

# **The Impact of Environmental Certification on U.S. Hardwood Flooring Manufacturers**

by

**Curt Alt**

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**Dr. Robert Bush, Chairman  
Dr. A.L. Hammett  
Dr. Fred Lamb  
Dr. Paul Smith  
Dr. Robert Smith**

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**Curt Alt**

## **(ABSTRACT)**

A nation-wide survey of hardwood flooring manufacturers was conducted in the spring of 1998. The objectives of the study were to determine the differences in beliefs towards certification between certified and non-certified hardwood flooring manufacturers and to explore the decision to certify and the implications of that decision. Those objectives were chosen because certification is a developing phenomenon of which there are some aspects that remain unknown. The survey consisted of a mail questionnaire that was sent to more than 250 hardwood flooring manufacturers. The questionnaire was used to collect demographic and attitudinal information from the respondents about certification. The second part of the research used the Analytic Hierarchy Process to model the decision process hardwood flooring manufacturers go through when deciding whether or not to certify. Data were collected as part of the mail questionnaire. The final goal of the research, to explore the experiences of certified manufacturers, was met through the use of personal interviews with the manufacturers.

The results from the mail survey indicated that certified hardwood flooring manufacturers tended to be smaller than non-certified hardwood flooring manufacturers. The total amount of certified hardwood flooring produced in the U.S. in 1997 was estimated to be 435,579 bdft, roughly 0.1% of the total reported amount of hardwood flooring produced. The research also indicated that certified manufacturers felt that there was a need for certification in the U.S. and that it was the environmentally responsible thing to do, while the non-certified manufacturers felt that that was untrue. The most important factor in the non-certified manufacturers' decision whether to certify is the profit potential of the product, while the certified manufacturers based their decision to certify on the marketing advantages, image benefits, and access to new markets that the certified product provides.

Overall, certified and non-certified hardwood flooring manufacturers hold widely differing views on certification, and those differing beliefs contribute to the choices each group makes.

## **Dedication**

To Madeline, for being the reason that I finally finished this work. And to Lara, for giving her to me and for showing me a world of love and support. And to my parents, for their continued love, support, and patience.

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## **Preface**

This dissertation is broken into five chapters. Chapter 1 explains the problem and provides the necessary background information. Chapter 2 details the mail survey and the comparison of the certified and non-certified hardwood flooring manufacturers. Chapter 3 describes the AHP process and the resulting decision model. Chapter 4 discusses the personal interviews with the certified hardwood flooring manufacturers. And, Chapter 5 discusses the results of the work in the framework of certification as a strategic business decision.

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# Chapter 1 — Introduction and Literature Review

## Introduction

The United States forest products industry is a dynamic and important part of the economy. Many citizens fail to realize just how vast and important the forest products industry is to the U.S. The 43,700 forest products companies employ 1.75 million people and produce over \$300 billion in forest products annually (U.S. Census Bureau 1998). In addition, Americans consume over 60 billion board feet of lumber per year (Howard 1997). Also, most Americans fail to realize that the forest products industry provides us with more than 5,000 unique products that enrich our lives everyday. When presented with those facts, most people understand that this often overlooked industry is in fact a key element in the U.S. economy.

However, the industry is not without its critics. Public concern over the state of the world's forests and the pressures being placed upon those forests by the world demand for wood have been increasing since the 1980s. Led by environmental groups, those concerns came to the forefront at the Earth Summit in Rio in 1992 when the participating nations agreed to monitor and sustainably develop the world's forests.

The U.S. forest products industry has been slow to respond to the attacks by environmental groups. The industry has finally united behind the Wood Promotion Network advertising campaign that rolled out in January 2001 and will promote the environmental stewardship and benefits of wood products and wood products companies. However, the message of the good work that the industry is doing is slow to reach the public and often falls on deaf ears, and the environmental groups have been vocal and united in their attacks on the industry. In their effort to improve the state of the world's forests and control the wood harvested for use around the world, the environmental movement has adopted the certification of sustainably produced wood products as their method of choice.

Certification of timber products involves having an organization examine the practices of a company to certify that they are environmentally benign. Although the certification of sustainably managed wood products is a tantalizing solution to the concerns of the environmental movement, the process has been slow to be adopted in the industry. Experts estimate the percentage of certified product available on the market at less than one percent of the total demand for wood products, far too little to be a significant current in the industry (Kiekens 2000f, Boutin 2000, Heissenbuttel 2000). Although study after study has demonstrated that consumers say they want certified products, in the real world marketplace consumers have repeatedly demonstrated that they are not willing to pay more for certified products (Hansen 1997).

## **Problem Statement**

The certification movement is still in its infancy and many manufacturers are skeptical about its long-term efficacy. Certifying agencies have tried to generate enthusiasm for their movement, but it has proven difficult due in part to the high levels of misinformation, misunderstanding, and emotion surrounding the true state of the U.S. hardwood resource. Many consumers express concern about timber harvesting and the state of U.S. forests but are unable to provide specific reasons for their uneasiness. Instead, they base their disquiet on vague perpetuated beliefs about old growth forests and deforestation. At the same time, many U.S. manufacturers argue that certification is unnecessary given the well-managed state of U.S. forests and the lack of overt consumer demand.

However, despite the limited demand for certified products, a few companies have voluntarily chosen to undergo certification. This is particularly the case in the U.S. hardwood flooring industry. In an industry with relatively few firms, a number of companies have become certified. This makes the U.S. hardwood flooring industry a prime choice for studying the certification phenomenon. As with any developing phenomenon, it is useful to understand the underlying beliefs and attitudes that companies hold towards certification. Also, the decision to become certified is an important decision that can have a profound impact on a hardwood flooring company. Decomposing that decision to determine its important components can facilitate the understanding of how manufacturers approach the decision and can provide assistance when making the decision. Finally, because certification is a relatively new movement, it is important to understand the real world implications of the decision to certify. This work is an attempt to provide that needed information.

Because conducting a study of the impact of certification on the entire U.S. wood products industry would be difficult and unproductive, this study concentrated on the U.S. hardwood flooring industry. U.S. hardwood flooring manufacturers were chosen as the population of this study for a number of reasons: the manageable size of the industry, the visibility of the product to the end consumer, the control the end consumer has over the choice of the product, the ability of manufacturers to produce a uniform product and promote the product to consumers as an entire system, the short distribution channels from manufacturer to end consumer, the potential for certification to have a large impact in the industry, and the inroads already made by certification in the industry. However, the important trends and implications uncovered by this research will be applicable to industries other than hardwood flooring.

## Objectives

Based on the problem statement, the following objectives were defined:

- Determine the influence of selected factors on a manufacturer's decision to produce certified hardwood flooring
- Assess the impact that the decision to enter the certified hardwood flooring market has had on the business operations of those manufacturers producing certified hardwood flooring

## Literature Review

### The Hardwood Flooring Industry

#### History of the Hardwood Flooring Industry

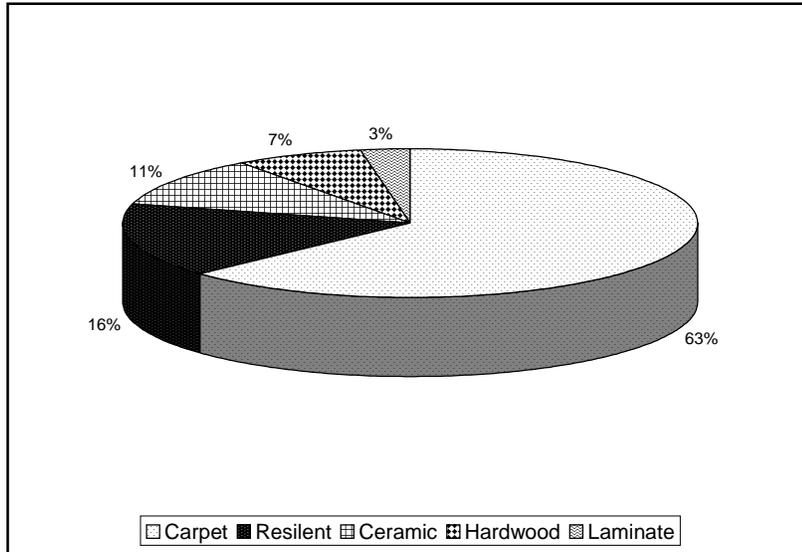
Hardwood flooring was the floor covering of choice from 1907 through 1966, growing from 33.6 million board feet of flooring shipped in 1907 to 654.4 million in 1966, with 1.2 billion board feet shipped in the peak year of 1955 (Helm 1999). However, hardwood flooring was not considered a high-end product, and owners often covered as much of the floor as possible with area rugs (Helm 1999). Two events took place in the mid-1960s, however, which changed the importance of hardwood flooring. The first was the advent of the tufting machine, which led to low-cost production of wall-to-wall carpeting (Wheat 1995). The second, and more significant, event was a change in mortgage policy in 1966 which no longer required new homes to have hardwood floors to qualify for FHA home mortgages (Helm 1999, NOFMA 1996, Sinclair 1992). That change in mortgage policy led to a swift and steady decline in flooring sales over the next 16 years and an explosion in the amount of carpet used in homes (Helm 1999). The low point for the hardwood flooring industry came in 1982, when a mere 75 million board feet of hardwood flooring was shipped (Helm 1999). The unpopularity of hardwood flooring also reflected in the amount of hardwood lumber used by the industry. In 1960, the production of hardwood flooring used about 12.8% of all domestically produced hardwood lumber. That figure had dropped to 1.2% by 1980 (Sinclair 1992).

