for 52% of the treated lumber demanded. An additional 28% was used in residential construction for similar outdoor uses and non-residential applications consumed the balance or about 20% of all treated lumber products (RISI 1987). Home center sales to professional contractors and remodelers (PRO's) grew by \$6.7 billion from 1983 to 1985 and achieved a record high 41% of the total \$62.2 billion home center sales in 1985 (Franta and Johnson 1986). These PRO's purchase approximately 40 percent of all treated lumber products sold by retailers in the U.S. (Walsh 1985). As the market for treated lumber matures, competition at the retail level for these professional customers will intensify.

## **The Home Center Industry**

The home center or home improvement center is one of the most dynamic retail segments in the U.S. economy. Driven by whopping gains in the sale of lumber, building materials and millwork product lines, this retail segment grew in sales from \$50.2 billion in 1983 to \$62.2 billion in 1985 (Franta and Johnson 1986). A full 50% of this growth can be attributed to lumber sales which increased by \$6 billion during these two years and are projected by retailers to be the product line with the fastest sales growth through 1988 (Franta and Johnson 1986). According to Home Center Magazine's 1986 Market Profile (Franta and Johnson 1986), 94% of U.S. home centers carried treated lumber in 1986, up strongly from the 82% who carried and sold the line in 1984.

## **Study Implications**

Segmentation analysis, a fundamental marketing concept, provides the framework for marketing strategy and resource allocations (Wind 1978). Clearly, the monetary importance of the treated lumber market supports this investigation as an aid to the understanding of a key market segment for the forest products industry. Furthermore, knowledge of regional differences may initiate and support managerial decisions regarding treated lumber product lines in terms of modifications or new products that would improve competitive positions in different geographic markets. Moreover, promotion materials such as advertising, store displays and product literature, may be more effectively employed on a regional basis.

Lumber drives the sale of other (potentially higher margin) merchandise and may be considered of paramount importance to home centers and building supply dealers (Payless 1985). With this in mind, a fuller understanding of the product and service attributes, opinions, knowledge, and demographics underlying the regional segments of treated lumber customers may provide managerial strategies for obtaining an increased share of lumber purchases which will typically lead to higher overall sales.

Thus, the two major research goals of this study are: (1) to investigate regional differences among PRO's in terms of the following treated lumber variable sets: attribute importance, opinions, knowledge and demographics and (2) to provide market segment profiles based on the first objective for managerial decision making.

## **METHODS**

### **Sampling**

A standardized mailing list was purchased from a national marketing firm (Best 1986). This list was a random sample of 3,361 professional contractors and remodelers located throughout the U.S. chosen on an Nth name basis. A total sample size of 3,000 was calculated to be sufficiently large to allow approximately a 95% confidence interval with an absolute error of 5% or less in overall survey results with an additional 10% to 11% added to allow for undeliverables (Mendenhall et al. 1986). Response rate estimates in the statistical calculations are based on previous studies by Adams

(1956), Boyd et al. (1981), Donald (1960) and Hochstim (1970) which indicate expected response rates of 15% to 35% for random U.S. population samples.

Very large builders typically are not found in telephone book yellow pages, the source of our sample. To this end, some sampling bias may have been introduced due to the exclusion of these major builders. However, since the very large builders often purchase their materials with a great deal of buyer leverage through wholesalers or direct from the manufacturer and this study, by design, examined the retail customer, these smaller "yellow page" PRO's were deemed most appropriate for our study.

Following a thorough pretest, a questionnaire was administered in March, 1987 to the 3,361 previously described and randomly selected PRO's. A follow-up letter was mailed 10 days after the questionnaire. Eighteen percent or 543 usable questionnaires were returned; 398 (11.8%) were undeliverable due largely to the transient nature of small builders in the U.S.

Potential bias due to non-response can be studied by comparing those who respond immediately with those who respond after follow-up steps are taken, and through post hoc follow-up telephone interviews with non-respondents (Fowler 1984). Both of the procedures were employed using nine key demographic variables. Administering a Chi-square test of independence, no significant (at the  $p=.05$  level) differences existed between early and late respondents or between respondents and nonrespondents, thus allowing concerns over

non-response to be set aside.

## **Respondents**

Southern PRO's represented the largest regional group with 28% of the 543 respondents residing in the 16 southern states. Builders in the 12 North Central states comprised 26% of the respondents whereas Northeastern and Western PRO's made up 25% and 18% of the total respondents, respectively, in our study (Table 1). Eighteen respondents failed to indicate the state in which they conducted the majority of their business and therefore could not be categorized by region.

Over two-thirds of the 543 respondents were involved in repair and remodeling (R&R) followed by One-Family builders (34%) and patio/deck builders (25%). Some PRO's undertake more than one type of building activity in a given year, thus, the numbers add to more than 100%. Clearly, the smaller builders were represented with our sample frame since 71% had sales of less than \$500,000. The median value of treated lumber purchases in 1986 for this group was \$5,000 and the mean was \$16,569. Respondents averaged 18 years of building experience and 67% had some college education (28% were college graduates).

## **Research Design**

The design of this paper was descriptive in which the phenomenon under investigation were described by determining the relationship, if present, between the dependent and independent variables. The

dependent or criterion variable in this study was the four U.S. Bureau of Census regions. The independent or predictor variables were: (1) product and service attributes, (2) opinions, (3) awareness and knowledge and (4) demographics (Figure 1).

### **Criterion (Dependent) Measures**

In order to differentiate geographically among professional contractors and remodelers (PRO's), respondents were categorized into four mutually exclusive U.S. Bureau of Census regions. This classification into region was based on their answer to the question: "In what state do you conduct the majority of your business?".

### **Predictor (Independent) Measures**

Twelve product and eight service attributes were rated by respondents on a 5-point Likert scale from 1=very unimportant to 3=neither important nor unimportant to 5=very important. These attributes, provided in Table 2, indicate that PRO's nationwide stress straightness as the single most important treated lumber attribute. Whereas brand names, color and promotional materials represent the least important attributes, their mean ratings of 2.98, 2.99 and 3.01, respectively, suggest an indifference for these items.

Sixteen opinion statements were provided to respondents in order to gain additional insight into the human characteristics of PRO's that influence their responses to market variables (Berkman and Gilson 1986) (Table 3). PRO's were asked to indicate their level of

agreement or disagreement on a 5-point Likert scale of 1=strongly agree to 5=strongly disagree to 3=neither agree nor disagree to 3.0 and general disagreement with the five statements scoring below 3.0.

Five demographic items were measured; "age," "education," "years experience," "total sales" and "treated lumber purchases" (Table 4). Four of the 5 items were measured categorically. That is, "age," "education," "total sales" and "treated lumber purchases" were represented on the questionnaire by fixed categories for the respondents to check. "Years experience" was an open-ended question.

Table 5 provides four knowledge items. Respondents were asked to indicate their knowledge of pressure treated lumber brands, chemicals, Consumer Information Sheets (CIS's) and Permanent Wood Foundations (PWF's). PRO's, in general, are highly aware of PWF's and relatively unaware of CIS's, treated lumber brands and the chemicals used in the treating process.

### **Data Analysis**

The differences between the four U.S. Bureau of Census regions were analyzed on both a univariate and multivariate basis using ANOVA<sup>1</sup> and stepwise multiple discriminant analysis<sup>2</sup> (MDA). The stepwise method is appropriate when the researcher wishes to consider a large number of independent variables for inclusion in the discriminant

function (Hair et al. 1987). Regional comparisons were examined as follows: (1) a univariate (ANOVA) F-test where each independent variable was examined individually to determine if PRO's varied by region; Duncan's<sup>3</sup> multiple range test, a post hoc statistical test, was then performed on the statistically significant (at the p=.05 level) relationships to ascertain which regions differed and (2) a stepwise multiple discriminant analysis where all 45 independent variables were analyzed to provide a summary profile of differences among the four geographic region members. Group centroids (means) were then plotted in order to visualize the criterion groups of region on each of the significant canonical functions (Lumpkin et al. 1985). All analysis utilized the SPSS<sup>x</sup> (1986) statistical software package.

Validation of significant discriminant functions may be accomplished by randomly dividing the population into two groups and developing classification matrices (Hair et al. 1987). The formula for determining the percent correctly classified by chance is:  $C = 1 / \text{number of groups}$  (Hair et al. 1987). Since our 4 region MDA correctly classified 33.64% of respondents, and the chance probability is .25, the predictive accuracy is considered acceptable. Additionally, the maximum chance criteria of 28.05% exceeded the proportional chance criteria and was therefore compared to the hit ratio (percent correctly classified) in the hold-out sample of 33.64%, thus indicating a very good model (Hair et al. 1987).

## RESULTS

### Product and Service Attributes

Six treated lumber attribute variables emerged as related to geographic region ( $p = .05$ ): dealer reputation, good treated lumber product variety at dealer, surface cleanliness, general appearance, convenient location of the supplier (dealer) and brand named product (Table 2). A Duncan's multiple range test ( $p = .05$ ) was employed to determine which regions differed. Western PRO's differ from the rest of the U.S. They rated five of the six attributes as less important. Convenient location is less important to North Central builders as compared to the other three regions. The Northeast segment, the most discriminating PRO retail customer, ranks highest on all six of these attributes.

### Opinions

Six of the sixteen opinion statements showed significant differences between regions at the  $p = .05$  level using univariate ANOVA. The six significant statements are: a warranty would make me more likely to build PWF's, brand named treated lumber is superior to generic, I am willing to pay more for higher quality/better looking treated lumber, masonry foundations are more comfortable than PWF's, CCA treated lumber should not be used for picnic tables and CCA treated lumber is entirely safe to the resident for indoor applications (Table 3).

In general, Duncan's post hoc analysis showed Western builders as compared to the other three regions are less inclined to pay more for higher quality/better looking treated products, feel less strongly that brand named treated products are superior and are the most trusting in terms of treated lumber product safety. The Northeastern PRO, conversely, disagrees most regarding the safety of using CCA treated lumber for counter tops and butcher blocks and to residents for indoor applications while agreeing more than the other three regions that quality/appearance is worth a price premium.

### **Demographics**

Table 4 provides the univariate analysis of six key demographic items on the four census region segments. Three items were significantly different between regions at the  $p=.05$  level: age, education level and treated lumber purchases in 1986. Western PRO's generally have higher education levels and lower treated lumber purchases versus the other three regions of the U.S. using Duncan's multiple range test. The Northeasterner, the youngest responding group of builders, rates lowest in terms of education.

### **Knowledge**

Three of the four measures of customer knowledge differed significantly by region. Brand awareness, knowledge of the chemicals used in the treating process and knowledge of PWF's differentiate the four segments when considered one at a time. Southern PRO's are the

least knowledgeable about treated lumber brands and the chemicals used; however, a greater percent of Southern builders have heard of PWF's than in any of the other regions (Table 5).

### **A Compact Portrayal**

Stepwise multiple discriminant analysis was used on all 45 independent variables in the 4 sets. To summarize the regional differences among PRO's, fifteen independent or predictor variables were retained in the stepwise analysis, adequately depicting the relationships (Table 6). The stepwise method enters the independent variables into the discriminant function one at a time based on their discriminating power (Hair et al. 1987). This method is employed when considering a large number of independent variables and identifies a reduced set that is as good or better than the complete set of variables. The maximum number of discriminant functions possible is equal to the number of groups in the dependent variable less one (Churchill 1987). Accordingly, all three discriminant functions reached significance in this analysis. The functions explained 56.2, 29.9 and 13.9 percent of the variance, respectively.

Based on the canonical loadings, function 1 reflects large, price sensitive, risk taking firms with older owners. Moreover, these PRO customers feel that treated lumber products are safe to residents for indoor applications, have relatively little knowledge of the chemicals used in the treated products they use and are not concerned about surface cleanliness. Thus, function 1 can be labeled "large,

price sensitive, risk taking PRO's."

The second function, based on the canonical loadings of absolute .30 and greater, describes PRO respondents who are heavy users of treated lumber products, and feel that the product attributes of general appearance and moisture content are important; grade is not. These market segment member firms are also run by older, less educated builders. This dimension is characterized by "heavy usage, appearance, non-technical PRO's."

Function 3 is defined primarily by customers who place a premium on the convenient location of the building supply retailer and grades. Moreover, this segment is unconcerned about moisture content and the most aware of PWF's yet feels that masonry foundations provide superior comfort as compared to PWF's. Thus, this dimension is described as "convenience, technical, anti-PWF PRO's."

The last aspect of discriminant analysis, the interpretation stage, may be conducted by plotting the group centroids of significant discriminant functions (Hair et al. 1987). Centroids for the four regions relative to the three functions are portrayed in Figure 2. Each PRO segment is plotted in 3-dimensional space according to the centroids of each of the three treated lumber segments identified by Functions 1 through 3. This technique illustrates regional differences to provide insight to the segment comparisons (Perreault, Jr. et al. 1979).

In terms of the first function, the "large, price sensitive, risk taking PRO's," both Western and Southern builders are most

described; Northeastern PRO's are least described and builders in the North Central states are intermediate. The second function separates the Western builder from the other three regions. This distinction, illustrated in Figure 2, characterizes respondents in the non-Western states as heavy treated lumber consumers who shop for good appearance and proper moisture content and feel strongly that picnic table tops are an appropriate use for treated lumber products. The Western builder is unique on this function in terms of the lowest treated lumber purchase level, highest educational level, and lowest attribute importance score for general appearance and moisture content. The last dimension, function 3, shows Southern and Northeastern builders as different from respondents in the North Central states; Western PRO's are intermediate. In other words, Southern and Northeastern PRO's are most concerned about dealer location and treated lumber grades; the least interested in moisture content. Furthermore, these two regions are the least aware of PWF's and agree the strongest that masonry provides better living comfort versus PWF's. North Central PRO's represent these characteristics in reverse.

#### **SUMMARY AND CONCLUSIONS**

The four predictor sets of attributes, opinions, knowledge and demographics successfully relate to the geographic location of the PRO respondent. To provide a concise understanding of these regional distinctions, stepwise multiple discriminant analysis was employed and regional PRO groups were depicted in 3-dimensional discriminant space

with each axis represented by market segments as follows:

- (1) Large/price sensitive/risk taking PRO's: best describes PRO's in the Southern and Western region; not Northeastern PRO's. North Central builders are intermediate.
- (2) Heavy usage/appearance/moisture content/non-technical PRO's primarily Northeastern and Southern PRO's and to a lesser extent, the North Central respondent; not Western builders.
- (3) Convenience/technical/anti-PWF PRO's shows the North Central PRO's as low on this function and different compared with the other three census regions.

Based on these findings, retailers and manufacturers may provide different product offerings in different regions of the U.S. Northeastern PRO's rank high on segment two and three characteristics, yet lowest by far in terms of segment one dimensions. This implies a very discriminating, younger customer segment with heavy treated lumber consumption, small firm size, price insensitivity who may shop for either appearance and moisture content or grade and dealer location. This Northeastern PRO may be reticent to adopt PWF construction techniques.

Western PRO's, conversely, rank highest on segment one, lowest on segment two and intermediate on segment three characteristics. This PRO may be described as being a large, price sensitive builder with very low treated lumber purchases. His/her chemical knowledge is the lowest of the four regions and surface cleanliness is relatively unimportant. This Western PRO most strongly agrees that CCA treated lumber products are entirely safe to the resident for indoor applications. Given the greater availability of naturally durable species such as cedar and redwood in the West, this low use and

knowledge of CCA treated products is not surprising.

The last two regional groups also show a dichotomy. Southern PRO's rank high on all three discriminant functions whereas builders in the North Central states possess a low relative rank. These last two regions are more difficult to segment as a result. Generally, Southern respondents represent older builders who have large firms and heavy treated lumber consumption. Moreover, they have little knowledge of the treating chemicals used, feel that treated products are safe to residents indoors, and look for appearance, and convenient location. This PRO segment may or may not shop for moisture content or grade and will probably prefer masonry over treated lumber for a foundation material.

On the other hand, North Central respondents are characterized by firm size and treated lumber usage rates below average who feel that dealer location and treated lumber grades are of low importance, and moisture content is of high importance compared to the other three regions. These PRO's are the most aware of, and may be the most receptive to, PWF construction.

This study suggests that professional contractors and remodelers differ regionally in terms of treated lumber wants and needs. In particular, Western builders differ from the rest of the country. Practitioners may achieve greater success by developing communication strategies to target builders in a specific region. For instance, the Western PRO places the lowest emphasis on appearance and brand names and uses the least treated lumber compared to the other three regions.

Northeastern market strategies may profitably focus on higher quality and higher priced specialty products. The findings show this region to be the least price sensitive builder segment with the greatest emphasis on quality, appearance, treated lumber product variety and brand names.

To date, consumer level research is non existent in the important area of treated lumber retail sales. This research provides a prerequisite base of exploratory information providing macro geographic trends concerning the PRO retail market for CCA treated lumber products. Additional market research of a more specific geographical focus, such as focus groups or mail panel surveys in selected Standard Metropolitan Areas or SMA's, may assist in delineating further regional differences and thus, provide valuable insight for targeting promotional, distribution, pricing and product strategies.

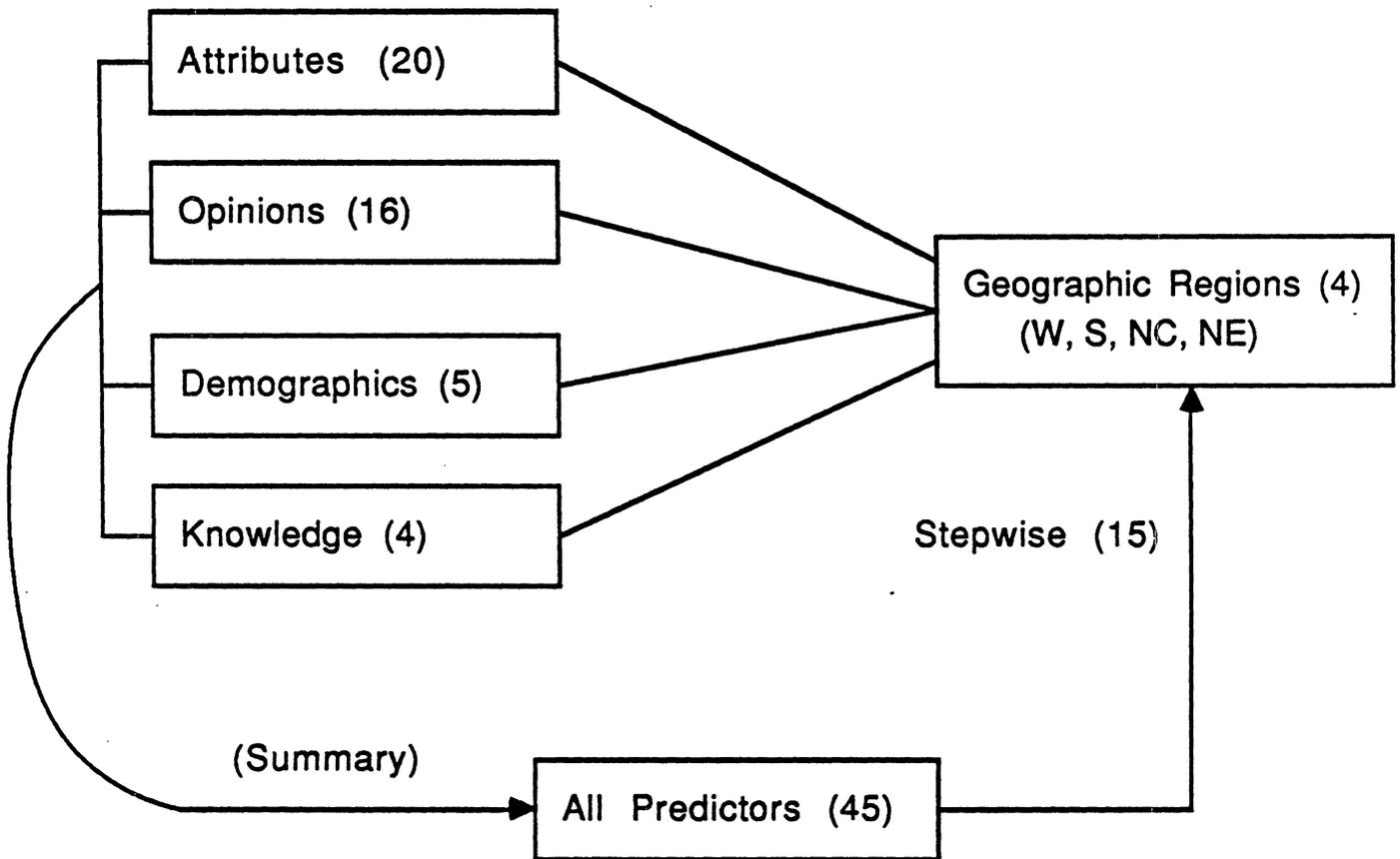
## Notes

1. The analysis of variance or ANOVA statistical procedure is a method for comparing the means of  $> 2$  populations. In other words, ANOVA analyzes one independent variable with two or more levels; in this case, the independent variable means are compared by four regions.
2. Multiple discriminant analysis or MDA, a multivariate analytical technique, examines relationships that may be present among more than one dependent variable. MDA is the appropriate technique when the dependent variable is categorical (nonmetric) and the independent variables are continuous (metric). In this study, MDA examines regional differences in terms of 45 independent variables.  
  
MDA derives the linear combination of the multiple independent variables (in this case, attributes, opinions knowledge/awareness, and demographics) that will discriminate best between dependent groups (regions) (Hair et al. 1987).
3. Duncan's multiple range post hoc test is a statistical comparison technique. ANOVA simply determines whether or not a statistically significant group difference exists, not which groups differ. Post hoc multiple comparison tests, such as Duncan's, compares the means of all groups to determine which pairs or combination of pairs differ.

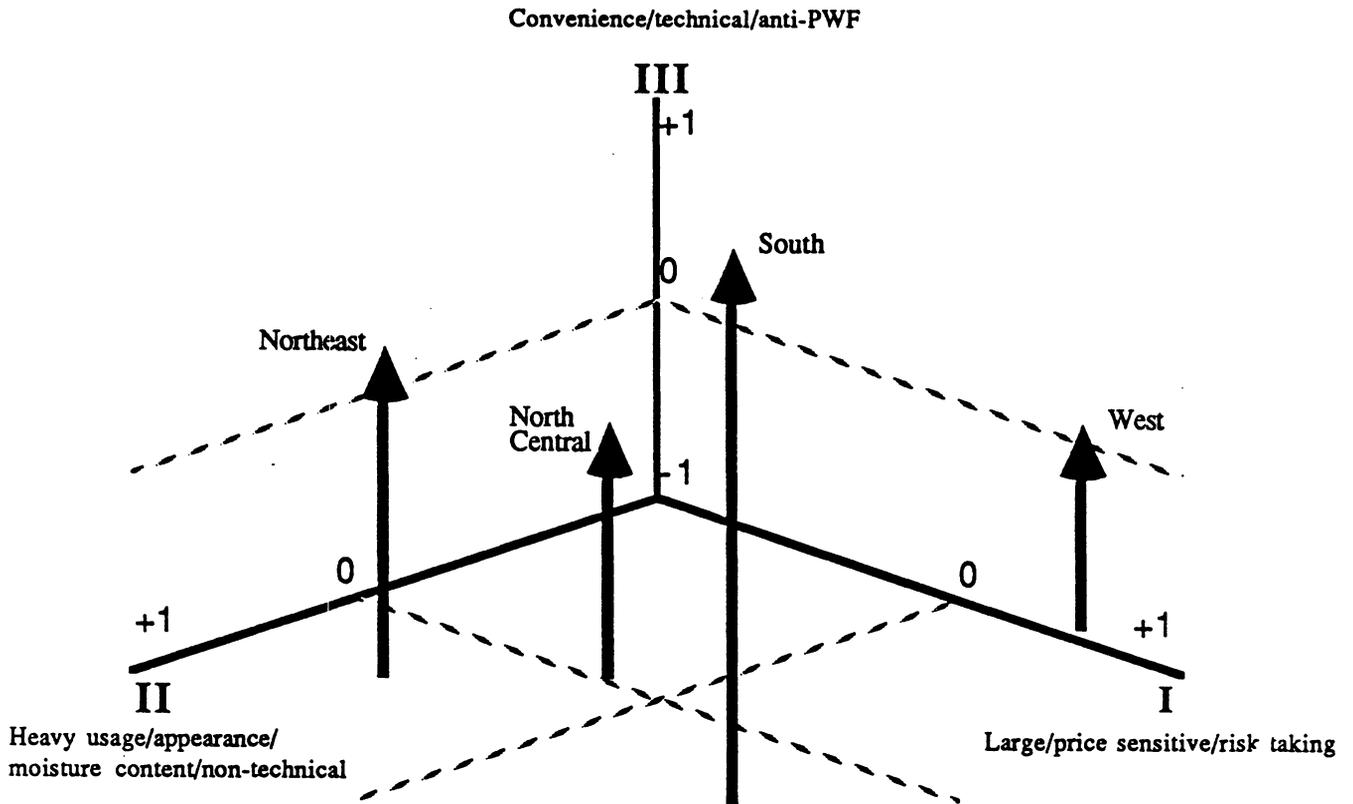
### LITERATURE CITED

1. Adams, J.S. 1986. An Experiment on Question and Response Bias. Public Opinion Quarterly 20(Fall):593-598.
2. Boyd, Jr., H.W., R. Westfall and S.F. Stasch. 1981. Marketing Research Text and Cases. Richard D. Irwin, Inc., Homewood, IL.
3. Berkman, H.W. and C. Gilson. 1986. Consumer Behavior Concepts and Strategies. Third edition, Kent Publishing Company, Boston, MA.
4. Best Mailing Lists and Printing Corp. 1986. 34 West 32nd St., New York, N. Y. 10001.
5. Churchill, G.A. Jr. 1987. Marketing Research Methodological Foundations. Fourth Ed., the Dryden Press, Chicago, IL.
5. Donald, M.N. 1960. Implications of Non-Response for the Interpretation of Mail Questionnaire Data. Public Opinion Quarterly 24(Spring):99-114.
6. Eliades, G.K. 1988. Pressure Treating Numbers Bullish. Merchant Magazine(April):15.
7. Fowler, F.J. 1984. Survey Research Methods. Sage Publications, Beverly Hills, CA.
8. Franta, H. and M.L. Johnson. 1986. Home Center Magazine's 1986 Market Profile. (September):19-33.
9. Fuller, B. and M. R. Walsh. 1983. Treated Wood Study. The Markets for Treated Lumber, Timbers and Plywood: Recent Developments and Prospects for the Future. Data Resources Inc. (changed to: Resource Information Systems, Inc.), Bedford, MA.
10. Hair, J.F., Jr., R.E. Anderson and R.L. Tatum. 1987. Multivariate Data Analysis. 2nd edition Macmillan Publishing Co., New York, NY.
11. Hochstim, J.R. 1967. A Critical Comparison of Three Strategies of Collecting Data From Households. J. of the Statistical Assn. 62 (September):976-989.
12. Lumpkin, J.R., B.A. Greensberg and J.L. Goldstucker. 1985. Marketplace Needs of the Elderly: Determinant Attributes and Store Choice. J. of Retailing, 61(Summer):75-105.
13. Mendenhall, W., L. Ott and R. L. Scheaffer. 1986. Elementary Survey Sampling. Wadsworth Publishing Company, Inc., Boston, MA.

14. Micklewright, J.T. 1988. Wood Preservation Statistics, 1986: A Report To The Wood Preserving Industry In The United States. (January).
15. Payless Cashways, Inc. 1985. Phoenix Project Report. Kansas City, MO.
16. Perreault Jr., W.D., D.N. Behrman and G.M. Armstrong. 1979. Alternative Approaches for Interpretation of Multiple Discriminant Analysis in Marketing Research. J. of Business Research, 7(June): 151-173.
17. RISI (Resource Information Systems, Inc.) 1987. Treated Lumber A Treat For Southern Pine. (In Crow's Weekly Newsletter), 16 (January):2.
18. Schiffman, L.G. and L.L. Kanuk. 1983. Consumer Behavior. 2nd edition, Prentice-Hall, Inc., Englewood Cliffs, NJ.
19. SPSS<sup>x</sup> Inc. 1986. User's Guide: Statistical Package for the Social Sciences, Version X. 2nd Edition, Chicago, IL.
20. Wind, Y. 1978. Issues and Advances in Segmentation Research. J. of Marketing Research, 15 (August):317-37.



**Figure 1. Conceptualization of Linkage Between Four Sets of Predictor Variables and Geographic Region**



	<u>Centroids</u>		
	(F1)	(F2)	(F3)
West	0.52	-1.05	0.08
South	0.49	0.30	0.24
North Central	-0.18	-0.01	-0.55
Northeast	-0.66	0.25	0.18

**Figure 2. Portrayal of Geographic Regions on Three Canonical Axes**

**Table 1. PRO Sampling Plan and Response Rates  
By Census Region**

Region	Total number of PRO's	PRO's sampled		--Responses--		
		(number)	(percent of sample)	(number)	(% of total)	(response rates)
West	13,711	683	20.3%	98	18%	16%
South	29,555	1,169	34.8%	149	28%	14%
North Central	21,055	837	24.9%	143	26%	20%
Northeast	11,413	672	20.0%	135	25%	23%
Unidentified <sup>1</sup>				18	03%	
<b>Totals =</b>	<b>75,734</b>	<b>3,361</b>	<b>100.0%</b>	<b>543</b>	<b>100%</b>	<b>18%<sup>3</sup></b>
<b>Less Undeliverables:</b>		<b>&lt;398&gt;<sup>2</sup></b>				
<b>Total Sampled:</b>		<b>2,963</b>				

<sup>1</sup> Eighteen respondents did not indicate which state they conducted the majority of their business and therefore could not be categorized by state or region.

<sup>2</sup> 398 questionnaires were returned as undeliverable.

<sup>3</sup> Total response rates are calculated as: 
$$\frac{\# \text{ responses}}{\# \text{ mailed} - \text{undeliverables}} = \frac{543}{2,963} = 18.3\%$$



**Table 3. Professional Builder's Opinions by Region on  
Sixteen Statements Concerning Treated Lumber**

Treated Lumber Opinions <sup>2</sup>	All Regions (n=423)	Geographic Segment				Univariate F-ratios	p	Differing Groups (Duncan's <sup>2</sup> )
		W (n=69)	S (n=128)	NC (n=109)	NE (n=117)			
(Mean Opinion Ratings)								
CCA treated lumber emits odors	2.91	2.94	2.84	2.93	2.95	0.37	.78	
Warranty would increase chance of bldg. PWF's	3.38	3.42	3.59	3.26	3.24	2.55	.05	S from NC,NE
Brand named treated lumber is superior	3.24	2.97	3.33	3.24	3.31	3.25	.02	W from S,NC,NE
Would pay more for KDAT treatment	3.45	3.31	3.49	3.51	3.44	0.94	.42	
More concerned with appearance vs. grade of treated lumber	3.06	2.88	2.99	3.19	3.12	1.27	.29	
Retail salespeople are knowledgeable about treated lumber	2.50	2.29	2.52	2.64	2.49	2.03	.11	
PWF's are acceptable as alternatives to masonry found'ns.	2.81	2.81	2.89	2.90	2.63	1.96	.12	
Will pay more for better appearance treated lumber	3.69	3.46	3.64	3.76	3.80	3.02	.03	W from NC,NE
Masonry foundations are more comfortable vs. PWF's	3.19	3.22	3.27	2.97	3.31	3.32	.02	NC from W,S,NE
Will pay more for brand names	2.93	2.83	2.91	2.90	3.03	1.01	.39	
CCA treated lumber is safe for counter tops and butcher blocks	1.84	1.99	1.96	1.77	1.72	2.22	.09	
CCA p-t lbr. should not be used for picnic tables	3.09	3.39	2.88	3.16	3.10	3.29	.02	W from S
CCA treated lumber is safe to resident for outdoor applications	3.81	3.71	3.88	3.83	3.79	0.87	.46	
CCA treated lumber is safe to resident for indoor applications	3.03	3.32	3.27	2.93	2.72	9.72	.00	W,S from NC,NE

Table 3. Continued.

Treated Lumber Opinions <sup>1</sup>	All Regions (n=423)	Geographic Segment				Univariate F-ratios	p	Differing Groups (Duncan's <sup>2</sup> )
		W (n=69)	S (n=128)	NC (n=109)	NE (n=117)			
(Mean Opinion Ratings)								
CCA treated lumber to the builder	3.15	3.06	3.29	3.19	3.03	1.83	.14	
CCA treated lumber is safe with proper use, handling and disposal precautions	3.51	3.51	3.59	3.55	3.44	0.68	.56	

<sup>1</sup> Opinions were rated on a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

<sup>2</sup> Duncan's multiple range post hoc test statistically significant at the p= .05 level.

Table 4. Professional Builder Demographics by Region

Demographics <sup>1</sup>	All	Geographic Segment				Univariate		Differing Groups (Duncan's <sup>2</sup> )
	Regions (n=456)	W (n=79)	S (n=131)	NC (n=126)	NE (n=120)	F-ratios	p	
Age	3.83	3.90	3.92	3.94	3.59	2.50	.05	NE from W,NC
Education	2.91	3.15	2.97	2.87	2.73	3.89	.01	W from NE
Years experience	17.55	17.01	16.94	18.60	17.48	0.59	.62	
1986 total sales	2.14	2.25	2.29	2.07	1.97	2.10	.10	
1986 treated lumber purchases	2.03	1.53	2.20	1.97	2.27	15.84	.00	W from NC; NC from NE

<sup>1</sup> Demographic variables were rated as follows:

Age = 1 (Under 21) to 2 (21-30) to 3 (31-40) to 4 (41-50) to 5 (51-60) to 6 (Over 60).

Education = 1 (Some HS) to 2 (HS Grad.) to 3 (Some College) to 4 (College Grad.).

Years experience = mean rating.

1986 sales = 1 (Under \$150,000) to 2 (\$150,000 to \$500,000) to 3 (\$500,001 to \$1 mill.) to 4 (\$1 mill. to \$2.5 mill.) to 5 (Over \$2.5 mill.).

1986 treated purchases = 1 (Under \$2,500) to 2 (\$2,500 to \$10,000) to 3 (Over \$10,000).

<sup>2</sup> Duncan's multiple range post hoc test statistically significant at the p= .05 level.

**Table 5. Professional Builder's Knowledge/Awareness of  
Four Items by Region**

<u>Knowledge</u> <sup>1</sup>	All Regions (n=432)	<u>Geographic Segment</u>				Univariate F-ratios	p	Differing Groups (Duncan's <sup>2</sup> )
		W (n=72)	S (n=130)	NC (n=113)	NE (n=117)			
Brand awareness	.36	.28	.48	.29	.33	4.25	.01	S from W,NC,NE
Chemical knowledge	.31	.33	.41	.24	.26	3.46	.02	S from NC,NE
Consumer Information								
Sheet knowledge	.37	.32	.36	.39	.40	0.50	.68	
Permanent Wood Found- ation awareness	.70	.71	.61	.81	.70	4.21	.01	S from NC

<sup>1</sup> Knowledge/Awareness items were rated on a 2-point scale of 0 ("No" are not aware/knowledgeable) and 1 ("Yes" are aware/knowledgeable).

<sup>2</sup> Duncan's multiple range post hoc test statistically significant at the p= .05 level.

**Table 6. A Compact Portrayal of Three PRO Segments in Terms of the Fifteen Best Predictor Variables**

Function	Eigenvalue	Percent of Variance	Canonical Correlation	Significance
1	0.321	56.19	.4932	.000 <sup>1</sup>
2	0.171	29.90	.3822	.000 <sup>1</sup>
3	0.080	13.91	.2715	.012 <sup>1</sup>

15 Stepwise Variables<sup>2</sup>

Canonical Loadings<sup>3</sup>

	Function 1	Function 2	Function 3
Surface cleanliness (4)	-.57	-.16	-.25
Treated lumber is safe to residents indoors (2)	.54	-.05	-.04
Total sales (3)	.38	-.08	.06
Chemical knowledge (7)	-.35	-.15	-.25
Age (11)	.35	.34	-.11
Price (8)	.30	-.08	-.19
Treated lumber purchases (1)	-.28	.73	.09
General appearance (10)	.15	.48	.02
Not safe for picnic tables (12)	-.08	-.41	-.05
Moisture content (15)	.24	.40	-.34
Education (9)	.25	-.30	.05
Grade (14)	.10	-.30	.30
Masonry is more comfortable (6)	-.12	-.03	.61
Convenient location (5)	.02	.06	.58
PWF awareness (13)	.23	.07	.30

<sup>1</sup> Three significant functions are used in the analysis.

<sup>2</sup> Numbers appearing in parentheses after variable names indicate order of entry into stepwise analysis.

<sup>3</sup> Loadings of an absolute .30 or greater are considered significant with the directional relationship provided by the sign (Hair et al. 1987).

**A Profile of the Do-It-Yourself Customer For  
CCA Treated Lumber Products**

(A Manuscript prepared for submission  
to Forest Products Journal)

*"Customers are people; consumers are statistics."*

--Stanley Marcus, founder of Neiman-Marcus

**A Profile of the Do-It-Yourself Customer For  
CCA Treated Lumber Products**

**ABSTRACT**

Eighty-six percent of all respondents of a nationwide survey of households consider themselves to be do-it-yourself'ers (DIY'ers). Over half of these DIY'ers completed their last project less than 3 months ago. The average number of hours per month of DIY activity by respondents was 20. Average treated lumber purchases in 1987 by respondents were \$312.00; median value was \$30.00. For the past three year period (1985-1987), these treated purchases were \$743.00 (mean) and \$200.00 (median). Landscaping uses such as fences, landscaping timbers and lattice work were the most frequently mentioned treated lumber applications followed by decks and outdoor structures. Lattice panels, deck kits and residential fencing were the three most popular specialty items that DIY'ers planned to purchase in 1988. Only 38 percent of respondents knew the species of treated lumber purchased whereas a mere 21 percent could recall a treated lumber brand name. DIY'ers nationwide feel that treated lumber is more durable by about 4 years versus Cedar and Redwood (25 years versus 21 years). By far, the most important product and service attribute is straightness followed by general appearance, price, grade, knowledgeable salespeople and good variety of treated lumber products at the dealer.