#### The Hardwood Flooring Industry Today

After decades of stagnation and decreasing shipments, the hardwood flooring segment of the U.S. flooring market has seen an explosion in demand for most of the last two decades. Shipments of hardwood flooring have grown by an average of 13% a year since 1982, resulting in a cumulative increase of more than 700% from 1982 to 1999 (Helm 1999).

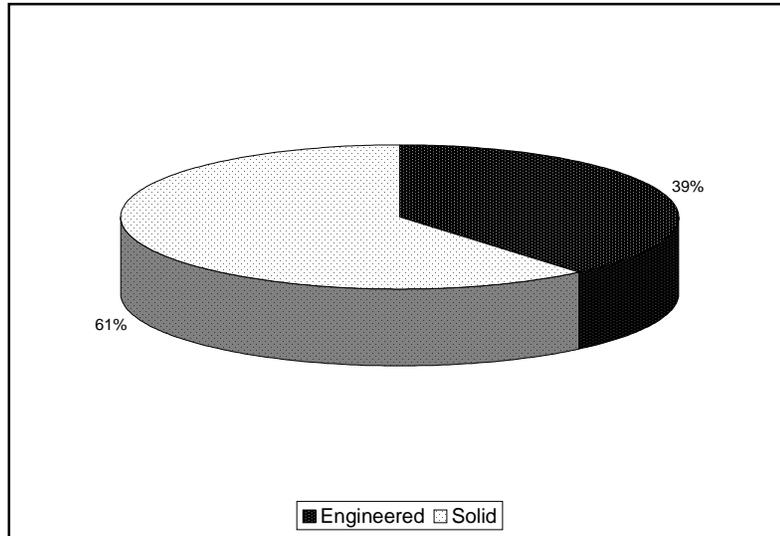
Retail sales of hardwood flooring reached \$1.35 billion in the U.S. in 1999, with sales

increasing every year since 1982 (Tucker 2000). On a sales basis, hardwood flooring has increased its market share from 2.8% of the market in 1980 to 7.2% of the entire floor covering market in 1999 (Figure 1-1) (Wheat 1995, Tucker 2000). From 1990 to 1999, the value of manufacturers' hardwood flooring shipments grew 158%. In 1998, the 699 million square feet of hardwood flooring shipped represented 2.7% of the 25.6 billion square feet of total floor coverings shipped (Tucker 2000).



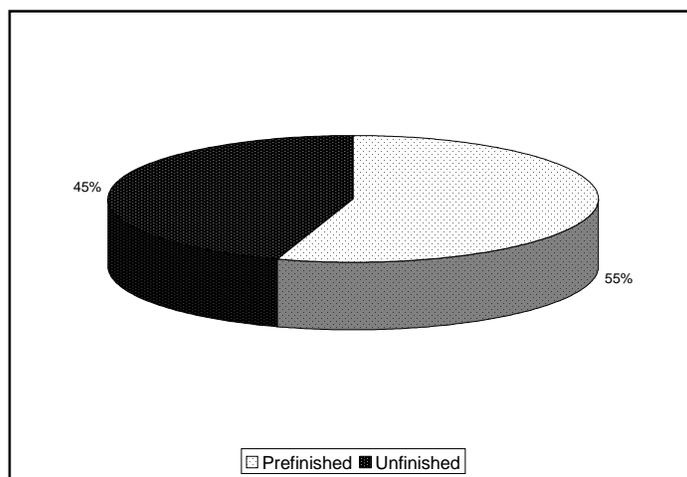
**Figure 1-1: U.S. Floor Covering Sales by Product Type: 1999**

Within the hardwood flooring industry there are two main types of product manufactured: solid hardwood flooring (made from a solid piece of hardwood lumber) and engineered flooring (a plywood product made up of perpendicular plies of hardwood or softwood veneer topped with a hardwood face veneer). The engineered product continues to take market share from solid flooring and accounted for 39% of the hardwood flooring market in 1999 (Figure 1-2) (Tucker 2000).



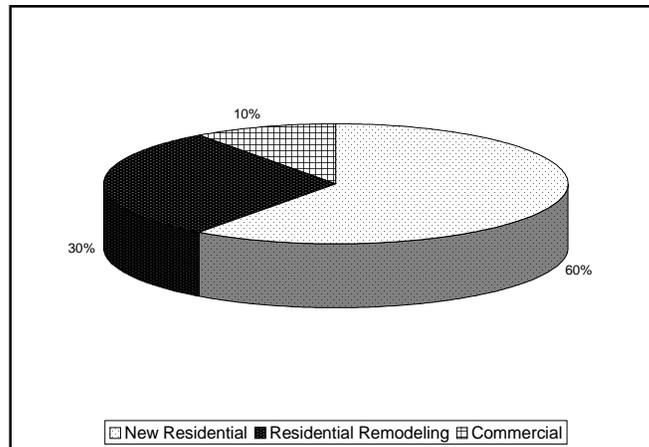
**Figure 1-2: U.S. Hardwood Flooring Production by Type of Flooring: 1999**

Hardwood flooring can also be manufactured as a prefinished or unfinished product. Prefinished hardwood flooring is finished with a protective coating at the factory, which allows for very simple installation at the job site. Unfinished hardwood flooring must be finished at the job site after it has been installed, which makes for a more difficult installation but allows for more unique finishes. Prefinished flooring has been steadily taking market share from unfinished flooring and accounted for 55% of the residential flooring sold in 1999, a reversal of the industry breakdown in the mid-1990s (Figure 1-3) (Tucker 2000).



**Figure 1-3: U.S. Hardwood Flooring Production by Finish Type: 1999**

The largest market for hardwood flooring in the U.S. is new residential construction, which accounted for 60% of the hardwood flooring sold in 1999 (Tucker 2000). The residential remodeling market was the second largest market for hardwood flooring, with 30% of the product sold, and the commercial market, which has long viewed hardwood flooring as not durable enough for use, accounted for the remaining 10% of the market (Figure 1-4) (Helm 1999).



**Figure 1-4: U.S. Hardwood Flooring Production by End Use: 1999**

Recently, the hardwood flooring industry has seen a number of acquisitions that have resulted in a single dominant manufacturer. The largest hardwood flooring company in the U.S. market is Armstrong World Industries, which owns Triangle Pacific (the parent company of the Bruce, Hartco, Robbins, Premiere, and Traffic Zone hardwood flooring companies) and accounted for 40% of the U.S. hardwood flooring sales in 1999 (Helm 1999). The Burrell Company, owner of the Dixon Lumber Company, holds the second leading sales position in the U.S. market with 10% of 1999 sales, and Domco Tarkett, owner of Harris Tarkett, follows with the third leading sales position in the hardwood flooring industry (Helm 1999). However, while the traditional hardwood flooring companies have been consolidating, a number of large plywood, veneer, and lumber manufacturers have recently vertically integrated and begun producing hardwood flooring (Helm 1999).

Hardwood flooring is the most expensive floor covering on the market, which accounts for the following discrepancy highlighted by Helm (1999): while hardwood flooring held 7.6% of the floor covering sales in 1998, its percentage of the square footage was only 2.4%. Hardwood flooring averaged \$2 a square foot in 1998 (Helm 1999). That is slightly more than laminate flooring, double the cost of ceramic tile, and nearly triple the cost of carpet, which averaged 69 cents a square foot (Helm 1999). Of the three types of flooring—unfinished, prefinished, and engineered—unfinished is the least expensive and engineered is the most expensive (Helm 1999). However, after the

installation costs are added in the three flooring costs work out to be about the same (Helm 1999).

### **Distribution Channels in the Hardwood Flooring Industry**

The distribution channels in the hardwood flooring industry are quite simple and short. Traditionally, the product has moved from the manufacturer to a distributor to a main street retailer. The pathway to market does depend, however, on the end market being served, and the channels have been changing slowly as manufacturers look for new ways to bring their product to market (Wahlgren 2001). The traditional pathway, however, has contributed to the close working relationship between manufacturer and retailer that has been a hallmark of the hardwood flooring industry (Wahlgren 2001).

The end markets for hardwood flooring can be broadly classified into four markets: residential new construction, repair and remodel, do-it-yourself (DIY), and commercial new construction and repair and remodel. The residential new construction market is the largest market for hardwood flooring with 60% of the total production (Figure 1-4), the repair and remodel and DIY markets account for 30% of total production, and the commercial market accounts for the remaining 10% of production.