## INTRODUCTION

Since 1977, about the time treated lumber sales began to take off, the market has grown from 1.5 billion board feet (bbf) of pressure treated lumber to 5.5 bbf in 1986 (Micklewright 1988). Approximately 92 percent of the total volume of pressure treated lumber, timbers and plywood was treated with chromated copper arsenate (CCA) (Micklewright 1988). Overall treated wood forecasts for the balance of the century call for continued growth in lumber, timbers and plywood demand though at a slower rate than during the past decade.

In 1986, residential repair and remodeling accounted for 52 percent of the total market for treated lumber. Another 28 percent of treated lumber was used in new residential uses (RISI 1987).

### **The Home Improvement Retail Environment**

Evolving from the repair and remodeling market are the one-stop home improvement centers which cater specifically to the Do-It-Yourself (DIY) customer and the Professional Contractor/Remodeler (PRO). The home improvement retailer is one of the most dynamic retail segments in the U.S. economy growing from \$50.2 billion in sales in 1983 to \$62.2 billion in 1985 (Franta and Johnson 1986). This dramatic increase was driven by whopping gains in the sale of lumber, building materials and millwork product lines which increased by nearly \$12 billion during 1984-1985. The DIY market segment in 1985 represented approximately 60 percent of the total home improvement expenditures (Payless 1986).

Lumber and building materials represented the greatest contribution to home center sales in 1985 comprising 54 percent of total sales (Franta and Johnson 1986). Lumber alone accounted for 29 percent of total home center sales. According to the 1986 Profile of the Home Center Market, (Franta and Johnson 1986) lumber tops the list as the department that retailers expect to experience the fastest growth in the future. Payless Cashways, Inc. (1986) states that lumber is their most important offering. Besides accounting for over 25 percent of sales, lumber products drive the sale of other higher-margin merchandise (Payless 1986). According to the DIY Research Institute (Green and Farnsworth 1983), lumber products used for home improvement and repair projects are purchased at the following retail outlets: home centers (51%), lumber/building material outlets (42%), and others (7.0%).

In 1985, homeowners spent \$80.3 billion on remodeling and repairs --78 percent more than they did in 1982 (Guenther 1986). Over 30 percent of the 92 million permanent residences in the U.S. are more than 45 years old, which make them prime candidates for spending on upkeep and improvement (Guenther 1986). According to the National Association of the Remodeling Industry (NARI), remodeling is expected to grow at an average annual rate of 14 percent from 1985 through 1990 (NARI 1986).

Franta and Johnson (1986) indicated that 94 percent of home centers carry treated lumber. This is up 12 percentage points from the 82 percent of home centers that carried treated lumber in 1984.

Treated wood is considered part commodity and part specialty by many home centers. Active programs such as in-store presentations, advertising, and improved service have been implemented to maintain share of treated wood sales. Increased competition among wood treaters has led to the addition of new products such as radius edge decking, deck kits, PWF's, fire retardent treated lumber, the addition of weathering agents to wood preservatives, more attractive deck and outdoor project designs, the Wood Slab system and color tints to gain competitive advantage and increased margins.

Approximately 85 percent of treated lumber, timber and plywood sales go through retailers (Walsh 1985). Of these retail sales, about 46 percent go directly to residential consumers DIY'ers for repairs and alterations and nearly 40 percent are to home improvement and residential contractors or PRO's (Fuller and Walsh 1983). The balance (about 15% of retail sales) go to non-residential building and non-building construction, farm use, industry and government (Fuller and Walsh 1983).

### **The DIY Customer**

Home center sales to DIY'ers have grown from \$16.1 billion to \$31.2 billion from 1977 to 1985 (Franta and Johnson 1986). Between 1970 and 1983, the DIY market grew much faster than the total home improvement market (Green and Farnsworth 1983). This DIY boom has created a favorable market segment for treated lumber with approximately 80 percent of treated lumber used for decks, fences,

landscape timbers and other backyard projects being installed by the homeowner (Ryan 1988).

A major factor that will substantially impact the growth of tomorrow's DIY market is the ripple effect of the baby boom. Baby boomers, now 22-40 years old, make up 40 percent of the U.S. population (Francese 1986). As this generation ages, it will continue for another 20 years to pass through age brackets which enjoy heavy DIY participation rates. Baby boomers between the ages of 25 and 39 earn about half of the U.S. personal income and represented nearly 70 percent of home purchases in 1983 (Kitzke 1985). These highly educated customers are increasingly demanding both service in the form of knowledgeable salespeople and warranties/guarantees. According to Cahners's Bureau of Marketing Research, the total home improvement market is projected to reach \$124 billion by 1990 with the DIY home improvement share representing \$73 billion (Kitzke 1985).

### **U.S. Demographics**

The past decade has seen dramatic changes in long established regional demographic trends. As John Naisbitt noted in his best selling book, "Megatrends" (1984), the 1980 census showed that for the first time in U.S. history, the South and West had more people than the Northeast and North Central. Projections by Chase Econometrics (Wright and Melnick 1985) indicate the following population gains by region from 1985 through 1990: West +10.58 percent; South +10.92 percent; North Central +1.56 percent and;

Northeast +1.21 percent. Another significant demographic factor is the declining population growth rate over the last four decades from 1.7 percent growth in the 1950's to 1.3 percent, 1.1 percent and 0.9 percent population growth rates in the 60's, 70's and 80's, respectively (Wright and Melnick 1985).

According to Steven R. Brown (1985) of Alcan Building Products, Warren, Ohio, today's consumer is changing. These trends have implications to the remodeling industry in terms of tailoring a sales strategy to meet the market. In general, Brown speaks of four trends:

- (1) Today's consumer is more affluent.
- (2) The rise of the two-income family.
- (3) Higher education levels.
- (4) Women are more active in remodeling decisions.

### **Study Justification**

CCA pressure treated lumber, timbers and plywood have enjoyed tremendous growth over the last two decades. Nearly 2 million treated wood decks are projected to be built by DIY'ers and PRO's in the U.S. in 1988, up from the 1.1 million in 1984 (Hand 1988; Eliades 1988). Total treated lumber shipments in 1987, valued at \$1.8 billion, s expected to level off at an annual increase of 4 percent over the next 5 years compared to the 14 percent annual growth in treated lumber production from 1977 through 1986 (Micklewright 1988; Ryan 1988). As growth slows, practitioners in the marketplace will meet greater success by predetermining what consumers will buy and thus, focusing on the

consumer's needs. This consumer-oriented marketing philosophy is often known as the "marketing concept".

Traditionally very little research has been done on the buying habits of the final consumer of the vast majority of lumber and wood products (Rich 1970). Much of the demand for treated lumber depends ultimately on demand by final household consumers and, these consumers. Needs, preferences and attitudes toward treated wood products are poorly understood. The purpose of this study is to enhance this understanding.

#### **RESEARCH METHODOLOGY**

Secondary data collection, although extensive, proved insufficient to meet the study goals and nationwide primary data collection was necessary. The mail survey method of data collection has shown to be the most efficient and cost effective vehicle for securing data from such a geographically dispersed population (Kanuk and Berenson 1975). A mail survey was administered, following a thorough pretest, to 3,224 randomly selected DIY'ers in all 50 states in October, 1987. It was determined that 3,000 households with a response rate of 12 percent to 15 percent would provide at least 400 useable questionnaires. These 400 responses are calculated as sufficiently large to allow a 95% confidence interval with an absolute error of 5% or less in overall survey results (Mendenhall et al. 1986). The additional 224 mailed surveys allowed for an anticipated 8 to 10 percent undeliverable rate. A follow-up was sent approximately 10 days after the initial mailings

and 491 usable questionnaires, resulting in a 17 percent response rate, were received from DIY respondents (Table 1). Previous studies by Franta and Johnson (1988), Boyd et al. (1981), Hochstim (1970) and Donald (1960) estimate response rates of 15 percent to 35 percent from random mail surveys in the U.S.

### **Nonresponse Bias**

Potential bias due to nonresponse can be studied by comparing those who respond immediately to those who respond after follow-up steps are taken (Fowler 1984). The later respondents are generally believed to be more like non-respondents. Time dependent relationships of seventeen key demographic variables in terms of before and after the follow-up letter were examined. Wave I represents those DIY'ers who responded immediately or within the first two weeks, whereas the Wave II respondents returned their survey after receiving the follow-up letter. The Chi-square<sup>1</sup> test of independence was used to determine the degree of variation in the survey results between Waves I and II. These tests indicated that, with 95 percent confidence, no differences were found between early and late respondents. This implies no evidence of nonresponse bias.

The most accurate means by which the sample population may be examined is through comparisons with the population as a whole (Fowler 1984). According to the latest U.S. Bureau of the Census statistics, the 1987 Statistical Abstract of the U.S., there were approximately 89.5 million households in the U.S. in March, 1987.

This census data shows family households to represent 72 percent of the total and non-family the balance or 28 percent. Fifty-eight percent of all households in the U.S. were classified as "married couple" and 28 percent as "married couple with children under 18 years old". Our sample showed 83 percent of respondents were married and 80 percent of those had children under 18 years old. Moreover, our sample consists of homeowners who are relatively younger, more affluent and better educated than the general population and thus, those who may be more active and product aware do-it-yourself'ers.

In a 1984 Home Center magazine study entitled "Home Center Consumers: A Comprehensive Analysis," 85 percent of the 1,204 households surveyed reported some DIY activity (HCRB 1984). Our study found a comparable 86 percent of responding households have conducted DIY activities.

## **DIY CUSTOMER PROFILE**

### **Demographics**

As shown in Table 2, 86 percent of households reported some DIY activity; 26 percent have hired a PRO for treated lumber projects. In the cover letter we requested that the survey be completed by the most influential household member for DIY activities. As a consequent, 85 percent of all respondents were male and 89 percent of all DIY respondents were male. Self acknowledged DIY'ers varied considerably by gender with 90 percent of male respondents and only 66 percent of female respondents reporting DIY activity. Slightly over one-quarter

of respondents have hired a professional contractor to build a treated lumber project. Overall, respondents indicated that they spent approximately 17 hours per month on DIY repair and remodeling activities (of all types) (Table 2). Over half of the respondents reporting DIY activity said that their last project was completed less than 3 months ago.

By region, 21 percent of respondents were from the Northeast, 31 percent from the North Central states, 32 percent from Southern states and the balance or 16 percent live in the Western region. The vast majority (83%) of respondents are homeowners followed by multi-family such as condominiums, townhouses, duplexes and trailers owners (8%) and renters (9%). Respondents were asked to estimate the current value of their residence. Nearly two-thirds of respondents nationwide lived in homes worth less than \$100,000 and less than 10 percent resided in \$200,000 plus homes.

As shown in Figure 1, almost half of all respondents are college graduates; over three quarters have "some college." Nearly one-third of all households queried have two incomes. Another 38 percent of all households nationwide earn 1.5 incomes and the balance, 31 percent are single-income households. In terms of total household income, only 11 percent of responding households earned less than \$20,000 per year whereas 31 percent earned \$50,000 or more annually (Figure 2).

The average age of all respondents was 41 years. Eighty-three percent of all respondents were married and the average number of children was 2.0. Overall, on a weekly basis, respondents listen to

15 hours of radio, watch 14 hours of television and read newspapers 5 hours. In 1987, responding DIY'ers averaged \$312 (median \$30) in expenditures on treated lumber products and over the last three years they averaged \$742 (median \$200).

### **Applications and Purchase Intent**

DIY respondents were asked to indicate the type of treated lumber applications their current residence had by checking the nine categories listed in Table 3. Landscaping uses such as fences, landscape timbers and lattice work represented the single most common existing treated lumber use in the DIY residences in 1987. Decks were found in nearly half of all homes and 39 percent of residences had treated lumber outdoor structures such as sheds, garages, carports and boat docks. Regionally, the Northeastern homes have the greatest percentage of decks (61%); Southern homes the lowest (31%). A Chi-square<sup>1</sup> test of independence was used to determine the applications that, with 95% confidence, differed among the four regions. Decks, Wall/Roof/Floor Framing, Home Exteriors and Permanent Wood Foundation (PWF) Uses were found to differ by region (Table 3).

DIY'ers were then asked to indicate the treated lumber specialty products that they intended to purchase in the next 12 months (Table 4). Lattice panels were the most popular overall with 34 percent of households indicating an intent to buy. Deck kits were the second most frequently checked product at 24 percent followed by residential

fencing (21%) and fancy deck posts/rails (19%). Western DIY'ers differed from the other three regions regarding purchase intent. Lattice panels and fancy deck posts/rails are less important to Westerners whereas residential and agricultural fencing are more popular. A Chi-square<sup>1</sup> test of independence indicated, with 95% confidence, that purchase intent for four of the ten items varied by region (Table 5).

### **Family Decision-Making**

An important question for practitioners and researchers to address is which family members are influential in making purchase decisions regarding treated lumber product applications. Understanding decision making roles of household members may provide a basis upon which to develop products and design promotional strategies.

Nine tasks in the consumer purchase decision as shown in Table 5 were numerically coded as 1=husband makes the decision, 2=husband and wife jointly make the decision and 3=wife makes the decision. Therefore, the smaller the number, the greater the husband's influence and conversely the larger the number the greater the wife's influence. Only married couples, representing 83 percent of respondents, were included in this analysis.

For all nine tasks, the influence of the husband dominated the treated lumber decision. The most wife influenced tasks in the purchase of treated lumber products is the suggestion of the project initially. A mean of 1.86 indicates that this is almost a joint

decision. On the other extreme, the husband dominates the tasks of building the project, purchasing the materials, and deciding on the materials. In general, the wife is most influential in the early stages of the decision-making process whereas the husband's role increases in the latter stages.

ANOVA<sup>2</sup> was used to determine if household decision-making differed regionally. Five of the nine tasks were found, with 95% confidence, to differ by region. The Western family is generally the most husband dominated in the treated lumber project purchase decision.

### **Knowledge and Awareness**

Brand awareness measurements (unaided recall) were conducted by requesting that DIY'ers indicate any pressure treated lumber brand names they can remember (up to three). Only 18 percent of the 308 respondents of this question indicated that they remembered at least one brand of treated lumber. Furthermore, only 10 (or 18%) of these 55 brand aware DIY'ers recalled more than one brand and only one respondent provided three different treated lumber brands. Wolmanized<sup>R</sup> was the most frequently identified brand name at half (50%) of all those mentioned.

Table 6 shows the DIY'ers knowledge and awareness of the chemicals used in treated lumber products. Overall, 37 percent of DIY'ers (115 respondents) felt that they did know the chemicals used in the treated lumber products they purchased in 1987. Based on the responses of these 115 DIY'ers who provided answers to the chemicals used, CCA was

the most commonly stated chemical type (51%), followed by Pentachlorophenol (16%) and Creosote (7%).

North Central respondents used CCA the most (69%); Western DIY'ers the least (23%). Many respondents indicated purchases of more than one type of chemically treated lumber. That is, 11 percent of all responding DIY'ers indicated usage of both penta and creosote treated lumber products over the past three year period. CCA products were mentioned two-thirds of the time either alone or with other chemical products, penta was checked by 37 percent of respondents and creosote by 25 percent of respondents.

#### **Product and Service Attributes**

Twelve product attributes were rated by respondents on a 5-point Likert scale such that 1=not important at all, 2=slightly important, 3=moderately important, 4=very important and 5=extremely important. These attributes, displayed in Table 7, indicate that DIY'ers feel all product attributes are important (mean rating greater than 2.0); it is simply a matter of relative importance. Whereas species, color and brand name received the lowest average ratings at 2.77, 2.57 and 2.28 respectively, these product attributes are considered to be slightly to moderately important to the DIY'er. Overwhelmingly, the most important pressure treated lumber product attribute among DIY'ers was straightness. General appearance, price and grade were the next most important characteristics followed by surface cleanliness, chemical retention level, KDAT, moisture content and quality mark.

Comparison of the regional means for each product attribute through ANOVA shows that only two product attributes, general appearance and KDAT differ significantly at the  $p = .05$  level among DIY'ers in the four Bureau of Census regions (Table 7). The Western respondents felt that general appearance and KDAT were less important than the other three regions and North Central DIY'ers felt these two product attributes are more important compared to the other U.S. Bureau of Census regions. Brand names were significant at the .13 level of significance in the ANOVA with Western respondents the least impressed with brand named treated lumber products.

To determine which product attribute groups differed significantly at the  $p = .01$ , a T-Test<sup>3</sup> was employed. Analysis suggested, with 99% confidence, that straightness was the most important product attribute sought by the DIY'er; brand name was least important:

	Appearance,	Surface Cleanliness,	Quality Mark,	
Straightness >	Price,	> Chemical Retention,	> Species,	> Brand
	Grade	KDAT,	Color	Name
		Moisture Content		

The nine service attributes in Table 8 were rated on the same importance scale as the product attributes. All nine received mean ratings of greater than 2.0 indicative that they are all at least slightly important to DIY'ers.

Promotional materials, with a mean importance rating of 2.58, was perceived by DIY'ers nationwide as the least important among the nine service items. Knowledgeable salespeople and a good variety of

pressure treated products at the building materials dealer were the two highest rated service attributes followed by convenient location and store reputation.

Based on ANOVA, only store reputation differed among DIY'ers between the regions at  $p = .05$  (Table 8). Western respondents felt that the reputation of the dealer was less important than respondents in the other three regions of the U.S.

The mean attribute rating by DIY'ers for these nine service attributes indicate significant differences at the  $p = .01$  using a T-Test. Knowledgeable salespeople, product variety, convenient location, store reputation, price incentives, DIY plans and warranty were more important than delivery service and promotional materials.

### **Treated Lumber Opinions**

Seven opinion statements (Table 9) were provided to respondents in order to gain additional insight into treated lumber product and service attributes. A Likert 5-point agreement scale produced mean opinion ratings for each of the statements.

In general, DIY'ers are relatively neutral that brand named treated lumber is superior to generic treated lumber products and that brand named products are worth a price premium. This neutrality is not surprising since brand names were found to be the least important of 21 selected product and service attributes that DIY'ers look for in treated lumber products.

In terms of quality, DIY'ers are slightly less concerned with appearance versus grade and furthermore, they will pay more for higher appearance (quality) treated products and are generally satisfied with the quality/appearance of treated lumber products available locally.

DIY'ers are neutral regarding the general treated lumber knowledge of retail salespeople. This attribute rates highest in importance among DIY'ers and may merit further examination by retailers. The last opinion statement involves a relative value judgement comparing treated lumber products with naturally durable species such as cedar or redwood. DIY'ers weakly disagree that treated lumber is worth more money versus cedar or redwood.

ANOVA was employed to determine if DIY'ers differed significantly among Bureau of Census regions regarding these seven product and service attribute opinions. Three of the seven opinion statements differed significantly by region at the .05 level. These three statements concern satisfaction with quality/appearance, brand named products are superior and will pay more for brand names. Western DIY'ers are less agreeable that brand named treated lumber is generally of superior quality" and "will pay more for brand named treated lumber" versus DIY'ers from the other three regions. Southern DIY'ers are the most satisfied with the quality/appearance of local treated lumber; Western and North Central respondents are the least satisfied.

## **Branding Effectiveness**

Currently, branding seems only partially effective. However, an effective brand naming strategy may be a beneficial tool to implement in conjunction with segmentation tactics. This study indicates a general lack of brand awareness. Only one-third of PRO's and 21 percent of DIY'ers could recall (unaided) at least one brand of treated lumber.

In support of this contention, response frequencies were examined for two key brand name perception statements. Over 40 percent of PRO respondents checked "Neither Agree Nor Disagree" to "Brand named treated lumber is generally of superior quality" and "will pay more for brand named treated lumber." Moreover, 60 percent and 33 percent of DIY'ers checked the neutral response to these "superior quality" and "pay more" brand-related statements. Overall, the mean opinion scores confirm this neutrality for these two brand perceptions. Much room exists in the industry to improve brand awareness in order to differentiate a firm's product line.

## **SUMMARY**

This market research suggests opportunities for targeting promotional activities, product offerings and informational programs to better respond to the needs of the do-it-yourself'er that uses CCA treated lumber products. One area of special importance concerns treated lumber product applications and purchase intent. The most frequently mentioned DIY treated lumber application was for

landscaping uses with about 63 percent of all households. This implies a tremendous opportunity in treated product applications suitable for a less skilled DIY'er including decks, outdoor structures and outdoor furniture. Specialty products should have enormous growth potential since over one-third of respondents indicated they planned to purchase lattice panels in 1988 followed by deck kits (24%) and residential fencing (21%). DIY deck and outdoor project plans available at the retailer or in other promotional vehicles and the development and availability of practical specialty products could be a catalyst for treated lumber sales.

An examination of the relative decision-making roles of husband and wife for treated lumber projects shows that the husband is the key figure in this process. The wife's decision-making influence is strongest in the early stages of the project, such as suggesting the project, specifying size/style and deciding how much to spend. These findings suggest that most promotional strategies should address both male and female DIY'ers.

A mere 37 percent of DIY'ers could identify the chemicals used in the treating process from a choice of CCA, Penta and Creosote preservative chemicals. However, only 64 percent of respondents indicated that CCA was the preservative chemical used in the treated lumber they used/purchased. Accordingly, it may be surmised that fewer DIY'ers would be aware of the chemicals used in an unaided recall question!

Only 21 percent of DIY'ers can recall at least one brand of treated lumber. This poor brand awareness suggests opportunities that exist for increased efforts in this area. Branding may assist manufacturers through an improved bargaining position with retailers and distributors due to increased market acceptance, higher quality and higher profits (Lazer and Culley 1983). The costs of brand promotion may be offset by higher prices, and/or faster turnover and reduction of future promotional expenses if and when routine or repeat purchases result (McCarthy and Perreault 1987).

Product and service attributes were examined to determine the benefits sought by DIY customers. DIY'ers are particularly concerned about straight, good-looking and properly graded material at the best price. Moreover, these retail customers insist on knowledgeable salespeople and demand that this material can be purchased in a single retail outlet with a convenient location that provides a full line of treated lumber products.

The current structural grades for treated lumber products may not adequately address the customer's appearance demands. Often, a product of proper grade for the structural application is simply unacceptable as a material for visual applications such as outdoor uses. These findings pose three potential opportunities:

- (1) Efforts to change the current grades to better reflect appearance needs could benefit the entire industry through increased demand and improved satisfaction by customers of treated lumber products.

- (2) The large within grade appearance variability may provide an incentive for establishing brand named treated lumber products of consistently good appearance. Promotion of this brand, backed consistent quality could provide a preferred product that customers would willingly pay a premium for.
- (3) A retailer with a knowledgeable sales force regarding treated lumber products and applications may provide a competitive advantage through increased sales to the DIY customer.

## Notes

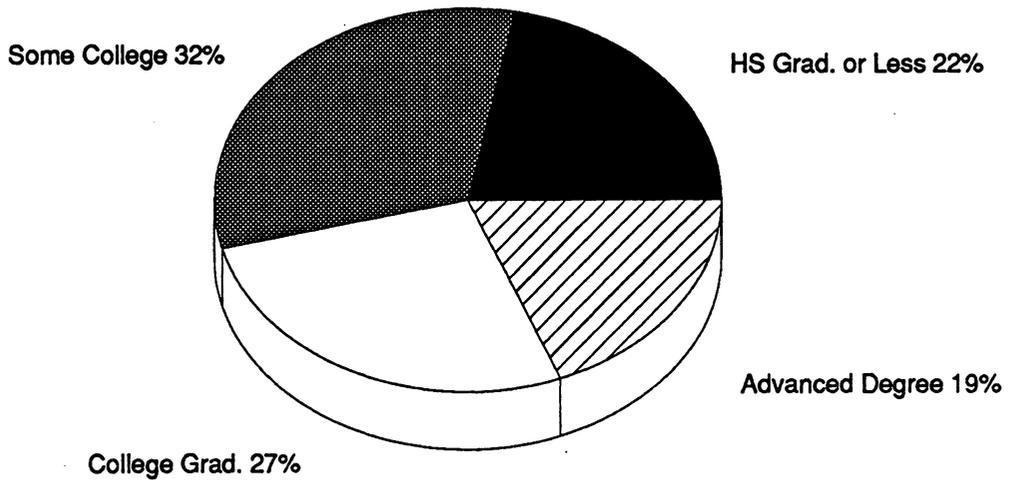
1. The chi-square statistical procedure is used to test the significance of the differences observed between the two sets of categorical variables. Assumptions include: (1) samples are random and independent and (2) observations are categorical and mutually exclusive.
2. The analysis of variance or ANOVA statistical procedure is a method for comparing the means of > 2 populations. In other words, ANOVA analyzes one independent measure with two or more levels. Assumptions include: (1) samples are random and independent, (2) the dependent variables are interval or higher and (3) sampled populations have the same shapes, means and variances.
3. The T-Test for two independent samples is a special case of ANOVA when comparing the means of two populations. In this study, each attribute mean was compared with the next lowest attribute mean to determine if the mean scores are significantly different at the  $p = .01$  level. Assumptions include: (1) the two samples are independent and (2) sampled populations have the same variances.

## REFERENCES

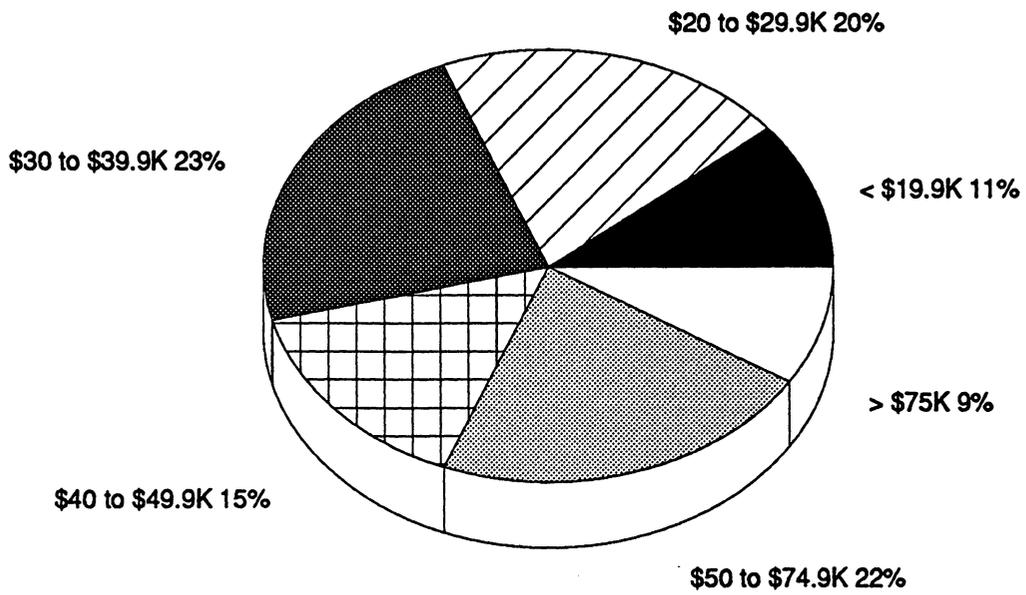
1. Boyd, Jr., H. W., R. Westfall, and S. F. Stasch. 1981. Marketing Research Texts and Cases. Richard D. Irwin, Inc., Homewood, IL.
2. Brown, S.R. 1985. Changing Demographics Alters Strategy. (In Professional Builder, May):86.
3. Donald, M.N. 1960. Implications of Non-Response for the Interpretation of Mail Questionnaire Data. Public Opinion Quarterly 24(Spring):99-114.
4. Eliades, G.K. 1988. Pressure Treating Numbers Still Bullish. (In Merchant Magazine, April):15.
5. Francese, P.K. 1986. Selling the Baby Boomers. Lawn & Garden Mktg. (January):8-9.
6. Fowler, F.J., Jr. 1984. Survey Research Methods. Sage Publications, Inc., Beverly Hills, CA.
7. Franta, H. and M.L. Johnson. 1986. Home Center Magazine's 1986 Market Profile. Home Center Mag. (September):19-33.
8. Franta, H. and M.L. Johnson. 1988. Remodeling: Just Who is Selling the Remodeler. Home Center Mag. (January):48-53.
9. Fuller, B. and M. R. Walsh. 1983. Treated Wood Study. The Markets for Treated Lumber, Timbers and Plywood: Recent Developments and Prospects for the Future. Data Resources Inc. (changed to: Resource Information Systems, Inc.), Bedford, MA.
10. Green, F. L. and B. T. Farnsworth. 1983. The DIY Consumer Outlook. A Psychographic Segmentation. DIY Research Institute, Indianapolis, IN.

11. Guenther, R. 1986. Remodelers Post Record Year as Rates Sink and Sales Rise. Wall Street Journal (August 13):25.
12. Hand, L. 1988. It's Outdoor Deck-Building Season Again. (In Woodshop News, May):16-17.
13. Hochstim, J.R. 1967. A Critical Comparison of Three Strategies of Collecting Data From Households. Journal of the Statistical Assn. 62 (September 1967):976-989.
14. Home Center Research Bureau. 1984. Home Improvement Consumers: A Comprehensive Analysis. Home Center Magazine, Lincolnshire, IL.
15. Kanuk, L. and C. Berenson. 1975. Mail Surveys and Response Rates: A Critical Review. Journal of Marketing Research, Vol. XII (November):440-453.
17. Kitzke, P.S. 1985. Who Are These People, and Why Should You Care? Bldg. Supply and Home Ctrs. (August):150-152.
18. Lazer, W. and J. D. Culley. 1983. Marketing Management: Foundations and Practices. Houghten-Mifflin Co., Boston, MA.
19. McCarthy, J.E. and W.D. Perreault, Jr. 1987. Basic Marketing: A Managerial Approach. Richard D. Irwin, Homewood, IL.
20. Micklewright, J.T. 1988. Wood Preservation Statistics, 1986: A Report To The Wood-Preserving Industry In The United States. (January).
21. Naisbitt, J. 1984. Megatrends: Ten New Directions Transforming Our Lives. Warner Books, Inc., New York, NY

22. NARI (National Assn. of the Remodeling Industry). 1986.  
Professional Remodeling: A Profile of a \$58 Billion Industry.  
Arlington, VA.
23. Payless Cashways, Inc. 1986. 1985 Annual Report. Kansas City,  
MO.
24. Resource Information Systems, Inc. (RISI). 1987. Treated Lumber  
A Treat For Southern Pine. (In Crow's Newsletter, Jan. 2):2.
25. Rich, S.U. 1970. Marketing of Forest Products. McGraw-Hill,  
Inc., New York, NY.
26. Ryan, S. 1988. Retailers Profit From New Treating Trends. (In  
Merchant Magazine, April):13.
27. Walsh, M.R. 1985. Treated Lumber: Bright Spot in Wood Economy.  
Forest Indust., (November):36-38.
28. Wright, G. and S. Melnick. 1985. Trends Impacting the CII  
Market. (In Building Design and Construction, February):48-49.



**Figure 1. Education of Respondents (85% Male)**



**Figure 2. Total Household Income**

**Table 1. DIY Sampling Plan and Response Rates  
by U.S. Bureau of Census Region**

Region	--Households sampled--		--Responses--		
	(percent)	(number)	(number)	(% of total)	(response rates)
West	15.9%	513	78	16%	15%
South	35.6%	1,148	159	32%	14%
North Central	28.6%	922	152	31%	16%
Northeast	19.9%	641	101	21%	16%
Unidentified <sup>1</sup>			1	0%	
<hr/>					
Totals =	100.00%	3,224	491	100%	17% <sup>3</sup>
Less Undeliverables:		<358> <sup>2</sup>			

Total Sampled: 2,866

<sup>1</sup> One respondent did not indicate which state he/she lived and therefore could not be categorized by state or region.

<sup>2</sup> 358 questionnaires were returned as undeliverable.

<sup>3</sup> Total response rates are calculated as:  $\frac{\# \text{ responses}}{\# \text{ mailed - undeliverables}} = \frac{491}{2,866} = 17.1\%$

# mailed - undeliverables 2,866

Table 2. Basic DIY Respondent Information by Region.

	West (78) <sup>1</sup>	South (159)	NC (152)	NE (101)	All Regions (490)
Gender (% male)	91%	83%	87%	84%	85%
Are you a DIY'er?	87%	86%	87%	85%	86%
--Males--	90%	90%	89%	92%	90%
--Females--	57%	67%	70%	63%	66%
Have you ever hired a PRO for treated lumber applications	26%	31%	21%	25%	26%
Average hours per month of DIY activity	16	15	16	22	17

<sup>1</sup> Number of responses per category are in parentheses.

**Table 3. Percent of DIY'ers Who Used Treated Lumber Products for the Following Applications in Their Current Residences.**

Applications in 1987	West (35) <sup>1</sup>	South (108)	NC (95)	NE (72)	All Regions (310)	Significant
						Difference Between Regions <sup>2</sup>
Landscaping	57%	61%	64%	65%	63%	No
Decks	31	47	44	61	48	Yes
Outdoor Structures	37	44	41	31	39	No
Other Outdoor	29	34	36	26	32	No
Outdoor Furniture	29	22	35	24	27	No
Wall/Roof/Floor Framing	40	34	22	11	26	Yes
Home Exteriors	17	27	16	13	19	Yes
Permanent Wood Foundations	17	12	04	03	08	Yes
Other	03	06	08	06	06	No

<sup>1</sup> Number of responses per category are in parentheses.

<sup>2</sup> Statistically significant at the .05 level using ANOVA.

**Table 4. Percent of DIY'ers Who Plan to Purchase the Following Treated Lumber Specialty Products in 1988.**

Specialty Products for 1988	West (35) <sup>1</sup>	South (107)	NC (95)	NE (73)	All Regions (310)	Significant
						Difference Between Regions <sup>2</sup>
Lattice Panels	17%	34%	36%	41%	34%	Yes
Deck Kits	14	21	29	27	24	No
Residential Fencing	34	18	22	19	21	Yes
Fancy Deck Posts/Rails	11	15	19	29	19	Yes
Fancy Outdoor Stair Kits	17	13	16	22	16	No
Radius-edged Decking	09	14	14	22	15	No
"Weathered" Treated Prod's.	11	12	13	11	12	No
Permanent Wood Foundations	06	09	06	14	09	No
Agricultural Fencing	17	07	04	04	07	Yes
Color Tints	03	04	03	03	03	No

<sup>1</sup> Number of responses per category are in parentheses.

<sup>2</sup> Statistically significant at the .05 level using ANOVA.

**Table 5. Married DIY'er Comparison of Husband/Wife Involvement in Pressure Treated Lumber Buying Decisions By Region.**

Who Usually:	West (34) <sup>1</sup>	South (91)	NC (83)	NE (63)	All Regions (271)	Significant
						Difference Between Regions <sup>2</sup>
-----Mean Ratings <sup>3</sup> -----						
First Suggests Project	1.85	1.81	1.84	1.94	1.86	No
Specifies Size/Style	1.61	1.75	1.76	1.78	1.74	No
Decides How Much To Spend	1.48	1.67	1.69	1.78	1.68	Yes
Determines When To Do	1.33	1.48	1.31	1.59	1.44	Yes
Obtains Product Informat'n	1.18	1.35	1.37	1.48	1.37	Yes
Decides on Specific Store	1.15	1.35	1.35	1.32	1.32	No
Decides on Materials	1.18	1.23	1.24	1.21	1.22	No
Purchases Materials	1.00	1.29	1.19	1.21	1.20	Yes
Actually Builds Project	1.06	1.26	1.12	1.22	1.19	Yes

<sup>1</sup> Number of responses per category are in parentheses.

<sup>2</sup> Statistically significant at the .05 level using ANOVA.

<sup>3</sup> Respondents were asked to rate each category on a 3-point scale from 1=Male Dominated Decision to 2=Joint Decision to 3=Female Dominated.

**Table 6. DIY Respondent Knowledge of the Chemicals Used  
in Treated Lumber by Region.**

Chemicals	West (35) <sup>1</sup>	South (107)	NC (95)	NE (72)	All Regions (309)
% of Respondents indicating chemicals used	37% (13)	38% (41)	37% (35)	36% (26)	37% (115)

**Percent of Total Responses<sup>2</sup>  
(of the 115 or 37% who answered this question)**

CCA	23%	47%	69%	50%	51%
Penta	23	17	14	12	16
Penta and Creosote	15	12	13	04	11
CCA and Penta	15	12	00	08	08
Creosote	08	07	00	14	07
CCA and Creosote	08	05	03	08	05
CCA/Penta/Creosote	08	00	00	04	02
Totals =	100%	100%	100%	100%	100%

<sup>1</sup> Number of responses per category are in parentheses.

<sup>2</sup> If respondent checked more than one type of chemical, the response was recorded as a combination of two (or all three) preservative chemicals. Thus, the combined categories.

**Table 7. DIY Ratings of Selected Product Attributes by Region.**

Product Attributes <sup>1</sup>	West	South	NC	NE	All	Significant Difference Between Regions <sup>3</sup>
	(33) <sup>2</sup>	(104)	(96)	(39)	Regions (302)	
	-----Mean Ratings <sup>4</sup> -----					
Straightness	4.33	4.49	4.52	4.45	4.47	No
General Appearance	3.64	3.77	4.00	3.86	3.85	Yes
Price	3.70	3.90	3.93	3.65	3.83	No
Grade	3.85	3.73	3.93	3.81	3.82	No
Surface Cleanliness	3.33	3.34	3.60	3.55	3.47	No
Chemical Retention Levels	3.33	3.37	3.53	3.51	3.45	No
KDAT	3.03	3.13	3.51	3.41	3.30	Yes
Moisture Content	2.88	3.22	3.40	3.20	3.24	No
Quality Mark	2.73	2.96	3.01	3.12	2.99	No
Species	2.61	2.73	2.78	2.88	2.77	No
Color	2.36	2.63	2.59	2.54	2.57	No
Brand Name	1.91	2.32	2.32	2.33	2.28	No

<sup>1</sup> Product attribute groups separated by blank rows differed significantly at the p= .01 level according to a T-Test. Based on all regions ratings.  
<sup>2</sup> Number of responses per category are in parentheses.  
<sup>3</sup> Statistically significant at the .05 level using ANOVA.  
<sup>4</sup> Attributes were rated on a 5-point Likert scale from 1 (Not Important At All) to 5 (Extremely important).