Broadly speaking, hardwood flooring in the new residential market follows the traditional manufacturer–distributor–retailer pathway. However, the new residential market can be further broken down into large and small builders, and the channels used by those categories are different (Brown 2001). The large builders (Ryan Homes, Pulte Homes, etc.) make use of a flooring subcontractor who is given an annual contract to do all of the flooring work for the builder in a given area. The huge amount of work that such a contract provides the subcontractor allows the contractor to function as a de facto distributor and collapse the distributor and retailer segments of the distribution channel into one unit. The flooring contractor negotiates a deal with a manufacturer to provide all of the flooring for the year, and that flooring is then used in all of the new homes built in that area. This creates a simple distribution channel for the product, but severely limits the flooring choices the new homeowner is given when deciding what to put in their new home (Brown 2001).

The smaller new home builders utilize main street retailers and the traditional distribution channel for their hardwood flooring needs (Brown 2001). Main street retailers carry a wide selection of flooring types and brands, giving the builder a much wider selection of flooring from which to choose. The homeowner therefore has more control over the choice of flooring put in the home, so that brand recognition and manufacturer marketing efforts can make a difference in this market.

The repair and remodel market is very similar to the small builder market and uses the manufacturer–distributor–main street retailer distribution pathway (Brown 2001). The work in this segment is done by flooring contractors who do not have the capability to

carry flooring inventory. Therefore, they rely upon the retailer to stock the product and materials that they need for their jobs. This again gives the homeowner significant control over the flooring used, as the homeowner often specifies exactly which product they would like used on the job.

The do-it-yourself (DIY) market segment necessarily eliminates the contractor from the distribution chain and typically replaces the main street retailer with a big box store. As a result, the product moves from the manufacturer directly to the big box, where the consumer makes their purchase. The consumers therefore gain total control over the product used on the job. The big boxes attempt to lure the consumer in with low hardwood flooring prices and “no questions asked” warranties, and that insistence on cheap prices and service creates very low margins for the manufacturers (Brown 2001). In addition, because the manufacturers are dealing directly with the big box store, servicing the account can be extremely difficult and quality and profit issues result in frequent manufacturer turnover (Brown 2001).

The commercial market segment functions much like the large residential builder segment, except that the homeowner is replaced with an architect or specifier that decides which product to use (Brown 2001). The flooring travels from the manufacturer directly to the job site to be installed by the flooring contractor without going through a distributor. This market segment is characterized by long lead times from the specification to bid and final construction (Brown 2001).

### **Trends in the Hardwood Flooring Industry**

The demand for hardwood flooring has traditionally been related to new housing starts and the amount of hardwood flooring used per home. In 1933, the year in which the average new home had the highest amount of hardwood flooring, each new housing start contained an average of 1,445 board feet of hardwood flooring. However, from 1950 to 1976 the amount of wood flooring used per single family home declined by 90 percent (Sinclair 1992). The board feet of hardwood flooring used per housing start reached its lowest point in 1978, when the average new home had only 56 board feet of hardwood flooring (NOFMA 1996). Another factor in the demand for hardwood flooring is the versatility of the product, which has allowed it to penetrate the repair and remodeling segments and become a viable alternative in that market (Tucker 2000).

### ***Key Success Factors***

In its early days, hardwood flooring was known primarily for its form and function (Wheat 1995). However, today its best selling points are the warmth and elegance it has come to symbolize.

Several factors have led to hardwood flooring’s growth in market share. New technological innovations have lowered the cost of producing hardwood flooring, thus narrowing the gap between it and carpet in terms of price (Wheat 1995). Advancements

have also been made in the durability of the flooring. Buffing and waxing are no longer necessary as a variety of stains, sealers, polyurethanes, moisture cured urethanes, and water based urethanes are now available to color, cover, and protect hardwood floors (NOFMA 1994). These new protective coatings not only eliminate most of the care normally associated with hardwood flooring, they also allow hardwood flooring to be placed in applications, such as in the kitchen, previously off-limits to the product. The development of laminated products and thinner floorboards have also increased the number of subfloors upon which hardwood flooring can be laid (Wheat 1995). Hardwood flooring can now be installed on concrete slabs, plywood-on-slabs, and wood joists (NOFMA 1995).

Changes in customer perceptions concerning competing floor coverings and growth in complementary markets have also helped spark interest in hardwood flooring. The current cohort of homeowners grew up in the wall-to-wall shag carpeting and Orangeburg paneling era in the sixties and seventies and would rather stay away from carpeting in their homes today (Helm 1999). They want to fill their homes with the warmth and elegance hardwood provides. In addition, area rugs have gained popularity and have become much more affordable due to technological advances. Such rugs open up further decorating options for hardwood floors (Wheat 1995).

Finally, the wide variety of wood species available for use and the natural variation in wood allow hardwood flooring to be used as a true design element in a home or office (Helm 1999). This success factor is enhanced by the fact that the flooring manufacturer, distributor, contractor, and retailer work with the architect or designer throughout the entire job and take care of any problems as they arise (Berg 2000). And, while other floor coverings must be replaced when fashions change even if their lifespan is not complete, hardwood flooring can be refinished multiple times.

#### *Challenges for the Future of the Hardwood Flooring Industry*

Although forecasts show the growth in hardwood flooring continuing for the next couple of years, there are some challenges facing the manufacturers. Tucker (2000) and Helm (1999) have identified several challenges that manufacturers must meet in the coming years:

- Getting consumers to act on their high preference for hardwood flooring and purchase the product
- The aggressive competition from hard surface competitors like laminates
- Maintaining production quality and volume during fluctuations in raw material prices
- Maintaining and improving product quality and value with a naturally variable product and fluctuating raw material supplies
- Facing competition from overseas manufacturers
- Facing competition from domestic traditional non-hardwood flooring companies

- Working to increase consumption across all market segments
- Expanding into the commercial flooring market
- Promoting hardwood flooring at the industry and individual manufacturer level to increase hardwood flooring's presence in traditional flooring stores
- Combating negative consumer perceptions about the upkeep and durability of hardwood flooring

### **Previous Hardwood Flooring Studies**

Several aspects of the U.S. hardwood flooring industry have been examined in previous studies. Hansen and West (1998), Irland (1990), and Martens (1990) examined the current status and trends in the market; Martens (1971) compared the costs of alternate flooring materials; Nevel (1974 and 1975) detailed the use of hardwood flooring in the urban rehabilitation market; Haas and Smith (1997) examined the characteristics of the hardwood flooring market; Cesa and Sinclair (1988) documented the characteristics of the home center market for flooring; and Bush, Sinclair, and Araman (1990 and 1991) detailed the market needs and important attributes of the hardwood flooring market. These previous studies have examined a wide range of issues related to the hardwood flooring industry, but there are some gaps in knowledge that need to be addressed. First, many of the studies are quite dated, and it is difficult to find recent studies that profile the demographic makeup of the hardwood flooring industry. Second, no studies have examined the impact that the certification movement has had on the hardwood flooring manufacturers. Third, the important factors in the manufacturers' decision-making process whether or not to become certified are unknown.

### **Decision-Making**

As this study involves understanding how the decision to certify is made, it is worth reviewing key aspects of decision-making in general. Everyday, people everywhere make decisions that affect their lives. Most of these decisions are simple and require no more than a second or two of thought by the individual before an alternative has been chosen. As the complexity and ramifications of the decision increase, however, the decision process becomes more difficult and involved. In the business world, managers must make tough decisions about the course and operation of their firms everyday. Braverman (1980) distinguishes between managerial decisions and other common everyday decisions by defining managerial decisions as:

*“complex decisions that have a significant effect on some organization. In business organizations, the effect of managerial decisions is generally monetary.”*

The managerial decision of interest in this study is the decision by a hardwood flooring

manufacturer concerning whether to begin producing certified hardwood flooring.

### **Strategic Business Decisions**

Before examining the components of the decision to become certified, however, it is important to explore what type of managerial decision it is. All successful businesses follow a defined business strategy that guides their actions and decisions. The managerial decision-maker's role in implementing that business strategy is vitally important to the continued success of the firm. Indeed, Grant (1995) has suggested that the strategy that a business follows is the primary determinant of that business' success.

There are two types of strategic decisions identified by Grant (1995) that a firm must make: corporate level decisions and business level decisions. A corporate level strategic decision defines in which industries the firm will compete. A business level strategic decision defines how the firm will compete within a given industry. Given those definitions, the decision whether or not to certify is a business level decision. The firms are not deciding to enter into a new industry (a corporate level decision), but are rather determining how they should compete within their own industry (a business level decision).

The determination that certification is a business level decision adds increased importance to the decision, as business level strategies determine the success or failure of a firm (Grant 1995). That is, the choice of the industry in which a company chooses to compete is immaterial as long as a company competes successfully against competitors. In order to compete successfully, the company must develop a sustainable competitive advantage over their competitors. Therefore, the goal of any business level strategy is to produce a sustainable competitive advantage over rival firms. Whether or not certification provides hardwood flooring companies with a competitive advantage, and how the firms make the decision to certify, will be examined in this study.

### **Decision-Making Processes**

While all managers must make decisions, including whether or not to certify, they are not all equally adept at the task. Braverman (1980) suggests that, while all good decision-makers have an intuitive ability to select the right decision, successful decision-makers possess three common characteristics:

- Intelligence
- Familiarity with all aspects of their field
- Prodigious information gathering

The combination of these characteristics and an organized approach to decision-making can help the decision-maker improve the number of successful decisions they make.

When choosing which decision process to use, the decision-maker has a number of

choices. Decision-making approaches range from the very simple “gut feeling” decision process used by people everyday to the very complex mathematical decision formulas espoused by management science devotees. A very basic and general approach to making decisions is offered by Braverman (1980), who defines the formal intuitive decision-making process as follows:

1. Identify and list the complete set of viable alternative acts that are available to the decision-maker under a particular decision situation.
2. Identify and list the set of states of nature that have an appreciable effect on the consequences of the acts.
3. Determine and value the conditional consequences of each act for every state of nature.
4. Eliminate states of nature that have insignificant effects and acts that are clearly inferior to other available acts.
5. Select the appropriate decision criteria in light of the organization’s objectives and the decision-maker’s subjective assessment of the uncertainties pertaining to the situation.
6. Quantify the uncertainties in terms of the likelihood or probability that a particular state of nature will occur.
7. Use the quantitative measure of uncertainty, the conditional consequences, and the decision criterion to choose the optimal act.

Braverman (1980) and Moody (1983) identified the following partial list of decision-making techniques from which a concerned decision-maker can choose:

- Bayesian Statistical Decision Theory
- Brainstorming
- Checklisting
- Collective Bargaining
- Consensus Building
- The Delphi Method
- Didactic Interaction
- Fishbowling
- Informal Intuitive Decision-making
- Kepner-Tregoe
- Morphological Analysis
- Rating or Priority Systems
- Synectics

### **The Analytic Hierarchy Process**

No matter which of the decision techniques listed above is chosen, however, one element remains constant. The most important step in any decision process is to clearly define the decision to be made (Beach 1993). The Analytic Hierarchy Process (AHP),

developed by Thomas Saaty in the 1970s, is a tool that can be used by decision-makers to decompose the problem at hand and add insight to the decision process (Harker 1989). Saaty developed the AHP as a response to what he saw as increasingly complex decisions in an increasingly complex world. He saw that people were being asked to deal with problems that were so vast that the decision-makers did not have the resources to handle them. Rather than develop an even more complicated decision process to tackle these difficult problems, Saaty reasoned that the answer was to develop a simple yet effective tool to help any decision-maker attack even the most complicated problem (Saaty 1982). He states:

*“Rather, we need to view our problems in an organized but complex framework that allows for interaction and interdependence among factors and still enables us to think about them in a simple way.”* (Saaty 1982)

The AHP has frequently been used as a tool to aid in decisions ranging from sports to selecting a bridge material to predicting the size of rural families in India (see Golden et al. 1989; Saaty and Vargas 1991; and Smith and Bush 1995). The AHP is useful for its ability to lend a scientific basis to the creative, yet amorphous, formulation and analysis of a decision problem (Harker 1989). For these reasons, the AHP will be used in this research to model and illuminate the decision process used by hardwood flooring manufacturers when deciding whether or not to produce certified hardwood flooring.

The four basic steps involved in using the Analytic Hierarchy Process are described by Saaty (1991):

1. Break down a complex unstructured problem into its component parts.
2. Arrange the parts, or variables, into a hierarchic order.
3. Assign numerical values to subjective judgments on the relative importance of each variable.
4. Synthesize the judgments to determine which variables have the highest priority and should be acted upon to effect the final outcome.

Breaking the problem down into its component parts is a vitally important step when using the Analytical Hierarchy Process, for it is only through this process that the important factors in the problem can be clearly identified. By identifying all of the important components to the problem, the decision-maker is able to clearly “see” the problem before him and is prepared to develop the hierarchy necessary to use the AHP.

Once the decision-maker has a clear understanding of the components of the problem, the next step is to develop the hierarchy necessary to complete the Analytic Hierarchy Process. The different components are divided into categories (the goal, decision factors, and alternatives) and placed in the hierarchy based on the decision-maker’s understanding of the situation (Harker 1989). The creation of a hierarchy of

components is a very natural extension of a human being's ability to categorize complex situations and allows the decision-maker to process large amounts of information and form a more complete view of the problem at hand (Saaty 1982). The hierarchy is composed of three parts: the goal, decision factors, and alternatives. The goal is the overall purpose of the exercise; the decision factors are the important decision criteria that influence the decision; and the alternatives are the solutions to the problem from which the decision-maker is trying to choose. The goal is placed at the top of the hierarchy, the decision factors are in the middle, and the alternatives are placed at the bottom of the hierarchy.

Once the hierarchy has been constructed, the decision-maker (or decision-makers if the problem is being solved by a committee) ranks all of the different decision factors against each other through the use of simple pairwise comparisons. The comparisons are made on a scale of preferability or likeability, and Saaty developed a 9 point scale which is used for the comparisons. The decision-maker is asked to rate the preference for each decision factor when compared against each of the others. The purpose of the pairwise comparisons is to determine the relative weight, or importance, of each of the decision factors. Because the model is developed as a hierarchy, the elements in each level are influenced by the elements in the level immediately above. Therefore, the decision factors are defined in terms of the overall goal. The goal has a sum total of one assigned to it, and that sum is distributed as mathematical weights to the decision factors (based on the decision-maker's pairwise comparisons) so that the sum of all of the individual decision factor weights equals one. In this way, the decision factors are weighted according to their importance as defined by the decision-maker through the pairwise comparison process. The decision factor with the largest weight will be the one judged most important by the decision-maker, and so on.

Likewise, the decision-maker is asked to use pairwise comparisons to rate their preference for each alternative. The alternatives are rated with respect to the decision factors in the level above them, and the value of each individual decision factor (again equal to one) is apportioned among the different alternatives underneath that decision factor. That sum total of one for each decision factor is assigned as the weight of each alternative underneath it so that the sum total of all of the alternative weights under each decision factor is equal to one. In this way, the relative importance of each alternative, as given by the decision-maker's ratings, is reflected in the weight assigned to that alternative. The reader is referred to Harker (1989) for a complete justification of this method.

The final step in the use of the Analytical Hierarchy Process is to synthesize all of the pairwise comparisons to arrive at the most preferred alternative. After the decision-maker has compared all of the pairs of objects in the hierarchy and the weights of the decision factors and alternatives have been calculated, the preferred alternative is identified by multiplying the weight of each decision factor by the weight of the

alternatives underneath it. The alternative with the highest overall weight (preference) is the preferred alternative. Saaty (1982) provides a clear explanation of this process:

1. The relationships represent the level of impact of each of the objects in the hierarchy upon the objects in the next higher level.
2. The process is repeated for all of the objects in the hierarchy and results in a set of vectors of priority, or relative importance, for all of the objects in the hierarchy.
3. As a final step, the software weighs each vector of priority and comes down the hierarchy, calculating a set of net priority weights for the bottom row of the hierarchy (the alternatives). The alternative that receives the highest weight warrants the strongest consideration by the decision-maker as the solution to the problem.

It is in this final step that the usefulness of the AHP can most clearly be seen. As noted in the literature (Golden et al. 1989; Saaty 1982) the AHP is only a tool to aid in the decision-making process, it does not dictate an ultimate solution. Even though the AHP highlights one alternative as the most preferred, the others are not dropped from consideration. In fact, Saaty (1982) states that for the AHP to be effective it must be combined with informed discussion and should be repeated over time. As new information or opinions become available, they should be incorporated into the model and the model should be rerun to see how the new information affects the final outcome. This process highlights another benefit of the AHP—its ability to test the sensitivity of the given solution. During the decision-making process, the variables in the AHP model can be adjusted to determine the impact that suggested changes would have on the final solution. The flexibility and power of this tool make it an important element in the research process.

An attractive benefit of the AHP is that it contains a built-in procedure for dealing with the errors that are likely to occur during the ranking phase. Because the rankings are done subjectively by human decision-makers, inconsistency errors often occur. An error in consistency occurs when the relationship among objects is not consistent across all levels. Saaty (1982) identifies two different types of consistency:

- 1) Similar objects are grouped together according to homogeneity and relevance.  
*For example, two differently colored squares can be grouped by shape but not color.*
- 2) The relationships of objects based on a particular criterion justify each other.

*For example, if B is preferred by two over A, and C is preferred by three over B, then it follows that C is preferred by five over A. However, when asked to rank all of the objects separately, a human decision-maker may indicate that C is preferred by only four over A (an inconsistent ranking).*

The AHP deals with inconsistency by starting from the premise that human decision-makers will give inconsistent results. The program calculates the amount of inconsistency (as compared to the theoretically perfect answers) and reports this figure as a consistency ratio (CR). Harker (1989) reports that a result of 0.1 is the accepted upper limit for the CR, which means that there is roughly a 10% chance that the decision-maker answered the questions in a purely random manner. If the CR is greater than 0.1, Harker recommends having the decision-maker revise some of the judgments in an attempt to arrive at more consistent results.