**Table 8. DIY Ratings of Selected Service Attributes by Region.**

Service Attributes <sup>1</sup>	West (33) <sup>2</sup>	South (104)	NC (96)	NE (39)	All Regions (302)	Significant
						Difference Between Regions <sup>3</sup>
-----Mean Ratings <sup>4</sup> -----						
Knowledgeable Salespeople	3.27	3.60	3.66	3.43	3.54	No
Treated Product Variety	3.33	3.44	3.63	3.59	3.52	No
Convenient Location	3.30	3.55	3.31	3.52	3.44	No
Store Reputation	2.85	3.53	3.42	3.32	3.37	Yes
Price Incentives	2.97	3.21	3.23	3.10	3.17	No
DIY Plans	2.91	3.07	3.22	3.00	3.08	No
Warranty	2.70	3.09	3.06	3.07	3.03	No
Delivery Service	2.52	2.73	2.80	2.84	2.76	No
Promotional Materials	2.36	2.63	2.59	2.58	2.58	No

<sup>1</sup> Product attribute groups separated by blank rows differed significantly at the p= .01 level according to a T-Test. Based on all regions ratings.  
<sup>2</sup> Number of responses per category are in parentheses.  
<sup>3</sup> Statistically significant at the .05 level using ANOVA.  
<sup>4</sup> Attributes were rated on a 5-point Likert scale from 1 (Not Important At All) to 5 (Extremely important).

**Table 9. DIY Opinions Regarding Treated Lumber by Region.**

Opinion Statements	West (74) <sup>1</sup>	South (151)	NC (144)	NE (95)	All Regions (464)	Significant Difference Between Regions <sup>2</sup>
-----Mean Ratings <sup>3</sup> -----						
Will pay more for higher quality/appearance treated lumber	3.53	3.55	3.61	3.68	3.60	No
Am satisfied with quality/appearance of treated lumber	3.43	3.64	3.41	3.53	3.51	Yes
Brand named treated lumber is generally of superior quality	2.93	3.15	3.17	3.21	3.14	Yes
Retail salespeople are knowledgeable about treated lumber	3.03	2.93	3.01	3.03	2.99	No
Will pay more for brand named treated lumber	2.73	2.85	3.03	3.02	2.92	Yes
More concerned with appearance vs. grade/species of treated lumber	2.81	2.74	2.89	2.78	2.80	No
Will pay more for treated lumber vs. cedar/redwood	2.77	2.67	2.69	2.69	2.73	No

<sup>1</sup> Number of responses per category are in parentheses.

<sup>2</sup> Statistically significant at the .05 level using ANOVA.

<sup>3</sup> Attributes were rated on a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

**Product Quality As A Competitive  
Advantage For the Forest Products Industry**

(A manuscript prepared for submission to  
Wood and Fiber Science)

*"Commodity is a dirty word... and outstanding quality is the  
sustaining advantage."*

*--Peters and Waterman, In Search of Excellence*

**Product Quality As A Competitive  
Advantage For the Forest Products Industry**

**ABSTRACT**

Product quality is currently an important competitive issue facing North American firms. This paper examines the predictive efficacy of using a reduced set of product and service attributes (benefits) to characterize perceived product quality market segments. A set of twenty benefits were factor analyzed to eliminate redundant variables and provide a condensed set of eleven underlying benefits sought by Professional Building Contractor and Remodeler retail customers of CCA pressure treated lumber products. These eleven benefits were then presented as surrogate predictor variables in a subsequent canonical correlation analysis employed to define simultaneously four distinct market segments based on quality perceptions. This user-based or customer identification of subjective quality segments provides the first step in delineating a defensible quality niche to gain competitive advantage.

## INTRODUCTION

### Quality Perceptions

The concept of quality as a competitive weapon has been examined in terms of profitability, productivity, costs, prices and market share (Garvin 1984a; Shetty 1987; Peters and Waterman 1982; Jacobson and Aaker 1987). Quality perceptions have received less attention than warranted in the literature. No well developed theory exists to explain how consumers judge the perceived quality of a product (Purwar 1984). For the average consumer, objective quality is a difficult concept; perceived quality is typically substituted (Olson 1972). Perceived quality involves the subjective feeling, impression or judgement of the relative quality of the product (Olson 1972). It is this buyer's perception of quality that must be addressed (Kotler 1980).

Quality has become a major issue and important factor for wood products producers and retailers. Buyers generally have limited objective knowledge of product quality and tend to substitute aesthetics as a measure of perceived quality. With CCA treated wood products, knowledge is even more limited and perceived quality is even more critical because the products are often on display in homeowner's backyards and may serve as a measure of status. Retailers generally feel that customers are willing to pay for quality wood, and will penalize stores that don't provide it (Kelleher 1986). Kelleher has hypothesized that appearance is a major factor that equates to quality in consumer's purchase decisions.

Standard softwood lumber grades have served for decades as the traditional objective measure of quality for structural lumber. These grades incorporate straightness criteria and, in general, a base line appearance through restrictions on knot size, discoloration, checks, shakes, splits, slope of grain and wane. When lumber is on display, such as decks, many builders purchase the more expensive No. 1 grade simply to obtain a better looking product even though a No. 2 grade may meet building code requirements (Kelleher 1986; Walsh 1985).

Three different approaches may be employed when defining quality (Garvin 1984b). The traditional path in the forest products industry involves a manufacturing perspective and focuses on the supply side. These manufacturing-based definitions rely on "conformance to specifications" (Crosby 1979) and emphasize engineering and quality control to achieve cost reduction.

The second, and perhaps less utilized means of defining quality in the forest products sector, is the customer or user-based orientation. This highly subjective marketing orientation views quality in terms of consumer preferences -- determinants of demand -- where those goods that best satisfy the wants and needs of individual consumers are those they regard as having the highest quality (Garvin 1984b; Kuehn and Day 1962). In other words, this user-based approach implies a "fitness for use" (Juran 1979) and "a means through which the product and service in use will meet the expectations of the customer" (Whiting and Walsh 1986) where the expert is the customer and quality relates to the specific end use of the product in

question.

The third approach considers value in terms of costs and prices. According to Broh (1982), quality products provide conformance at an acceptable cost and/or performance at an acceptable price. This view relates the two previous quality approaches and provides the foundation of the quality perception measurement statements used in this study.

### **Conceptual Background**

The problem now becomes how to measure the factors that the customers perceive to constitute quality and once measured how to use this knowledge to improve the competitiveness of wood products. In order to best address this issue, a single product line, CCA treated lumber products, was chosen to serve as an example. It can be argued that the benefits (product and service attributes) customers seek when purchasing treated lumber products, in essence, define their perception of quality. These benefits are the basic rationale for the existence of market quality segments. This causal approach to marketing has been shown to determine purchase behavior much more accurately than do demographics or volume consumption (Haley 1968). Haley's scheme has been validated empirically by other studies (Bahn and Gandhi 1987; Granzin and Painter 1979).

The basis for this study holds that the construct of benefits reflects the influence of product quality perceptions. Figure 1 illustrates the conceptual linkage between twenty benefits,

represented by eleven selected surrogate variables, and five quality perception items. Thus, the hypothesized relationship under investigation involves the use of benefits to portray market segments based on customers' product quality perceptions.

Additionally, there exists a fundamental need to determine the predictive usefulness of selected benefit measures in defining perceived quality for wood products. From a marketing viewpoint, this subjective or perceptual measurement and identification of quality is a prerequisite to the operational focus of improving quality through engineering and manufacturing processes. Both perspectives need to coexist and must be addressed in a successful quality strategy.

## METHODOLOGY

### Sample Frame

Professional building contractors are the largest users of CCA treated lumber products and therefore are our population of interest (Walsh 1985). According to current (1986) sample frames compiled from all phone book yellow page directories in the U.S., the following contractor populations have been identified (Best 1986; Zeller 1986; American Business Lists 1986):

One-Family Unit Builders	50,614
Home Improvement Builders	45,496
Patio/Deck Builders	2,624

These three categories were merged with duplicate listings deleted, thus providing a single, mutually exclusive population of 75,734 elements defined as "New One-Family Home Improvement and Patio/Deck Contractors."

Some sampling bias may have been introduced due to the exclusion of builders who do not advertise in telephone book yellow pages, typically the very large builders. However, since the very large builders generally do not buy at retail outlets and this study, by design, examined the retail customer, potential bias was not deemed a problem.

#### **Data Collection**

A mail survey was administered, following a thorough pretest, in March, 1987 to 3,361 randomly selected builders<sup>1</sup> located in all 50 states on an Nth name basis. In other words, every 22nd builder nationwide was included in the study. A random number generator from 1 to 22 provided the first builder. Thus, the chance for selection of each element was known and equal (Mendenhall et al. 1986). A follow-up was sent ten days after the initial mailing and 543 usable questionnaires were returned, resulting in an 18% response rate after

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<sup>1</sup> A total sample size of 3,000 was calculated to be sufficiently large, given a response rate of about 15% or at least 400 useable responses, to allow a 95% confidence interval with an absolute error of 5% or less in overall survey results (Mendenhall et al. 1986). The extra 361 questionnaires were mailed in anticipation of a 10% to 12% undeliverable rate.

adjusting for 398 undeliverables (Dillman 1978). Previous studies by Boyd et al. (1981), Donald (1960) and Hochstim (1970) estimate response rates of 15% to 35% from random mail surveys in the U.S. Figure 2 illustrates the sampling scheme and responses by geographic region.

Potential non-response bias was studied by comparing two dependent relationships: (1) time-dependent trends comparing those who responded immediately with those who responded after follow-up steps were taken, and (2) post hoc follow-up telephone interviews with non-respondents (Fowler 1984). A non-parametric technique, the Chi-square test, was employed to test these two dependent relationships on each of nine key demographic variables. The tests indicated that no significant (at the  $p=.05$  level) differences existed between early and late respondents or between respondents and nonrespondents, thus allowing concerns over non-response bias to be set aside.

### **Profile of Respondents**

Over two-thirds of the 543 respondents were involved in repair and remodeling (R&R) followed by one-family builders (34%) and patio/deck builders (25%). These builder type categories are not mutually exclusive as many builders work in more than one category in a given year; therefore, percentages do not add to 100%. Clearly, the smaller builders were represented within our sample frame since 71%

had sales of less than \$500,000. The median value of treated lumber purchases in 1986 for this group was \$5,000 and the mean was \$16,569. Respondents averaged 18 years of building experience and 67% had some college education (28% were college graduates).

### **Measurement of Perceived Product Quality**

The quality perception construct was measured by asking respondents to indicate their level of agreement with each of five statements concerning the quality of treated lumber. These five assertions, as stated on the questionnaire, are provided in Table 1. A five-point scale anchored by "Strongly Disagree" and "Strongly Agree" was used to measure these product quality perceptions.

The five statements were developed from three main concepts which can be used to measure quality perceptions of treated lumber products.

- (1) Brand Names: Very little work has been conducted concerning the branding of primary wood products (Kelleher 1985; Advertising and Sales Promotion 1965; Sinclair and Seward 1988). Many major players in the wood treating industry feel strongly that treated lumber does have brand appeal (Kelleher 1986); however, the effectiveness remains undocumented.
- (2) Appearance: The primary uses of treated lumber are in decks, patios, fences and other outdoor applications where purchases are based on permanence, appearance and finally cost (Lindberg 1986). How a product looks is highly subjective and strongly relates to the user-based approach to quality (Garvin 1984b).
- (3) KDAT: Traditionally, dry wood is viewed as more dimensionally stable and of higher quality. Current wood treating technology leaves the lumber wet. Kiln Dried After Treatment is performed by about 40% of all treaters in the U.S. and is used on approximately 20% of the industries' volume (Fuller and Walsh 1983). Present controversy surrounds this service.

Each of these three quality perception concepts incorporates a value-based approach to product quality perceptions where quality is viewed relative to "worth" (Garvin 1984b). If builders are willing to pay a premium for a product attribute, we can assume that attribute infers higher perceived quality. Studies have shown that the amount of information available to consumers may affect the correlation of this price/quality relationship (Riesz 1979).

### **Measurement Of Benefits**

Benefits were quantified by using a 5-point scale with choices ranging from "Very Unimportant" to "Very Important." Mean importance scores for these twenty benefits are provided in Figure 3.

Straightness stood alone as the single most important benefit, whereas brand names, color and promotional materials represented the least important attributes to the responding builders.

Garvin (1984a) refers to eight dimensions (benefits) of product quality, inclusive of perceived quality. He states that a reduced set of these benefits should be chosen on which a firm wishes to compete in a specific niche. Lumber and building materials retailers may enhance or detract from a treated lumber quality image through surrogate or indirect indicators of quality (Garvin 1984a; Engel et al. 1968). These product and service benefits served as potential predictors of CCA treated lumber product quality perceptions primarily because they are more easily perceived and interpreted than objective quality (Olson 1972). Whereas Garvin's (1984a) framework utilizes

benefits to define product quality, this study examines the relationship between the customers' required benefits and their product quality perceptions.

#### DATA ANALYSIS

The set of twenty product and service benefits used in this study justifies an attempt at data reduction. Factor analysis was used to eliminate redundant benefits for improved reliability and validity (Alpert 1972). This resulted in a reduction from twenty benefits to eleven underlying factors (Hair et al. 1987). For each of the eleven factors identified, the benefit achieving the highest loading was selected as a surrogate for that factor (Table 2).

Given the necessity of examining the extent and character of the relationship between two sets of continuous variables (quality perceptions and benefit surrogates), canonical correlation was selected as the method for analysis (Wind 1978; Schnaars and Schiffman 1984).

Canonical correlation extracts as many roots as the number of variables in the smaller set. Each of these significant roots provides a weighted, linear combination of the variables in the criterion set (quality perceptions) and a similar combination of the variables in the predictor set (benefits) (Hair et al. 1987). The pair of such linear combinations for each significant root can be explained in terms of the relationship between the collective pattern of product quality perceptions (criterion set) of builders in a

distinct market segment and the pattern of treated lumber benefits (predictor set) they feel are important.

The first root provides the highest intercorrelation possible between the two canonical variates; successive roots are derived from subsequent orthogonal rotations. This implies that the market segments defined by each root provide distinct choices for managers in search of target market niches. These segments can be viewed as a simultaneous relationship between patterns of the predictor and criterion constructs.

Loadings and interpretation of these patterns are directly analogous to the loadings used in factor analysis to interpret the canonical variates extracted by the factoring procedure. Only those variables with loadings of an absolute value of at least .30 will be considered (Hair et al. 1987). Magnitude and sign of loading for a given variable indicate the nature of the individual contribution of that individual variable.

## RESULTS

A VARIMAX factor analysis produced eleven independent factors (benefit surrogates). Each of which were interpreted as a basic benefit sought by purchasers of treated lumber products (Sheth 1977). These eleven factors represented 78% of the variance in the 20 benefit items (Table 2). Communality indices (summed square factor loadings) reflect the amount of variance in a particular variable that is accounted for by factor solution (Hair et al. 1987). Most

communalities are in the .70 to .80 range, thus a good factor structure.

Table 3 presents the findings of the canonical correlation analysis with four of five possible roots significant at the .05 level. These roots, A through D, characterize four distinct market segments. Each segment is described by a given root through examination of the patterns of loadings on the pairs of canonical variates for both product quality perceptions and benefits.

Root A characterizes a segment of builders who desire both brand named treated lumber and Kiln Dried After Treatment (KDAT) service and are willing to pay more for these two benefits. Furthermore, appearance is not more important than grade or species to these customers. Quality marks are the most important benefit these builders seek, whereas general appearance is unimportant.

Root B presents a customer segment who will pay a premium for both quality/appearance and KDAT treated products. The positive benefit loadings (Table 3) indicate the importance of general appearance, moisture content and dealer variety whereas price and price incentives are considered of low importance.

Root C builders shop for appearance over grade and/or species and will pay a premium for brand names but do not perceive KDAT service to be of value. These builders seek convenience in the form of a good variety of treated lumber at the dealer and look for price incentives such as free charge accounts and quantity discounts. As expected, the product benefits of grade and moisture content are not important to

this customer segment.

The fourth segment delineated in this analysis, Root D, is characterized by builders who feel strongly that brand named treated lumber is superior yet will not pay more for these better offerings! This segment shops for price, general appearance and quality marks in that order. Moreover, this price-sensitive builder does not care about delivery service.

Figure 4 provides a graphical view of the value perceptions of four builder segments in terms of the three major concepts employed to measure treated lumber quality perceptions. That is, the willingness of the builder to pay a premium for kiln dried after treatment (KDAT) service, brand names and appearance. In general, segment A, the most technical builder, is quite willing to pay for both brands and KDAT service, yet unwilling to pay for appearance, whereas segment B members are slightly adverse to paying more for branded products, but will pay more for both KDAT service and attractive appearance. Segment C is a brand name shopper who will not pay more for either appearance or KDAT service. The last segment delineated, Root D, is the most price-sensitive customer who feels only a slight inclination to pay more for better looking treated lumber products.

Figure 5 illustrates quality perceptions as represented by the three conceptual approaches employed herein to define quality; user, manufacturing and value based. Segment A builders, once again, are shown to be the most interested in the technical aspects of quality and the least concerned with appearance. Root B members look for

appearance at the exclusion of price and quality marks. The third builder segment, Root C does not have particularly strong feelings regarding any of the three attributes whereas Root D builders load heavily on all three benefits, indicating a discerning segment who desires an attractive, quality marked product at the lowest price.

To summarize, the four significant perceived product quality segments identified were:

- Root A: Technical Brand Name/KDAT Builders: a segment who looks for technical markings such as quality marks, brand names, grades and KDAT service; both brand names and KDAT service will command a price premium with this customer. Appearance is unimportant.
- Root B: Price-Insensitive Kiln Dried/Appearance Builders: a quality oriented segment that perceives KDAT service, general appearance and moisture content as representative of a quality treated product. They will pay a premium for quality/appearance and KDAT service and seek a good variety of treated lumber products at a single dealer for convenience.
- Root C: Non-Technical Appearance/Brand Name Builders: a customer group who will pay a premium for brand names, looks for appearance and is unconcerned about grades and moisture content. This builder also looks for a good dealer variety and will utilize price incentives.
- Root D: Price-Sensitive Brand Name/Appearance Builders: a segment who perceives branded treated lumber products as superior but will not pay a premium for them, shops for price, appearance and quality marks and is unconcerned about delivery service.

## DISCUSSION

Through the development of quality perception segments, as they relate to benefit patterns, builders can be evaluated in terms of target marketing mix strategies. Both new and old products can be tailored to specific builder segments seeking a specific benefit pattern (Haley 1968).

### Managerial Implications

A firm may choose to pursue market niches based on perceived quality segments as a strategy to gain competitive advantage. This niching may be implemented by companies who use higher product quality to command price premiums (Jacobson and Aaker 1987). For example, practitioners may find it profitable to pursue price-insensitive builders through high priced, high quality product lines that emphasize appearance and KDAT service. Another market segment, the "technical brand name/KDAT builders," could be served concurrently with a single, best quality product line featuring an attractive, properly graded, brand named product with KDAT service; this premium product should appeal to both segments. A second major product line could target both the price-sensitive and the non-technical builders through lower priced, brand named treated lumber of high appearance but without KDAT service. Price incentives such as free charge accounts and quantity discounts may provide increased sales to this builder group.

## **Branding Effectiveness**

Currently, branding seems only partially effective. However, an effective brand naming strategy may be a beneficial tool to implement in conjunction with quality segmentation tactics. Some branding benefits (awareness, comprehension and preference) seem to be present in the fourth builder quality market delineated (Root D) who feels that brand named treated lumber products are superior to generics (Sinclair and Seward 1988). However, this study underscored the controversy regarding the willingness of builders to pay a premium for branded products as three segments loaded significantly on "Pay For Brands" (two positive; one negative). This finding suggests that price premiums, another aspect of a successful branding strategy, are viable in only two builder segments (Sinclair and Seward 1988).

## **CONCLUSIONS**

Our markets are becoming increasingly segmented in terms of consumer's wants over needs and the growth in premium products that enable higher margins (Quelch 1987). An increased understanding of intrinsic quality perceptions and the required benefits sought by customers of wood products can assist in identifying these segments. This study suggests that perceived quality, based on functional and aesthetic characteristics relative to price, represents the basic motivation behind wood product purchases where value drives the decision making process.

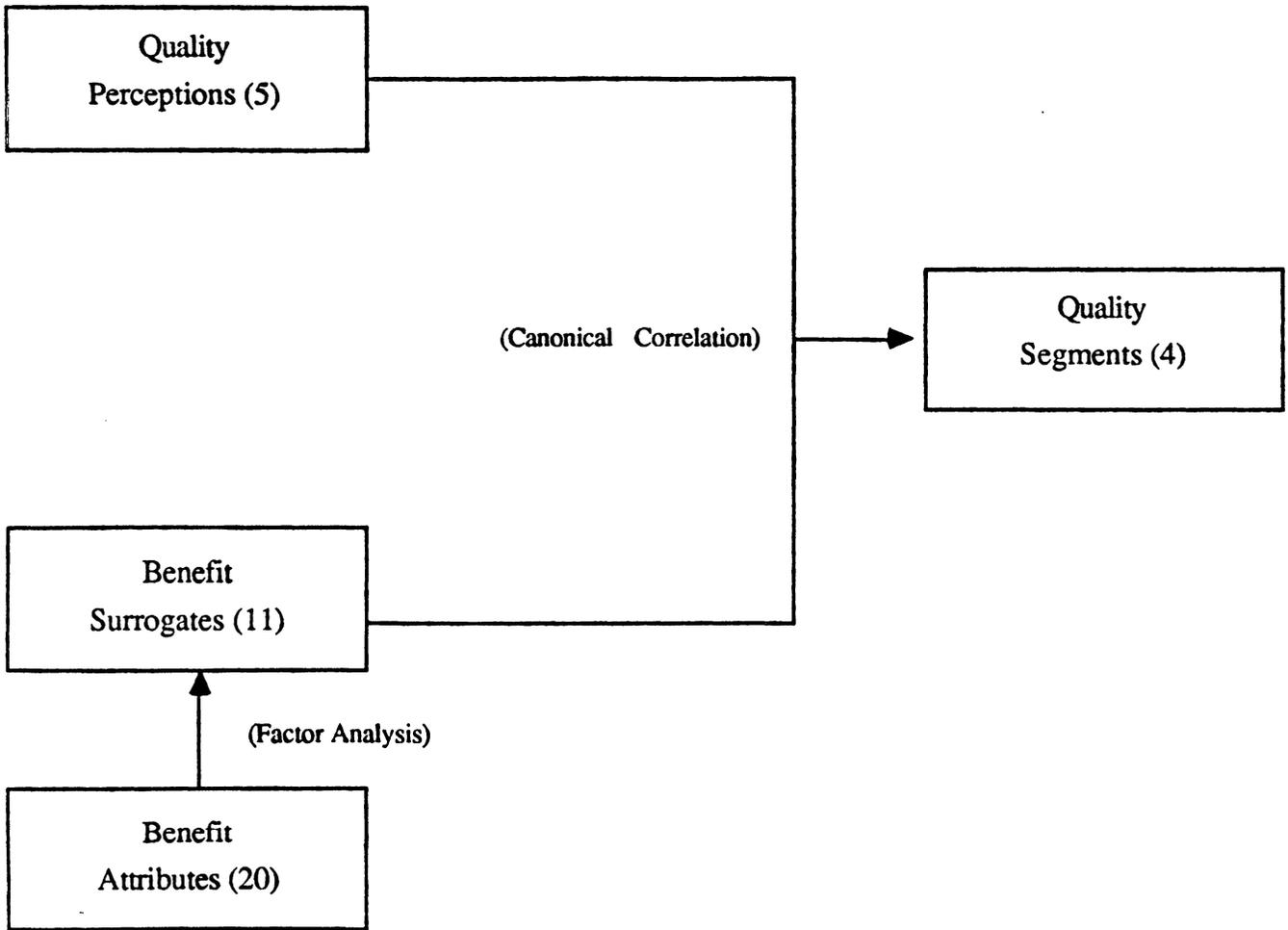
Benefits have been shown to be a useful construct for characterizing builder retail customer segments for wood products in terms of perceived quality. On this foundation, it is recommended that both the wood products manufacturing and retail industries may profit from considering their builder customers in terms of product quality perception segments who have distinct benefit requirements. By examining these segments individually and tailoring specific market offerings to better meet their needs, the competitiveness of the wood products industry can be enhanced.

## REFERENCES

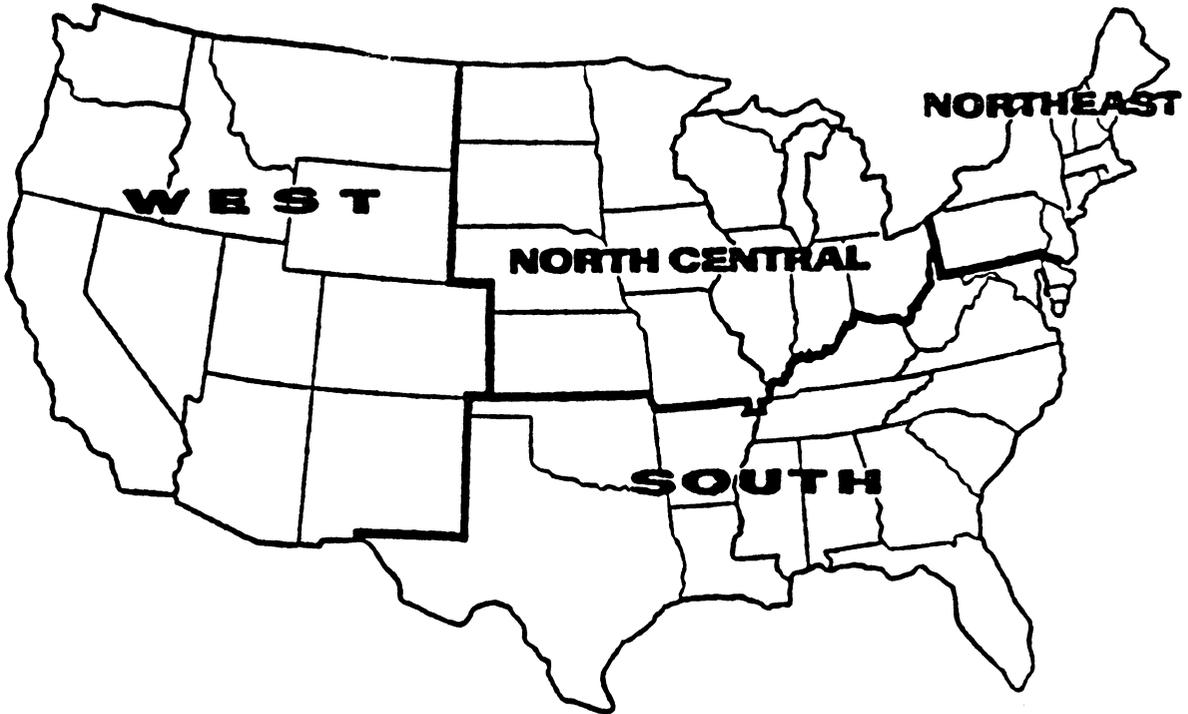
- Advertising and Sales Promotion. 1965. Achieving Brand Identity in a Multiproduct Line. (January):57-58.
- Alpert, M.I. 1972. Personality and the Determinants of Product Choice. J. of Marketing Research, V. IX (February):89-92.
- American Business Lists, Inc. 1986. 5707 86th Circle, Omaha, NE.
- Bahn, K.D. and N. Gandhi. 1987. Benefit Segmentation in the Generics Food Product Market. AMA Educators' Proceedings, (53):88-92.
- Best Mailing Lists and Printing Corp. 1986. 34 West 32nd St., New York, N. Y. 10001.
- Boyd, Jr., H. W., R. Westfall and S. F. Stash. 1981. Marketing Research Texts and Cases. Richard D. Irwin, Inc., Homewood, IL.
- Broh, R. A. 1982. Managing Quality for Higher Profits. McGraw-Hill, New York, NY.
- Crosby, Philip B. 1979. Quality Is Free. New American Library, New York, NY., pp. 14-15.
- Dillman, D. A. 1978. Mail and Telephone Surveys: The Total Design Method. John Wiley & Sons, Inc. New York, NY.
- Donald, M.N. 1960. Implications of Non-Response for the Interpretation of Mail Questionnaire Data. Public Opinion Quarterly, 24 (Spring):99-114.
- Engel, J.F., H.F. Fiorillo and M.A. Cayley. 1972. Market Segmentation: Concepts and Applications. New York: Holt, Rinehart and Winston, Inc.
- Fowler, Jr., F.J. 1984. Survey Research Methods. Sage Publications, Beverly Hills, CA.
- Fuller, B. and M. R. Walsh. 1983. Treated Wood Study. The Markets for Treated Lumber, Timbers and Plywood: Recent Developments and Prospects for the Future. Data Resources Inc. (changed to: Resource Information Systems, Inc.), Bedford, MA.
- Garvin, D.A. 1984a. Product Quality: An Important Strategic Weapon. Business Horizons, 27 (May/June):40-44.
- Garvin, D.A. 1984b. What Does Product Quality Really Mean? Sloan Management Review, (Fall):25-43.

- Granzin, K.L. and J.J. Painter. 1979. Using Benefits as a Basis for Multi-Criterion Market Segmentation. Charleston, SC: 1979 Proceedings: Southwestern Marketing Association Conference.
- Haley, R.I. 1968. Benefit Segmentation. J. of Marketing, 32 (July):30-35.
- Hair, J.F., Jr., R.E. Anderson and R.L. Tatum. 1987. Multivariate Data Analysis. 2nd ed. Macmillan Publishing Co., New York, NY.
- Hochstim, J.R. 1967. A Critical Comparison of Three Strategies of Collecting Data From Households. Journal of the Statistical Assn. 62(September):976-989.
- Jacobson, R. and D.A. Aaker. 1987. The Strategic Role of Product Quality. J. of Marketing 51(October):31-44.
- Juran, J. M. 1974. Quality Control Handbook. McGraw-Hill, New York, NY., pp. 2-3.
- Kelleher, J. 1985. Remodelers/Handyman. Home Center Mag., (December):25-27.
- Kelleher, J. 1986. Treated Lumber: Industry Settles Safety Issues. Home Center Mag., (April):75-81.
- Kotler, P. 1980. Principles of Marketing. Prentice Hall, Englewood Cliffs, NJ.
- Kuehn, A. A. and R. L. Day. 1962. Strategy of Product Quality. Harvard Business Review, (November-December):100-110.
- Lindberg, K.W. 1986. Is Lumber Quality Part of the Problem? Proceedings of the Sixteenth Forestry Forum. Virginia Tech (April):35-39.
- Mendenhall, W., L. Ott and R. L. Scheaffer. 1986. Elementary Survey Sampling. Wadsworth Publishing Company, Inc., Boston, MA.
- Olson, J.C. 1972. Cue Utilization in the Quality Perception Process: A Cognitive Model and an Empirical Test. Unpublished Ph.D. Dissertation, Purdue University.
- Peters, T.J. and R.H. Waterman. 1982. In Search of Excellence: Lessons From America's Best Run Companies. Harper & Row, New York.

- Purwar, P. C. 1984. The Role of Price Cues in Product Quality Perception: A Comprehensive Model and An Empirical Investigation. University Microfilms International, Ann Arbor, Mich. Ph.D Dissertation, State University of New York at Buffalo (1981).
- Quelch, J.A. 1987. Marketing the Premium Product. *Business Horizons*, (May/June):38-45.
- Riesz, P. C. 1979. Price-Quality Correlations for Packaged Food Products. *J. of Consumer Affairs*, (Winter):234-244.
- Schnaars, S.P. and L.G. Schiffman. 1984. An Application of Segmentation Design Based on a Hybrid of Canonical Correlation and Simple Crosstabulation. *J. of the Academy of Marketing Science*, 12(Fall):177-89.
- Sheth, J.N. 1979. Emerging Trends for the Retailing Industry. *J. of Retailing*, 59(Fall):6-18.
- Shetty, Y. K. 1987. Product Quality and Competitive Strategy. *Business Horizons* (May/June):46-52.
- Sinclair, S.A. and K.E. Seward. 1988. Effectiveness of Branding a Commodity Product. *Industrial Marketing Management*, 17(1):23-33.
- Walsh, M.R. 1985. Treated Lumber: Bright Spot in Wood Economy. *Forest Indust.*, (November):36-38.
- Whiting, E. and M. Walsh. 1986. What Is Quality and How Much Does It Cost? *Accountancy*, 97(February):146-149.
- Wind, Y. 1978. Issues and Advances in Segmentation Research. *J. of Marketing Research*, 15(August):317-37.
- Zeller, A.B., Inc. 1986. 475 Park Ave. South, New York, N. Y. 10016.



**Figure 1. Conceptual Model of Linkage Between Product Quality Perceptions and Benefits**



Region	Total Number of PRO's	Number of PRO's Sampled	Number of Responses	Response Rates
West <sup>1</sup>	13711	683	98	16%
South	29555	1169	149	14%
North Central	21055	837	143	20%
Northeast	11413	672	135	23%
Unidentified <sup>2</sup>		<398> <sup>3</sup>	18	
Totals	75734	2963	543	18%

<sup>1</sup>West region includes Alaska and Hawaii.

<sup>2</sup>Eighteen respondents did not indicate which state they conducted the majority of their business and therefore could not be categorized by state or region.

<sup>3</sup>398 questionnaires (12%) were returned as undeliverable. Response rates are calculated as: 
$$\frac{\# \text{ mailed} - \text{undeliverables}}{\# \text{ responses}}$$

Figure 2. Builder Sampling Plan and Response Rates:  
U.S. Bureau of Census Four Region Summary



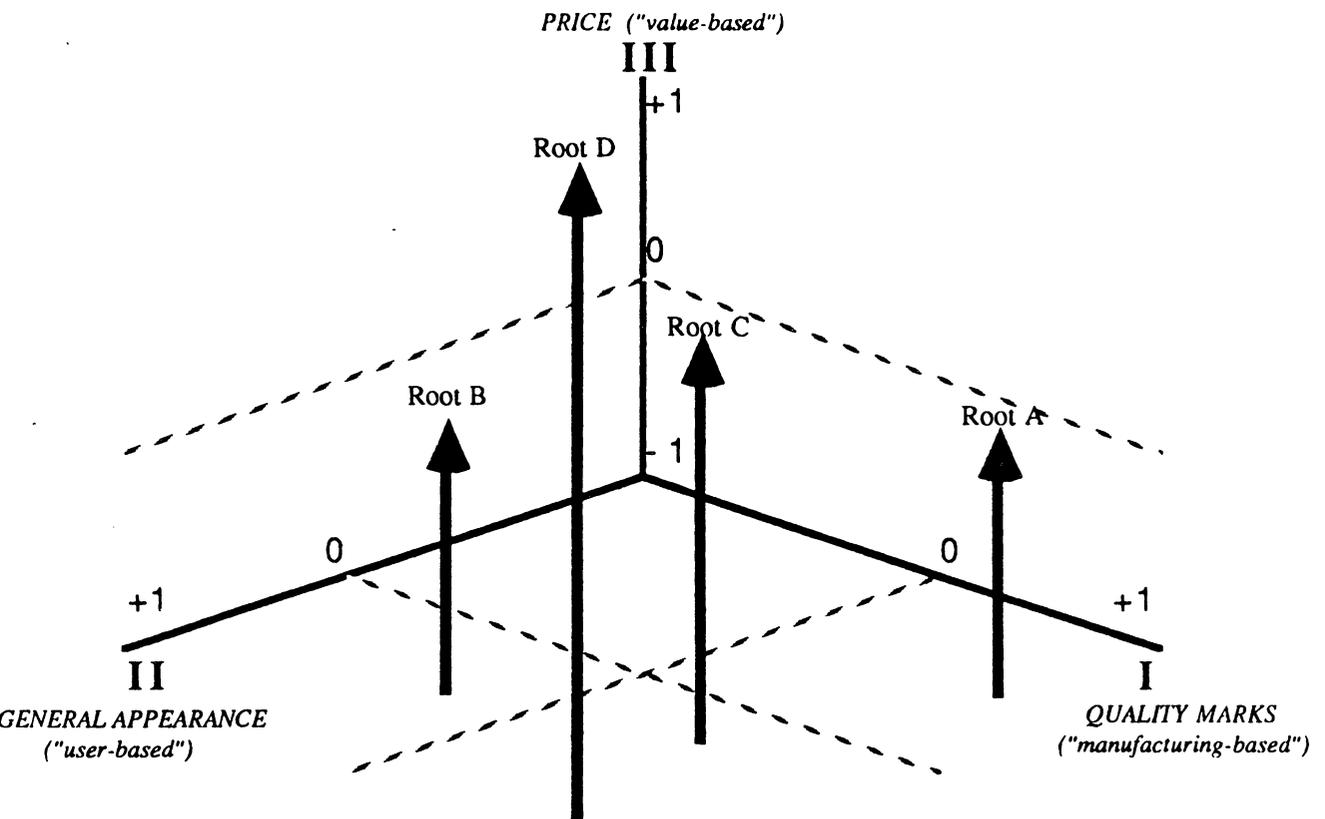


Figure 4. Four Builder Segments Portrayed In Terms of Three Selected Benefit Dimensions

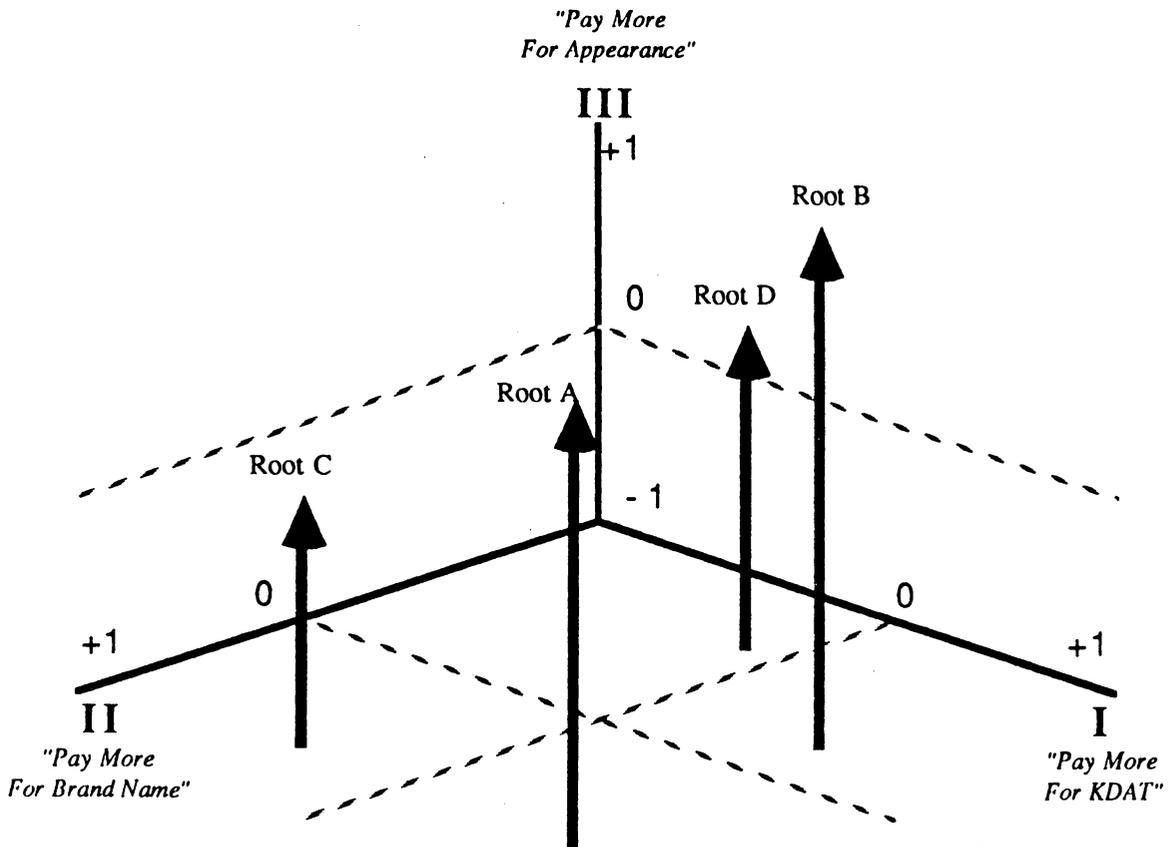


Figure 5. Four Builder Segments Portrayed In Terms of Three Value Perception Dimensions

**Table 1. Mean Agreement Scores for Five Treated Lumber Product  
Quality Perception Items**

Mean Agreement Variables	Scale <sup>1</sup>	Variance
<b><u>Brand Names</u></b>		
(1) Brand named treated lumber is generally of superior quality as compared to generic (Brand Names Superior)....	3.24	0.81
(2) I am willing to pay more for brand named treated lumber products (Pay For Brands).....	2.92	0.87
<b><u>Appearance</u></b>		
(3) I am more concerned with the appearance of treated lumber than the grade and/or species (Appearance Not Grade).....	3.07	1.17
(4) I am willing to pay more for higher quality/appearance treated lumber products (Pay For Appearance).....	3.69	0.67
<b><u>Kiln Dried After Treatment (KDAT)</u></b>		
(5) I am willing to pay more for KDAT treated lumber (Pay For KDAT).....	3.44	0.74

<sup>1</sup> Opinions were rated on a 5-point Likert scale from 1 (Strongly Disagree) to 3 (Neutral) to 5 (Strongly Agree).