### **Timber Certification**

Consumers are becoming increasingly interested in the environmental impacts of the products they use (Ozanne and Vlosky 1996). In response to this growing concern, many governments, environmental groups, and consumer groups have begun calling for a systematic method of monitoring the world's forests to ensure that they are not being irreparably damaged in the pursuit of raw material. This "green movement" is looking to the practices of sustainable forest management and timber certification as a means of developing a set of standards for wood products that are intended to encourage consumers to purchase wood originating from certified sustainable forests.

#### **Definitions**

Although often confused in the literature and by the public, sustainable forest management and timber certification are two separate terms. A full understanding of each is necessary before the forest products certification movement can be fully understood.

Sustainable forest management (SFM) can be defined as follows:

*The management of forest resources according to a number of agreed principles and criteria. In addition to managing the cut and the replanting to ensure continuity of supply, SFM can incorporate other principles concerned with water quality, bio-diversity, habitat, and the livelihood of indigenous peoples (Wadsworth and Boateng 1996).*

Sustainable forest management (SFM) is not a new or revolutionary practice. Policymakers have been concerned with the impact of forestry practices since at least the Eighteenth Century (Gane 1983). However, the focus of such policies has historically been on sustainable harvest levels, not the full range of forest values currently included in the definition of SFM (Kanowski 1996). Nevertheless, it is

important to keep in mind that SFM principles have long been the concern of the forest products industry (Kanowski 1996).

The U.S. has certainly not been absent from the sustainable forest management movement. In fact, the U.S. has a long history of active SFM programs. The American Forest Foundation has managed the American Tree Farm system, which provides formal recognition to private land owners who manage their forests on a sustainable basis, since 1941 (NAFI 1996). The Tree Farm system standards include developing a forest management plan, regeneration after harvest, and compliance with state and federal environmental laws and regulations (NAFI 1996).

If SFM is the actual process by which the guidelines for establishing a sustainably managed forest are created and implemented, then certification is the process of verifying the effectiveness of an organization in following those guidelines and making that information known to the public. Individual companies may apply to a certification program and, if they meet the minimum requirements of that program, they can become certified and may carry the program's certification symbol on their products and promotional materials.

Although initially only the forestland management and harvesting practices of a company could be certified, the need to track certified wood products through the entire manufacturing process quickly became apparent. As a result, the certification programs developed methods of certifying secondary manufacturers (that own no forestland) so that certified products could be tracked all the way from the forest to the consumer. This tracking process is known as "chain-of-custody" certification.

A complete definition of certification, therefore, should not be restricted to just forestland management and must include a consideration of both primary and secondary manufacturers. This author, therefore, suggests the following definition of certification:

*The process of evaluating the raw materials and corporate practices a company uses in the manufacture of wood products against a set of minimum standards.*

A certified company, therefore, is one that has successfully completed the certification process and is free to advertise their product as certified. By combining certified primary and secondary manufacturers, it is possible to move a certified product all the way through the manufacturing process from the forest to the consumer.

It is important to note that the certification process does not include a measure of the manufacturing quality or value of a product; it is simply a measure of the environmental and social rating of the product.

### **History of the Certification Movement**

Public concern over the state of the world's forests and the environmental impacts caused by the mounting pressure being placed upon those forests has been increasing since the 1980s. Initially led by environmentally-minded non-governmental organizations, this movement initially focussed on the destruction of tropical rain forests. However, in recent years the movement has included the world's temperate and boreal forests in its debate, stating that abusive forestry practices are not restricted to the tropics. In 1992, this movement received the backing of governments around the world, who acknowledged at the United Nations Conference on Environment and Development (UNCED)—the Earth Summit—that sound environments and economics are inextricably linked (SAF Study Group 1995). The Earth Summit participants accepted the “Forest Principles” and chapter 11 (“Combating Deforestation”) of the UNCED document Agenda 21, two documents that identify sustainable forestry management as a means of addressing the problems of the world's forests (SAF Study Group 1995). In response to the certification movement, private firms, industry associations, third-party organizations, and governmental organizations have undertaken certification programs in countries around the world.

### **The Certification Process**

#### *Standards*

The first step in any timber certification program is the development and adoption of an agreed upon set of standards against which the product or process in question can be compared. The International Standards Organization defines standards as:

*... documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics, to ensure that materials, products, processes, and services are fit for their purpose.*

Upton and Bass (1996) categorize the general term “standards” into external and internal standards, depending on how they are developed in relation to the local forest management unit. According to them, “external standards are those set by third-party independent bodies” outside of the local forest management unit, while “internal standards are those developed by the local forest management unit to describe the level of performance which their forestry activities must reach” (Upton and Bass 1996). However, standards by themselves are often too general to be of much use when examining a forestry operation and must be further refined through the development of principles and criteria. According to Upton and Bass (1996), principles “define the standard's scope,” while criteria “set out the key elements or dimensions that define and clarify the principles.” Together, these criteria and indicators define, for a number of items, the minimum level that must be met if the product or process is to be certified.

Having an acceptable set of criteria and indicators in place is, therefore, a necessary foundation for an internationally accepted certification program. Developing a set of

criteria and indicators that are acceptable around the world, however, has proven to be a monumental task. Almost every entity in the world involved in certification has developed standards of their own without regard to the work being done by the other organizations with similar goals (Upton and Bass 1996).

### *Types of Certification*

Cabarle et al. (1995) classify environmental claims into first-, second-, or third-party claims as follows:

- First-party claims are those made by producers about the environmental attributes of their own products.
- Second-party claims are endorsements by trade associations or similar affiliates with a vested, financial interest in the producer's competitiveness.
- Third-party claims are backed by independent entities that issue eco-labels based on objective assessments.

The proliferation of different types of certifying agencies and claims in the marketplace has had the unintended and undesirable consequence of confusing and misleading the consumer. A 1991 World Wide Fund for Nature (WWF) study of the UK market found that of more than 360 different certification claims for wood products offered by different companies, only four of the claims of sustainably produced wood products could be substantiated (Read 1991). In addition, the lack of a well-defined and accepted certification organization creates confusion and apprehension among forest products producers, who hesitate to be certified out of a fear that the certification program they choose may not be accepted by other groups.

### *Approaches to Certification*

A certification agency can use one of two approaches when certifying a forest products company: a product approach or a systems approach (SAF Study Group 1995). While both approaches result in a certification certificate, they differ fundamentally in scope and operation.

The product approach to certification focuses solely on the product in question, be it a 2" x 4" stud or a finished product such as ready-to-install flooring. During the certification process the history of the product, from the felling of the tree through the manufacturing process, is evaluated, usually by a contracted third-party organization (SAF Study Group 1995). At each stage of the product's development, the actions taken on the product are evaluated against a set of sustainable forest management practices. Once the product has successfully completed the certification process it is allowed to carry a label to demonstrate to the consumer that the product has been certified as

originating from a sustainably managed forest.

The systems approach focuses not on the product, but rather on the management practices employed by the firm under consideration. The certifying agency conducting a systems evaluation would look at such things as the company's objectives, goals, planning, quality control measures, record keeping, staff responsibilities, regulatory compliance, and training and education of its employees to ensure that they were environmentally sound, sustainable, and conducive to continuous improvement (SAF Study Group 1995). If a company passes a systems certification audit, it is assumed that any products the company produces are produced in an environmentally benign manner.

### **Certification Programs**

The pressure to create a workable certification system has created chaos in the certification movement. At any given time there are more than 40 different certification programs in development, each vying for recognition and acceptance (IWPA 2000). However, as of the fall of 2000 there are only five schemes that have made significant progress in the certification field: the Forest Stewardship Council, the Canadian Standards Association, the International Standards Organization, the Sustainable Forestry Initiative, and the Pan European Forest Certification system.

#### *Forest Stewardship Council (FSC)*

The Forest Stewardship Council (FSC) was created in 1993 when the World Wide Fund for Nature (WWF) brought together other environmental organizations and representatives from the forest industry in an attempt to create an international certification body (Sample 2000). The FSC has developed a network of certifying agencies that conduct the actual certification fieldwork for the organization and is working to develop regional standards by which the certifications can be conducted. Certifications are currently conducted based on a set of 10 generic forest management principles developed by the governing body (Kiekens 2000c). The FSC's vision was to become the objective international body at the forefront of the certification movement and to set the criteria by which all of the forest certification schemes would be judged, and has been championed by many celebrities and environmental groups as the sole credible certification entity (Miller 2000). However, the strong involvement of the environmental groups in the FSC has backfired on the movement and has tarnished the organization's reputation (Sample 2000). Many in the forest products industry have come to view the FSC as a strong-arm attempt by hard-line environmental groups to prescribe unworkable forest management practices.