**Table 2. Factor Structure of Twenty Required Benefits Concerning  
Treated Lumber Products and Services**  
(Equimax Rotated Factor Structure: Principal Components Factor Analysis)

Treated Lumber Evaluative Criteria	(ELEVEN FACTOR SOLUTION)											COMMUNALITY
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	INDEX (h <sup>2</sup> )
<b>1. <u>Technical Tags/Stamps</u></b>												
Quality Mark												.70
Warranty or Guarantee												.75
Chemical Retention												.71
Brand Name												.63
<b>2. <u>Dealer Attributes</u></b>												
Dealer Reputation												.70
Knowledgeable Salespeople												.75
Convenient Location												.82
<b>3. <u>Appearance</u></b>												
General Appearance												.78
Surface Cleanliness												.75
<b>4. <u>Moisture Content (Weight)</u></b>												
Moisture Content												.78
KDAT												.73
<b>5. <u>Promotion</u></b>												
Price Incentives												.77
Promotional Materials												.63
<b>6. <u>Grade</u></b>												
Grade												.83
Species												.81
<b>7. <u>Color</u></b>												
												.88
<b>8. <u>Dealer Variety</u></b>												
												.80
<b>9. <u>Price</u></b>												
												.82
<b>10. <u>Straightness</u></b>												
												.90
<b>11. <u>Delivery Service</u></b>												
												.92

**Evaluative Criteria**                      **F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11**

% variance explained:    24.5 8.3 7.4 6.2 5.4 5.2 4.5 4.3 4.1 3.9 3.6

eigenvalues:                      4.9 1.7 1.5 1.2 1.1 1.0 0.9 0.9 0.8 0.8 0.7

Table 3. Canonical Analysis of Product Quality Perceptions and Benefits

Variables	<u>Loadings</u>			
	Root A	Root B	Root C	Root D
<u>Product Quality Perceptions</u>				
(1) Brand Names Superior	.07	.03	.23	1.11
(2) Pay For Brands	.60	-.13	.72	-.73
(3) Appearance Not Grade	-.62	.24	.67	-.19
(4) Pay For Quality/Appearance	-.29	.64	-.29	.22
(5) Pay For KDAT	.36	.55	-.31	-.14
<u>Required Benefits (Surrogate Variables)</u>				
(1) Quality Marks	.83	-.17	.27	.33
(2) Knowledgeable Salespeople	.20	.24	-.06	-.24
(3) General Appearance	-.41	.33	.13	.59
(4) Moisture Content	.12	.33	-.50	-.02
(5) Price Incentives	-.11	-.40	.32	.10
(6) Grade	.15	-.05	-.61	.21
(7) Color	-.15	.12	.19	.03
(8) Dealer Variety	.04	.44	.67	.01
(9) Price	-.16	-.42	-.15	.61
(10) Straightness	-.17	.25	-.12	-.16
(11) Delivery Service	.05	.13	-.14	-.32
Canonical correlation	.45	.37	.25	.24
Multivariate F-ratio	4.24	3.20	2.27	2.14
Probability of Type I error	.000	.000	.000	.006

**Product Quality Perceptions and Benefit Segmentation  
in the Home Center Industry**

(A manuscript prepared for submission to  
Journal of the Academy of Marketing Science)

*"Quality is the index that reflects the extent to which the customer feels that his need, the product, and his expectations for that product overlap. The relevant measure of quality does not reside in the product. It resides between the customer's ears."*

--William R. Thurston, President and CEO of GenRad, Inc.

**Product Quality Perceptions and Benefit Segmentation  
in the Home Center Industry**

**ABSTRACT**

This paper examines the predictive effectiveness of using benefits to characterize product quality perception market segments. Twenty product and service attributes (i.e., benefits) and five product quality perception statements were used to investigate the nature of market segments of Professional Contractor/Remodeler (PRO) retail customers. Canonical correlation was employed to define simultaneously five distinct market segments based on the link between the two canonical variates of product quality and benefits. Required benefits were found to successfully characterize five quality perception groups. This study empirically tested these relationships to improve the understanding of this very important and potentially profitable retail customer.

## INTRODUCTION

### The Home Center Industry

The home center or home improvement retailer is one of the most dynamic retail segments in the U.S. economy. This retail segment grew in sales from \$50.2 billion in 1983 to \$62.2 billion in 1985 (Franta and Johnson 1986). However, the variation in this fragmented retail industry is great, ranging from single-store retailers to large firms operating hundreds of stores with annual sales in the billions of dollars. Driven by whopping gains in the sale of lumber, building materials and millwork product lines, home center retail sales grew by \$12 billion in 1984 and 1985.

The two major retail customer groups, Professional Contractors and Remodelers (PRO's) and Do-It-Yourself'ers (DIY'ers), accounted for 41% and 50%, respectively, of home center sales in 1985 (Franta and Johnson 1986). Lumber, the most important product category, represented 29% of home center industry sales and lumber, building materials, and millwork combined accounted for nearly 54% of home center sales in 1985 (Home Center Magazine 1986).

One of the fastest growing product lines for the home center industry over the last decade has been pressure treated lumber products. For example, in 1977, treated lumber products consumed approximately 1.5 billion board feet (Walsh 1985), however, by 1986, this had grown to nearly 5.5 billion board feet (Micklewright 1988). The percentage of home centers stocking treated lumber is also up sharply from 82% in 1984 to 94% in 1986 (Franta and Johnson 1986).

This rapid growth was made possible by consumer acceptance of the wood preservative, Chromated Copper Arsenate (CCA) which is used in about 93% of all treated lumber (Micklewright 1988).

CCA provides excellent long-lasting protection against rot or decay and insects, can be painted or stained like normal untreated wood, is clean and odorless. This makes treated lumber ideal for weather-exposed home improvements (predominantly decks). Strong demand is projected for treated lumber through 1995 (Fuller and Walsh 1983).

As the market for treated lumber matures and competition at the retail level intensifies, merchandising efforts for this important line will undoubtedly be stepped up. However, one of the most important customer groups, the professional contractor, is almost a mystery to home centers in terms of viable marketing information. Some very basic information is lacking. For example, retailers almost without exception have been unable to successfully segment their PRO customers (Kelleher 1985). The vast majority of retailers attempt to differentiate their PRO versus DIY customers by simply separating credit sales (assumed to be PRO's) from cash purchases (assumed to be DIY'ers) (Kelleher 1985). We propose to test the viability of segmenting of PRO retail customers in terms of treated lumber quality perceptions as characterized by required benefits.

## Conceptual Background

### Quality Perceptions

The concept of quality as a competitive weapon has been examined in terms of profitability, productivity, costs, prices and market share (Garvin 1984; Shetty 1987; Peters and Waterman 1982; Jacobson and Aaker 1987). Quality perceptions have received less attention than warranted in the literature. No well developed theory exists to explain how consumers judge the perceived quality of a product (Purwar 1984). For the average consumer, objective quality is a difficult concept; perceived quality is typically substituted (Olson 1972). Perceived quality involves the subjective feeling, impression or judgment of the relative quality of the product (Olson 1972).

Quality has become a major issue and important factor for all wood products sold in home centers; however, the emphasis on quality is magnified with treated lumber products which are often on display in homeowner's backyards and may provide reference group influences. Retailers generally feel that customers are willing to pay for quality wood, and will choose not to purchase from stores that don't provide it (Kelleher 1986). Kelleher (1986) has hypothesized that appearance is a major surrogate for quality in consumers' purchase decisions.

Retailers that specialize in "premium products" and services have many times found strong growth potential for their products (Advertising Age 1979; Chain Store Age 1982a). Conversely, retailers offering mass-market functional offerings may find survival more difficult (Chain Store Age 1982b). Sheth (1983) identifies the trend

toward premium products at the expense of best-value products as a major future impact on the retail industry. Treated lumber manufacturers and retailers have found value-added, high quality "specialty" products such as deck kits, fancy deck posts/rails/stair kits and lattice panels to boost margins and increase sales (Kelleher 1986; Walsh 1985).

The term "quality", taken by itself, implies a "fitness for use" (Juran 1979); a "conformance to specifications" (Crosby 1979); and, in general, "a means through which the product and service in use will meet the expectations of the customer" (Whiting and Walsh 1986). In other words, the expert is the customer and quality relates to the specific end use of the product in question.

↙ Broh (1982) defines quality products in terms of conformance at an acceptable cost and/or performance at an acceptable price. This value-based perspective of quality results in excellence relative to price; a difficult concept to define.

#### **Required Benefits**

Product and service attributes of treated lumber products, in essence, represent the benefits which PRO customers seek when purchasing and using the building material. The benefits sought may represent the underlying criteria for the existence of a market segment. This approach has shown to determine behavior and characterize markets segments more accurately than either demographics or volume consumption (Haley 1968). Haley's scheme, in which required benefits serve as the focus in segmenting customers' needs, has been

validated empirically by studies pertaining to various product and market classifications (\*Authors deleted in conformance with JAMS procedure to maintain anonymity, Granzin and Painter 1979). The authors (\*) found benefits to influence patronage patterns as well as relating to values, demographics, concern for nutrition and eating patterns in the restaurant industry. Since benefits were found to be useful in segmenting restaurant patrons, then it is hypothesized that it will be useful in another retail market, home improvement centers.

Home center retailers provide benefits with tangible and intangible attributes such as the "tags/stamps" located on the product to provide technical information, the visual "appearance" of the product (straightness, surface cleanliness, etc.), the nature of "service" provided both prior to and following the sale and "price" relative to competing retailers and products. These benefits will serve as potential predictors of treated lumber quality perceptions. To illustrate the potential usefulness of this perceptual construct of quality, as opposed to the objective measurements often employed such as grades and chemical retention levels, we must determine the pattern of benefits required by PRO's relative to, or at least consistent with, their patterns of perceived quality. Figure 1 illustrates the conceptual linkage of benefits and quality perceptions in defining product quality segments.

In summary, the two major research goals of this study are: (1) to determine the importance of the major benefits sought by PRO's, (2) to provide empirical evidence on the predictive utility of required

benefits for typifying market segments based on product quality perceptions. Additionally, this research seeks to extend these two psychological constructs in determining their importance to a large retail industry that has virtually gone unnoticed in the literature.

#### **Potential Contributions of the Study**

Clearly, the monetary importance of the treated lumber market supports this investigation as an aid to the understanding of a key segment of this retail industry. Additionally, there may be both academic and applied benefits. The academic benefits emerge from the predictive usefulness of selected measures of product and service attributes as well as product quality perceptions. The benefits sought by PRO customers are hypothesized to be related to quality perceptions of treated lumber products. The quality of treated lumber, according to some experts, varies widely (Kelleher 1986; Donnell 1987; Lindberg 1986). The impact of this quality variability is examined from the buyer's perspective. This research may provide additional insight into the concept of perceived quality and focus on how it is evaluated in light of required benefits.

Direct application of benefit findings to many areas of strategic marketing coupled with product quality perception measures provide a means of market segmentation. This interactive characterization may initiate and support managerial decisions regarding the treated lumber product line in terms of modifications or new products that would improve a competitive position. Moreover, promotion materials such as advertising, store displays and product literature, may be more

effectively employed with benefit segment information.

A recent market study conducted by Payless Cashways, Inc. (1985) found a strong statistical relationship between the store where people made the first purchase for a home improvement project and the store where they purchased the remainder of the materials. This "first" purchase, according to the Payless study, was most often lumber. Lumber drives the sale of other merchandise and may be considered of paramount importance to home centers and building supply dealers. With this in mind, a fuller understanding of the required benefits and underlying quality perceptions of treated lumber consumer segments may provide managerial strategies for obtaining an increased share of "first" purchases which will typically lead to higher overall sales of additional retail product lines.

#### METHODOLOGY

##### Sample Frame

The PRO contractor populations in the U.S. have been identified by various national standardized marketing information services (Best 1986; Zeller 1986; American Business Lists 1986). According to current (1986) sample frames compiled from all phone book yellow page directories in the U.S., the following contractor populations are identified:

One-Family Unit Builders	50,614
Home Improvement Builders	45,496
Patio/Deck Builders	2,624

These three categories were merged with duplicate listings deleted, thus providing a single, mutually exclusive population of 75,734 elements defined as "New One-Family, Home Improvement and Patio/Deck Contractors."

Some sampling bias may have been introduced due to the exclusion of PRO's who do not advertise in telephone book yellow pages, typically the very large builders. However, since the very large builders generally do not buy at retail outlets and this study, by design, examined the retail customer the smaller PRO's were deemed most appropriate for our study.

#### **Respondents**

Over two-thirds of the 543 respondents were involved in repair and remodeling (R&R) followed by one-family builders (34%) and patio/deck builders (25%). Clearly, the smaller builders were represented with our sample frame since 71% had annual sales of less than \$500,000 in 1986. The median value of treated lumber purchases in 1986 for this group was \$5,000 and the mean was \$16,569. Respondents averaged 18 years of building experience and 67% had some college education (28% were college graduates).

A mail survey was administered, following a pretest, to 3,361 randomly selected PRO's located in all 50 states. In other words, every 22nd PRO was included in our study. A random number generator from 1 to 22 provided the first PRO. Thus, the chance for selection of each element was known and equal (Mendenahall et al. 1986). A follow-up was sent ten days after the initial mailing. An 18%

response rate, or 543 usable questionnaires, was obtained after adjusting for 398 (11.8%) surveys that could not be delivered due to a change in address.

Potential bias due to non-response can be studied by comparing those who respond immediately with those who respond after follow-up steps are taken, and through post hoc follow-up telephone interviews with non-respondents (Fowler 1984). Both of the aforementioned procedures were employed using nine key demographic variables. Administering a Chi-square test of independence, no significant (at the  $p=.05$  level) differences existed between early and late respondents or between respondents and nonrespondents, thus allowing concerns over nonresponse bias to be set aside.

#### **Measurement of Product Quality Perception**

The quality perception construct was measured by asking respondents to indicate their level of agreement with each of five statements concerning the quality of treated lumber. These five assertions, as stated on the questionnaire, are provided in Table 1. A five-point Likert scale anchored by "Strongly Disagree" and "Strongly Agree" was used to measure these product quality perceptions. The three main concepts employed to measure treated lumber product quality perceptions were:

- (1) Brand Names: The essence of a brand strategy is to produce and market a brand so that it subsequently ends up in the consumer's awareness set (Markin 1979). Very little work has been conducted concerning the branding of primary wood products (Kelleher 1985; Advertising and Sales Promotion 1965; \*Authors deleted in conformance with JAM procedure).

Brand names are pivotal in two of the five selected quality measures (Table 1). In terms of overall quality/price perceptions, respondents agree slightly that brand named treated lumber is superior to its generic counterpart; however, they were neutral to slightly adverse to paying a premium for a brand named product.

- (2) Appearance: The primary uses of treated lumber are in decks, patios, fences and other outdoor applications where purchases are based on permanence, appearance and finally cost. Lindberg (1986) has hypothesized that species, grade and strength are of less importance than appearance or how the product will look in use.

Appearance characteristics of treated lumber products dominate two quality perception statements. PRO's are relatively neutral regarding their concern for appearance versus grade and/or species and yet they will pay more for higher quality/appearance treated products (Table 1).

- (3) KDAT: Traditionally, dry wood is viewed as more dimensionally stable and of higher quality. Current wood treating technology leaves the lumber wet. Lumber shrinks when dried. This may lead to twist, warp, etc. in-use. It is possible to Kiln Dry After Treatment (KDAT) and this is performed by about 40% of all treaters in the U.S. and is used on approximately 20% of the industries' volume (Fuller and Walsh 1983).

This study shows that PRO's generally agree that they will pay more for KDAT treated lumber (Table 1).

### **Measurement Of Benefits**

Benefits were quantified by using a 5-point Likert scale with choices ranging from "Very Unimportant" to "Very Important." Mean importance scores for these twenty benefits are provided in Figure 2. Twelve items may be considered as "product" benefits; the remaining eight as "service" benefits.

### **Data Analysis**

Given the necessity of examining the extent and character of the relationship between two sets of continuous variables, canonical correlation was selected as the method for segmenting the PRO retail

market for treated lumber products (Wind 1978; Schnaars and Schiffman 1984). Canonical correlation extracts as many roots as the number of variables in the smaller set of variables. In this study, there are five quality perception items in the criterion set and twenty required benefits in the predictor set. Thus, five pairs of canonical variates were extracted. Each of these five significant canonical functions or roots provides a weighted, linear combination of the criterion variables and a similar combination of the predictor variables (Hair et al. 1987).

The pair of such linear combinations for each significant root can be explained in terms of the relationship between the collective pattern of product quality perceptions of PRO's in a distinct market segment and the pattern of treated lumber benefits they feel are important. The first root provides the highest intercorrelation possible between the two canonical variates; successive roots are derived from subsequent orthogonal rotations. This implies that market segments defined by each root provide distinct choices for managers and marketers in search of target market niches. These segments can be viewed as a simultaneous relationship between patterns of the predictor and criterion constructs. This concurrent consideration of the two canonical variates provides a rich portrayal of the market segments, as compared to the relatively austere univariate methods of segmentation analysis (\* Authors deleted in conformance with JAMS procedure).

The size of the canonical loading for each measure indicates the relative contribution of that variable to the function or market segment (Hair et al. 1987). Here, all loadings of an absolute .30 and greater were employed in the concurrent consideration of the relationship between required benefits and quality perceptions. Loadings of this magnitude are, as a rule, considered significant (Hair et al. 1987).

### RESULTS

Table 2 presents the findings of the canonical correlation analysis between product quality perceptions and the 20 benefits. All five of the possible roots were significant as shown by the dimension reduction results provided by the SPSS-X statistical analysis package (SPSS Inc. 1986). These roots, segments A through E, characterize five autonomous market segments. Each segment is described by the patterns of loadings on the pairs of canonical variates for both product quality perceptions and required benefits.

The five significant roots provided substantive findings for interpretation. All five product quality variables were represented in the results; that is, they reached a loading of at least .30 on at least one canonical product quality variate. The four highest loadings reflect "Pay For Brands" (-.88 on root E), "Brand Names Are Superior" (.81 and .75 on roots E and D, respectively) and "Pay For KDAT" (.74 for root B).

Root A characterizes a segment of PRO's who will pay a premium for Kiln Dried After Treatment (KDAT) service and to a lesser extent for

brand named treated lumber, yet do not agree that appearance is more important than grade and/or species. This same market segment, as one would anticipate, feels that brand names and KDAT are the two most important benefits. To summarize, these builders are willing to pay a premium for a kiln dried, brand named and properly graded treated lumber product; they are serious builders who conceivably use treated products in low visibility structural applications where a dry (dimensionally stable) product of proper grade is important.

Root B presents a PRO customer segment who will also pay a premium for KDAT service; however, this group will not pay more for a brand named product and feels strongly that appearance as opposed to grade/species is the major concern. The positive benefit loadings indicate the importance of KDAT, general appearance and moisture content whereas the negatively loaded attribute quality mark is deemed unimportant to this market segment. In short, these PRO's want kiln dried products of high appearance and do not perceive brand named treated products as more valuable.

The third segment delineated in this analysis, Root C, is characterized by PRO's who want higher quality/appearance treated lumber, feel that branded products represent this quality perception and are quite willing to pay a premium for it. Additionally, these customers disagree that KDAT services are worth a price premium. These quality/appearance conscious PRO's look primarily for a clean, branded product. Moreover, a good variety of treated lumber and promotional materials offered by the retailer are important service

benefits whereas KDAT service is not an important attribute sought by this PRO segment.

Root D portrays a strong agreement that brand named treated lumber is of superior quality versus generics. Additionally, this group agrees that appearance is more important than grade and or species, yet is not willing to pay a premium for this appearance attribute. An abundant set of required benefits portrays this segment. In order of importance, price, general appearance, treated material variety, brand names and price incentives represent the most salient benefits for this consuming segment of PRO's. Technical attributes such as warranties, grades, KDAT, knowledgeable salespeople and surface cleanliness are unimportant to this group. Brand names may provide a surrogate measure of these technical attributes in the buyer's cognitive structure. In sum, these price-sensitive, non-technical customers seek the best-looking branded products at the lowest price. They may be considered as low-tech bargain shoppers or pragmatists.

Root E reveals a market segment who agrees that brand named treated lumber products are superior but not worth more money. Moreover this group is willing to pay more for higher quality/better looking treated lumber, yet feels that appearance is not more important than grades or species. Grade, appearance and price are the three most important treated lumber attributes this PRO seeks. Generally, these customers buy according to both grade and appearance. Brand names, if offered at comparable prices, and, if better looking, are preferred.

A graphical representation of value perceptions in terms of quality (performance) relative to price is provided in Figure 3. Five PRO segments are plotted on three axes labeled "Pay More For Appearance," "Pay More for Brand Name" and "Pay More For KDAT."

This illustration portrays three PRO segments -- Roots A, B and D --who agree that KDAT service is worth more money. Moreover, two segments --Roots A and C -- feel that brand named treated lumber products are worth a premium and three builder groups -- Roots B, C and E -- will pay more for appearance. In terms of a value-based approach to product quality, Root A seeks performance in the form of brand named, properly dried treated lumber at a premium price. This suggests that a high appearance product without KDAT and/or a brand name is of lower "value" to this PRO segment. Conversely, Root E equates appearance with high performance or "value" and will not pay a premium for KDAT service and/or brand named treated lumber products of poor appearance.

#### DISCUSSION

This empirical study characterized five distinct market segments of PRO retail customers for treated lumber products. To summarize, the perceived product quality segments identified in this study were:

- (1) Price-Insensitive KDAT/Brand Name PRO's: a segment that is willing to pay a premium for KDAT services and brand named treated lumber materials who does not feel that appearance is more important than grade/species.
- (2) Kiln Dried/Appearance PRO's: a quality-oriented segment that perceives KDAT, general appearance and moisture content, but not quality marks as representative of a quality treated product. They will not pay more for branded treated lumber.

- (3) Price-Insensitive Brand Name/Appearance PRO's: a market segment willing to pay a premium for high appearance, branded products. This builder incorporates surface cleanliness, promotional materials and dealer selection into the purchase decision and feels that additional cost for KDAT materials is unwarranted.
- (4) Price-sensitive, Low-Tech Bargain Hunters: a segment that looks for the best appearance, brand named treated lumber at the lowest price. Brand names may represent perceptual cues of the product's technical attributes which are seemingly unimportant to this customer.
- (5) Price-sensitive Appearance/Grade PRO's: a customer who makes treated lumber purchases based on both appearance and grade. Branded products are considered to be superior but not worth more money. Price is important, however, this PRO will pay for quality/appearance.

Implications for academicians and practitioners evolved from these findings. First, five distinct market segments of PRO's were successfully defined by the canonical analysis. These quality segments were able to be defined in terms of required benefits.

These findings provide an important information base for understanding the issue of product quality as it relates to benefits sought by PRO's in their purchase decision for treated lumber. In this study, benefits were used to portray segments based on their product quality perceptions as defined by the data from 543 professional contractors and remodelers. These quality perception segments emerged as PRO retail customers who value some combination of moisture content, brand names and appearance of treated lumber products relative to price.

When focusing on benefits, marketers can examine the product and service attributes that should be offered as opposed to what is

currently available. By providing quality perception segments, as they relate to benefit patterns, marketers can now evaluate these PRO's in terms of target marketing mix strategies for the segments that already exist. Both new and old products should be tailored to specific segments of PRO customers seeking a specific benefit pattern (Haley 1968).

A firm may choose to pursue market niches based on benefits as a market strategy to gain competitive advantage. This niching may be implemented by companies who use higher product quality to command price premiums (Jacobson and Aaker 1987). For example, practitioners may find it profitable to pursue price-insensitive PRO segments through high-priced, high-quality product lines that emphasize either appearance/KDAT service or KDAT/brand name/grades. A single, best-quality product line featuring an attractive, kiln dried, properly graded and branded product should appeal to both of these segments. Another potential strategic thrust of these findings indicate that price-sensitive PRO customers perceive quality in terms of either a combination of appearance and grade or based strictly on appearance. Both of these price-shopping segments perceive brands as superior but will not pay a premium for them. Therefore, retailers may wish to stock a second product line consisting of lower-priced, undried generic treated lumber of high appearance.

Currently, branding seems only partially effective. However, an effective brand naming strategy may be a beneficial tool to implement in conjunction with product segmentation tactics. The two largest

brand names in treated lumber, Koppers Co. and Osmose Wood Preserving Co., are utilizing brand name programs to create brand awareness and a quality image. These two firms are fighting to keep their products from becoming commodities. This study supports the contention that brand named treated lumber products are perceived as superior, while underscoring the controversy regarding the willingness of PRO's to pay a premium for branded products. Some branding benefits (awareness, comprehension and preference) seem to be present in the two price-sensitive PRO quality markets (segments 4 and 5) who feel that brand named treated lumber products are superior to generics (\*Authors deleted in conformance with JAMS procedure). On the other hand, only two segments (groups 1 and 3) are willing to pay more for branded treated lumber products. Thus indicating that price premiums, another aspect of a successful branding strategy, are present in some segments (\*Authors deleted in conformance with JAMS procedure).

Two of the five segments defined by this study feel that KDAT service is worth a price premium; one does not. Evidence suggests that PRO's equate KDAT with quality and would prefer moisture content choices at retail locations.

Appearance is a major theme in four of the five quality segments, yet only two segments are willing to pay a premium for this benefit. This suggests that many PRO's demand a treated lumber product of a minimum appearance level and do not feel that this quality appearance should command a price premium. Manufacturers and retailers can benefit by providing and stocking a product that not only meets

technical requirements but is also attractive. The current grades are very broad in terms of visual characteristics. In-use performance is the primary feature of current grading criteria. A structurally sound, properly-treated and appropriately graded product may simply be unacceptable to consumers in a visual sense.

#### **SUMMARY AND CONCLUSIONS**

The retail market is becoming increasingly segmented in terms of consumer's wants over needs and the growth in premium products that enable higher margins (Quelch 1987; Sheth 1983). An increased understanding of intrinsic quality perceptions and the required benefits sought by customers of treated lumber products may assist in identifying these retail segments. This study suggests that perceived quality, based on both functional and aesthetic characteristics relative to price, represents the basic motivation behind treated lumber purchases where value drives the decision making process.

Benefits have shown to be a useful construct for characterizing the PRO retail customer segments in the home center industry. The product and service attributes of straightness, appearance, grade, price and product variety, in that order, were found to be the five most important benefits PRO's seek in their treated lumber purchases. Five market segments, described by builder's product quality perceptions, provide marketers with valuable insight into the link between these two sets of canonical variates.

In general, product quality perceptions of brand names, overall appearance and Kiln Dried After Treatment (KDAT) service provided

segments that were then characterized in terms of the benefits they seek in a treated lumber purchase. On this foundation, the authors recommend that both treated lumber manufacturers and home center retailers may profit from considering their PRO customers in terms of product quality perception segments who have distinct benefit requirements.

## REFERENCES

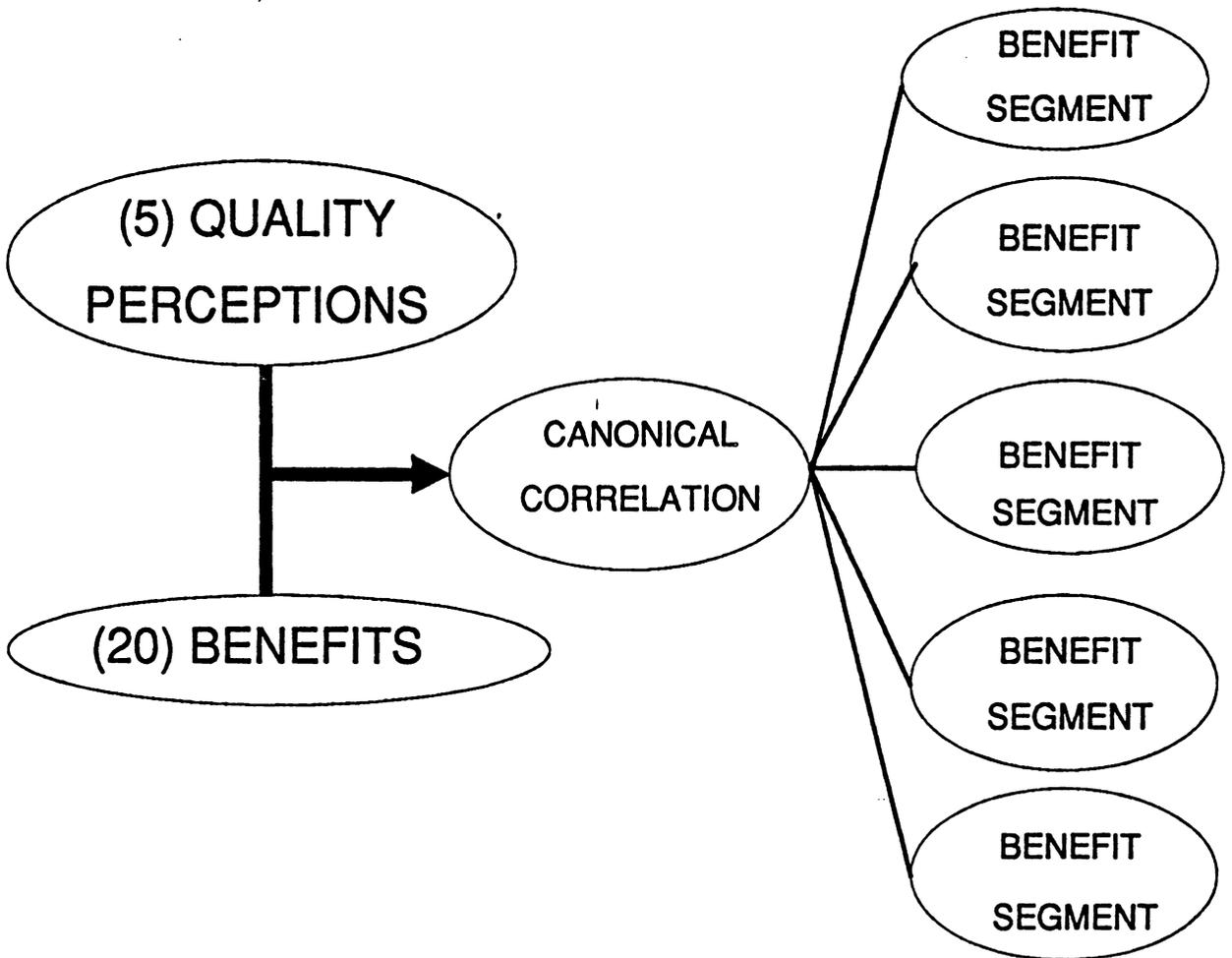
- Advertising Age. 1979. "Alexander's Joins Growing Gift Catalogue Market." Advertising Age 50 (November):4.
- Alvin B. Zeller, Inc. 1986. New York: Alvin B. Zeller, Inc.
- American Business Lists, Inc. 1986. Omaha, NE: American Business Lists, Inc.
- Bennion, Mark L. 1984. "Segmentation and Positioning in a Basic Industry." Industrial Marketing Management 16 (February):9-18.
- Best Mailing Lists and Printing Corp. 1986. New York: Best Mailing Lists and Printing Corp.
- Broh, R. A. 1982. Managing Quality for Higher Profits. New York: McGraw-Hill.
- Chain Store Age, General Merchandising Ed. 1982a. "Quiet Elegance Defines Out-Of-State Macy's." Chain Store Age 58 (September):29.
- \_\_\_\_\_, General Merchandising Ed. 1982b. "K-Mart's Bold, Off-Price Fashion Move." Chain Store Age 58 (November):51+.
- Crosby, Philip B. 1979. Quality Is Free. New York: New American Library. pg. 14-15.
- Donnell, Rich. 1987. "Tolleson Lumber Tops." Timber Processing (April):18-22.
- Dunn, Cori. 1985. "More Comments from Remodeling Contractors." Home Center Mag. (December):40-42.
- Evans, J. R. and B. Berman. 1982. Marketing. New York: Macmillan Publishing Co.

- Forest Industries. 1987. "North American Lumber Output Hits New High." Forest Industries (July):12-14.
- Franta, Harry and Mark L. Johnson. 1986. "Home Center Magazine's 1986 Market Profile." Home Center Magazine (September):19-33.
- Fuller, B. and M. R. Walsh. 1983. "Treated Wood Study. The Markets for Treated Lumber, Timbers and Plywood: Recent Developments and Prospects for the Future." Bedford, MA: Data Resources Inc. (changed to: Resource Information Systems, Inc.).
- Garvin, David A. 1984. "Product Quality: An Important Strategic Weapon." Business Horizons 27(May/June):40-44.
- Granzin, Kent L. and John J. Painter. 1979. "Using Benefits as a Basis for Multi-criterion Market Segmentation." Charleston, SC: 1979 Proceedings: Southwestern Marketing Association Conference.
- Haley, Russell I. 1968. "Benefit Segmentation." Journal of Marketing 32(July):30-35.
- Hair, Joseph F., Jr., Rolph E. Anderson and Ronald L. Tatum. 1987. Multivariate Data Analysis. (2nd ed) New York: Macmillan Publishing Co.
- Home Center Magazine. 1984. "1984 Profile of the Home Center Market; Summary Report." Chicago, IL: Home Center Research Bureau.
- Jacobson, Robert and David A. Aaker. 1987. "The Strategic Role of Product Quality." Journal of Marketing 51(October):31-44.
- Jenks, Holly. 1985. "Segmentation . . . Merchandising to the Tradesman." Home Center Magazine (December):28-30.
- Juran, J. M. 1974. Quality Control Handbook. New York: McGraw-Hill.

- Kelleher, Jack. 1985. "Remodelers/Handyman." Home Center Magazine (December):25-27.
- Kelleher, Jack. 1986. "Treated Lumber: Industry Settles Safety Issues." Home Center Magazine (April):75-81.
- Kotler, Philip. 1980. Principles of Marketing. Englewood Cliffs, NJ: Prentice Hall.
- Kotler, Philip. 1984. Marketing Management. (5th ed) pp. 273-275.
- Lambert, Zarrel V. and Richard M. Durand. 1975. "Some Precautions in Using Canonical Analysis." J. of Mktg. Res. 12 (November):468-75.
- Lindberg, Karl W. 1986. "Is Lumber Quality Part of the Problem?" Proceedings of the Sixteenth Forestry Forum. Virginia Tech (April):35-39.
- Markin, R. J. 1979. Marketing. New York: John Wiley & Sons, Inc.
- Mendenhall, W., L. Ott and R. L. Scheaffer. 1986. Elementary Survey Sampling. Boston, MA: Wadsworth Publishing Company, Inc.
- Micklewright, James T. 1988. "Wood Preservation Statistics, 1985: A Report To The Wood Preserving Industry In The United States." January.
- Nickels, W. G. 1984. Marketing Communications and Promotion. Columbus, OH: Grid Publishing Inc.
- Olson, J. C. 1972. "Cue Utilization in the Quality Perception Process: A Cognitive Model and an Empirical Test." Unpublished Ph.D. Disseration. Purdue University.
- Payless Cashways, Inc. 1985. "Phoenix Project Report." Kansas City, MO.

- Peters, Thomas J. and Robert H. Waterman. 1982. In Search of Excellence: Lessons From America's Best Run Companies. New York: Harper & Row.
- Purwar, Prem Chandra. 1984. "The Role of Price Cues in Product Quality Perception: A Comprehensive Model and An Empirical Investigation." University Microfilms International, Ann Arbor, Mich. Ph.D Dissertation. State University of New York at Buffalo (1981).
- Quelch, John A. 1987. "Marketing the Premium Product." Business Horizons (May/June):38-45.
- Richardson, Barry A. 1978. "Wood Preservation." Lancaster, England: The Construction Press.
- Schnaars, Steven P. and Leon G. Schiffman. 1984. "An Application of Segmentation Design Based on a Hybrid of Canonical Correlation and Simple Crosstabulation." Journal of the Academy of Marketing Science 12(Fall):177-89.
- Schoeffler, Sidney, Robert D. Buzzell, and Donald F. Heany. 1974. "Impact of Strategic Planning on Profit Performance." Harvard Business Review 52(March-April):137-145.
- Sheth, Jagdish N. 1979. "Emerging Trends for the Retailing Industry." Journal of Retailing 59(Fall):6-18.
- Shetty, Y. K. 1987. "Product Quality and Competitive Strategy." Business Horizons (May/June):46-52.
- Southern Forest Products Association. 1985. "Pressure Treated Southern Pine." New Orleans, LA.

- SPSS Inc. 1986. User's Guide: Statistical Package for the Social Sciences, Version X. Chicago, IL: (2nd ed).
- Walsh, Mel R. 1985. "Treated Lumber: Bright Spot in Wood Economy." Forest Indust. (November):36-38.
- Whiting, Edwin and Malcolm Walsh. 1986. "What Is Quality and How Much Does It Cost?" Accountancy 97 (February):146-149.
- Wind, Yoram. 1978. "Issues and Advances in Segmentation Research." Journal of Marketing Research 15(August):317-37.



**Figure 1**

**Conceptualization of Linkage Between Product  
Quality Perceptions and Benefits**





**Table 1. Mean Agreement Scores for Five Treated Lumber Product  
Quality Perception Items**

Variables	Mean Agreement Scale <sup>1</sup>	Variance
<b><u>Brand Names</u></b>		
(1) Brand named treated lumber is generally of superior quality as compared to generic (Brand Names Superior)....	3.24	0.81
(2) I am willing to pay more for brand named treated lumber products (Pay For Brands).....	2.92	0.87
<b><u>Appearance</u></b>		
(3) I am more concerned with the appearance of treated lumber than the grade and/or species (Appearance Not Grade).....	3.07	1.17
(4) I am willing to pay more for higher quality/appearance treated lumber products (Pay For Appearance).....	3.69	0.67
<b><u>Kiln Dried After Treatment (KDAT)</u></b>		
(5) I am willing to pay more for KDAT treated lumber (Pay For KDAT).....	3.44	0.74

<sup>1</sup> Opinions were rated on a 5-point Likert scale from 1 (Strongly Disagree) to 3 (Neutral) to 5 (Strongly Agree).

Table 2. Canonical Analysis of Product Quality Perceptions and Benefits

Variables	<u>Loadings</u>				
	Root A	Root B	Root C	Root D	Root E
<b><u>Product Quality Perceptions</u></b>					
(1) Brand Names Superior	.11	-.19	.25	.75	-.81
(2) Pay For Brands	.47	-.57	.38	-.25	-.88
(3) Appearance Not Grade	-.39	.38	.51	.47	-.50
(4) Pay For Appearance	-.11	.29	.60	-.67	.60
(5) Pay For KDAT	.64	.74	-.44	.26	-.12
<b><u>Benefits</u></b>					
(1) Straightness	-.05	.23	.11	-.09	-.02
(2) General appearance	-.16	.36	.25	.40	.50
(3) Grade	.04	-.07	-.21	-.41	.52
(4) Price	-.19	-.12	-.27	.47	.40
(5) Good dealer variety of treated lumber	.09	.19	.31	.36	-.20
(6) Surface Cleanliness	-.02	-.21	.51	-.49	-.11
(7) Convenient location of supplier	-.12	-.13	.13	-.02	-.10
(8) Short delivery lead times	.01	.05	.00	-.12	-.16
(9) Warranty or guarantee	.13	-.14	-.01	-.53	.10
(10) Dealer reputation	-.02	-.03	-.08	.14	.18
(11) Moisture content	.06	.33	-.23	.09	.28
(12) Price incentives	-.17	-.21	-.21	.33	-.05
(13) Knowledgeable salespeople at dealer	.10	.15	-.06	-.33	-.09
(14) Quality mark (inspection stamp)	.25	-.34	-.26	.24	.15
(15) Chemical retention levels	-.25	-.27	-.08	.24	-.13
(16) Kiln Dried After Treatment (KDAT)	.41	.64	-.44	.15	-.23
(17) Species	.15	-.20	-.02	-.31	.16
(18) Promotional materials	-.05	.09	.30	.03	-.19
(19) Color	-.22	.08	.19	.01	.02
(20) Brand name	.59	-.20	.42	.35	-.02
Canonical correlation	.58	.45	.38	.27	.26
Multivariate F-ratio	4.29	3.06	2.37	1.80	1.83
Probability of Type I error	.000	.000	.000	.004	.026

**The Effectiveness of the Consumer Awareness  
Program and Implications for The Wood Treating Industry**

(A manuscript prepared for submission  
to Wood and Fiber Science)

*"If a man can write a better book, preach a better sermon, or make  
a better mousetrap than his neighbor, though he builds his house  
in the woods the world will make a beaten path to his door."*

--Ralph Waldo Emerson

**The Effectiveness of the Consumer Awareness  
Program and Implications for the Wood Treating Industry**

**Abstract**

This research examines risk, an important determinant of consumer decision-making, as a function of product awareness and physical risk perceptions. Specifically, this study addresses the risk from treated lumber products that retail customers perceive. In September, 1985 a settlement agreement between the Environmental Protection Agency (EPA) and the wood preserving industry regarding the use and sale of wood treating chemicals was signed. One aspect of this agreement involved the education of consumers as to the proper use, handling and disposal of the preservative treated lumber products. Consumer Information Sheets (CIS's), the backbone of the Consumer Awareness Program (CAP), were employed to disseminate these common sense safety precautions. One goal of this study is to ascertain the effectiveness of the CAP by evaluating consumer awareness of the CIS's. The other primary objective, related to the first, is to evaluate the knowledge, awareness and physical risk perceptions that retail customers have regarding treated lumber products.

## INTRODUCTION

### Risk Assessment and Hazard Management

The marketing arena presents substantial insight as to how consumers incorporate risk perceptions into the decision-making process (Ross 1975). Consumer behavior as a risk taking process was first advanced by Bauer in 1960. Since then, much empirical research has addressed this multi-dimensional phenomenon and various models and theories of consumer behavior have been developed to widely embody perceived risk (Howard and Sheth 1969; Cox 1967; Cox and Rich 1967; Bettman 1970; Taylor 1974; Spence, Engel and Blackwell 1970; Peter and Ryan 1976). According to Cox (1967), the magnitude of perceived risk is determined by uncertainty and consequences. Taylor (1974) proposed a comprehensive risk theory in which uncertainty about the outcome may be reduced through information acquisition and uncertainty about the consequences is minimized by reducing the amount at stake or delaying the purchase decision. Risk, in a buying situation, may be viewed in terms of potential loss. Five major types of risk perceived by consumers have been identified as: functional, physical, financial, psychological and social (Shiffman and Kanuk 1983). Zikmund and Scott (1977) suggested that products may be categorized in terms of the type and intensity of risk perceptions they evoke from consumers.

Physical risk may be examined in terms of a hazard management framework that includes both technical and social factors (Slovic, Fischhoff and Lichtenstein 1981). Any hazard management system developed to protect consumers from the risks associated with products

must take into consideration technical factors as well as consumer psychological or internal subjective factors (Jacoby, 1981). Whereas subjective or "perceived" risk is the key influencer of consumer behavior, the technical or objective aspects of risk must not be overlooked in a hazard management system. Consumers respond only to hazards or risks they perceive (Slovic et al. 1981). Should the consumer fail to recognize that a risk exists, then behavior cannot be modified to reduce the risk (Jacoby 1981).

Hazard management frameworks including the two essential components of technical (objective) and social (subjective) issues may be viewed as follows (Jacoby 1981):

#### **Hazard Management Framework**

##### **Technical Issues**

- A) Identification
- B) Measurement
  - Probability
  - Consequence

##### **Social Issues**

- A) Risk Perception
  - Perceived Consequences
  - Subjective Probability
- B) Risk Acceptability

#### **Technical Issues**

Technical issues involve the identification of hazards and the measurement of these hazards in terms of their probability of occurrence and severity of their consequences. These aspects have been addressed for treated lumber following intensive research and testing by the Environmental Protection Agency (EPA) in Position Document (PD) 4 (EPA 1984). In 1978, the EPA initiated its formal Rebuttal Presumption Against Registration (RPAR) review of the major

wood preservatives under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). The EPA final position on wood preservatives was issued in July, 1984 (EPA, 1984).

In September 1985, the EPA and the wood preserving industry signed a settlement agreement regarding the use and sale of wood treatment chemicals. It was determined that the potential hazards pertained largely to applicators or other exposed individuals in the treating plants. Therefore, the ensuing regulatory measures of the EPA targeted the treating industry and restricted the sale and use of the preservative chemicals to certified applicators. In essence, pressure treated lumber was deemed a safe, reliable product for retail sale and residential use, provided a few practical safety precautions were followed. The wood preservative chemicals are classified as pesticides and will be regulated as such; however, wood treated with these chemicals is not.

One common method of determining the acceptability of risk is a formal cost/benefit or risk/benefit analysis as was conducted by the EPA in Position Document 4 (EPA 1984). The costs of using wood products treated with inorganic arsenicals, over 97% of which are CCA (Micklewright 1988), represent the risks to public health, whereas the benefits are economic (EPA 1984).

Due to the advantages of inorganic arsenical treated wood as compared to other currently available treatments, the EPA concluded in Position Document 4 (EPA 1984) that: (1) if inorganic arsenicals were cancelled, non-wood materials such as plastic, steel or concrete

would be substituted for treated wood, and that these materials would have a higher cost than wood and (2) due to the wide variety of uses for treated lumber, timbers and plywood, the Agency was not able to quantify the economic impact of cancelling the inorganic arsenicals. However this impact would be major in terms of: (1) the dollar impact, (2) total market impact, (3) disruption due to change to alternatives, (4) aesthetic considerations, and (5) the cost and availability of alternatives (EPA, 1984 pp.31-32). The bottom line: The EPA has determined that the benefits outweigh the risks.

The Agency's bases for issuing an RPAR for the inorganic arsenicals were oncogenic, mutagenic and reproductive or feterotoxic effects (EPA, 1984)<sup>1</sup>. After examining the risks in conjunction with the significant, albeit unquantifiable, economic benefits resulting from the use of inorganic arsenicals, the EPA decided on the following general requirements: (1) restricted use classification, (2) protective clothing requirements, (3) prohibitions against eating, drinking and smoking during application, (4) work clothing disposal regulations, (5) pesticide waste disposal regulations, (6) respirator use specifications, (7) wood surface deposit standards, (8) closed emptying/mixing system requirements for powder formulations and (9) mandatory participation in a Consumer Awareness Program (CAP) (EPA, 1984 pp. 204-229). These nine modifications to reduce the risk of inorganic arsenicals are aimed primarily at the manufacturer.

In addition, the EPA resolved that the majority of the population exposed to or using treated lumber products are not aware that the

wood is treated with a potentially hazardous pesticide and therefore a potential hazard existed among the general public. This determination resulted in the initiation of a Consumer Awareness Program (CAP) which featured Consumer Information Sheets (CIS's) to outline the proper use, handling and disposal precautions for treated wood in matter-of-fact terminology. These CIS's were to be disseminated at the point of sale for all treated lumber beginning December, 1985. The primary responsibility of this program lay with the wood treaters who were to ensure that CIS's and signs or placards reached the distributor with each treated lumber shipment (EPA pp. 223 1984). The objective of this program is to create end user awareness and thereby minimize risks.

### **Social Issues**

The social or subjective factors include the consumer's awareness or perception of the hazard, in this case, the physical risk associated with the CCA treated products, and the acceptability of this risk. A study by Slovic et al. (1981) examined risk acceptability from the consumer's perspective. Based on 90 activities and technologies, pesticides were ranked as the seventh most "risky" and fifty-seventh most "beneficial" to mankind. In other words, pesticides in general are perceived as very risky, and not very beneficial. This concurs with findings by Rethans and Albaum (1981) that perceived risk is inversely related to perceived benefit.

Risk perceptions, a central theme of this study, were examined globally in a previous study by Slovic et al. (1980) in which 18 characteristics of risk were hypothesized to be important. These 18 risk attributes could be reduced to three factors labeled "Dread," "Familiarity," and "Exposure," which accounted for most of the interrelationships between the 18 risk attributes. In general, this study showed pesticides to be considered as highly dreaded (ranked 10th), unfamiliar (ranked 59th) and exposing large numbers of people (ranked 9th) as compared to 89 other hazards studied (Slovic et al. 1980).

**The Consumer Awareness Program (CAP)**

In the fall of 1986, the EPA tested the effectiveness of the CAP through a third-party audit, the Techlaw study. This independent audit process was an essential aspect of a nationwide system to assure that consumers of treated lumber are aware of the proper use and precautions for using these products (Techlaw, Inc. 1986). Results of compliance with the CAP are shown as follows (Techlaw, Inc. 1986):

**Techlaw Study Results (1986):**

<b>Party Involved</b>	<b>% Aware of CAP</b>	<b>% Participating In CAP</b>
17 formulators	100	94
61 wood treaters	100	97
69 wholesalers-distributors/ retailers	81	70

Additionally, 74% of wholesalers/retailers had received written material relating to the CAP, 13% had documented procedures for CAP participation and 70% distributed CIS's to their customers. Moreover, only 6% documented their CIS distribution, 57% had CIS's available at the time of the audit and 32% had CIS's prominently displayed. The sales personnel were aware of a CAP in 39 of the 69 (57%) wholesalers/retailers audited.

The Techlaw study, however, failed to survey the actual consumers' awareness of the CAP. Given the goal of the CAP to provide CIS's to consumers, and given that the most direct means of assessing the success of the program involves information obtained directly from treated lumber consumers, it seems reasonable that retail customers should represent the population of interest. Techlaw (1986 pg. 2) states that "such an audit (of treated wood-buying consumers) was not practical because those consumers are not readily identifiable."

## **Objectives**

Given the work done to identify and measure the potential risk emanating from treated lumber products, the major goals of the study described in this report are twofold. First, to measure the consumer awareness of CIS's and therefore examine directly the effectiveness of the CAP. Attendant to this objective is the evaluation of overall consumer knowledge and awareness in terms of (1) the chemicals used in treated lumber products, (2) brand names and (3) the durability of treated lumber products versus competitive wood materials. Second,

physical risk perceptions from a safety standpoint will be addressed to evaluate consumer acceptability of the risk posed by treated lumber products.

### **RESEARCH METHODOLOGY**

Primary data collection was conducted via two distinct mail questionnaires aimed at two distinct retail customers for home centers and building materials dealers. These two groups, the professional contractor and remodeler (PRO) and the do-it-yourself'er (DIY'er) were surveyed as separate populations and are addressed and analyzed separately throughout this study.

#### **Phase I: PRO Sample Design**

Professional contractor populations in the U.S. have been identified by various national standardized information services (Best 1986; Zeller 1986; American Business Lists 1986). Best (1986) was instructed to merge three categories of professional contractors (single-family, home improvement and patio/deck builders) and delete the duplications. This single category consisted of 75,734 professional contractors that comprised the total PRO population as related to this study.

#### **Phase II: DIY Sample Design**

According to the latest U.S. Bureau of the Census figures, there were approximately 89,500,000 households in the U.S. in March, 1987.

Alvin B. Zeller, Inc. (1986) compiled a list of 55,000,000 households from U.S. Bureau of Census data, state and county tax records and national insurance registers. From this listing, a systematic random sample of 5 million households was derived; these 5,000,000 households served as the basis of the research sample for the DIY household customer.

### **Sampling**

Mail surveys were administered following thorough pretests, to 3,361 and 3,224 randomly selected PRO's (March 1987) and DIY'ers (October 1987), respectively, in all 50 states. This number of mailed questionnaires was estimated to provide at least 400 useable responses for each population under study, thus insuring a 95% confidence interval with an absolute error of 5% or less in the overall survey results (Mendenhall et al. 1986).

The mail survey method of data collection has shown to be the most efficient and cost effective vehicle for securing data from such a geographically dispersed population (Kanuk and Berenson 1975). A follow-up was sent approximately 10 days after the initial mailings and 543 and 491 usable questionnaires were returned from PRO and DIY respondents respectively. This resulted in an 18% response rate for the PRO and a 17% response rate for the DIY'er. Previous studies by Franta and Johnson (1988), Boyd, Westfall and Stasch (1981), Donald (1960) and Hochstim (1970) estimate response rates of 15% to 35% from general U.S. populations.

## **Nonresponse Bias**

Potential bias due to nonresponse can be studied in various ways. First, by comparing those who respond immediately to those who respond after follow-up steps are taken (Fowler 1984). The later respondents are generally believed to be more like non-respondents. Time dependent relationships of eleven key demographic variables for the PRO and seventeen demographic DIY items in terms of before and after the follow-up letter were examined. The Chi-square test of independence was used to determine the degree of variation between respondents during the first two weeks and those after the follow-up letter. These tests indicated that, with 95% confidence, no differences were found between early respondents and late respondents. This implies no evidence of nonresponse bias.

Second, telephone follow-ups to nonrespondents have been shown to assist in validation of the survey results (Fowler 1984). Following the return of all PRO surveys, forty nonrespondents were contacted by telephone in order to further determine if any nonresponse bias existed in our sample of 543 PRO's. The same demographic variables (except education and total sales which were difficult to obtain via telephone from respondents) were used to analyze nonresponse bias. The Chi-square test of independence was again employed. Results indicate that for all nine demographic variables no differences exist between the respondents and nonrespondents allowing concerns over nonresponse to be set aside.

The third, and perhaps most accurate means by which potential bias in a sample population may be examined is through comparisons with the population as a whole. Study limitations may be viewed by comparing our DIY respondents to the U.S. population as a whole via the 1987 Statistical Abstract of the U.S. Comparisons with these census records show the DIY sample used in our study is comprised of U.S. households with a significantly higher percent of married couple households (83% versus 58% nationally) and a much higher percent of married couples with children less than 18 years old (80% versus 28% nationwide). Additionally, our sample consists of homeowners who are relatively younger, more affluent and better educated than the general population. Thus defined, we do not attempt to generalize the study results to all U.S. households; simply to a segment of U.S. households. The sample identified herein, we feel, should be of considerable interest to many retailers, treaters, chemical manufacturers and lumber producers since they represent a significant market segment of more stable, knowledgeable and active Do-It-Yourself treated lumber consumers.

In a recent (1984) Home Center magazine study, "Home Improvement Consumers: A Comprehensive Analysis," 85% of the 1,204 households surveyed reported some DIY activity (Home Center Research Bureau 1984). Our study found a comparable 86% of responding households have conducted DIY activities.

## MEASUREMENT OF CUSTOMER KNOWLEDGE/AWARENESS

Laws and regulatory agencies are needed to protect basic consumer rights. But beyond protection, consumers need information and education to enable them to make better buying decisions (Schiffman and Kanuk 1983).

### Consumer Information Sheets (CIS's)

To measure consumer awareness/knowledge of CIS's, the PRO and DIY respondents were asked: "Can you tell me what Consumer Information Sheets (CIS's) are? (as they relate to pressure treated lumber products)" (Table 1). Only those PRO's who used pressure treated lumber products in 1986 (80% or 436 of the 543 respondents) and only the DIY'ers who have used or purchased pressure treated lumber products in the last three years (62% or 303 of the 491 respondents) were asked to answer this question. An opportunity to check a blank labeled "I really do not know what Consumer Information Sheets are" was provided as well as three additional multiple choice answers of which only one was correct. Slightly over half of all PRO's stated that they didn't know what CIS's were. An additional 11% chose one of the two incorrect responses and only 38% chose the right answer. Moreover, well over half (58%) of all DIY'ers checked the "don't know" response. An additional 19% chose one of the two incorrect responses; only 23% chose the right answer.

These results suggest that nearly two-thirds of builders who use treated lumber products and over three-quarters of DIY'ers who have

treated lumber product uses do not know what CIS's are.

## Chemicals

Wood preservatives in commercial use were categorized into the following four major classes in 1986: (1) creosote solutions (21% of all production), (2) pentachlorophenol (9%), (3) Waterborne preservatives (68%) and (4) fire retardant chemicals (2%) (Micklewright 1988). As a consumer acquires additional information about a product class, the uncertainty of consequences or risk is diminished (Schiffman and Kanuk 1983). As evidenced by the findings in Table 2, knowledge of the chemicals used in treated lumber products is low for both the PRO and the DIY consumer.

Approximately one-third of retail treated lumber customers (31% of PRO's and 37% of DIY'ers) could identify the chemicals used in treated lumber products. This was an aided recall, however, with no incorrect responses provided. Therefore, responses are considered to be perceptions of knowledge. Approximately 95% of treated lumber products contain the preservative CCA. However, of the 31% of PRO's responding to this question, only 61% indicated CCA was used. This finding creates suspicion as to the actual percent of "chemically aware" PRO's, certainly somewhat less than one-third! In terms of the DIY responses to a similar question, only 64% indicated that CCA was the preservative chemical used to treat the treated lumber they used/purchased. It is therefore reasonable to expect that less than 37% of "chemically aware" DIY'ers would respond to this question if

the categories had not been provided.

### **Brand Names**

Of eleven different risk relievers identified by Roselius (1971), "brand loyalty" and "major brand image" were ranked as first and second respectively, as relievers of the four types of losses or risks. This study shows that only one-third of PRO respondents and about one-fifth of DIY respondents could recall unaided at least one brand of treated lumber (Table 2).

### **Durability**

To evaluate the respondents' perception of lumber durability, a question was phrased as follows: "Based on your best guess, how many years would you say the following three materials (pressure treated, untreated and cedar/redwood lumber products) last or maintain structural strength in weather exposed above ground uses?" Treated lumber was rated as 27% and 19% longer lasting versus naturally durable species such as cedar and redwood by PRO's and DIY'ers respectively (Table 2).

### **MEASUREMENT OF PHYSICAL RISK**

The perceived risk associated with a product to self and others, physical risk, was measured by asking respondents to indicate their level of agreement or disagreement to seven (eight for the DIY'er) statements relating to the safety of treated lumber products (Tables 3

and 4). Overall, the strongest agreement from DIY respondents emerged from the statement "I would like more information on the proper use, handling and disposal of treated lumber." The strongest agreement for PRO's and the next strongest for DIY'ers resulted from the two statements: "treated lumber is safe to the resident for outdoor applications" and "given the proper use, handling and disposal of treated lumber products, these materials are entirely safe." DIY consumers agreed more than PRO's that "treated lumber products are entirely safe to the user (builder/DIY'er) that frequently uses these materials" and that "treated lumber can safely be used for picnic table tops." Both consumer groups were generally neutral in terms of the safety of treated lumber for indoor applications and the statement that CCA treated lumber emits odors. Finally, both respondents disagreed (PRO's relatively more than DIY'ers) that treated lumber can safely be used for counter tops and butcher blocks.

#### ADDITIONAL CONCERNS

##### PRO's:

PRO's were provided an opportunity to express any additional concerns that they may have regarding the EPA's approval of CCA treated lumber products following a 10-year study. This question was structured as open-ended to encourage sincere concerns and responses. Haller (1983) and Fowler (1984) present a strong case for the advantages of using open-ended questions to provide insight into, and an opportunity to convey, true consumer perceptions and to elicit

unanticipated responses. This type of question is particularly suited to exploratory research where new ideas and relationships are sought (Boyd et al. 1981).

Only 15% or 82 of the 543 responding builders answered this question. The most common response (22 of 82) was; "no concerns." The most frequent concern noted was user safety (20 of the 82 responses) in terms of the risk to the builder/resident from skin contact or leaching and the long term effects of exposure. Other related safety concerns include: inhalation dangers from sawdust and fumes, a general lack of knowledge, awareness of the safety precautions and consequences, suspicion of the Environmental Protection Agency (EPA), durability concerns, unacceptable product quality, disposal precautions and risk to children for playground applications.

**DIY'ers:**

For household respondents, the additional concerns question was much more global. Specifically, the open-ended question was worded as follows: "As a past, present or potential consumer of CCA pressure treated lumber products, do you have any general comments or concerns about these products in terms of quality, availability, service, safety, etc.?" Only the safety issue, the topic of greatest response, will be addressed in this study.

Forty-one percent or 202 of the 491 DIY respondents answered this question. Clearly, the topic of greatest concern for DIY respondents

related to user safety such as chemical concerns, lack of product awareness and desire for information on product usage, handling and disposal with 45% or 90 of the 202 responses addressing this issue. The most prevalent responses in this category included: "a general concern over the safety and health hazards" (24 responses), "give out more information on usage, handling and disposal precautions" (15 responses), "I need more information on the safety of the chemicals used" (14 responses) and "is treated lumber safe for: burning, inhaling sawdust, children who play around it, animals to chew on it" (11 responses).

## DISCUSSION

### Consumer Awareness

The findings of this study indicate that only 38% of the 436 PRO respondents and 23% of the 303 DIY respondents who have used treated lumber products from 1985-1987 could successfully identify the correct response from a multiple choice question which described the Consumer Information Sheets (CIS's). These CIS's serve as the main vehicle for conveying information about treated wood to purchasers of treated lumber products and to the end-users (EPA 1984).

Chemical awareness by retail customers is also quite low. This study estimates that slightly less than one-third of all PRO and DIY respondents are knowledgeable about preservative chemicals. According to Kelleher (April 1986), many retailers are still uninformed and/or confused about the safety issue and their customers know even less.

In terms of treated lumber brand awareness, these products suffer from relatively ineffective product differentiation. A brand name serves to identify the product and service and thus differentiate them from competitors (Evans and Berman 1982). In a study by Rich (1986), forest products firms adopting a differentiation and/or focus strategy were more profitable than those following a low cost strategy.

Especially for treated lumber products, which are on display in homeowner's backyards, many treaters, manufacturers and retailers feel that an effective brand name would constitute an effective risk reduction strategy. Roselius (1971) found the three risk relievers of brand loyalty, major brand image and government testing to rank 1st, 2nd and 3rd, respectively for reducing hazard or physical loss. These mechanisms are used by consumers to reduce the perceived risks affecting their decisions.

### **Durability**

Durability is the primary selling point that differentiates treated lumber products in the consumer's mind. This product attribute, representing a functional risk to potential consumers, may be a primary means of communicating a competitive advantage to retail customers. When a treated lumber application is considered, the entire evoked set of product alternatives is most likely limited to just a few alternatives such as treated lumber, untreated lumber, naturally durable species and perhaps concrete.

Treated wood generally has a useful life at least 5-10 times longer than untreated wood (EPA, PD 4 1984; FPL 1987). This study indicates that treated lumber products are perceived as less than 4 times as durable in weather exposed above ground applications than comparable untreated lumber. This is perhaps a conservative perception among users, one that may benefit from promotional address. Additionally, PRO and DIY respondents feel that treated lumber lasts an average of 6 and 4 years longer, respectively, than naturally durable species such as redwood and cedar.

One potential communication strategy aimed at reducing this functional risk to retail customers may be the uniformity of decay resistance afforded by treated lumber in weather exposed environments. The degree of natural decay resistance of common untreated construction wood materials, limited to the heartwood of durable species, depends on the nature and amount of fungitoxic extractives present (Haygreen and Bowyer 1982). Furthermore, this amount varies considerably within a species, and with location, age and rate of growth of the tree (Haygreen and Bowyer 1982). This creates a functional durability variability or uncertainty for the consumer that is not present in preservative treated lumber products.

### **Physical Risk Perceptions**

The findings from the risk opinion statements indicate a general state of ambivalence toward physical risk from treated lumber. On a scale of 1 to 5, mean ratings for 14 out of 15 risk items ranged from

a high of 3.81 to a low of 2.41. The only statement receiving an extreme mean rating (1.84), and only by PRO respondents, was "CCA pressure treated lumber can safely be used for counter tops and butcher blocks." This general level of apathy suggests a lack of knowledge and awareness by these two groups of retail customers. Further evidence of consumer apathy emerges from an examination of the frequency of responses. Overall, a staggering 36% and 32% of DIY and PRO responses, respectively, were "neither agree nor disagree!" In fact, for the DIY'ers, nearly half of the 463 responses for three of the questions: "CCA emits odors," "...safe for counter tops and butcher blocks," and "... safe for indoor applications," had no opinion! An examination of the open-ended question provides additional insight into the consumer perceptions of the risk from treated lumber products. Many concerns and questions addressed topics discussed in the Consumer Information Sheets. In fact, approximately 10% of PRO and 18% of DIY respondents' written concerns in the questionnaire could be directly answered by a CIS.

### CONCLUSIONS

It is recommended that treaters, manufacturers and retailers first identify the type of risk or loss perceived by a consumer for a specific product, then develop a suitable risk reduction strategy (Roselius 1971). Clearly, the retail customer of treated lumber products is not fully informed about the proper use, handling and disposal of these products. Moreover, the industry may not have fully

employed or adequately conveyed the risk coping strategies of brand loyalty and/or government testing. One means consumers use to reduce perceived risk is to solicit additional product information (Schiffman and Kanuk 1983). High priced products, such as a new deck, involve a greater risk which may necessitate a simplified communication strategy to reduce that risk. It is conceivable that available product literature such as customized CIS's could provide a device for reducing perceived risk in the decision process.

Information search thru both formal and informal sources allows the consumer to better predict the consequences of a purchase, thus reducing the level of perceived risk (Schiffman and Kanuk 1983). This implies that a competitive advantage may be garnered by successfully conveying information to the consumer. The EPA found this product to be safe to consumers given that proper use, handling and disposal precautions are followed. A promotional strategy to educate consumers may serve to build confidence and quell potential suspicion, thus fostering a greater trust.

Treated lumber sales have increased dramatically. However, with twice the number of treating plants in the U.S. compared with 10 years ago, and the growth in demand slowing, this maturing product line is becoming increasingly competitive (Caswell 1987). In order to maintain a competitive advantage, firms will need to pursue market related strategies. One such strategy, brand naming, may provide a significant reduction in risk if employed successfully. Associated with a brand strategy could be the dissemination of safety

precautions, such as personalized CIS's in order to create trust between the manufacturer and the treated lumber customer.

The continued success of large players in this treated lumber arena could be dictated by government intervention, consumer litigation and/or competing products with a lower perceived risk. One argument favoring treated lumber in terms of environmental impacts compares substitution with non-wood products. Substitute materials such as concrete, steel, cement block require more non-renewable forms of energy and cause greater pollution and impacts on the environment (Josephson 1977).

Many opportunities for increased treated lumber sales exist, especially for new products and in the international arena. It is time for the treated industry to actively assert itself as a consumer oriented producer.

#### Footnote

<sup>1</sup> As is often the case with important economic and political issues, there is more than one side of the story. According to an AWPA article (Arsenault, 1977), inorganic pentavalent arsenical compounds have been used as wood preservatives for more than 35 years with no reports of adverse effects. Furthermore, due to the chemical fixation process with the wood substrate, the treated wood products are extremely durable, non-phytotoxic and safe to handle in all applications.

The carcinogenic properties, suggested by some laboratory tests, failed to differentiate between the more toxic trivalent forms of arsenic and the substantially less toxic pentavalent forms used in arsenical treated wood (American Wood Preservers Institute and Society of American Wood Preservatives Position Document 2/3 Rebuttals, EPA pp. 88-107 1984). Furthermore, these tests also generally used dosage levels and other procedures that were inconsistent with actual use and environmental exposure.

Arsenite ( $AS_2O_3$ ), the trivalent form of inorganic arsenic, was used by researchers to reach conclusions on the carcinogenic effects of arsenate ( $AS_2O_5$ ), the pentavalent form of arsenic, found in wood preservatives. Much controversy remains as to the in vivo reduction of pentavalent arsenic to trivalent arsenic (EPA PD 4 pp. 88-108; 1984).

The industry feels that the dangers have been publicized in exaggerated form by the cement, concrete and, more recently, the California redwood industries. On the basis of all the available test data, it can reasonably be concluded that none of the pentavalent arsenic forms used in arsenical wood preservatives have been shown to cause unreasonable risks to man or the environment (Arsenault 1977).

### Literature Cited

- American Business Lists, Inc. 1986. 5707 South 86th Circle, Omaha, NE.
- Arsenault, R. D. 1977. Summary of the Arsenical Wood Preservative Memorandum. AWPA Proceedings, Vol. 73.
- Bauer, R.A. 1960. Consumer Behavior an Risk Taking. (In Dynamic Marketing For a Changing World, R. S. Hancock, ed., Chicago, Illinois):389-398, American Marketing Association, June, 1960.
- Best Mailing Lists and Printing Corp. 1986. 34 West 32nd St., New York, N. Y. 10001.
- Bettman, J.R. 1973. Perceived Risk and Its Components: A Model and Empirical Test. J. of Marketing Research, Vol. X (May 1973):184-90.
- Boyd, Jr., H. W., R. Westfall, and S. F. Stasch. 1981. Marketing Research Texts and Cases. Richard D. Irwin, Inc., Homewood, IL.
- Caswell, M. 1987. Treating Scores Big With Brewton Lumber. (In Timber Processing), (April):22.
- Cox, D.F. 1967. Risk Taking and Information Handling in Consumer Behavior. Boston: Graduate School of Business Administration, Harvard University, 1967, pp. 487-506.
- Cox, D.F. and S.U. Rich. 1967. Perceived Risk and Consumer Decision Making--The Case of Telephone Shopping. (In Risk Taking and Information Handling in Consumer Behavior, Donald F. Cox, ed.):82-108, Boston: Graduate School of Business Administration, Harvard University.

- Donald, M.N. 1960. Implications of Non-Response for the Interpretation of Mail Questionnaire Data. Public Opinion Quarterly 24(Spring):99-114.
- Environmental Protection Agency. 1984. Creosote, Inorganic Arsenicals, Pentachlorophenol. Position Document No. 4, Office of Pesticides and Toxic Substances, U.S. Environmental Protection Agency, Washington, DC, 334 pgs.
- Evans, J. R. and B. Berman. 1982. Marketing. MacMillan Publishing Co., New York, NY.
- Fowler, F.J. Jr. 1984. Survey Research Methods. Sage Publications, Inc., Beverly Hills, CA.
- FPL (Forest Products Lab.) 1987. Wood Handbook: Wood As An Engineering Material. Agricultural Handb. 72. Washington, D.C. USDA. 466p.
- Franta, H. and M.L. Johnson. 1986. Home Center Magazine's 1986 Market Profile. (September):19-33.
- Haller, T. 1983. Danger: Marketing Researcher at Work. Greenwood Press, Westport, CT.
- Haygreen, J.G. and J.L. Bowyer. 1982. Forest Products and Wood Science: An Introduction. The Iowa State University Press, Ames, Iowa.
- Hochstim, J.R. 1967. A Critical Comparison of Three Strategies of Collecting Data From Households. J. of the Statistical Assn. 62 (September 1967):976-989.

- Home Center Research Bureau. 1984. Home Improvement Consumers: A Comprehensive Analysis. Home Center Magazine, Lincolnshire, IL.
- Jacoby, J. 1981. Some Perspectives on Risk Acceptance. (In Advances in Consumer Res., Vol. 8., K. B. Monroe ed.):506-510.
- Josephson, H.R. 1977. "Economic, Social and Environmental Benefits From Use of Wood Preservatives. AWPA Proceedings, Vol. 73.
- Howard, J.A. and J.N. Sheth. 1969. The Theory of Buyer Behavior. John Wiley and Sons, New York, NY.
- Kanuk, L. and C. Berenson. 1975. Mail Surveys and Response Rates: A Critical Review. J. of Marketing Research, Vol. XII (November):440-453.
- Kelleher, J. 1986. Treated Lumber: Industry Settles Safety Issues. Home Center Mag., (April):75-81.
- Mendenhall, W., L. Ott and R. L. Scheaffer. 1986. Elementary Survey Sampling. Wadsworth Publishing Company, Inc., Boston, MA.
- Micklewright, J.T. 1988. Wood Preservation Statistics, 1986: A Report To The Wood-Preserving Industry In The United States. (January).
- Peter, J.P. and M.J. Ryan 1976. An Investigation of Perceived Risk at the Brand Level. J of Marketing Research, Vol. XII (May):184-8.
- Rethans, A.J. and G.S. Albaum. 1981. Towards Determinants of Acceptable Risk: The Case of Product Risks. (In Advances in Consumer Research, Vol. 8, K. B. Monroe ed.):506-510.

- Rich, S. U. 1986. Recent Shifts in Competitive Strategies in the U.S. Forest Products Industry and the Increased Importance of Key Market Functions. *Forest Products J.* 36(7/8):34-44.
- Roselius T. 1971. Consumer Rankings of Risk Reduction Methods. *J. of Marketing*, Vol.35 (January):56-61.
- Ross, I. 1974. Perceived Risk and Consumer Behavior: A Critical Review. (In *Adv. in Consumer Research*, Vol. II, M. J. Schinger ed., Urbana, Illinois), Association for Consumer Research.
- Schiffman, L.G. and L.L. Kanuk. 1983. *Consumer Behavior*. Prentice-Hall, Inc., Englewood Cliffs, NJ
- Slovic, P., B. Fischhoff and S. Lichtenstein. 1980. Facts and Fears: Understanding Perceived Risk. (In Societal Risk Assessment. How Safe is Safe Enough?):181-216. Published Symposia held at General Motors Research Laboratories, Warren, MI. Plenum Press, New York.
- Slovic, P., B. Fischhoff and S. Lichtenstein. 1981. Facts and Fears: Societal Perception of Risk. (In Advances in Consumer Research, Vol. 8, K.B. Monroe ed.):497-502.
- Spence, H.E., J.F. Engel, and R.D. Blackwell. 1970. Perceived Risk in Mail-Order and Retail Store Buying. *J. of Marketing Research*. Vol. VII(August):364-9.
- Taylor, J.W. 1974. The Role of Risk in Consumer Behavior. *J. of Marketing*, Vol. 38(April):54-60.
- Techlaw, Inc. 1986. An Audit of the Wood Treating Industry For Compliance With the Voluntary Consumer Awareness Program. (September 30) 6 pgs., Lakewood, CO.

U.S. Department of Commerce. 1978. Interagency Task Force on Product Liability: Final Report. National Technical Information Service, Springfield, VA.

Zeller, Alvin B., Inc. 1986. 475 Park Ave. South, New York, N. Y. 10016.

Zikmund, W. G. and J.E. Scott. 1973. A Multivariate Analysis of Perceived Risk, Self-Confidence and Information Sources. (In Advances in Consumer Research, Vol. I. Proceedings of the Association for Consumer Research, S. Ward and P. Wright ed., Chicago, Illinois):406-416.