However, the FSC is the only certification body that is capable of conducting chain-of-custody certification, and that fact has made the organization a favorite of large corporations looking to align themselves with a certification scheme. Chain-of-custody certification allows companies to track individual certified products, or product

components, through the manufacturing process from company to company. That tracking process allows the finished products to be individually labeled with a sticker verifying that they are certified. In the last year, leading Do-It-Yourself (DIY) retailers such as Home Depot, Lowes, and Menards have all announced environmental policies centering on the certification of the wood products they sell. Many of those announcements have included FSC as their scheme of choice, as that is the only certification program that is capable of supplying individually certified secondary wood products. The FSC also has the support of buyer's groups around the world, which were formed to support the FSC and encourage retailers to adopt the FSC scheme. In addition, the support of environmental groups and foundations has led to the decision by several U.S. states to certify their state forestlands under the FSC program. In fact, those certified state forestlands make up the vast majority of the FSC certified forests in the U.S. (Kiekens 2000a).

In addition to the impression that the movement is simply a vehicle for the agenda of radical environmental groups, the FSC faces other challenges. At the WWF Forests for Life Conference and Trade Fair for Certified Forest Products, the movement showcased the impressive strides that it had made in attracting participating companies and retailers to the program. However, two key points of conflict were raised with which the movement must deal. The first is that, while the initial impetus for the development of the certification movement was the destruction of the tropical forests, all of the focus of the movement has shifted to temperate forests and developed countries. The second complaint concerned the continuing inability of the FSC to supply adequate amounts of certified products and the refusal of the program to recognize the legitimacy of alternate certification schemes (Oliver 2000a).

As of December 2000, the FSC had certified 51,080,265 acres of forestland around the world (Oliver 2001).

#### *Canadian Standards Association (CSA)*

The Canadian Standards Association (CSA) is a national organization that develops standards and certification programs in a number of fields. The CSA worked with the Canadian forest industry and other stakeholders to develop the CSA Sustainable Forest Management Standards that were approved in 1996. To be certified under the standards, forest products companies must implement a comprehensive SFM system and establish on-the-ground performance objectives that meet the 21 critical elements set by the Canadian Council of Forest Ministers. Also, applicants must undergo an independent third-party audit of the management system and field inspections to confirm that the performance standards are being met (Kiekens 2000c).

As of December 2000, the CSA had certified 7,413,000 acres of forestland in Canada (Oliver 2001).

### *International Standards Organization 14000 Standards*

The International Standards Organization (ISO) is a world-wide federation of national standards bodies that promote the development of voluntary standards in all industries (Kiekens 2000c). In 1993, the ISO, working with the Canadian Standards Association, developed guidelines for sustainable forest management (Sample 2000). The standards that were developed, the ISO 14001 standards, are an environmental management system that provides a framework for a company to judge and rate its environmental performance. Rather than rating the product itself, the standards describe environmentally benign management activities that the company should follow to continually improve its environmental performance to achieve sustainable forestry.

As of October 2000, approximately 51,891,000 acres of forestland in Canada had been certified by ISO (Kiekens 2000f).

### *Sustainable Forestry Initiative (SFI)*

In response to the certification initiatives being developed by other entities, the American Forest and Paper Association (AF&PA), one of the forest products industry's leading associations, developed an alternate sustainable forest management program of its own. The program, entitled the AF&PA Sustainable Forestry Initiative (SFI), was developed in 1996 and was made a requirement of membership in AF&PA. Initially rejected out-of-hand by environmental groups because it was developed by the forest industry, the program has nonetheless made great strides in the past four years and has emerged as the primary competition to the FSC in the U.S. The amount of land certified under SFI in the U.S. surpasses the amount of FSC-certified land, and a number of high-profile companies have signed on with the program.

However, the SFI program is not generally recognized as a legitimate certification body by environmental groups or the FSC. In an effort to gain legitimacy, the initiative underwent several changes in 1999 and 2000. An independent Sustainable Forest Board (SFB) was developed to run the program, and the SFB implemented a number of changes in the program (Oliver 2000b):

1. The SFI principles were converted to a formal standard, consistent with ISO 14001.
2. The program was opened to companies that are not members of AF&PA.
3. A voluntary, independent third-party verification option was added.

In addition, AF&PA developed a logo and labeling option for those companies that have passed SFI certification. However, the environmental community still seems to be reluctant to accept the SFI as a "real" certification movement and still solely supports

the FSC (Sample 2000). Until the environmental community and the forest industry can agree to come to the table and negotiate, it seems that these two competing systems will continue to operate independently.

Another problem that has plagued both the FSC and SFI schemes is the inappropriateness of the programs for small, private landowners. Both schemes are intended to certify large, industrial landowners or manufacturers. In an effort to combat that problem, the SFI program reached a mutual recognition agreement with the American Tree Farm System, the oldest certification program in the U.S., in June 2000. Begun in 1941, the American Tree Farm System prescribes sustainable management practices for small, private landowners. Under the agreement, the two programs will recognize each other's members as legitimately certified landowners, and the agreement brings an additional 25 million acres of certified forests into the 47 million acres already third-party certified in the U.S. under SFI.

#### *Pan European Forest Certification System (PEFC)*

The Pan European Forest Certification System (PEFC) was launched on June 30, 2000 and became an immediate alternative to the FSC in Europe (Kiekens 2000b). Like the FSC, the PEFC is an international certification program that does not actually certify forestlands itself, but rather accredits existing national certification schemes. In addition, the scheme has developed an eco-label that recognized national certification programs are free to allow the independently certified landowners to use. As of October 2000, five national certification programs have been recognized by the PEFC (Kiekens 2000e). As of December 2000, the PEFC had certified 79,986,270 acres of forestland across Europe (Oliver 2001). That means that in only one-half year of operation, the PEFC has certified more forest area than the FSC has been able to certify in seven years of operation.

#### **The Supply and Demand of Certified Material**

Throughout the world, forests have been certified in North American, Central and South America, Africa, Europe, and Asia. The total area of certified forestland in the world is more than 250,000,000 acres, with a total annual production from those forests of 29,800,000 cubic meters roundwood equivalent of certified material (Kiekens 2000f, Boutin 2000, Heissenbuttel 2000). However, when compared to the total annual world production of roundwood equivalent of industrial wood, the production of certified material amounts to only 0.5% of the total production of globally traded wood products. That limited supply of certified raw material has made it difficult for producers (and would-be producers) of certified products to find an adequate supply of raw material (Business Ethics 2000). In addition, large retailers that have adopted environmental policies specifying FSC certified wood products have become increasingly critical of the program's inability to supply enough certified wood to meet their needs and the FSC's continued refusal to work with other certification programs (Oliver 2000a). In an attempt to secure more certified wood, United Kingdom DIY

retailer B&Q announced in September 2000 that it was reexamining its certification policy to see if it might include additional certification programs (Kiekens 2000e). In addition, U.S. DIY giant Home Depot has also been critical of the FSC for the same reasons. These moves suggest that the large retailers are willing to accept certification programs other than the FSC (Kiekens 2000b).

The demand for certified forest products has steadily increased, although the demand does not appear to originate with consumers. Rather, the increase in demand follows the adoption of pro-certification policies by a number of large retailers around the world (Kiekens 2000b). The FSC and its backing environmental groups have been very successful at establishing “buyer’s groups” of key forest products users that have successfully lobbied for increased use of FSC certified wood (CURE 2000). In response to pressure from environmental groups, many large retailers have adopted environmental policies calling for the elimination of wood from “endangered areas” and giving preference to certified wood. Many of the policies identify the FSC as the only acceptable certification scheme.

However, because of the success that the FSC and its buyer’s groups have had in encouraging retailers to adopt FSC-specific environmental policies, the demand for FSC certified products currently exceeds the supply. That disconnect has led to the complaints previously mentioned.

### **The Quest for Mutual Recognition**

In the last half of 2000, the dominant movement that has emerged in environmental certification is the push for mutual recognition among the competing certification schemes. As the certification movement has gained ground and large retailers have adopted environmental wood policies, there has been increased pressure to simplify the chaos of the competing certification schemes by encouraging programs to recognize each other as legitimate and to create a single, global certification program. Two of the largest wood products retailers, U.S.-based Home Depot and UK-based B&Q, are concerned that FSC’s refusal to work with other schemes will create confusion for consumers in the marketplace and will discourage landowners from certifying (Oliver 2000c).

Certification programs other than the FSC have all made progress towards mutual recognition. In October 2000, Seven Islands Land Company announced that it was the first landowner in the world to have undergone third-party certification of its forests by both the FSC and SFI (Kiekens 2000e). Seven Islands went on to say that “both [the] SFI and FSC programs provide credible and objective methods of evaluating sustainable forestry in the field” (Kiekens 2000e). In addition, the state forestlands of Maine, Tennessee, and North Carolina are to be certified by both SFI and FSC as a means of conducting a comparative analysis of both programs (Kiekens 2000d). In June 2000 the SFI program and the American Tree Farm System reached a mutual recognition

agreement, and pilot mutual recognition agreement programs are underway between the CSA and SFI and between the CSA and PEFC (Kiekens 2000d, Kiekens 2000e). In another step, the International Forest Industry Roundtable and PEFC have met and agreed to work together on the further development of international mutual recognition procedures (Oliver 2000c). However, for all the progress that has been made in mutual recognition, there is still animosity between the environmental group-backed FSC and the industry-backed SFI programs. Until those two groups agree to work together to further the certification movement, the lingering industry/environment split will continue to fester (Sample 2000).

### **Previous Certification Studies**

Several aspects of the certification movement have been examined in previous studies. Carter and Merry (1998) examined the status of certification; Stevens, Ahmad, and Ruddell (1998) and Vlosky and Ozanne (1998) explored the manufacturers perspective on certification; McMahon (1996) detailed the industrial forestry perspective on certification; Hayward and Vertinsky (1999) evaluated the forest owner and manager perspective on certification; Ruddell and Stevens (1998) looked at certification from the perspective of the business and institutional furniture manufacturer; Vlosky and Ozanne (1997) detailed the wood products business customer perspective; Ozanne and Volsky (1997) and Forsyth, Haley, and Kozak (1999) explored consumers' willingness to pay for certified products; Panches and Hansen (1997) and Hansen (1997) evaluated the implications of certification in marketing strategy; and Ozanne and Smith (1998) segmented the market for certified wood products. While there has been extensive recent research on certification, no study has looked at the hardwood flooring manufacturers' perspective on certification or examined the important decision-making factors considered by the manufacturers. In addition, the impact that the decision to certify has had on hardwood flooring manufacturers has not been explored. Finally, while there is only limited research available on the total supply of certified material, there has been no estimate made of the amount of certified hardwood flooring available in the marketplace.

### **Summary**

The timber certification movement has generated strong feelings within the forest products community, but so far only a small number of manufacturers to become certified. Although environmental groups have worked hard to generate support for the certification programs and demonstrate the need to certify, many manufacturers continue to resist becoming certified. Conventional wisdom states that those companies that have become certified are finding it difficult to secure an adequate supply of certified raw material and have found limited demand for their products outside of a few FSC-supported buyer's groups.

When exploring a developing phenomenon such as certification, it is important to examine aspects of the movement that are unknown. Limited research into the real world experiences of certified manufacturers is found in the literature. In addition, the important factors in a manufacturer's decision to certify are unknown, and the interaction of those factors has yet to be explored. Finally, the amount of certified hardwood flooring produced annually in the U.S. is unknown. This study will contribute to the general understanding of certification by focusing on the U.S. hardwood flooring industry and exploring the experiences of manufacturers in that industry with certification.

As the certification movement develops, it is important to understand the attitudes and beliefs that manufacturers hold towards certification and the decision process that a manufacturer goes through when deciding to certify. This information will be valuable to those following the certification movement and to manufacturers within the industry struggling with the decision.

It is also important to examine the real world experiences of those manufacturers that have chosen to certify. Research has been conducted into the perspectives of numerous stakeholders towards certification, but little research has been done on the implications of the decision to certify. This information will be valuable to those manufacturers considering becoming certified.

Furthering the understanding of certification, the important factors in the decision, and the implications of the decision to certify will help those tracking the movement and those within the industry evaluate the certification option.

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## **Chapter 2 — A Description of Certified and Non-certified U.S. Hardwood Flooring Manufacturers and their Attitudes Towards Green Certification**

## **Problem Statement and Justification**

Retail sales of hardwood flooring reached \$1.35 billion in the U.S. in 1999, with sales increasing every year since 1982 (Tucker 2000). On a sales basis, hardwood flooring has increased its market share from 2.8% of the market in 1980 to 7.2% of the entire floor covering market in 1999 (Wheat 1995, Tucker 2000). From 1990 to 1999, the value of the manufacturer's hardwood flooring shipments grew 158%. On a product shipped basis, hardwood flooring's 699 million square feet of product shipped in 1998 represents about 2.7% of the 25.6 billion square feet of total floor coverings shipped (Tucker 2000).

The hardwood flooring industry in the U.S. is made up of many small firms, but is dominated by three giants. The largest hardwood flooring company in the U.S. market is Armstrong World Industries, which owns Triangle Pacific (the parent company of the Bruce, Hartco, Robbins, Premiere, and Traffic Zone hardwood flooring companies) and had 40% of the U.S. hardwood flooring sales in 1999 (Helm 1999). The Burress Company, owner of the Dixon Lumber Company, is the second leading producer in the U.S. market with 10% of 1999 sales, and Domco Tarkett, owner of Harris Tarkett, came in as the third leading producer of hardwood flooring (Helm 1999). This bipolar industry composition makes it difficult to generate a reliable demographic profile of the industry. An accurate profile of the industry will help strategic planners both inside and outside of the industry. In addition, a clear understanding of the size and make-up of the industry is important to those studying the industry and supplying materials to the manufacturers.

While certification has been slow to permeate many of the wood products industries, it has made relatively large inroads into the hardwood flooring industry. In a fairly small industry, there are a number of manufacturers that have chosen to undergo certification. The presence of those certified manufacturers allows for a contrasting study of the beliefs and demographic characteristics of the certified and non-certified manufacturers. Gaining an understanding of the underlying differences in beliefs that the certified and non-certified manufacturers hold can shed light on why some have chosen to become certified and others have not. In a developing movement such as certification, such information is important in helping to understand the phenomenon.

In addition, to date no estimate of the amount of certified hardwood flooring produced annually in the U.S. has been made. Mapping the demographic profile of the certified manufacturers will show how much certified flooring is produced and highlight any differences in the characteristics of the certified manufacturers as compared with the non-certified manufacturers. Developing an accurate estimate of the amount of certified hardwood flooring produced in the U.S. and the characteristics of the certified hardwood flooring manufacturers will assist those studying the phenomenon and will provide a benchmark for tracking the growth of certified flooring.

## Objectives

The objectives of the research reported in this paper were:

- To define the characteristics of U.S. manufacturers of certified and non-certified hardwood flooring
- To compare and contrast the attitudes of manufacturers of certified and non-certified hardwood flooring towards the green certification movement

## Methods

### Population

There were two populations of interest in this study: U.S. manufacturers of non-certified hardwood flooring and U.S. manufacturers of certified hardwood flooring. For the purposes of this research, U.S. manufacturers of certified hardwood flooring were identified as those manufacturers producing flooring certified by a Forest Stewardship Council (FSC)-certified third-party certification agency at the time this research was conducted in the spring of 1998.

### Sampling Frame

The sampling frame for the U.S. manufacturers of non-certified hardwood flooring was the 1997 Directory of the Wood Products Industry and the membership lists for the following industry trade associations: the National Oak Flooring Manufacturers Association, the Maple Flooring Manufacturers Association, and the National Wood Flooring Association. Any company identified in the Directory of the Wood Products Industry as manufacturing hardwood flooring was included in the sample frame. The membership lists from the industry associations were cross-referenced with the list taken from the Directory of the Wood Products Industry to ensure the completeness and validity of the sample frame. A total of 244 firms were identified as U.S. manufacturers of non-certified hardwood flooring. Although discussions with industry experts revealed that this number might be high, it was decided to include all 244 firms on the mailing list. The sample frame was quite small and manageable and the first question on the mail questionnaire asked the respondents whether or not they produced hardwood flooring. Therefore, there was no danger in including firms that did not manufacture hardwood flooring in the study and allowing them to opt out of the survey.

For the purposes of this research the second target population, U.S. manufacturers of certified hardwood flooring, was defined as those U.S. flooring manufacturers that were

manufacturing hardwood flooring that had been evaluated and certified by an independent, third-party, Forest Stewardship Council accredited certifying agency at the time this research was conducted in the spring of 1998. The study was limited to FSC-certified companies because, in the spring of 1998, the FSC was the only program that had made significant progress certifying companies. In the U.S., the Rainforest Alliance's *Smart Wood Program* and Scientific Certification Systems' *Forest Conservation Program* were the only two Forest Stewardship Council accredited certifying agencies in the spring of 1998. The sampling frame for this population was therefore the directories of the Rainforest Alliance's *Smart Wood Program*, Scientific Certification Systems' *Forest Conservation Program*, and the Good Wood Alliance. The Good Wood Alliance was an association of individuals and organizations that acted as an international clearinghouse for information on responsible wood use. Because the Good Wood Alliance did not have the ability to certify firms itself, any hardwood flooring manufacturer identified in the Good Wood Directory should be represented on either the Rainforest Alliance's or Scientific Certification Systems' lists. Those two lists therefore formed the basis for identifying the firms of interest, and both lists were cross-referenced with the Good Wood Directory to check for completeness. This process identified 14 firms as U.S. manufacturers of certified hardwood flooring.

### **Data Collection**

Data collection began with a review of the current literature and other published secondary data pertaining to the U.S. hardwood flooring industry. This information was collected from the hardwood flooring trade associations and other relevant sources. Additional information was gathered through discussions with industry experts and attendance at events and trade shows such as the National Wood Flooring Association's 1997 Annual Convention in Nashville, TN. Information collected in this phase of the research included descriptor statistics of the U.S. hardwood flooring industry (size, product offerings, number of firms, etc.) and trends within the industry. This information offered insight into the U.S. hardwood flooring industry and was used to develop questions for the mail questionnaire.