Table 1. Regional Breakdown of Consumer Information  
Sheet (CIS) Responses.

**QUESTION:** Can you tell me what Consumer Information Sheets (CIS's) are? (as they relate to pressure treated lumber products) Please check one only.

Responses	PRO's (436) <sup>1</sup>	DIY'ers (303)
Don't know.	51% (224)	58% (177)
Instructions from the American Wood Preserver's Bureau (AWPB) regarding installation of Permanent Wood Foundations (PWF's).	08% (36)	07% (21)
Information distributed by bldg. supply dealers regarding proper use and disposal of treated wood. (Correct response)	38% (163)	23% (70)
Pamphlets from Consumer Guide magazine about which treated wood products are the best buys.	03% (13)	12% (35)

<sup>1</sup> Number of responses per category are in parenthesis.

Table 2. PRO and DIY Knowledge/Awareness Measures.

Knowledge/Awareness Items:	PRO's	DIY'ers
<b><u>Percent of Respondents Who:</u></b>		
Know what CIS's are (multiple choice)	38%	23%
Know the chemicals used (aided recall)	31%	37%
Can recall (unaided) at least one brand of treated lumber	33%	18%
<b><u>Number of Years the Following Materials Last (Maintain Structural Strength) in Weather Exposed Above Ground Uses:</u></b>		
Treated lumber products (average)	28 yrs.	25 yrs.
Naturally durable species (ie. cedar & redwood) (average)	22 yrs.	21 yrs.
Untreated lumber products (ie. pine, spruce, Douglas fir) (average)	8 yrs.	7 yrs.

Table 3. PRO Physical Risk Perceptions.

	Frequency of Response <sup>1</sup>					Mean Score
	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree	
	1	2	3	4	5	
CCA p-t lbr. is safe to resident for out- door applications <sup>2</sup>	1%	5%	20%	60%	14%	3.81
With proper use, hand- ling and disposal of CCA p-t lbr. they are entirely safe	3%	6%	36%	48%	7%	3.53
CCA p-t lbr. is safe to the builder	7%	14%	39%	37%	3%	3.15
CCA p-t lbr. is safe to resident for in- door applications	7%	21%	37%	32%	3%	3.04
CCA p-t lbr. emits odors	4%	29%	42%	22%	3%	2.90
CCA p-t lbr. can safely be used for picnic table tops	14%	21%	31%	28%	6%	2.90
CCA p-t lbr. is safe for counter tops and butcher blocks	45%	30%	22%	2%	1%	1.84

<sup>1</sup> Frequency based on 445 responses for each of seven risk items.

<sup>2</sup> p-t represents pressure treated.

Table 4. DIY Physical Risk Perceptions.

	Frequency of Response <sup>1</sup>					Mean Score
	Strongly Disagree	Disagree	Neither Nor Disagree	Agree	Strongly Agree	
	1	2	3	4	5	
I would like more info. on proper use, handling and disposal of CCA p-t lumber <sup>2</sup>	3%	7%	21%	49%	20%	3.75
CCA p-t lbr. is safe to resident for outdoor applications	1%	7%	25%	58%	9%	3.69
With proper use, handling and disposal of CCA p-t lbr. they are entirely safe	0%	5%	35%	51%	9%	3.64
CCA p-t lbr. is safe to the DIY'er	1%	11%	39%	43%	6%	3.43
CCA p-t lbr. can safely be used for picnic table tops	6%	11%	29%	48%	6%	3.37
CCA p-t lbr. is safe to resident for indoor applications	7%	25%	48%	19%	1%	2.83
CCA p-t lbr. emits odors	6%	29%	46%	18%	1%	2.81
CCA p-t lbr. is safe for counter tops and butcher blocks	22%	23%	47%	7%	1%	2.41

<sup>1</sup> Frequency based on 463 responses for each of eight risk items.

<sup>2</sup> P-t represents pressure treated.

**Consumer Risk Orientation As A Basis For  
Perceived Physical Risk Segments**

(A manuscript prepared for submission  
to Journal of Business Research)

*"Segmentation is based upon developments on the demand side of the market and represents a rational and more precise adjustment of product and marketing effort to consumer or user requirements."*

--Wendell Smith, Product Differentiation and Market Segmentation

**Consumer Risk Orientation As A Basis For  
Perceived Physical Risk Segments**

**Abstract**

The concept of perceived risk, first proposed by Bauer in 1960, contains the two primary structural dimensions of uncertainty and consequences. Consumers often perceive risk in making product purchase decisions because of uncertainty as to the consequences of their product selection. This risk varies by product class and consumer personality type and may consist of any one or combination of the following major perceived risk types: functional, physical, financial and psychosocial. This study attempts to delineate physical risk segments for pesticide preservative treated lumber products. It employs cluster analysis methods to examine risk averse or risk taking personal orientations. The resulting contractor/remodeler (PRO) and Do-It-Yourself (DIY) market segments are further characterized using discriminant analysis with three psychographic predictor sets of variables. These psychographic predictors, consisting of opinions/attitudes, knowledge/awareness and demographics, portray perceived physical risk segments to substantiate and provide additional insight on risk theory. Furthermore, this study may assist practitioners in planning communication strategies to provide a competitive advantage and/or to minimize potential losses by anticipating possible consumer protection requirements and litigation entanglements.

## INTRODUCTION AND BACKGROUND

### Perceived Risk

The theory of consumer behavior as an instance of risk taking was first advanced by Raymond Bauer in 1960 (Bauer 1960). Since then much research has been conducted dealing with the nature of perceived risk and risk reduction processes in consumer decision making (Bauer 1960; Cox 1967; Cox and Rich 1967; Roselius 1971; Bettman 1973). Consumers respond only to risks they perceive; this concept of perceived risk may be defined as follows: "Consumer behavior involves risk in the sense that any action of a consumer will produce consequences which he cannot anticipate with anything approaching certainty, and some of which at least are likely to be unpleasant" (Bauer; pg.89 1960). This definition emphasizes two key dimensions in terms of subjective or perceived risk (Bauer 1960): uncertainty and consequences.

Four major types of risk perceived by consumers have been identified as: functional, physical, financial and psychosocial (Roselius 1971; Shiffman and Kanuk 1983). Strategies for reducing perceived risk may include: (1) information seeking from formal or informal sources, (2) brand loyalty, (3) major brand image, (4) store image, (5) most expensive model, and (6) reassurances such as guarantees, warranties, government/ private laboratory testing or prepurchase trial (Shiffman and Kanuk 1983).

Zikmund and Scott (1973) suggest that products can be categorized in terms of the type and intensity of perceived risk they evoke from consumers and that this risk is a function of both the consumer

personality and the product class. Cox (1967) defined two risk personalities: the "clarifier" who seeks information to reduce ambiguity and the "simplifier" who reduces ambiguity by ignoring unpleasant uncertainties and/or consequences. Consumers have been further described as either risk takers or risk averters. The risk takers, also called "low-risk perceivers" or "broad categorizers," prefer a large selection whereas the risk averters, referred to as "high-risk perceivers" or "narrow categorizers," prefer to limit their choices (Bettman 1973; Roselius 1971; Pettigrew 1968). This suggests the importance of risk perception personalities as a determining market variable for segmenting markets, developing new products and guiding promotional activities.

#### **Treated Lumber Products and Retail Customers**

This study examines retail customers in terms of their physical risk perceptions of treated lumber products. Approximately 95% of these products are treated with the pesticide CCA (chromated copper arsenate) (Micklewright 1988). CCA treated products, one of the most dynamic segments of the wood products industry over the last decade, increased from approximately 1.5 billion board feet (bbf) in 1977 to approximately 6.0 bbf in 1986 (Micklewright 1988; SFPA 1988). According to Home Center Magazine's 1986 Market Profile (Franta and Johnson 1986), 94% of U.S. home centers carried treated lumber in 1986, up strongly from the 82% who carried and sold the line in 1984.

CCA provides excellent long lasting protection against rot or decay and insects, can be painted or stained like normal untreated wood, and is clean, odorless and non-leachable. This makes treated lumber ideal for weather exposed home improvements, predominantly decks. Strong demand is projected for treated lumber through 1995 (Fuller & Walsh 1983; SFPA 1988). As the market for treated lumber matures and competition at the retail level intensifies, merchandising efforts for this important line will undoubtedly be enhanced.

Treated lumber has been the focus of a long term study conducted by the Environmental Protection Agency (EPA). The Agency's bases for issuing a Rebuttal Presumption Against Registration (RPAR) for these inorganic arsenicals (CCA) were oncogenic, mutagenic and reproductive or feterototoxic effects (EPA, 1984). The EPA's final position on wood preservatives was issued in July, 1984 in Position Document (PD) 4 (EPA, 1984). In September 1985, the EPA and the wood preserving industry signed a settlement agreement regarding the use and sale of wood treatment chemicals. In essence, CCA treated lumber products were deemed to be safe, reliable products for retail sale and residential use, provided a few common sense safety precautions were followed. The wood preservative chemicals are classified as pesticides and will be regulated as such; however, wood treated with these chemicals is not similarly regulated since the preservative chemicals are "fixed" to the wood substrate to form an insoluble non-leachable compound.

In a study by Slovic et al. (1981), four different groups of people were asked to rate 90 activities and technologies according to the mean risk and benefit judgement as rated on a 0 - 100 scale from "not risky" to "extremely risky" and from "no benefit" to "very great benefit". Pesticides were ranked seventh for perceived risk and fifty-seventh for perceived benefit. This substantiates the findings of Rethans and Albaum (1981) that perceived risk or hazardousness was inversely related to perceived benefit or the acceptability of product risks.

Among 18 characteristics of risk hypothesized to be important in a previous study by Slovic et al. (1980), three factors, labeled dread, familiarity, and exposure, seem able to account for most of the 18 risk variable interrelationships. Application of factor analysis, an interdependence statistical technique used for data reduction, showed that the pattern of intercorrelations could be represented by these three factors. Pesticides received the tenth, fifty-ninth and ninth highest ranking for the factors dread, familiarity and exposure respectively (Slovic et al. 1980). In other words, pesticides are considered to be highly dreaded, exposing large numbers of people and are relatively unfamiliar as compared to 89 other hazards studied (Slovic et al. 1980).

## CONCEPTUALIZATION

According to Ross (1975) the relative importance of each type of risk depends on the nature of the product and purchase decision. For CCA treated lumber products, it may be argued that the most germane perceived risk type relates to the uncertainty of safety and consequences to the user, to other people and to the environment in general (Schiffman and Kanuk 1983). As a basis for empirical investigation, physical risk perceptions from a marketing perspective address the product risk characteristics which are believed to influence the acceptability of that risk.

Roselius (1971) viewed several risk relievers simultaneously to determine the degree of assistance each provided to reduce the threat of four types of loss: (1) time loss, (2) hazard loss, (3) ego loss and (4) money loss. His study further characterized risk relievers according to the varying impact they had on the buying situation, the kind of loss perceived and the type of buyer involved. The conceptualization offered by Roselius (1971) is quite general and, in fact, may be narrowed considerably to allow a researcher to focus on specific products and customers.

In this case, the perceived safety of CCA treated lumber products to builders, do-it-yourselfers and residents is used to segment markets according to a risk personality orientation. The conceptualization further emphasizes the relationships between perceived physical risk segments and three sets of predictor variables used to profile retail consumer groups of CCA treated lumber products.

More specifically, the conceptual links used to characterize each of the two major retail customers (builders and do-it-yourself'ers) involve opinions/attitudes regarding treated lumber products, the knowledge/awareness consumers possess regarding these products and demographic items. These hypothesized links are shown in Figures 1 and 2.

### **Consumerism**

Public policy makers interested in consumer protection are concerned with product safety and improved information whereas practitioners seek the causes of consumer dissatisfaction (Berkman and Gilson 1986). Through customer complaints, marketers may identify the causes of dissatisfaction and thus creating an opportunity for increased satisfaction (Berkman and Gilson 1986). Consumerism may be defined as "the social movement seeking to augment the rights and power of buyers in relation to sellers" (Kotler; pg.273 1984). The rapid rise of consumerism has occurred in conjunction with a legal environment that has shifted in favor of the consumer (Berkman and Gilson 1986). The implications to manufacturers may be far reaching. Those firms who interpret this new consumer rights environment as a threat may be ignoring an important opportunity to obtain feedback from the customer and thus achieve a competitive advantage. The excellent companies derive benefit by listening and being close to their customers (Peters and Waterman 1982). As treated products achieve wider usage, practitioners may find that addressing this issue

is no longer an option but is imperative.

## RESEARCH METHODOLOGY

### Data Collection

This study consisted of two distinct populations: the professional builder/contractor (PRO) and the do-it-yourselfer (DIY'er). Combined, these two groups comprise over 86% of retail sales and approximately 71% of all sales of CCA treated lumber products (Walsh 1985).

### Phase I ... the "PRO"

Professional contractor populations in the U.S. have been identified by various national standardized information services (Best 1986; Zeller 1986; American Business Lists 1986). According to 1986 sample frames compiled from all phone book yellow page directories in the U.S., the following contractor populations were identified:

One-Family Units	50,614
Home Improvement	45,496
Patio Deck Builders	2,624

The commercial marketing information service was instructed to merge the three categories and delete the duplications. This provided a single mutually exclusive population with the elements defined as "New One-Family, Home Improvement and Patio and Deck Contractors." This single category consisted of 75,734 elements that comprised the total PRO population as related to this study.

## Phase II ... the "DIY'er"

According to the latest U.S. Bureau of the Census figures, there were approximately 89,500,000 households in the U.S. in March, 1987. Alvin B. Zeller, Inc. of New York, NY has compiled a list of 55,000,000 households from U.S. Bureau of Census data, state and county tax records and national insurance registers. From this listing, a systematic random sample of 5 million households was derived; these 5,000,000 elements served as the basis of the research sample for the DIY household customer.

### **Sampling**

Mail surveys were administered, following thorough pretests, to 3,361 and 3,224 randomly selected PRO's and DIY'ers, respectively in all 50 states on an Nth name basis to insure geographic proportionality. A conservative estimated response rate of 15% was based on previous studies by Franta and Johnson (1988), Boyd et al. (1981), Donald (1960) and Hochstim (1970) for random mail surveys in the U.S. Therefore, by mailing 3,000 questionnaires to each of the two major populations, over 400 useable responses were anticipated, thus providing a 95% confidence interval with an absolute error of 5% or less in the overall survey results (Mendenhall et al. 1986). Tables 1 and 2 illustrate the sampling schemes and response rates by region.

The mail survey method of data collection has shown to be the most efficient and cost effective vehicle for securing data from such a

geographically dispersed population (Kanuk and Berenson 1975). A follow-up was sent approximately 10 days after the initial mailings and 543 and 491 usable questionnaires were returned from PRO and DIY respondents, respectively. This resulted in an 18% response rate for the PRO and a 17% response rate for the DIY'er.

### **Nonresponse Bias**

Potential bias due to nonresponse was examined by various methods. First, a comparison between early and late respondents on eleven key demographic variables for the PRO and seventeen demographic DIY items were examined (Fowler 1984). The Chi-square test of independence indicated that, with 95% confidence, no differences were found between early and late respondents. This implies no evidence of nonresponse bias.

Second, telephone follow-ups to nonrespondents were used to assist validation of the survey results (Fowler 1984). Following the return of all PRO surveys, forty nonrespondents were contacted by telephone in order to further determine if any nonresponse bias existed in our sample of 543 PRO's. The same demographic variables (except education and total sales which were difficult to obtain via telephone from respondents) were used to analyze nonresponse bias. The Chi-square test of independence was again employed. Results indicate that for all nine demographic variables no differences exist between the respondents and nonrespondents allowing concerns over nonresponse to be set aside.

The third, and perhaps most accurate means by which potential nonresponse bias may be examined is through comparisons with the population as a whole (Fowler 1984). Study limitations were viewed by comparing our study respondents to the U.S. population via the 1987 Statistical Abstract of the U.S. These contrasts indicate that our DIY sample consists of a higher percent of married couple households (83% compared to 58% nationwide) and a much greater percent of married couples with children under 18 (80% versus 28% nationally). In addition, our sample consists of homeowners who are relatively younger, more affluent and better educated than the general population. Thus defined, we do not attempt to generalize the study results to all U.S. households; simply to a segment of U.S. households. The sample identified herein, we feel, should be of considerable interest to many retailers, treaters, chemical manufactures and lumber producers since they represent a significant market segment of more stable, knowledgeable and active Do-It-Yourself treated lumber consumers.

The Home Center Research Bureau's "Home Improvement Consumers: A Comprehensive Analysis" indicates that 85% of single-family homeowners in their 1984 study reported some DIY activity (Home Center Research Bureau 1984). Our study shows that 86% of responding households have conducted DIY activities.

## Measures

Physical risk perceptions were measured via statements referring to the general safety of CCA treated lumber products. Seven items for the PRO customer and eight DIY customer items were measured on a 5-point Likert scale anchored by 1= "strongly disagree" to 5= "strongly agree" to determine a perceived risk orientation (Tables 3 and 4).

Opinion and attitude items were quantified with nine statements for PRO's relating to CCA treated lumber products; DIY'ers responded to sixteen statements concerning these products and related DIY activities. Once again, the same 5-point Likert scale of agreement was used to measure these responses (Table 5 and 6).

Knowledge and awareness revolved around the following five treated lumber items: (1) treated lumber brand awareness, (2) knowledge of the preservative chemicals used in the treated products, (3) knowledge of Consumer Awareness Sheets (CIS's) (one page fliers distributed by retailers to inform customers of the proper use, handling and disposal of treated lumber products), (4) awareness of Permanent Wood Foundations (PWF's), an engineered wood foundation system and (5) knowledge of the durability of treated lumber products in terms of years of service life. The first four concepts were measured by percent of respondents who were knowledgeable and aware of the concept. The last item, durability, was measured in average years (Tables 7 and 8).

Demographics included a number of commonly used measures of socioeconomic characteristics relative to the two populations of interest. The DIY'er lends itself to a fuller set of fifteen demographic items including media habits whereas the PRO is described with a more austere set of seven variables (Tables 9 and 10).

### **DATA ANALYSIS**

Given the conceptualization of perceived physical risk as a function of both the product class and the customer personality as "low-risk perceivers" versus "high-risk perceivers", it is logical to segment the two major treated lumber customer groups according to these dimensions. Each of the two retail groups, the PRO and the DIY'er, were subjected to a separate hierarchical cluster analysis using SPSS<sup>x</sup> (1986) statistical software (Hair, Anderson and Tatham 1987). Based on responses to the 7 PRO and 8 DIY physical risk variables described in Tables 3 and 4, this analysis grouped together individuals who exhibited a similar pattern of response across these physical risk opinion statements.

The analysis consequently identified a high-risk perceiver segment labeled as "risk averse" and a low-risk perceiver tagged a "risk taker" for each of the two major retail groups identified herein, the PRO and the DIY'er. The profiling stage provides F-ratios for the criterion variables and involves the use of discriminant analysis of the clusters based on risk personality orientation of the two PRO physical risk segments (Table 3) and two comparable segments of

DIY'ers (Table 4) (Bahn and Granzin 1985). Subsequent ANOVA and discriminant analysis, involving the three predictor sets of opinions/attitudes, knowledge/awareness and demographics, are used to further profile the two risk cluster segments for each of the two major retail customers. Classification matrices were developed for each of discriminant analysis to predict the accuracy of the significant functions (Hair et al. 1987). Utilizing the maximum chance criteria (Hair et al. 1987), all discriminant models are valid.

## FINDINGS

### PRO Physical Risk Clusters

The cluster analysis for PRO retail customers produced two groups of customers based on the 7 physical risk variables (Table 3). The variables shown represent the variables used in clustering. The statistics provide the relative contribution of each of the seven variables to segment formation. Based on the F-ratios, the five variables lending the most to the two clusters are, in order of importance: "safe for counter tops and butcher blocks," "safe for picnic table tops," "safe to resident for indoor applications," "entirely safe to the builder" and "entirely safe with the proper safety precautions."

Canonical loadings of an absolute .30 and greater are used to describe the multivariate relationship of a statistically significant function (Hair et al 1987). The "risk takers" are in stronger agreement than the "risk averse" on the following four risk perception

statements: treated lumber is safe for counter tops/butcher blocks, treated lumber is safe for picnic table tops, treated lumber is safe for indoor applications and treated lumber is safe to the builder.

In sum, risk takers represent builders who feel less threatened by CCA treated lumber products and resident and builder safety. These segments substantiate previous findings that consumers may be delineated by a risk personality (Shiffman and Kanuk 1983). The "risk taker" segment could be correlated to a low-risk perceiver or a broad categorizer. Conversely, the "risk averse" segment may be viewed as somewhat parallel to previously identified high-risk perceivers or narrow categorizers.

#### **DIY Physical Risk Clusters**

A similar cluster analysis for DIY retail customers also produced two distinct groups of customers based on the 8 physical risk variables (Table 4). Once again, these variables form the basis of the two clusters of DIY customers. The F-ratios indicate that four variables contributed the most to the two segments. In order of importance, they are: "entirely safe with the proper safety precautions," "entirely safe to the DIY'er," "safe to resident for outdoor applications" and "treated lumber can safely be used for picnic table tops."

The multivariate discriminant analysis shows the "risk taking" DIY segment versus "risk averse" DIY'ers to agree more on the following three opinion statements: treated lumber is entirely safe with proper

use, handling and disposal precautions, treated lumber is entirely safe to the DIY'er and treated lumber is safe to the resident for outdoor applications. Correspondingly, the risk taker may be viewed as a low-risk perceiver who will risk or more willingly accept risk to maximize positive instances of consumption (Pettigrew 1968).

### **Opinions/Attitudes**

Two of the nine opinion/attitude statements for PRO's reached significance (differed by risk personality type) at the .05 level in tests using univariate ANOVA (Table 5). The two significant items are "PWF's represent an acceptable alternative to masonry foundations" and "a warranty would make me more likely to build PWF's." To reduce uncertainty, consumers may seek reassurance through warranties and/or comparison of product alternatives (Shiffman and Kanuk 1983).

The significant discriminant function loads heavily on the same two opinion/attitude items plus a third item: "I am willing to pay more for higher quality/better looking treated lumber products," thus expanding the portrayal of these two physical risk segments. The function, significant at the  $p = .00$  level, shows Group A, the risk averse PRO's, as more willing to pay a premium for quality and appearance and less agreeable that PWF's are acceptable alternatives and are more luring with a warranty. This function depicts a segment of builders who will pay to reduce risk and will not easily accept new products despite a risk reducing warranty. This finding is consistent with the literature which depicts the high perceiver (risk averse)

consumer as a narrow categorizer who limits choices to a few safe alternatives (Pettigrew 1968).

In terms of the DIY physical risk segments, seven of the sixteen opinion/attitude statements differed significantly between risk averters and risk takers in univariate analysis (Table 6). "Pay more for quality and appearance," "satisfied with the quality and appearance," "more confident about DIY projects than most people," "own a DIY workshop," "have time for DIY projects," "do DIY projects to save money" and "get satisfaction from DIY projects" distinguish among the risk averse and risk taker segments of DIY'ers in univariate analysis.

The multivariate analysis further describes these two segments with six of the seven aforementioned variables loading at .30 or higher. Only "own a DIY workshop" did not load significantly on the canonical function which describes the risk taking DIY'ers as follows: more willing to pay for quality and appearance treated products, more satisfied with the quality and appearance of treated products, more confident DIY'ers, more time for DIY activities, and greater agreement that he/she tackles DIY projects to save money and that he/she derives satisfaction from DIY activities. In general this analysis represents a risk taking DIY who, unlike the PRO risk taker, will pay a premium to reduce risk. Moreover, this risk taking segment is a more confident and active DIY'er who is generally more satisfied with the quality and appearance of treated lumber products.

In summary, this profile of physical risk perception segments based on sixteen opinion/attitude statements delineates a relatively active and confident risk taking DIY segment versus a less active, less confident risk averse DIY group.

### **Knowledge/Awareness**

Only one of the five PRO knowledge/awareness items reached significance in the univariate analysis (Table 7). These results show the risk takers or Group B builders to have a greater treated lumber brand awareness than the risk averse segment. The discriminant function, significant at  $p = .017$ , represents a more knowledgeable and aware segment of risk takers in terms of both brands and the preservative chemicals used in the treating process. These low perceivers (Group B), who involve a larger range of product alternatives (broad categorizers) in the consumptive process, represent a more informed builder segment.

Analysis featuring these same five knowledge/awareness items for the DIY risk segments did not produce any significant variables by ANOVA (Table 8). Moreover, the multivariate analysis was non-significant at  $p = .63$ .

One noteworthy feature of this analysis is the general lack of knowledge and awareness of treated lumber products that both DIY and PRO retail customers exhibit. Overall only about one-third of PRO's and one-fifth of DIY'ers who have used treated lumber products could recall unaided at least one brand of treated lumber. Moreover,

knowledge of the preservative chemicals and the Consumer Information Sheets is very low for these two major retail groups.

### **Demographics**

Four of the seven PRO demographic measures reached significance in the univariate analysis (Table 9). When examined singly, treated lumber purchases in 1987, education levels, firm size and builder type distinguish among the two physical risk segments of builders. The risk averse segment versus the risk taking segment represents a PRO with lower treated lumber usage, less formal education, smaller average firm size and more repair and remodeling contractors.

The multivariate analysis confirms the univariate findings with the same four items represented in the significant discriminant function. This suggests that the risk averse segment of PRO's, a less educated and less knowledgeable consumer, is also a lower user of the product line, CCA treated lumber, that forms the basis of this research.

In terms of the two risk segments of DIY'ers, four of the fifteen demographic items reached significance by ANOVA (Table 10). The risk averse segment contains a lower percent of DIY'ers, lower mean treated lumber usage for the past three years (1985-1987), less average hours per month of DIY activity and more female respondents.

The discriminant analysis produced a much fuller portrayal of the two DIY risk segments. The significant discriminant function represents a risk taking segment as a more active DIY'er with higher

treated lumber usage, greater newspaper readership, fewer females, lower education for both the respondent and the spouse, fewer household incomes and a lower mean home value. In general, the high perceivers or risk averse segment of DIY respondents, as indicated in the opinion/attitude analysis, include less active and confident DIY'er with lower treated lumber usage. However, in contrast to the PRO risk segments, this risk averse DIY'er has higher mean education levels.

#### DISCUSSION

A consumer's perceptions about a specific market item can be viewed from four perspectives: brand images, price perceptions, perception of salespeople, self or object, and risk perception (Berkman and Gilson 1986). The level of risk a consumer perceives in a given purchase decision is a function of both the type of product and the consumer's personality. Perceived risk, not actual risk, influences purchase behavior (Cox 1967; Pettigrew 1968; Roselius 1971; Bettman 1973).

For other consumer products, Arndt (1967) found perceived risk to differ for high versus low risk perceivers for coffee; Zikmund and Scott (1973) provided contradictory results for lawn furniture, color TV's and stationery. According to Ross (1974), the effect of self-confidence on perceived risk remains unclear. This study indicates that "risk takers" differ significantly from "risk averse" DIY'ers in terms of a higher self-confidence rating for do-it-yourself

projects.

Physical risk, one of the fundamental components of risk, forms the basis of the segmentation scheme to differentiate between risk averse and risk taking PRO and DIY customer personalities and their purchase decisions regarding treated lumber materials. The results support the relationship between membership in physical risk segments and opinions/attitudes, knowledge/awareness and demographics for PRO customers and opinions/attitudes and demographics for DIY'ers. This suggests the usefulness of considering physical risk perception segments as a central theme for understanding the consumption process for treated lumber products.

For the professional contractor/remodeler, the physical risk statements that distinguish the risk averse segment from the risk taking PRO are as follows: CCA treated lumber products are less safe for counter tops and butcher blocks; these products are less safe for picnic table tops; treated lumber is less safe for indoor applications; and these treated products are less safe to the builder. These risk averse builders consist of a greater percentage of repair and remodelers with smaller firms, less education and lower levels of treated lumber usage as compared to the risk taking segment. Moreover, the risk averters in contrast to the risk takers are less knowledgeable of treated brands and preservative chemicals, agree more strongly that quality and appearance is worthy of a price premium and are less accepting of Permanent Wood Foundation systems and warranty promises.

Profiling the do-it-yourself'er reveals that the risk averse segment is less convinced that CCA treated lumber is safe for outdoor applications, that these products are safe to the DIY'er and that these treated products are entirely safe with the proper safety precautions compared with DIY risk takers. This risk averter personality type is characterized further as a less active and confident DIY'er with lower treated lumber usage, lower newspaper readership, a higher percent of females, higher education, a greater mean number of household incomes, and more expensive homes compared to the risk takers. In addition, the risk averting DIY'er may be distinguished from the risk taker in terms of being less willing to pay a premium for higher quality and appearance treated lumber products and a lower satisfaction with the quality and appearance of these treated products.

The lifestyle form of psychographic segmentation employed in this study represents a detailed insight by which many types of segment descriptors are employed. This type of general segmentation leads to efficient communication planning in terms of advertising, promotion, retailer-support merchandising, publicity and public relations (Ray 1982). For home centers and building supply centers, treated lumber manufacturers and preservative chemical companies, perceived risk segment profiles may further assist managers in their understanding of PRO and DIY retail customers for treated lumber products.

Great care should be exercised when expanding this portrayal to other wood and non-wood product lines in the home improvement market

since other dimensions of risk such as functional, financial and psychosocial, may be considered as more significant segmentation criteria.

### CONCLUSIONS

This study attempts to delineate, by perceived risk orientation, various treated lumber buying segments then to define distinctive traits of each subsegment. This should enable practitioners to develop customer-specific marketing programs to address these perceived risk segments.

Perceived risk theory suggests that methods of reducing the uncertainty of consequences for important purchase decisions, such as increasing brand visibility and loyalty, providing both formal and informal product information, selling through reputable dealers and various reassurance programs may represent effective market strategies. Risk averse and risk taking segments were identified for both professional contractors and do-it-yourself'ers individually based on physical risk perceptions. Multivariate analysis provided results that supported the hypothesis that the lifestyle measures of opinions/attitudes, knowledge/awareness and demographics relate to the physical risk perceptions for treated lumber products.

Of eleven different risk relievers identified by Roselius (1971), "brand loyalty" and "major brand image" were ranked first and second respectively as relievers of the four types of losses or risks. For hazard or safety loss, specifically, government testing proved to be

the third most favorable risk reliever. However, as this study shows, only one-third of PRO's and 21% of DIY'ers could recall at least one brand of treated lumber. In addition, knowledge of preservative chemicals and Consumer Information Sheets is low for both groups indicating a lack of knowledge about the EPA initiated Consumer Awareness Program.

There appears to be much room for additional work by chemical companies, treaters and retailers in the application of risk relieving strategies to enhance a competitive position in the treated lumber arena. Furthermore, public policy makers that address consumer protection may wish to consider these findings in terms of the perceived safety risk from the consumer perspective associated with a product under study by the EPA.

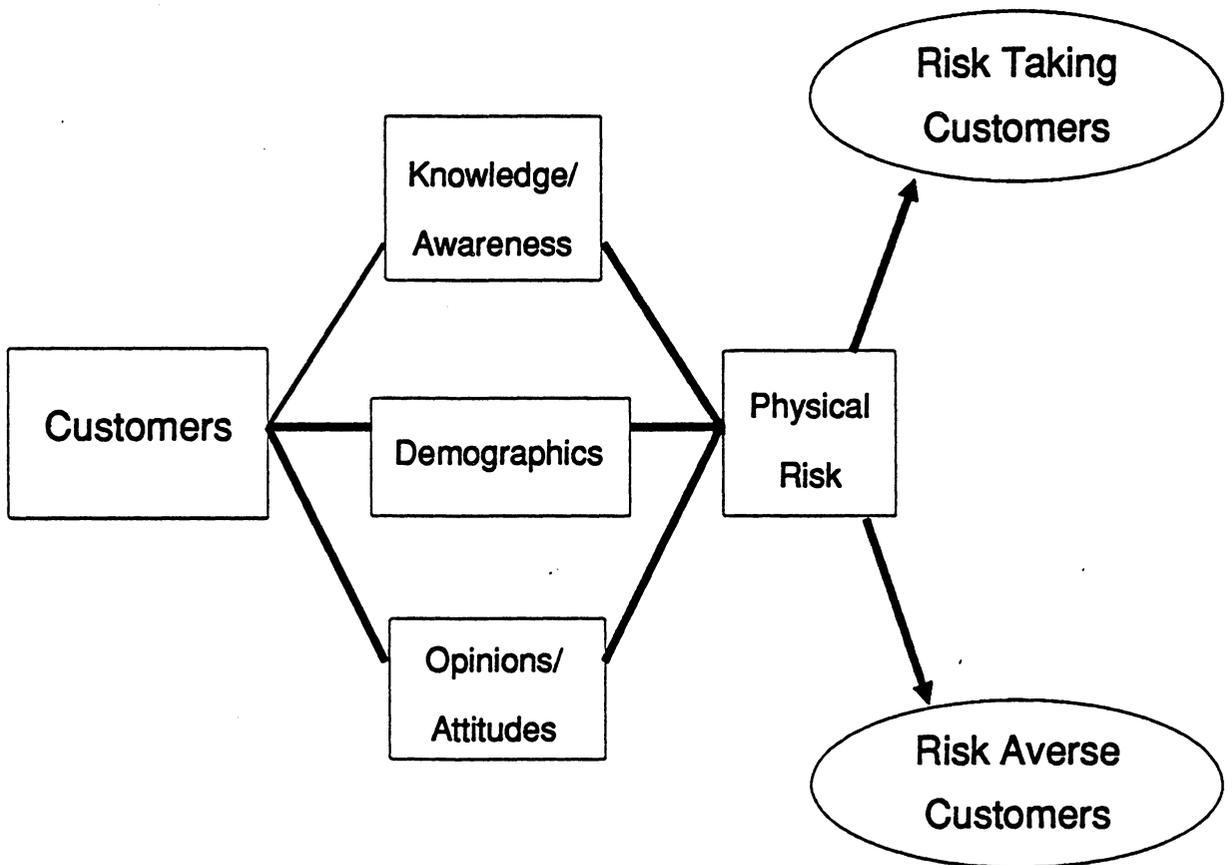
These findings support further work in the area of perceived risk dimensions as a central theme of consumer buying decisions in the marketplace. Moreover, these results extend previous findings on the characterization of physical risk determination from a safety and hazard management perspective while shedding additional light on personality types for segmenting risk orientation.

### Literature Cited

- American Business Lists, Inc. (1986), 5707 South 86th Circle, Omaha, NE.
- Arndt, Johan (1967), "Perceived Risk, Sociometric Integration and Word of Mouth in the Adoption of a New Food Product," (In Risk Taking and Information Handling in Consumer Behavior, Donald F. Cox, ed.):82-108, Boston: Graduate School of Business Administration, Harvard University.
- Bahn, Kenneth D. and Kent L. Granzin (1985), "Benefit Segmentation in the Restaurant Industry," J. of the Academy of Marketing Science, Vol. 13, No. 3 (Summer):226-247.
- Bauer, Raymond A. (1960), "Consumer Behavior an Risk Taking," (In Dynamic Marketing For a Changing World, R. S. Hancock, ed., Chicago, Illinois):389-398, American Marketing Association, June, 1960.
- Berkman, Harold W. and Christopher Gilson. (1986), Consumer Behavior Concepts and Strategies," Kent Publishing Company, Boston, MA.
- Best Mailing Lists and Printing Corp. (1986), 34 West 32nd St., New York, N. Y. 10001.
- Bettman, James R. (1973), "Perceived Risk and Its Components: A Model and Empirical Test," J. of Marketing Research, Vol. X (May 1973), 184-90.
- Boyd, Jr., H. W., R. Westfall, and S. F. Stasch (1981), "Marketing Research Texts and Cases," Richard D. Irwin, Inc., Homewood, IL.
- Cox, Donald F. (1967), "Risk Taking and Information Handling in Consumer Behavior," Boston: Graduate School of Business Administration, Harvard University, 1967, 487-506.
- Cox, Donald F. and Stuart U. Rich (1967), "Perceived Risk and Consumer Decision Making--The Case of Telephone Shopping," (In Risk Taking and Information Handling in Consumer Behavior, Donald F. Cox, ed.):82-108, Boston: Graduate School of Business Administration, Harvard University, 1967.
- Donald, Marjorie N. (1960), "Implications of Non-Response for the Interpretation of Mail Questionnaire Data," Public Opinion Quarterly 24(Spring):99-114.

- Environmental Protection Agency (1984), "Creosote, Inorganic Arsenicals, Pentachlorophenol," Position Document No. 4, Office of Pesticides and Toxic Substances, U.S. Environmental Protection Agency, Washington, DC, 334 pgs.
- Fowler, Floyd J. Jr. (1984), "Survey Research Methods," Sage Publications, Inc., Beverly Hills, CA.
- Franta, Harry and Mark L. Johnson (1986), "Home Center Magazine's 1986 Market Profile," (September)19-33.
- Fuller, B. and M. R. Walsh (1983), "Treated Wood Study. The Markets for Treated Lumber, Timbers and Plywood: Recent Developments and Prospects for the Future," Data Resources Inc. (changed to: Resource Information Systems, Inc.), Bedford, MA.
- Hair, Joseph F. Jr., Rolph E. Anderson, and Ronald L. Tatham (1987), "Multivariate Data Analysis with Readings," Macmillan Publishing Company, New York, NY.
- Hochstim, Joseph R. (1967), "A Critical Comparison of Three Strategies of Collecting Data From Households," J. of the Statistical Assn. 62 (September 1967):976-989.
- Home Center Research Bureau (1984), "Home Improvement Consumers: A Comprehensive Analysis," Home Center Magazine, Lincolnshire, IL.
- Kanuk, Leslie and Conrad Berenson (1975), "Mail Surveys and Response Rates: A Critical Review," J. of Marketing Research, Vol. XII (November):440-453.
- Kotler, Philip (1984), "Marketing Management," 5th ed. pp. 273-275. Prentice Hall, Englewood Cliffs, NJ.
- Micklewright, James T. (1988), "Wood Preservation Statistics, 1986: A Report To The Wood-Preserving Industry In The United States," (January).
- Peters, Thomas J. and Robert H. Waterman (1982), "In Search of Excellence: Lessons From America's Best Run Companies," Harper & Row, New York.
- Pettigrew, Thomas F. (1968), "The Measurement and Correlates of Category Width as a Cognitive Variable," J. of Personality, 26(December): 532.
- Porter, Michael E. (1985), "Competitive Advantage Creating and Sustaining Superior Performance," the Free Press. A Division of Macmillan, Inc., New York, NY.

- Ray, Michael L. (1982), "Advertising and Communication Management," Prentice-Hall, Inc., Englewood Cliffs, NJ.
- Rethans, Arno J. and Gerald S. Albaum (1981), "Toward Determinants of Acceptable Risk: The Case of Product Risks," (In Advances in Consumer Research, K. B. Monroe ed.), Vol. 8, pp. 506-510.
- Rich, S. U. (1986), "Recent Shifts in Competitive Strategies in the U.S. Forest Products Industry and the Increased Importance of Key Market Functions," Forest Products J. 36(7/8):34-44.
- Roselius, Ted (1971), "Consumer Rankings of Risk Reduction Methods," J. of Mktg., Vol.35 (January), pp. 56-61.
- Ross, Ivan (1974), "Perceived Risk and Consumer Behavior: A Critical Review," (IN Advances in Consumer Research, Vol. II, M. J. Schinger ed., Urbana, Illinois), Association for Consumer Research).
- Schiffman, Leon G. and Leslie Lazar Kanuk (1983), "Consumer Behavior," Prentice-Hall, Inc., Englewood Cliffs, NJ
- SFPA (Southern Forest Products Association) (1988), "It's Outdoor Deck-Building Season Again," (In Woodshop News, May, pp. 16-18.
- Slovic, P., B. Fischhoff and S. Lichtenstein (1980), "Facts and Fears: Understanding Perceived Risk," (In Societal Risk Assessment. How Safe is Safe Enough?):181-216. Published Symposia held at General Motors Research Laboratories, Warren, MI. Plenum Press, New York.
- Slovic, P., B. Fischhoff and S. Lichtenstein (1981), "Facts and Fears: Societal Perception of Risk," Adv. in Consumer Res., Vol. 8.(In K. B. Monroe ed.):497-502.
- SPSS<sup>x</sup> Inc., (1986), "User's Guide: Statistical Package for the Social Sciences, Version X," 2nd Edition, Chicago, IL.
- Walsh, Mel R., (1985), "Treated Lumber: Bright Spot in Wood Economy", Forest Indust., (November)36-38.
- Zikmund, William G. and Jerome E. Scott (1973), "A Multivariate Analysis of Perceived Risk, Self-Confidence and Information Sources," (In Advances in Consumer Research, Vol. I. Proceedings of the Association for Consumer Research. S. Ward and P. Wright, ed., Chicago, Illinois):406-416.
- Zeller, Alvin B., Inc. (1986), 475 Park Ave. South, New York, N. Y. 10016.



**Figure 1. Conceptual Model of Linkages Between Knowledge/Awareness, Demographics, Opinions/Attitudes and Physical Risk Perceptions For Two Segments of Retail Customers**

**Table 1. PRO Sampling Plan and Response Rates  
Four Region Summary**

Region	Total number of PRO's	PRO's sampled		--Responses--		
		(number)	(percent of sample)	(number)	(% of total)	(response rates)
West	13,711	683	20.3%	98	18%	16%
South	29,555	1,169	34.8%	149	28%	14%
North Central	21,055	837	24.9%	143	26%	20%
Northeast	11,413	672	20.0%	135	25%	23%
Unidentified <sup>1</sup>				18	03%	
<hr/>						
Totals =	75,734	3,361	100.0%	543	100%	18% <sup>3</sup>
Less Undeliverables:		<398> <sup>2</sup>				
<hr/>						
Total Sampled:		2,963				
<hr/>						

<sup>1</sup> Eighteen respondents did not indicate which state they conducted the majority of their business and therefore could not be categorized by state or region.

<sup>2</sup> 398 questionnaires were returned as undeliverable.

<sup>3</sup> Total response rates are calculated as: 
$$\frac{\# \text{ responses}}{\# \text{ mailed} - \text{undeliverables}} = \frac{543}{2,963} = 18.3\%$$

**Table 2. DIY Sampling Plan and Response Rates  
Four Region Summary**

Region	--Households sampled--		--Responses--		
	(percent)	(number)	(number)	(% of total)	(response rates)
West	15.9%	513	78	16%	15%
South	35.6%	1,148	159	32%	14%
North Central	28.6%	922	152	31%	16%
Northeast	19.9%	641	101	21%	16%
Unidentified <sup>1</sup>			1	00%	
<hr/>					
Totals =	100.00%	3,224	491	100%	17% <sup>3</sup>
Less Undeliverables:		<358> <sup>2</sup>			
<hr/>					
Total Sampled:		2,866			

<sup>1</sup> One respondent did not indicate which state he/she lived and therefore

could not be categorized by state or region.

<sup>2</sup> 358 questionnaires were returned as undeliverable.

<sup>3</sup> Total response rates

are calculated as: 
$$\frac{\# \text{ responses}}{\# \text{ mailed - undeliverables}} = \frac{491}{2,866} = 17.1\%$$

**Table 3. Mean Physical Risk Patterns For Two Risk Perception Groups of PRO's.**

Risk Perception Statements:	Group A "Risk Averse" (n=220)	Group B "Risk Takers" (n=216)	All PRO's (n=436)	F-Ratio	Canonical Loadings
--mean rating <sup>1</sup> --					
CCA p-t <sup>2</sup> lbr. emits odors	3.00	2.79	2.90	6.33	-.11
CCA p-t lbr. is safe for counter tops and butcher blocks	1.33	2.37	1.84	203.20	.65
CCA p-t lbr. can safely be used for picnic table tops	2.45	3.37	2.90	84.94	.41
CCA p-t lbr. is safe to resident for outdoor applications	3.84	3.78	3.81	0.63	-.04
CCA p-t lbr. is safe to resident for indoor applications	2.74	3.35	3.04	47.10	.31
CCA p-t lbr. is safe to the builder	2.86	3.45	3.15	46.14	.31
With proper use, handling and disposal of CCA p-t lbr. they are entirely safe	3.29	3.77	3.53	41.75	.29
Centroids	-1.05	1.06			

<sup>1</sup> Opinions were rated on a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

<sup>2</sup> P-t represents pressure treated.

Note: Classification Matrix Results:

Hold-out Sample = 82.83% correctly classified

C<sub>max</sub> = 221/543 = 40.70%

Table 4. Mean Physical Risk Patterns For Two Risk Perception Groups of DIY'ers.

Risk Perception Statements:	Group A "Risk Averse" (n=217)	Group B "Risk Takers" (n=246)	All DIY'ers (n=463)	F-Ratio	Canonical Loadings
	--mean rating <sup>1</sup> --				
CCA p-t <sup>2</sup> lbr. emits odors	2.93	2.69	2.81	9.33	-.10
CCA p-t lbr. is safe for counter tops and butcher blocks	2.47	2.37	2.41	1.21	-.04
CCA p-t lbr. can safely be used for picnic table tops	2.96	3.44	3.37	54.77	.25
CCA p-t lbr. is safe to resident for outdoor applications	3.24	4.08	3.69	204.10	.49
CCA p-t lbr. is safe to resident for indoor applications	2.61	3.02	2.83	27.03	.18
CCA p-t lbr. is safe to the DIY'er	2.89	3.90	3.43	286.70	.58
With proper use, handling and disposal of CCA p-t lbr. they are entirely safe	3.11	4.11	3.64	429.60	.71
I would like more info. on proper use, handling and disposal of CCA p-t lumber	3.67	3.83	3.75	3.15	.06
Centroids	-1.45	1.28			

<sup>1</sup> Opinions were rated on a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

<sup>2</sup> P-t represents pressure treated.

Note: Classification Matrix Results:

Hold-out Sample = 79.88% correctly classified

C<sub>max</sub> = 219/543 = 40.33%

Table 5. Discriminant Analysis of Two PRO Risk Segments  
in Terms of Nine Opinion Items.

Opinion/Attitude Statements	Group A "Risk Averse" (n=220)	Group B "Risk Takers" (n=216)	Univariate F-ratios	p	Canonical loadings <sup>1</sup>
	--mean rating <sup>2</sup> --				
Brand named p-t <sup>3</sup> lbr. is superior to generics	3.22	3.26	0.22	.64	.09
More concerned with appearance vs. grade for p-t lbr.	3.05	3.09	0.10	.75	.06
Retail salespeople are knowledgeable about p-t lbr.	2.52	2.45	0.53	.47	-.14
Will pay more for higher quality/ appearance p-t lbr.	3.76	3.62	3.39	.06	-.35
Will pay more for branded p-t lbr.	2.86	2.97	1.64	.20	.25
Would pay more for KDAT <sup>4</sup> p-t lbr.	3.49	3.39	1.37	.24	-.23
PWF's provide accept- able alternatives to masonry found'ns	2.68	2.97	9.43	.00	.59
Masonry foundations are more liveable vs. PWF's	3.20	3.19	0.00	.95	-.01
Warranty would increase chance of bldg. PWF's	3.24	3.56	9.13	.00	.58
Centroids	-0.25	0.25			

<sup>1</sup> The discriminant function is significant at p= .000.

<sup>2</sup> Opinions were rated on a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

<sup>3</sup> P-t represents pressure treated.

<sup>4</sup> KDAT represent Kiln Dried After Treatment.

Note: Classification Matrix Results:

Hold-out Sample = 58.80% correctly classified

C<sub>max</sub> = 216/543 = 39.78%

Table 6. Discriminant Analysis of Two DIY Risk Segments  
in Terms of Sixteen Opinion Items.

Opinion/Attitude Statements <sup>1</sup>	Group A "Risk Averse" (n=216)	Group B "Risk Takers" (n=246)	Univariate F-ratios	p	Canonical loadings <sup>2</sup>
	--mean rating <sup>2</sup> --				
Brand named p-t <sup>3</sup> lbr. is superior to generics	3.07	3.19	2.76	.10	.24
More concerned with appearance vs. grade for p-t lbr.	2.73	2.87	1.89	.17	.20
Retail salespeople are knowledgeable about p-t lbr.	2.91	3.07	3.20	.07	.25
Will pay more for higher quality/ appearance p-t lbr.	3.51	3.67	4.64	.03	.31
Will pay more for branded p-t lbr.	2.95	2.90	0.41	.52	-.09
Am satisfied with the quality/appear. of p-t products	3.41	3.62	7.94	.00	.40
Will pay more for p-t lbr. versus cedar/redwood	2.79	2.68	1.97	.17	-.20
PWF's provide accep- table alternatives to masonry found'ns	2.73	2.89	3.20	.07	.26
Warranty would increase chance of bldg. PWF's	3.50	3.61	0.91	.34	.14
DIY project plans would increase my p-t lumber usage	3.77	3.76	0.01	.93	-.01

Table 6. Continued.

Opinion/Attitude Statements <sup>1</sup>	Group A "Risk Averse" (n=216)	Group B "Risk Takers" (n=246)	Univariate F-ratios	p	Canonical loadings <sup>2</sup>
	--mean rating <sup>2</sup> --				
High DIY confidence	3.57	3.83	7.40	.01	.39
PRO labor is too high	3.94	4.03	0.85	.36	.13
Own a DIY workshop	3.17	3.39	3.74	.05	.28
Have time to DIY	3.30	3.69	14.80	.00	.55
DIY to save money	3.88	4.10	6.11	.01	.35
DIY for satisfaction	4.09	4.35	11.47	.00	.48
Centroids	-0.35	0.31			

<sup>1</sup> The discriminant function is significant at p= .000.

<sup>2</sup> Opinions were rated on a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

<sup>3</sup> P-t represents pressure treated.

Note: Classification Matrix Results:

Hold-out Sample = 54.73% correctly classified

C<sub>max</sub> = 223/543 = 41.07%

**Table 7. Discriminant Analysis of Two PRO Risk Segments  
in Terms of Five Knowledge Items.**

Knowledge Items:	Group A "Risk Averse" (n=187)	Group B "Risk Takers" (n=181)	Univariate F-ratios	p	Canonical loadings <sup>1</sup>
‡ Brand Aware	31%	45%	7.92	.01	.83
‡ Know the Chemicals	29%	37%	3.28	.07	.53
‡ Know what CIS's are	39%	38%	0.04	.80	.07
‡ Have heard of PWF's	73%	70%	0.28	.59	.16
Years p-t <sup>2</sup> lbr lasts	28.1	27.6	0.11	.74	.09
Centroids	0.17	-0.17			

<sup>1</sup> The discriminant function is significant at p= .017.

<sup>2</sup> P-t represents pressure treated.

Note: Classification Matrix Results:

Hold-out Sample = 58.37% correctly classified

C<sub>max</sub> = 220/543 = 40.52%

Table 8. Discriminant Analysis of Two DIY Risk Segments  
in Terms of Five Knowledge Items.

Knowledge Items:	Group A "Risk Averse" (n=187)	Group B "Risk Takers" (n=181)	Univariate F-ratios	p	Canonical loadings <sup>1</sup>
% Brand Aware	18%	19%	0.02	.89	
% Know the Chemicals	34%	42%	1.86	.17	
% Know what CIS's are	21%	27%	1.36	.25	
% Have heard of PWF's	30%	26%	0.41	.52	
Years p-t <sup>2</sup> lbr lasts	25.3	25.5	0.01	.93	
Centroids	-0.14	0.09			

<sup>1</sup> The discriminant function is not significant at p= .05, therefore loadings were not provided.

<sup>2</sup> P-t represents pressure treated.

**Table 9. Discriminant Analysis of Two PRO Risk Segments  
in Terms of Eight Demographic Items.**

Demographic Items:	Group A "Risk Averse" (n=187)	Group B "Risk Takers" (n=181)	Univariate F-ratios	p	Canonical loadings <sup>1</sup>
Geotype <sup>2</sup> (4 groups)	2.20	2.11	0.80	.37	-.16
1987 p-t <sup>3</sup> purchases (3 categories)	2.13	2.29	3.85	.05	.35
Age (3 categories)	3.74	3.71	0.71	.79	-.05
Education (4-pt scale)	2.82	3.04	6.20	.01	.44
Firm size (1986 sales) (5 levels)	1.86	2.41	21.70	.00	.83
Experience (3 levels)	1.91	1.91	0.00	.97	-.01
Builder type (% of Repair & Remodelers)	81%	61%	17.64	.00	.74
Centroids	-0.29	0.30			

<sup>1</sup> The discriminant function is significant at p= .000.

<sup>2</sup> Geotype represent a population density from 1 = urban to 2 = suburban to

3 = small town to 4 = rural.

<sup>3</sup> P-t represents pressure treated.

Note: Classification Matrix Results:

Hold-out Sample = 57.08% correctly classified

C<sub>max</sub> = 216/543 = 39.78%

**Table 10. Discriminant Analysis of Two DIY Risk Segments  
in Terms of Sixteen Demographic Items.**

Demographic Items:	Group A "Risk Averse" (n=158)	Group B "Risk Takers" (n=195)	Univariate F-ratios	p	Canonical loadings <sup>1</sup>
Geotype <sup>2</sup> (4 groups)	2.56	2.62	0.20	.65	.08
Do DIY activities	86%	95%	8.34	.00	.54
1987 p-t <sup>3</sup> purchases	\$246.	\$378	2.21	.14	.28
1985-1987 p-t purch's.	\$645	\$942	3.68	.05	.36
Hrs/month of DIY	16.1	20.5	3.99	.04	.37
Hrs/week of TV	12.7	14.1	1.37	.24	.22
Hrs/wk of newspapers	4.4	5.1	2.58	.10	.30
Hrs/wk of radio	11.2	11.9	0.18	.67	.08
Gender (% Female)	13%	7%	3.72	.05	-.36
Age (years)	41.0	40.1	0.64	.43	-.15
Education (respondent) (6-point scale)	3.59	3.36	3.48	.06	-.35
Education (spouse) (6-point scale)	3.11	2.89	3.56	.06	-.35
# of household incomes (1=1; 1.5=2; 2=3)	2.13	1.96	3.11	.07	-.33
Income (8-point scale)	5.75	5.48	2.45	.12	-.29
Home value (6 levels)	2.68	2.46	2.62	.10	-.30
Centroids	0.32	-0.26			

<sup>1</sup> The discriminant function is significant at p= .050.

<sup>2</sup> Geotype represent a population density from 1 = urban to 2 = suburban to

3 = small town to 4 = rural.

<sup>3</sup> P-t represents pressure treated.

Note: Classification Matrix Results:

Hold-out Sample = 61.03% correctly classified

C<sub>max</sub> = 244/543 = 44.94%

## **EXECUTIVE SUMMARY**

Professional contractors/remodelers (PRO's) and do-it-yourself (DIY) households throughout the U.S. were surveyed individually to examine the knowledge/awareness and attribute importance of the retail customer of CCA pressure treated lumber products and to assess their perceptions of these products in terms of product quality and risk perceptions. Primary data collection was conducted via two separate mail surveys aimed at these two distinct retail customers for home center and building supply dealers. The PRO and DIY customer groups are addressed and analyzed separately throughout this research effort.

### **PRO's**

The PRO questionnaire was mailed in March, 1987 and included responses from 543 builders nationwide. Two-thirds of responding PRO's were involved in repair and remodeling (R&R); many of these R&R contractors also conduct other types of construction activities such as new housing and patio/deck building. Over 70% of respondents had less than \$500,000 in 1986 sales. Average treated lumber purchases by PRO's in 1986 were \$16,569 with a median of \$5,000. Two-thirds of PRO's have had some college education; 28% are college graduates. The average number of years of building experience by respondents is just over 18 years (the median is 15 years).

Outdoor uses, such as decks, patios, gazebos, porches, balconies and pool enclosures were the most prevalent pressure treated lumber application with 91% of PRO's indicating this use in 1986. Lattice

panels represent the most popular specialty item that respondents intend to purchase in 1987 (45% of builders).

Builders nationwide feel that pressure treated lumber will outperform naturally durable species such as redwood and cedar by about 6 years (28 years versus 22 years). PRO's also perceive their customers as being uninformed regarding pressure treated lumber, stating that nearly half have no knowledge and rely entirely on the builder's judgement.

The most important product and service attribute (by far) is straightness followed by general appearance, grade, good variety of pressure treated lumber products at dealer, price, surface cleanliness and convenient location of the supplier. Promotional materials, brand names and color were rated the least important.

Approximately two-thirds of PRO's are not knowledgeable about the contents of the Consumer Information Sheets (CIS's). In general, builders disagree slightly that CCA pressure treated lumber emits odors, that these products are safe to residents for indoor applications and that picnic table tops are a safe use for these CCA products. Furthermore, they disagree strongly that CCA pressure treated lumber products can safely be used for counter tops and butcher blocks.

There is a strong agreement among PRO's that CCA pressure treated lumber is safe in outdoor applications and that with the proper handling and disposal precautions, these materials are entirely safe. However, only slight agreement is exhibited by builders regarding

CCA's product safety to builders, themselves.

Three different segmentation strategies provided a clearer picture of the PRO customer for pressure treated lumber products. A geographic segmentation strategy identified pressure treated lumber customer groups based on the four U.S. Bureau of Census regions.

The second segmentation method investigated product quality perceptions. This concept was pursued in two chapters with two slightly different methods. The first examines the predictive efficacy of using twenty benefits or product and service attributes and five product quality perception statements to characterize the nature of 5 quality market segments. Canonical correlation was employed to define simultaneously these five market segments.

The other quality segmentation chapter addresses a user-based approach to product quality through a reduced set of eleven benefits and the same five product quality perception items. Factor analysis eliminated highly redundant variables to provide a condensed set of underlying benefits sought by PRO's. These eleven surrogate predictor variables, in conjunction with the five product quality statements, defined four distinct market segments.

The third segmentation scheme addresses physical or safety risk perceptions in terms of a general propensity of a consumer to take or avoid risk. PRO respondents were categorized through hierarchical cluster analysis into a risk taking and a risk averse segment based on seven physical risk statements. These two segments were further characterized using discriminant analysis with the three psychographic

predictor variable sets of opinions, awareness and demographics.

**DIY'ers:**

The DIY survey was mailed in October, 1988 and included responses from 491 households nationwide. Eighty-six percent of responding DIY'ers have conducted some DIY home improvement and/or repair activities; only two-thirds of female respondents are DIY'ers. Only 26% have hired a PRO for pressure treated lumber remodeling/construction. Over half of DIY'ers completed their last project less than 3 months ago. The average number of hours per month of DIY activity by respondents was 20. Average (mean) treated lumber purchases in 1987 by respondents was \$312.00; median value was \$30.00. For the past three year period (1985-1987), these treated purchases were \$743.00 (mean) and \$200.00 (median).

The vast majority (83%) of respondents are single-family homeowners. Nearly two-thirds of these homes are worth less than \$100,000; 9% are worth over \$200,000. The mean age of respondents was 41 years, 85% were male, 83% were married and the average number of children was 2.0 and average. Over three-quarters of respondents had some college education, 31% are two-income families and over two-thirds of responding households earned over \$30,000 in 1987.

Landscaping uses such as fences, landscaping timbers and lattice work were the most used pressure treated lumber applications with 63% of respondents indicating this application. Lattice panels were the most popular specialty item that DIY'ers planned to purchase in 1988

(34% of respondents).

Only 38% of respondents knew the species of pressure treated lumber purchased whereas a mere 21% could recall a treated lumber brand name. Over one-third of respondents indicated a knowledge of the chemicals used in the treating process and only one-fourth of DIY'ers have heard of Permanent Wood Foundations (PWF's). DIY'ers nationwide feel that pressure treated lumber is more durable by about 4 years versus Cedar and Redwood (25 years versus 21 years).

Over three-quarters of all respondents are not knowledgeable about the contents of the Consumer Information Sheets (CIS's). Generally, DIY'ers agree that they would like more safety information, that CCA products are safe for outdoor projects, that CCA is safe with proper safety precautions and that CCA products are safe to the DIY'er. However, these respondents disagree slightly that CCA products are safe for indoor applications and that CCA emits odors. There is a strong disagreement that CCA is safe for counter tops and butcher blocks.

The most important product and service attribute (by far) is straightness followed by general appearance, price, grade, knowledgeable salespeople and good variety of pressure treated lumber products at dealer. Color, promotional materials, delivery service and species were rated the least important.

The DIY customer was further characterized in terms of physical risk orientation or personality type segments. As was the case for the PRO, a risk averse and a risk taking segment emerged from a

cluster analysis; these two segments were subsequently profiled using discriminant analysis.

### **Strategic Implications**

This marketing research effort suggests opportunities for targeting promotional activities, product offerings and informational programs to better respond to the needs of the professional contractor/remodeler and the do-it-yourself homeowner that uses CCA pressure treated lumber products. Areas of special importance include:

#### **Product Applications and Purchase Intent**

DIY'ers have as their highest application, landscaping uses found in only 63% of all homes. This implies a tremendous opportunity in all pressure treated product applications suitable for a less skilled DIY'er including decks, outdoor structures and outdoor furniture. Specialty products should have enormous growth potential since over one-third of respondents indicated they planned to purchase lattice panels in 1988 followed by deck kits (24%) and residential fencing (21%). DIY deck and outdoor project plans available at the retailer or in other promotional vehicles and the development and availability of practical specialty products could be a catalyst for treated lumber sales.

### **Knowledge of Brands**

Overall brand awareness is very low for pressure treated lumber. Only one-third of PRO's and 21% of DIY'ers can recall at least one brand of treated lumber. Both builders and DIY'ers generally will not pay a premium for branded products, however, they will pay for better appearance/quality. Promotional work to link appearance/quality with brands may assist in changing this opinion.

### **Permanent Wood Foundations**

Primarily through reading materials, PWF's are well-known among builders (70% are aware). On the other hand, only one-fourth of DIY'ers have ever heard of PWF's. PRO's and DIY'ers are still unconvinced that PWF's satisfy their durability and dryness requirements. Additionally, the availability, resale value and uniform quality of these PWF's are suspect. Promotional literature currently expounds the comfort of PWF's in below-grade living, however, this message has not convinced either the PRO or the DIY'er. Warrantees, according to both PRO's and DIY'ers would provide an incentive to try PWF construction. Some sort of promotional effort that would provide builders and/or homeowners with a low-risk opportunity to experiment with PWF's may meet with success.

## Product and Service Attributes

Both builders and DIY'ers are particularly concerned about straight, good looking and properly graded material at the best price. Moreover, these two customers demand that this material can be purchased in a single retail outlet that provides a full line of treated lumber products and the DIY customer insists on knowledgeable salespeople. The current structural grades for treated lumber products may not adequately address the customer's appearance demands. Often, a product of proper grade for the structural application is simply unacceptable as a material for visual applications such as outdoor uses. These findings pose three potential opportunities:

- (1) Efforts to change the current grades to better reflect appearance needs could benefit the entire industry through increased demand and improved satisfaction by customers of treated lumber products.
- (2) The large within grade appearance variability may provide an incentive for establishing brand-named pressure treated lumber products of consistently good appearance. Promotion of this brand, backed consistent quality could provide a preferred product that customers would willingly pay a premium for.
- (3) A retailer with a knowledgeable sales force regarding treated lumber products and applications may provide a competitive advantage through increased sales to the DIY customer.

## **Quality Perceptions**

A firm may choose to pursue market niches based on perceived quality segments as a strategy to gain competitive advantage. This niching may be implemented by companies who use higher product quality to command price premiums. For example, practitioners may find it profitable to pursue price insensitive builders through high priced, high quality product lines that emphasize appearance and KDAT service. Another market segment, the "technical brand name/KDAT builders," could be served concurrently with a single, best quality product line featuring an attractive, properly graded, brand named product with KDAT service; this premium product should appeal to both segments. A second major product line could target both the price sensitive and the non-technical builders through lower priced, brand named treated lumber of high appearance but without KDAT service. Price incentives such as free charge accounts and quantity discounts may provide increased sales to this builder group.

## **Risk**

Neither PRO's, nor DIY'ers in general, are very knowledgeable about the chemicals used, or the proper use, handling and disposal of pressure treated lumber products. This lack of knowledge could result in lower confidence in the product, its producers and the distributors. As stated by the Environmental Protection Agency (EPA), the product can safely be used. Stronger measures to provide this information to the builder and the DIY'er may foster trust and result

in increased customer loyalty.

Additional risk reducing strategies in the form of brand image, private testing information, store image or selective distribution, endorsements and/or more accessible warranties (offered through the retailer?) may be considered to reduce consumer uncertainty or risk. A better job of explaining proper safety procedures might reduce potential liability problems.

*"Probably the most important management fundamental that is being ignored today is staying close to the customer to satisfy his needs and anticipate his wants. In too many companies, the customer has become a bloody nuisance whose unpredictable behavior damages carefully made strategic plans, whose activities mess up computer operations, and who stubbornly insists that purchased products should work."*

--Lew Young, Editor-in-Chief, Business Week

## RECOMMENDATIONS FOR FUTURE RESEARCH

Several promising areas for future research emerged from this exploratory market research project:

1. Validation with factor analysis on the twenty product and service treated lumber attributes holds promise for using a reduced set in subsequent studies. Eleven attributes explained nearly 80% of the variance in the original 20 items. Future studies addressing consumers of lumber and building materials product lines may benefit from examining these eleven factors.
2. Regional differences in terms of product and service attributes, opinions, risk, knowledge, applications and others indicates a need for more detailed geographic data. This additional research may target the distribution channel members in order to define treated lumber product and customer differences, not only by region, but within a region. A basis for defining more detailed primary data collection methodologies could, arguably, include various Standard Metropolitan Areas (SMA's) within a Bureau of Census region.
3. The competitive position of CCA treated lumber products relative to competing treated and untreated wood and non-wood materials may provide the basis for important strategic management decisions. For example, CCA treated material is predominantly southern yellow pine. Competitive treated lumber species include Ponderosa pine and red pine plus the incised species or species groups of hem-fir, Douglas fir and Canadian spruce-pine-fir. Untreated lumber species that compete with treated lumber include naturally durable species such as cedar, redwood and various imported tropical hardwoods such as Pau Lope and Bongossi.
4. From a more global perspective, an examination of the competitive position of CCA treated southern yellow pine treated lumber in terms of a 10 year outlook may hold promise. Radiata pine plantations in Chile, New Zealand and Australia are anticipated to create a worldwide glut of fast-growth pine in the near future. This species is may be treated with CCA preservatives to acceptable chemical penetration and retention levels without incision and may be a major competitive threat to current southern pine markets.

5. The effectiveness of branding strategies employed in the treating industry from the retail buyer's perspective may warrant further examination. A brand name may prove to be a most effective risk reducer for both industrial and end-use consumers. Additional insight from the industrial buyer's perspective may assist in the determination of an effective branding strategy.
  
6. Competing chemical preservatives that provide comparable decay resistance with less environmental impact are constantly under investigation. Moreover, non-leachable waterbornes that chemically fix with the wood substrate at a slower rate enabling the use of more refractory species such as Canadian S-P-F and Western species such as Douglas fir and hemlock are being researched. In addition, strategic marketing decisions, based on potential litigation problems, may encourage the use of less effective but safer chemicals. Consumer acceptance of various lumber species and preservative chemicals may be anticipated with the use of focus groups or personal interviews. This entire cost/benefit arena holds promise for additional market research studies.

*"Creativity is thinking up new things. Innovation is doing new things."*

--Theodore Levitt, Harvard University

**APPENDIX**

**VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY  
DEPARTMENT OF FOREST PRODUCTS  
PROFESSIONAL CONTRACTOR AND REMODELER (PRO) SURVEY**

**WHEN WE REFER TO PRESSURE TREATED LUMBER PRODUCTS, WE MEAN THAT PRESERVATIVE CHEMICALS HAVE BEEN FORCED INTO THE WOOD UNDER HIGH PRESSURE (ABOUT 150 psi.) FOR DECAY RESISTANCE. FIRE TREATED LUMBER PRODUCTS WILL NOT BE ADDRESSED**

1) Please indicate your firm's major line(s) of work in 1986 by checking the appropriate space(s).

- SINGLE-FAMILY HOMEBUILDER
- MULTI-FAMILY HOMEBUILDER
- HOME IMPROVEMENT CONTRACTOR/REMODELER
- PATIO/ DECK BUILDER
- NON-RESIDENTIAL BLDG. CONTRACTOR
- OTHER, PLEASE SPECIFY: \_\_\_\_\_

2) Is the area in which the majority of your business is generated an URBAN, SUBURBAN, SMALL TOWN or a RURAL area? Please check only one.

- URBAN (CENTRAL CITY):** A city or group of contiguous communities with a combined population of over 100,000.
- SUBURBAN (URBAN FRINGE):** Similar to urban but with a population of 100,000 or less.
- SMALL TOWN:** More isolated from a major urban area than suburban with a population of 100,000 or less.
- RURAL:** Population is scattered over a wide area, sparsely populated as compared to urban.

3) In what state do you conduct the majority of your business? Please name only one state.

\_\_\_\_\_

**IF YOU DID NOT USE ANY TREATED LUMBER PRODUCTS IN 1986, PLEASE SKIP TO QUESTION #26 (LAST PAGE).**

4) Please indicate which pressure treated lumber brands you perceive as ranking highest in terms of overall quality. Please rank them in order of 1st = highest.

- I CAN'T RECALL ANY TREATED LUMBER BRANDS.
- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_

5) When building with pressure treated lumber products, what type of nails and fasteners does your firm use? Please check all that apply.

- HOT-DIPPED GALVANIZED
- STAINLESS STEEL
- ALUMINUM
- CARBON STEEL
- OTHER, PLEASE SPECIFY: \_\_\_\_\_

6) Please indicate the type of applications that you undertook in 1986 that used pressure treated lumber, timbers and plywood. Please check all that apply.

- OUTDOOR USES** such as decks, patios, gazebos, porches, balconies, pool enclosures, etc.
- OUTDOOR STRUCTURES** such as sheds, garages, carports, doghouses, boatdocks, etc.
- LANDSCAPING** uses such as fences, landscaping timbers, lattice work, etc.
- HOME EXTERIORS** such as siding, sheathing, soffits, fascia, etc.
- WALL FRAMING** uses such as wall studs, sills, plates, etc.
- ROOF FRAMING** uses such as roof joists, rafters, beams, etc.
- FLOOR FRAMING** uses such as floor joists, flooring, etc.
- PERMANENT WOOD FOUNDATION** uses.
- OUTDOOR FURNITURE** uses including planters.
- OTHER**, PLEASE SPECIFY: \_\_\_\_\_

7) Please indicate the type of CCA (salt)-treated specialty and upgrade products that you or your firm plan to purchase in 1987. Please check all that apply.

- |  |                                     |
|--|-------------------------------------|
|  | <b>MAY<br/>PURCHASE<br/>IN 1987</b> |
| PERMANENT WOOD FOUNDATIONS.....                    | _____ ( )                           |
| RADIUS-EDGED DECKING.....                          | _____ ( )                           |
| WOOD TREATED TO APPEAR NATURALLY WEATHERED.....    | _____ ( )                           |
| WOOD WITH VARIOUS COLOR TINTS (NOT GREEN).....     | _____ ( )                           |
| DECK KITS .....                                    | _____ ( )                           |
| FANCY DECK POSTS OR RAILS.....                     | _____ ( )                           |
| FANCY OUTDOOR STRINGERS, STEPS AND/OR STAIR KITS.. | _____ ( )                           |
| RESIDENTIAL FENCING.....                           | _____ ( )                           |
| AGRICULTURAL FENCING.....                          | _____ ( )                           |
| LATTICE PANELS.....                                | _____ ( )                           |

8) Of the total volume of pressure treated lumber products your firm purchased in 1986, what percent was purchased from the following suppliers? Total should = 100%

<b>RETAILERS</b> (ie. hardware stores, home centers and lumber & bldg. materials dealers)	<b>PERCENT</b> _____ %
<b>WHOLESALES</b>	_____ %
<b>DIRECT FROM TREATERS</b>	_____ %
	<b>TOTAL = 100%</b>

9) Please tell me the approximate percentage breakdown of your firm's 1986 pressure treated lumber, timbers and plywood purchases by species. Total should = 100%.

<b>SPECIES</b>	<b>PERCENT</b>
SOUTHERN YELLOW PINE	_____ %
PONDEROSA PINE	_____ %
RED PINE	_____ %
DOUGLAS FIR	_____ %
HEMLOCK	_____ %
OAK	_____ %
OTHER, PLEASE SPECIFY: _____	_____ %
OTHER, PLEASE SPECIFY: _____	_____ %
	<b>TOTAL = 100%</b>

10) Can you tell me the chemicals used in the pressure treated lumber products you purchased in 1986? Please also indicate the approximate percent of each type purchased in 1986. Total should = 100%.

( ) YES. ( ) NO, I DON'T KNOW THE CHEMICALS USED.

CHEMICAL TYPE	PERCENT
PENTACHLOROPHENOL (PENTA)	_____ %
CREOSOTE SOLUTIONS	_____ %
CCA (SALT TREATED)	_____ %
ACCA, ACA, ACC, AND/OR CZC	_____ %
OTHER, PLEASE SPECIFY: _____	_____ %
TOTAL = 100%	

☞ Please answer questions #11 thru #14 regarding the awareness that you, the builder, have of pressure treated lumber products. There are no right or wrong answers.

11) Can you tell me what CONSUMER INFORMATION SHEETS (CIS'S) are? (as they relate to pressure-treated lumber products) Please check one only.

- ( ) I REALLY DO NOT KNOW WHAT CONSUMER INFORMATION SHEETS ARE.
- ( ) INSTRUCTIONS FROM THE AMERICAN WOOD PRESERVERS BUREAU REGARDING INSTALLATION OF PERMANENT WOOD FOUNDATIONS.
- ( ) INFORMATION DISTRIBUTED BY BLDG. SUPPLY DEALERS REGARDING PROPER USE AND DISPOSAL OF TREATED WOOD.
- ( ) PAMPHLETS FROM CONSUMER GUIDE MAGAZINE ABOUT WHICH TREATED WOOD PRODUCTS ARE THE BEST BUYS.

12) How do you dispose of your pressure treated lumber scraps? Please check all that apply.

- ( ) BURN ON JOBSITE
- ( ) HAUL TO A DUMP OR LAND FILL
- ( ) BURY ON OR NEAR THE JOBSITE
- ( ) OTHER, PLEASE SPECIFY: \_\_\_\_\_

13) Based on your best guess, how many years would you say the following materials last (maintain structural strength) in weather-exposed above-ground uses? YEARS

- PRESSURE TREATED LUMBER PRODUCTS \_\_\_\_\_
- NATURALLY DURABLE SPECIES (ie. CEDAR & REDWOOD) \_\_\_\_\_
- UNTREATED LUMBER PRODUCTS (ie. PINE, S-P-F, DF) \_\_\_\_\_

14) Based on your experience, what percentage of your customers fit into the following categories concerning their overall knowledge of pressure treated lumber products? Total should = 100%.

THE CUSTOMERS:	PERCENT
KNOW EXACTLY WHAT THEY WANT	_____ %
HAVE SOME KNOWLEDGE; ASK BUILDER'S OPINION	_____ %
RELY ENTIRELY ON THE BUILDER'S JUDGEMENT	_____ %
TOTAL = 100%	

15) When purchasing pressure treated lumber, timbers and plywood, what product attributes do you feel are the most important? (Please rate each characteristic on a scale of 1 = VERY UNIMPORTANT TO 5 = VERY IMPORTANT by checking the appropriate space.)

ATTRIBUTES	VERY UNIMPORTANT	UNIMPORTANT	NEITHER IMPORTANT NOR UNIMPORTANT	IMPORTANT	VERY IMPORTANT
	1	2	3	4	5
STRAIGHTNESS .....	( )	( )	( )	( )	( )
SPECIES .....	( )	( )	( )	( )	( )
PRICE .....	( )	( )	( )	( )	( )
COLOR .....	( )	( )	( )	( )	( )
DEALER REPUTATION .....	( )	( )	( )	( )	( )
GOOD VARIETY OF PRESSURE TREATED PRODUCTS AT DEALER.....	( )	( )	( )	( )	( )
MOISTURE CONTENT .....	( )	( )	( )	( )	( )
SURFACE CLEANLINESS .....	( )	( )	( )	( )	( )
GENERAL APPEARANCE .....	( )	( )	( )	( )	( )
GRADE .....	( )	( )	( )	( )	( )
KNOWLEDGEABLE SALES PEOPLE AT DEALER.....	( )	( )	( )	( )	( )
CONVENIENT LOCATION OF SUPPLIER .....	( )	( )	( )	( )	( )
BRAND NAMED PRODUCT.....	( )	( )	( )	( )	( )
QUALITY MARK (INSPECTION STAMP) .....	( )	( )	( )	( )	( )
WARRANTY OR GUARANTEE.....	( )	( )	( )	( )	( )
CHEMICAL RETENTION LEVELS.....	( )	( )	( )	( )	( )
KILN DRIED AFTER TREATMENT.....	( )	( )	( )	( )	( )
SHORT DELIVERY LEAD TIMES.....	( )	( )	( )	( )	( )
PROMOTIONAL MATERIALS (ie. ADVERTISEMENTS, STORE DISPLAYS, PRODUCT LITERATURE, ETC) .....	( )	( )	( )	( )	( )
PRICE INCENTIVES (ie. FREE CHARGE ACCTS., QUANTITY DISCOUNTS, ETC.) .....	( )	( )	( )	( )	( )

Please answer questions #16 thru #22 regarding PERMANENT WOOD FOUNDATIONS by checking the appropriate space.

16) Have you ever heard or read about PERMANENT WOOD FOUNDATIONS (PWF's)?

- NO. IF NO, PLEASE GO TO QUESTION #23
- YES.

17) Have you ever built a PERMANENT WOOD FOUNDATION?

- NO.
- YES. IF YES, HOW MANY? IN 1986 = \_\_\_\_\_ PWF'S  
BEFORE 1986 = \_\_\_\_\_ PWF'S

18) Have you ever considered building a PERMANENT WOOD FOUNDATION? If so, why? If not, please check the first space. Please check all that apply.

- I HAVE NOT CONSIDERED PERMANENT WOOD FOUNDATIONS
- DISSATISFACTION WITH SOME ASPECT OF THE TRADITIONAL MASONRY FOUNDATION
- THE CUSTOMER REQUESTED THAT A PERMANENT WOOD FOUNDATION BE CONSIDERED AS AN OPTION
- SIMPLY CURIOUS ABOUT THE CONCEPT.
- OTHER, PLEASE SPECIFY: \_\_\_\_\_

19) When did you first learn about PERMANENT WOOD FOUNDATIONS? Please check one only.

- THIS PAST YEAR
- MORE THAN 2 YRS. AGO
- 1 TO 2 YRS. AGO
- DON'T REMEMBER

20) How did you learn about PERMANENT WOOD FOUNDATIONS? Please check all that apply.

- FROM A CUSTOMER.
- THROUGH WORD-OF-MOUTH (OTHER BUILDERS, ETC.)
- READING MATERIALS (MAG'S, PROMOTIONS, ETC.)
- FROM THE SUPPLIER (RETAILER, WHOLESALER, MFG'ER, ETC.)
- OTHER, PLEASE SPECIFY: \_\_\_\_\_

21) Please rate the following PERMANENT WOOD FOUNDATION characteristics compared to masonry foundations as you perceive them by checking the appropriate spaces.

PERMANENT WOOD FOUNDATION CHARACTERISTIC	WORSE	SAME	BETTER
DURABILITY.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DRYNESS.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
INSTALLATION EASE.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COST.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
UNIFORM QUALITY.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AVAILABILITY.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

22) Are you aware that there is a special FUN grade of lumber and plywood available specifically for PERMANENT WOOD FOUNDATION uses?

- NO.
- YES. IF YES, IS FUN GRADE AVAILABLE LOCALLY?
- NO.
- YES.

23) Please indicate the level of agreement or disagreement you attach to the following statements. (Please rate each statement on a scale of 1 = STRONGLY DISAGREE to 5 = STRONGLY AGREE by checking the appropriate space.)

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
	1	2	3	4	5
CCA PRESSURE TREATED LUMBER EMITS ODORS.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A WARRANTY WOULD MAKE ME MORE LIKELY TO BUILD PERMANENT WOOD FOUNDATIONS (PWF'S).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BRAND NAMED TREATED LUMBER IS GENERALLY OF SUPERIOR QUALITY AS COMPARED TO GENERIC TREATED LUMBER PRODUCTS...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I AM WILLING TO PAY MORE FOR KILN DRIED AFTER TREATMENT (KDAT) TREATED LUMBER PRODUCTS.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I AM MORE CONCERNED WITH THE APPEARANCE OF PRESSURE TREATED LUMBER PRODUCTS THAN THE GRADE AND/OR SPECIES....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RETAIL SALESPEOPLE ARE GENERALLY KNOWLEDGEABLE ABOUT TREATED WOOD (CHEMICALS, DURABILITY, APPLICATIONS, ETC.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PERMANENT WOOD FOUNDATIONS REPRESENT AN ACCEPTABLE ALTERNATIVE TO MASONRY FOUNDATIONS.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I AM WILLING TO PAY MORE FOR HIGHER QUALITY/BETTER LOOKING TREATED LUMBER PRODUCTS.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MASONRY FOUNDATIONS PROVIDE BETTER COMFORT IN BELOW-GRADE LIVING ENVIRONMENTS THAN PERMANENT WOOD FOUNDATIONS.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I AM WILLING TO PAY MORE FOR BRAND NAMED TREATED LUMBER PRODUCTS.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24) CCA (salt)-treated lumber products have been approved for use by the Environmental Protection Agency (EPA) after a 10-year study. Do you have any further concerns?

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25) Please indicate the level of agreement or disagreement you attach to the following statements by checking the appropriate space. Please check only one space for each statement.

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
	1	2	3	4	5
CCA TREATED LUMBER CAN SAFELY BE USED FOR COUNTER TOPS AND BUTCHER BLOCKS...	( )	( )	( )	( )	( )
CCA TREATED LUMBER SHOULD NOT BE USED FOR PICNIC TABLE TOPS.....	( )	( )	( )	( )	( )
CCA TREATED LUMBER PRODUCTS ARE ENTIRELY SAFE TO THE RESIDENT FOR OUTDOOR APPLICATIONS. (ie. decks, carports, etc.).....	( )	( )	( )	( )	( )
CCA TREATED LUMBER PRODUCTS ARE ENTIRELY SAFE TO THE RESIDENT FOR INDOOR APPLICATIONS. (ie. PWF's, wall studs, etc.).....	( )	( )	( )	( )	( )
CCA TREATED LUMBER PRODUCTS ARE ENTIRELY SAFE FOR THE BUILDER/CARPENTER THAT FREQUENTLY USES THESE MATERIALS.....	( )	( )	( )	( )	( )
GIVEN THE PROPER USE, HANDLING AND DISPOSAL OF CCA TREATED LUMBER PRODUCTS, THESE MATERIALS ARE ENTIRELY SAFE.....	( )	( )	( )	( )	( )

**FINALLY, WE WOULD LIKE TO ASK SOME QUESTIONS ABOUT YOURSELF FOR STATISTICAL PURPOSES.**

- 26) What is your position/title? \_\_\_\_\_
- 27) What is your age? Please check one.
- ( ) UNDER 21      ( ) 41 TO 50  
 ( ) 21 TO 30      ( ) 51 TO 60  
 ( ) 31 TO 40      ( ) OVER 60
- 28) What is your education level? Please check one.
- ( ) SOME HIGH SCHOOL OR LESS  
 ( ) HIGH SCHOOL GRADUATE  
 ( ) SOME COLLEGE  
 ( ) COLLEGE GRADUATE
- 29) Approximately how many years have you been a builder? \_\_\_\_\_ YEARS.
- 30) Approximately what was your firm's total sales in 1986. Please check one only.
- ( ) LESS THAN \$150,000  
 ( ) \$150,000 TO \$500,000  
 ( ) \$500,000 TO \$1 MILLION  
 ( ) \$1 MILLION TO \$2.5 MILLION  
 ( ) OVER \$2.5 MILLION
- 31) Please estimate your total treated lumber purchases in 1986. (total dollars)
- \$ \_\_\_\_\_

THANK YOU VERY MUCH FOR YOUR COOPERATION AND TIME IN FILLING OUT THIS SURVEY. PLEASE RETURN IT TO ME IN THE STAMPED/ADDRESSED ENVELOPE PROVIDED.

If you would like additional information regarding the following aspects of pressure treated lumber products, please check the appropriate spaces below AND PRINT YOUR NAME AND ADDRESS ON THE BACK OF THE RETURN ENVELOPE (NOT on this questionnaire). We will see that you get it. All replies are strictly confidential.

- ( ) INFORMATION ON PERMANENT WOOD FOUNDATIONS  
 ( ) INFORMATION ON PRESSURE TREATED SOUTHERN PINE  
 ( ) INFORMATION ON USE, HANDLING AND DISPOSAL OF PRESSURE TREATED WOOD

**VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY  
DO-IT-YOURSELF (DIY) SURVEY**

**WHEN WE REFER TO PRESSURE-TREATED LUMBER, WE MEAN LUMBER THAT HAS HAD PRESERVATIVE CHEMICALS FORCED INTO IT UNDER HIGH PRESSURE TO PREVENT DECAY. A COMMON EXAMPLE USED AROUND MOST HOMES IS THE GREENISH COLORED SALT-TREATED (CCA) LUMBER.**

- 1) Have you ever conducted any DO-It-Yourself (DIY) home improvement and/or repair activities?
- ( ) NO.  
( ) YES. → MY LAST DO-IT-YOURSELF PROJECT WAS COMPLETED: (please check one only)
- ( ) LESS THAN 3 MONTHS AGO.  
( ) 4 TO 12 MONTHS AGO.  
( ) OVER 12 MONTHS AGO.
- 2) Is the area in which you now live an URBAN, SUBURBAN, SMALL TOWN or a RURAL area? Please check only one.
- ( ) **URBAN (CENTRAL CITY):** A city or group of contiguous communities with a combined population of over 100,000.  
( ) **SUBURBAN (URBAN FRINGE):** Similar to urban but with a population of 100,000 or less.  
( ) **SMALL TOWN:** More isolated from a major urban area than suburban with a population of 100,000 or less.  
( ) **RURAL:** Population is scattered over a wide area, sparsely populated as compared to urban.
- 3) In what state do you currently live? Please name only one state.
- 4) Have you ever hired a Professional contractor/remodeler to build anything with pressure-treated lumber?
- ( ) NO.  
( ) YES.
- 5) Does your current residence have any of the following pressure-treated lumber uses? Please check all that you are aware of.
- ( ) **DECKS**  
( ) **OTHER OUTDOOR USES** such as patios, gazebos, porches, balconies, pool enclosures, etc.  
( ) **OUTDOOR STRUCTURES** such as sheds, garages, carports, doghouses, boatdocks, etc.  
( ) **LANDSCAPING** uses such as fences, landscaping timbers, lattice work, etc.  
( ) **HOME EXTERIORS** such as siding, sheathing, soffits, fascia, etc.  
( ) **WALL, ROOF OR FLOOR FRAMING** uses such as studs, rafters, flooring, etc.  
( ) **PERMANENT WOOD FOUNDATION**  
( ) **OUTDOOR FURNITURE** uses including planters.  
( ) **OTHER, PLEASE SPECIFY:** \_\_\_\_\_
- 7) Do you plan to purchase any of the 10 pressure-treated wood products listed below in the next 12 months? Please check all that apply.
- MAY PURCHASE  
NEXT YEAR
- PERMANENT WOOD FOUNDATION.....( )  
RADIUS-EDGED DECKING.....( )  
WOOD TREATED TO APPEAR NATURALLY WEATHERED.....( )  
WOOD WITH VARIOUS COLOR TINTS (NOT GREEN).....( )  
DECK KIT.....( )  
FANCY DECK POSTS OR RAILS.....( )  
FANCY OUTDOOR STRINGERS/STEPS/STAIR KITS.....( )  
RESIDENTIAL FENCING.....( )  
AGRICULTURAL FENCING.....( )  
LATTICE PANELS.....( )
- 8) Can you tell me the approximate percentage breakdown of your pressure-treated lumber product purchases/uses by species in the last 3 YEARS. Total should = 100%.
- ( ) NO. I DON'T KNOW THE SPECIES.

**IF YOU HAVE NOT USED OR PURCHASED ANY PRESSURE-TREATED LUMBER PRODUCTS IN THE PAST THREE YEARS, PLEASE SKIP TO QUESTION #17 (PAGE THREE).**

- 5) What family member typically makes Do-It-Yourself project and buying decisions regarding pressure-treated lumber products? Please answer all questions by checking the appropriate space.
- | WHO USUALLY:                | HUSBAND | WIFE | JOINT |
|-----------------------------|---------|------|-------|
| FIRST SUGGESTS PROJECT      | ( )     | ( )  | ( )   |
| DETERMINES WHEN TO DO       | ( )     | ( )  | ( )   |
| DECIDES HOW MUCH TO SPEND   | ( )     | ( )  | ( )   |
| SPECIFIES SIZE/STYLE        | ( )     | ( )  | ( )   |
| DECIDES ON MATERIALS        | ( )     | ( )  | ( )   |
| OBTAINS PRODUCT INFORMATION | ( )     | ( )  | ( )   |
| DECIDES ON SPECIFIC STORE   | ( )     | ( )  | ( )   |
| PURCHASES MATERIALS         | ( )     | ( )  | ( )   |
| ACTUALLY BUILDS PROJECT     | ( )     | ( )  | ( )   |

SPECIES	PERCENT
SOUTHERN YELLOW PINE	____%
PONDEROSA/RED PINE	____%
DOUGLAS FIR	____%
HEM-FIR	____%
OAK	____%
OTHER, PLEASE SPECIFY: _____	____%
TOTAL = 100%	

- 9) Can you tell me the chemicals used in the pressure treated lumber products that you purchased/used in the last 3 years? Please check all that apply.
- ( ) NO, I DON'T KNOW THE CHEMICALS USED.
- ( ) PENTACHLOROPHENOL (PENTA)  
( ) CREOSOTE SOLUTIONS  
( ) CCA (SALT TREATED)  
( ) OTHER, PLEASE SPECIFY: \_\_\_\_\_

PLEASE ANSWER QUESTIONS #10 THRU #15 REGARDING THE AWARENESS THAT YOU HAVE OF PRESSURE-TREATED LUMBER PRODUCTS. *There are no right or wrong answers.*

- 10) Can you tell me what CONSUMER INFORMATION SHEETS (CIS'S) are? (as they relate to pressure-treated lumber products) Please check one only.
- INSTRUCTIONS FROM THE AMERICAN WOOD PRESERVERS BUREAU REGARDING INSTALLATION OF PERMANENT WOOD FOUNDATIONS.
  - INFORMATION DISTRIBUTED BY BLDG. SUPPLY DEALERS REGARDING PROPER USE AND DISPOSAL OF TREATED WOOD.
  - PAMPHLETS FROM CONSUMER GUIDE MAGAZINE ABOUT WHICH TREATED WOOD PRODUCTS ARE THE BEST BUYS.
  - I DON'T KNOW.
- 11) Based on your best guess, how many years would you say the following materials last (maintain structural strength) in weather-exposed above-ground uses?
- YEARS
- PRESSURE-TREATED LUMBER PRODUCTS \_\_\_\_\_
- NATURALLY DURABLE SPECIES (i.e. CEDAR & REDWOOD) \_\_\_\_\_
- UNTREATED LUMBER PRODUCTS (i.e. PINE, SPRUCE, DOUGLAS FIR, ETC.) \_\_\_\_\_
- 12) Have you ever heard or read about PERMANENT WOOD FOUNDATIONS (PWF's)?
- NO. IF NO, PLEASE GO TO QUESTION #15.
  - YES. ▶ IF YES, WHEN DID YOU FIRST LEARN OF PWF'S?
- APPROXIMATELY \_\_\_\_\_ YEARS AGO. →

13) Please rate the following PERMANENT WOOD FOUNDATION characteristics compared to masonry foundations as you perceive them by checking the appropriate spaces.

PERMANENT WOOD FOUNDATION CHARACTERISTIC	WORSE	SAME	BETTER
	1	2	3
▶ DURABILITY.....	( )	( )	( )
▶ DRYNESS.....	( )	( )	( )
▶ INSTALLATION EASE.....	( )	( )	( )
▶ COST.....	( )	( )	( )
▶ UNIFORM QUALITY.....	( )	( )	( )
▶ AVAILABILITY.....	( )	( )	( )
▶ FINISHING EASE.....	( )	( )	( )
▶ RESALE VALUE.....	( )	( )	( )
▶ COMFORT.....	( )	( )	( )

- 14) Are you aware that a special FDN (FOUNDATION) grade of lumber and plywood is available specifically for PERMANENT WOOD FOUNDATION uses?
- NO.
  - YES. ▶ IF YES, IS FDN GRADE AVAILABLE LOCALLY?
- ( ) NO.  
( ) YES.

- 15) Do you recall any pressure-treated lumber brand names?
- NO, I CAN'T RECALL ANY TREATED LUMBER BRANDS.
  - YES. IF YES, PLEASE LIST ALL BRANDS YOU RECALL.
1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

16) When purchasing pressure-treated lumber products, what product attributes do you feel are the most important? (Please rate each attribute on a scale of 1 = NOT IMPORTANT AT ALL TO 5 = EXTREMELY IMPORTANT by checking the appropriate space.)

	NOT IMPORTANT AT ALL	SLIGHTLY IMPORTANT	MODERATELY IMPORTANT	VERY IMPORTANT	EXTREMELY IMPORTANT
	1	2	3	4	5
STRAIGHTNESS .....	( )	( )	( )	( )	( )
SPECIES .....	( )	( )	( )	( )	( )
PRICE .....	( )	( )	( )	( )	( )
COLOR .....	( )	( )	( )	( )	( )
STORE REPUTATION .....	( )	( )	( )	( )	( )
GOOD VARIETY OF PRESSURE-TREATED PRODUCTS AT RETAILER.....	( )	( )	( )	( )	( )
MOISTURE CONTENT (WEIGHT) .....	( )	( )	( )	( )	( )
SURFACE CLEANLINESS .....	( )	( )	( )	( )	( )
GENERAL APPEARANCE .....	( )	( )	( )	( )	( )
GRADE .....	( )	( )	( )	( )	( )
KNOWLEDGEABLE SALES PEOPLE .....	( )	( )	( )	( )	( )
CONVENIENT LOCATION OF THE RETAILER .....	( )	( )	( )	( )	( )
BRAND NAME .....	( )	( )	( )	( )	( )
QUALITY MARK (INSPECTION STAMP) .....	( )	( )	( )	( )	( )
WARRANTY END TAG.....	( )	( )	( )	( )	( )
PRESERVATIVE RETENTION LEVELS.....	( )	( )	( )	( )	( )
KILN DRIED AFTER TREATMENT.....	( )	( )	( )	( )	( )
DELIVERY SERVICE .....	( )	( )	( )	( )	( )
PROMOTIONAL MATERIALS (i.e. ADVERTISEMENTS, STORE DISPLAYS, PRODUCT LITERATURE, ETC) .....	( )	( )	( )	( )	( )
PRICE INCENTIVES (i.e. FREE CHARGE ACCTS., QUANTITY DISCOUNTS, ETC.) .....	( )	( )	( )	( )	( )
THE AVAILABILITY OF DO-IT-YOURSELF PROJECT PLANS .....	( )	( )	( )	( )	( )



17) Please indicate the level of agreement or disagreement you attach to the following statements. (Please rate each statement on a scale of 1 = STRONGLY DISAGREE TO 5 = STRONGLY AGREE by checking the appropriate space.)  
 "P-T" in the following 24 statements refers to CCA pressure-treated lumber products (the greenish-colored lumber).

	STRONGLY DISAGREE 1	DISAGREE 2	NO OPINION 3	AGREE 4	STRONGLY AGREE 5
<b>► Product and Service Attribute Opinions:</b>					
CCA PRESSURE-TREATED (P-T) LUMBER EMITS ODORS.....	( )	( )	( )	( )	( )
I AM MORE CONCERNED WITH APPEARANCE THAN GRADE/SPECIES OF P-T LUMBER.....	( )	( )	( )	( )	( )
RETAIL SALESPEOPLE ARE GENERALLY KNOWLEDGEABLE ABOUT P-T LUMBER (PRESERVATIVES, DURABILITY, APPLICATIONS, ETC.).....	( )	( )	( )	( )	( )
I AM GENERALLY SATISFIED WITH THE QUALITY/APPEARANCE OF P-T LUMBER PRODUCTS AVAILABLE AT MY LOCAL RETAILER.....	( )	( )	( )	( )	( )
A WARRANTY WOULD MAKE ME MORE LIKELY TO BUY A HOME WITH A PERMANENT WOOD FOUNDATION (PWF).....	( )	( )	( )	( )	( )
PWF'S REPRESENT AN ACCEPTABLE ALTERNATIVE TO MASONRY FOUNDATIONS.....	( )	( )	( )	( )	( )
<b>► Consumer Attitude Opinions:</b>					
EASY-TO-FOLLOW INSTRUCTIONS WOULD MAKE ME MORE LIKELY TO TACKLE DO-IT-YOURSELF PROJECTS THAT USE PRESSURE-TREATED (P-T) LUMBER.....	( )	( )	( )	( )	( )
I AM MORE SELF-CONFIDENT ABOUT DO-IT-YOURSELF PROJECTS THAN MOST PEOPLE..	( )	( )	( )	( )	( )
I THINK THE COST OF PROFESSIONAL LABOR IS TOO HIGH.....	( )	( )	( )	( )	( )
I HAVE A WORKSHOP THAT IS OFTEN USED FOR HOME PROJECTS.....	( )	( )	( )	( )	( )
I DON'T HAVE TIME FOR DO-IT-YOURSELF PROJECTS.....	( )	( )	( )	( )	( )
I TACKLE DO-IT-YOURSELF PROJECTS TO SAVE MONEY.....	( )	( )	( )	( )	( )
I GET SATISFACTION FROM DOING DO-IT-YOURSELF PROJECTS.....	( )	( )	( )	( )	( )
<b>► Consumer Usage Opinions:</b>					
I WOULD LIKE MORE INFORMATION ABOUT THE PROPER USE, HANDLING AND DISPOSAL OF PRESSURE-TREATED (P-T) LUMBER PRODUCTS.....	( )	( )	( )	( )	( )
P-T LUMBER CAN SAFELY BE USED FOR COUNTER TOPS AND BUTCHER BLOCKS.....	( )	( )	( )	( )	( )
P-T LUMBER CAN SAFELY BE USED FOR PICNIC TABLE TOPS.....	( )	( )	( )	( )	( )
P-T LUMBER IS ENTIRELY SAFE TO THE RESIDENT FOR OUTDOOR APPLICATIONS.....	( )	( )	( )	( )	( )
P-T LUMBER IS ENTIRELY SAFE TO THE RESIDENT FOR INDOOR APPLICATIONS.....	( )	( )	( )	( )	( )
P-T LUMBER IS ENTIRELY SAFE TO THE DO-IT-YOURSELF OR BUILDER WHO FREQUENTLY USES THESE MATERIALS.....	( )	( )	( )	( )	( )
WITH PROPER USE, HANDLING AND DISPOSAL OF P-T LUMBER PRODUCTS, THESE MATERIALS ARE ENTIRELY SAFE.....	( )	( )	( )	( )	( )
<b>► Price/Quality Opinions:</b>					
BRAND NAMED PRESSURE-TREATED (P-T) LUMBER IS GENERALLY OF SUPERIOR QUALITY AS COMPARED TO GENERIC TREATED LUMBER PRODUCTS.....	( )	( )	( )	( )	( )
I AM WILLING TO PAY MORE FOR BRAND NAMED P-T LUMBER.....	( )	( )	( )	( )	( )
I WOULD PAY MORE FOR HIGHER QUALITY/BETTER LOOKING P-T LUMBER PRODUCTS...	( )	( )	( )	( )	( )
I WOULD PAY MORE FOR P-T LUMBER TEAM FOR CEDAR OR REDWOOD.....	( )	( )	( )	( )	( )



18) As a past, present or potential consumer of CCA pressure-treated lumber products, do you have any general comments or concerns about these products in terms of quality, availability, service, safety, etc.?

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↓ **FINALLY, WE WOULD LIKE SOME INFORMATION ABOUT YOU FOR STATISTICAL PURPOSES. REMEMBER, ALL INFORMATION IS CONFIDENTIAL.** ↓

- 19) In what type of dwelling do you currently live?
- RENT AN APARTMENT/TOWNHOUSE/CONDO/DUPLEX
  - RENT A HOUSE
  - OWN A CONDOMINIUM/TOWNHOUSE/DUPLEX/TRAILER
  - OWN A HOUSE
  - OTHER, PLEASE SPECIFY: \_\_\_\_\_
- 20) What is the approximate age of your current residence?
- LESS THAN 5 YEARS
  - 5 TO 9 YEARS
  - 10 TO 19 YEARS
  - 20 TO 29 YEARS
  - 30 TO 39 YEARS
  - 40 YEARS OLD AND OLDER
- 21) How many years have you lived in your present home?
- 2 YEARS OR LESS
  - 3 TO 5 YEARS
  - 6 TO 9 YEARS
  - 10 TO 19 YEARS
  - 20 YEARS AND OVER
- 22) Please estimate your total pressure-treated lumber product purchases in 1987 in total dollars.
- \$ \_\_\_\_\_
- 23) Please estimate your total pressure-treated lumber product purchases in the last 3 years (total dollars).
- \$ \_\_\_\_\_
- 24) Approximately how many hours per month do you spend on DO-IT-YOURSELF repair and remodeling activities (of all types)?
- \_\_\_\_\_ HOURS PER MONTH
- 25) About how many hours per week do you watch television?
- \_\_\_\_\_ HOURS PER WEEK
- 26) About how many hours per week do you spend reading newspapers?
- \_\_\_\_\_ HOURS PER WEEK
- 27) About how many hours per week do you spend listening to the radio?
- \_\_\_\_\_ HOURS PER WEEK
- 28) What is your sex?                     MALE     FEMALE
- 29) What is your age?                    \_\_\_\_\_ YEARS OLD
- 30) What is your marital status?
- SINGLE                                     WIDOWED
  - MARRIED                                  DIVORCED/SEPARATED
- 31) How many children do you have? \_\_\_\_\_ CHILDREN
- 32) What is the age of your YOUNGEST child? \_\_\_\_\_ YEARS
- 33) What are the respective education levels of both you and your spouse?
- |                          | YOUR                     | SPOUSE                   |  |
|--------------------------|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | SOME HIGH SCHOOL OR LESS               |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | HIGH SCHOOL GRADUATE                   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | SOME COLLEGE                           |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4-YEAR COLLEGE GRADUATE (B.A./B.S.)    |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | MASTER'S OR 5-YEAR PROFESSIONAL DEGREE |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | DOCTOR'S DEGREE                        |
- 34) How many household incomes do you currently enjoy?
- SINGLE INCOME
  - ONE FULL-TIME; ONE PART-TIME INCOME
  - TWO FULL-TIME INCOMES
- 35) What is your total annual household income (pre-tax)?
- UNDER \$10,000                          \$30,000- \$39,999
  - \$10,000- \$14,999                        \$40,000- \$49,000
  - \$15,000- \$19,999                        \$50,000- \$74,999
  - \$20,000- \$29,999                        OVER \$75,000
- 36) What is your present occupation? \_\_\_\_\_
- 37) Please give a brief description of your job.  
\_\_\_\_\_
- 38) What is the present occupation of your spouse?  
\_\_\_\_\_
- 39) Please give a brief description of your spouse's job.  
\_\_\_\_\_
- 40) Please estimate the current value of your residence.
- LESS THAN \$50,000                        \$150,000 TO \$199,999
  - \$50,000 TO \$99,999                       \$200,000 TO \$300,000
  - \$100,000 TO \$149,999                    OVER \$300,000

☛ **THANK YOU VERY MUCH FOR YOUR COOPERATION AND TIME IN FILLING OUT THIS SURVEY. PLEASE RETURN IT TO ME IN THE STAMPED/ADDRESSED ENVELOPE PROVIDED.**

*If you would like FREE OUTDOOR PROJECT AND DECK PLANS for pressure-treated lumber products, please PRINT YOUR NAME AND ADDRESS ON THE BACK OF THE RETURN ENVELOPE (NOT on this questionnaire). We will see that you get it. Remember, all replies are strictly confidential.*

Sample Size Calculations (The PRO)

Assumptions for sample size:

1. Population is normally distributed.
2. Bound on the error of estimation is 5%.
3. Confidence interval is set at 95%, which is standard for surveys of this nature.
4. p is the proportion of PRO's who have used treated lumber. Since the value, p, is unknown; p = 0.5 was chosen because this value will give the largest sample size required for the population because this value represents the greatest variance of the population.

Equation:

$$n = \frac{N(p)(q)}{(N-1)D + (p)(q)}$$

n = sample size

N = PRO population size

p = proportion of PRO's who have used treated lumber

q = 1-p

D = B<sup>2</sup>/4;      B = .05

$$n = \frac{100,000(.5)(.5)}{99,999(.000625) + (.5)(.5)} = 398$$

Results:

A minimum of 398 returned surveys are needed in order for the total survey to be within a bound on the error of estimation of 5% at the 95% confidence level.

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Mendenhall, W., L. Ott, and R. L. Scheaffer (1986), "Elementary Survey Sampling," Wadsworth Publishing Company, Inc., Boston, MA.

Sample Size Calculations (The DIY'er)

Assumptions for sample size:

1. Population is normally distributed.
2. Bound on the error of estimation is 5%.
3. Confidence interval is set at 95%, which is standard for surveys of this nature.
4. p is the proportion of homeowners who are DIY'ers. Since the value, p, is unknown; p = 0.5 was chosen because this value will give the largest sample size required for the population because this value represents the greatest variance of the population.

Equation:

$$n = \frac{N(p)(q)}{(N-1)D + (p)(q)}$$

n = sample size  
N = Homeowner population size  
p = proportion of homeowners who are DIY'ers  
q = 1-p  
D = B<sup>2</sup>/4;     B = .05

$$n = \frac{55,000,000 (.5) (.5)}{54,999,999 (.000625) + (.5) (.5)} = 400$$

Results:

A minimum of 400 returned surveys are needed in order for the total survey to be within a bound on the error of estimation of 5% at the 95% confidence level.

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Mendenhall, W., L. Ott, and R. L. Scheaffer (1986), "Elementary Survey Sampling," Wadsworth Publishing Company, Inc., Boston, MA.

INORGANIC ARSENICAL PRESSURE-TREATED WOOD  
(including: CCA, ACA and ACZA)

CONSUMER INFORMATION

This wood has been preserved by pressure-treatment with an EPA-registered pesticide containing inorganic arsenic to protect it from insect attack and decay. Wood treated with inorganic arsenic should be used only where such protection is important.

Inorganic arsenic penetrates deeply into and remains in the pressure-treated wood for a long time. Exposure to inorganic arsenic may present certain hazards. Therefore, the following precautions should be taken both when handling the treated wood and in determining where to use or dispose of the treated wood.

USE SITE PRECAUTIONS

Wood pressure-treated with waterborne arsenical preservatives may be used inside residences as long as all sawdust and construction debris are cleaned up and disposed of after construction.

Do not use treated wood under circumstances where the preservative may become a component of food or animal feed. Examples of such sites would be structures or containers for storing silage or food.

Do not use treated wood for cutting-boards or countertops.

Only treated wood that is visibly clean and free of surface residue should be used for patios, decks and walkways.

Do not use treated wood for construction of those portions of beehives which may come into contact with the honey.

Treated wood should not be used where it may come into direct or indirect contact with public drinking water, except for uses involving incidental contact such as docks and bridges.

HANDLING PRECAUTIONS

Dispose of treated wood by ordinary trash collection or burial. Treated wood should not be burned in open fires or in stoves, fireplaces, or residential boilers because toxic chemicals may be produced as part of the smoke and ashes. Treated wood from commercial or industrial use (e.g., construction sites) may be burned only in commercial or industrial incinerators or boilers in accordance with state and Federal regulations.

Avoid frequent or prolonged inhalation of sawdust from treated wood. When sawing and machining treated wood, wear a dust mask. Whenever possible, these operations should be performed outdoors to avoid indoor accumulations of airborne sawdust from treated wood.

When power-sawing and machining, wear goggles to protect eyes from flying particles.

After working with the wood, and before eating, drinking, and use of tobacco products, wash exposed areas thoroughly.

If preservatives or sawdust accumulate on clothes, launder before reuse. Wash work clothes separately from other household clothing.

(Consumer Information Sheet Approved by the U.S. Environmental Protection Agency)



COLLEGE OF AGRICULTURE AND LIFE SCIENCES

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061

SCHOOL OF FORESTRY AND WILDLIFE RESOURCES  
DEPARTMENT OF FOREST PRODUCTS, 210 CHEATHAM HALL

March 25, 1987

Dear Professional Contractor/Remodeler:

The Department of Forest Products at Virginia Tech is conducting a survey of the important Professional customers for CCA Pressure-Treated lumber products. We are focusing our effort on the best source for this information, Professional Contractors and Remodelers. Your name was randomly selected in a scientific fashion for inclusion in this study. Therefore, your response to the enclosed survey is of key importance to the success of our research.

The purpose of this survey is to better understand the retail market for CCA Pressure-Treated Lumber, Timbers and Plywood. The study should enable manufacturers and retailers to better meet the needs that you, the Professional, require in these CCA Pressure-Treated products.

Because the survey deals with the attitudes and preferences that professional builders have about various CCA Pressure-Treated Lumber products, we ask that it be completed by a person that usually handles these materials. Even if you do not use pressure-treated lumber products, please complete the first 3 questions then skip to the last page (as instructed in the questionnaire); this will only take about two minutes. All responses are extremely important for the success of this study.

At first glance, the survey may seem long, but it has been designed for easy completion. For the survey results to be reliable, we need a high rate of response, so your answers are crucial. Won't you please take a few moments to fill out the enclosed questionnaire and return it in the postage-paid reply envelope. All answers are strictly confidential.

Thank you in advance for your cooperation and help!

Sincerely,

Paul M. Smith  
Research Assistant

Steven A. Sinclair  
Associate Professor

P.S. If you would like additional information on pressure-treated lumber products sent to you, please check the appropriate spaces on the last page of the questionnaire and write your name and address on the back of the return envelope. We will see that you get it.

Enclosure



VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061

SCHOOL OF FORESTRY AND WILDLIFE RESOURCES  
DEPARTMENT OF FOREST PRODUCTS, 210 CHEATHAM HALL

April 1, 1987

Dear Friend:

I recently sent you a letter requesting your company's participation in a customer market survey for pressure-treated lumber products I am conducting as part of my studies here at Virginia Tech. If you have returned the survey, thank you for your help! Your response is very important to me because it will provide the information I need to complete my work towards a Ph.D degree in Forest Products.

I realize that business people, such as yourself, are very busy and you may not yet have found the time to complete the survey. However, I would like to encourage you to do so. The survey takes only a short time to complete and you need not identify yourself or your company. The information which you supply in this study may help you, the contractor, either directly or indirectly in the future, because you are providing information about the retail customer's attitudes, knowledge and preferences toward pressure-treated lumber products; an important first step in improving service, information and product offerings!

Even if you do not use pressure-treated lumber products, I would appreciate your time and effort in completing the first three questions plus the last section on the last page. This will only take a few minutes and the information which you supply in those few minutes is extremely important.

If you would like additional information on Pressure-Treated Southern Pine, Permanent Wood Foundations, and/or the Use, Handling and Disposal of Pressure-Treated Wood, please check the appropriate spaces on the back of the questionnaire and write your name and address on the back of the return envelope. We will see that you get it. All answers are confidential.

Once again, thank you for your help!

Sincerely,

Paul M. Smith  
Graduate Student

*Please help! I need more responses to complete this study and my degree. A response from your firm would help.  
Thanks,*



COLLEGE OF AGRICULTURE AND LIFE SCIENCES

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061

DEPARTMENT OF FOREST PRODUCTS

*Thomas M. Brooks Forest Products Center*

October 16, 1987

Dear Prospective Do-It-Yourselfer:

Will you do us a favor?

We are conducting a survey of the important Do-It-Yourself customers for pressure-treated lumber products. We are focusing our effort on the best source for this information, households located throughout the U.S. The study should enable manufacturers and retailers to better meet the needs that you, the consumer, require in pressure-treated products.

Your name was randomly selected in a scientific fashion for inclusion in this study. Therefore, your response to the enclosed survey is of key importance to the success of our research.

We ask that the survey be completed by the most influential household member for Do-It-Yourself activities. Even if you have not used or purchased any pressure-treated lumber products in the last 3 years, please complete the first 4 questions then skip to page three (as instructed in the questionnaire); this will only take about 5 minutes of your time. ***All responses are extremely important for the success of this study and the completion of my degree!***

For the survey results to be reliable, we need a high rate of response, so your answers are crucial. Won't you please take a few moments to fill out the enclosed questionnaire and return it in the postage-paid reply envelope. Of course, all answers are strictly confidential.

Thank you in advance for your cooperation and help!

Sincerely,

Paul M. Smith  
Graduate Student  
Forest Products Marketing

Steven A. Sinclair  
Associate Professor  
Forest Products Marketing

P.S. If you would like free outdoor project and deck plans for pressure-treated lumber products sent to you, please write your name and address on the back of the return envelope in the spaces provided, or if you prefer, request the booklet in a separate letter.

Enclosure



VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061

DEPARTMENT OF FOREST PRODUCTS

*Thomas M. Brooks Forest Products Center*

October 23, 1987

Hello there!

I recently sent you a letter requesting your participation in a customer market survey for pressure-treated lumber products I am conducting as part of my studies here at Virginia Tech. If you have returned the survey, thank you for your help! Your response is very important to me because it will provide the information I need to complete my work towards a Ph.D degree in Forest Products.

I realize that anonymous mail, such as the survey, often receives a low priority and you may not yet have found the time to complete it. However, I would like to encourage you to do so. The survey takes only a short time to complete and you need not identify yourself. The information which you provide will assist manufacturers and retailers in providing the pressure-treated lumber products and services that customers demand!

Even if you do not use pressure-treated lumber products, I would appreciate your time and effort in completing the first four questions plus the last two sections (pages 3 & 4) of the survey. This will only take about 5 minutes and the information which you supply in those few minutes is extremely important.

If you would like a free booklet of Outdoor Projects and Deck Plans, simply write your name and address on the back of the return envelope in the spaces provided, or if you prefer, request the information in a separate letter. *Remember, all answers are strictly confidential.*

Once again, thank you for your help!

Sincerely,

Paul M. Smith  
Graduate Student

*Please help! I need more responses to complete this study and my degree. A response from you would help.*  
*Thanks,*

**The vita has been removed from  
the scanned document**