Secondary data relating to the U.S. certified hardwood flooring manufacturers was also collected. The data collected during this phase was quite similar to the data collected on the non-certified hardwood flooring manufacturers.

The next phase of data collection was the procurement of primary data. Primary data on the U.S. manufacturers of non-certified hardwood flooring were collected by means of a mail questionnaire. There were two separate sets of data collected from the U.S. manufacturers of non-certified hardwood flooring. The first set of data collected through this questionnaire was exploratory and was used to gain insight into the attitudes and perceptions of non-certified hardwood flooring manufacturers towards

timber certification. Because the top management of each firm sets the corporate strategic direction (Dess and Davis 1984, Hambrick 1981), the questionnaire was sent to the president or chief executive officer of each firm. Topics covered included: 1) awareness and knowledge of the timber certification movement, 2) perceptions of the timber certification movement, 3) any pressures felt from outside of the firm to switch to a certified product, and 4) views on the long-term efficacy and importance of the timber certification movement. Respondents were asked to rate their agreement or disagreement with a number of statements on 5-point Likert scales.

The second set of data collected offered insight into the makeup of the hardwood flooring industry. Respondents were asked to provide information on the products their firms make, the amount of hardwood flooring produced annually, and their annual sales.

Based on the research objectives and primary data collected, a questionnaire was developed to conduct the research. The questionnaire was assessed for clarity, completeness, and content by industry experts and was frequently revised based on the suggestions received. The completed questionnaire was pre-tested by seven industry experts in March 1998 and any further suggested refinements were made before conducting the study. Methods suggested by Jobber (1986) and Mangione (1995) were used to increase the response rate for the mail questionnaire. These methods included:

- A good cover letter
- Prepaid return postage for the questionnaire
- Guarantees of anonymity/confidentiality
- Reminders
- Clean, well written questionnaire

The initial wave of questionnaires was mailed to the 244 non-certified hardwood flooring manufacturers in May 1998. The questionnaires were mailed first class along with a cover letter in a standard 10x13 inch envelope. Respondents were guaranteed anonymity and confidentiality and were told that their response was crucial to the success of this study.

Two weeks after the first wave of questionnaires was mailed, a simple reminder postcard was mailed to those companies that had not yet responded to the survey. The postcard again stressed the importance of the survey research and asked the respondent to please take the time to complete and return the survey. In addition, a "Thank You" postcard was sent to those companies that returned the questionnaire.

In June 1998 the second wave of questionnaires was mailed to those companies that had not yet responded. The cover letter again stressed the importance of the research and reminded the respondent that their input was crucial to the success of the survey.

Two weeks after the second wave of questionnaires was sent, a final reminder postcard was mailed to those companies that had failed to respond. In addition to those postcards, "Thank You" postcards were continually sent to those companies that returned completed questionnaires.

The next phase of data collection was the collection of primary data from the U.S. manufacturers of certified hardwood flooring. Due to the small number of manufactures in this population it was crucial to attempt to get a high response rate. Therefore, each potential respondent was contacted by telephone beginning in July 1998 to introduce the survey and impress upon them the importance of their response. After the telephone calls were made, the questionnaire form was faxed to the individual respondents for completion. Follow-up phone calls were made if needed.

### **Data Analysis**

Completed questionnaires and interview forms were first checked for errors and omissions before being cataloged and coded. The coded forms were then entered into an MS Excel spreadsheet to facilitate further analysis. The information from the two populations of interest, certified and non-certified manufacturers of hardwood flooring, was compared and contrasted to determine whether or not differences existed between the two groups. The Excel Data Analysis Pak and other add-ins provided the statistical functions needed to analyze the returned questionnaires.

In academic circles there are often discussions about the legitimacy of using Likert scale based ordinal data as if it were interval data. However, because the idea of treating ordinal data as interval data is well established in the literature (Kerlinger 1973) and has become common practice in research (Harrell and Bennett 1974, Gaski and Etzel 1986, Bowe 2000), this study will follow precedent and treat the responses to the Likert scales as interval data, allowing means and other common statistical operations to be performed.

## **Results and Discussion**

### **Validity and Response Rate**

A researcher must be concerned with two types of validity: internal and external. Internal validity refers to the appropriateness of the research instrument and the compatibility of the different research groups used in the study. External validity refers to the confidence one has regarding the application of small-sample research results back to the whole population (Malhotra 1996).

Dooley (1990) has identified several threats to internal validity: reverse causation and time, group, and mortality threats. However, he states that the identified threats are only a concern for experimental research designs. Because the current study involved a simple mail questionnaire, questions of internal validity were minimized. In addition, the use of established methods of increasing the survey response rate increased the number of useable responses and reduced concerns of external validity and sampling errors in the research.

Of the 244 questionnaires mailed to the non-certified manufacturers, 13 were returned with bad addresses or were otherwise undeliverable. The first question on the survey asked the respondents whether or not they produced hardwood flooring and asked them to check "Yes" or "No." If the respondent checked "No," they were thanked for their time and asked to return the questionnaire. Seventy-nine respondents either responded "No" to that initial question or phoned to say that they did not manufacture hardwood flooring. Of the remaining 152 surveys, 33 were returned completed and were deemed useable for the study. The returned surveys represent a 22% response rate to the mail survey. This response rate was calculated by subtracting bad addresses and "No" responses from the total number of surveys and dividing the number of useable completed surveys by the remaining amount.

Of the 14 companies initially identified as U.S. manufacturers of certified hardwood flooring, the phone calls in July 1998 revealed that 1 company had gone out of business, 4 companies identified as manufacturers actually did not manufacture certified flooring, and 1 certified manufacturer refused to participate in the survey. That left a total of 8 companies that participated in the survey for a calculated response rate of 89%.

### **Non-Response Bias**

Telephone calls were made to randomly selected companies that did not respond to the survey to evaluate potential non-response bias. Calls were made until five companies agreed to answer the questions. Using non-parametric statistics to analyze the differences, no significant differences were found between the respondents and non-respondents.

### **The U.S. Hardwood Flooring Industry**

The survey respondents were asked to respond to general questions designed to gain descriptive information about the hardwood flooring industry. This information included general production information, the size of the firms, and the annual sales of hardwood flooring. Both certified and non-certified producers were asked to answer the questions.

### **Number of Employees**

Respondents were asked to provide the number of part-time and full-time employees employed in their company's hardwood flooring operations in 1997. This information is useful in estimating the size of the firms comprising the U.S. hardwood flooring industry. The information collected is displayed in Table 2-1 and Table 2-2.

**Table 2-1: Number of Employees Employed in 1997 by Non-certified Hardwood Flooring Companies by Type of Employee**

| <b>Type of Employee</b> | <b>Mean</b> | <b>Median</b> | <b>Maximum</b> | <b>Minimum</b> |
|-------------------------|-------------|---------------|----------------|----------------|
| Part-time               | 10          | 4             | 80             | 1              |
| Full-time               | 224         | 50            | 4000           | 1              |

**Table 2-2: Number of Employees Employed in 1997 by Certified Hardwood Flooring Companies by Type of Employee**

| <b>Type of Employee</b> | <b>Mean</b> | <b>Median</b> | <b>Maximum</b> | <b>Minimum</b> |
|-------------------------|-------------|---------------|----------------|----------------|
| Part-time               | 4           | 3             | 10             | 1              |
| Full-time               | 26          | 8             | 120            | 1              |

Non-certified flooring manufacturers employed more full-time employees than certified companies, although on average each made use of about the same number of part-time employees. Certified manufacturers used an average of 4 part-time employees in their operations, while non-certified manufacturers used 10 part-time employees on average. However, the median levels of part-time employment for the two groups are almost identical; non-certified producers employ a median level of 4 part-time workers and certified producers employ a median level of 3 part-time employees.

There is a large difference between the two populations of interest when looking at the number of full-time employees they employed. The non-certified manufacturers employed approximately ten times the number of full-time employees when compared to the certified manufacturers. The average non-certified manufacturing facility employed 224 full-time workers, while the average certified facility employed only 26.

### **Board Feet of Production**

The differences between the sizes of the firms in the two populations become even more pronounced when one examines the annual production levels of the certified and non-certified producers. Respondents were asked to provide the annual production of flooring for their companies, which is shown in Table 2-3.

**Table 2-3: Reported 1997 Hardwood Flooring Production (bdft) by Type of Flooring**

| Type of Flooring | Reported 1997 Production | Percentage of Reported Production |
|------------------|--------------------------|-----------------------------------|
| Non-certified    | 358,698,975              | 99.9                              |
| Certified        | 428,104                  | 0.1                               |
| <b>TOTAL</b>     | <b>359,127,079</b>       | <b>100</b>                        |

It is interesting to note that the amount of certified hardwood flooring produced in 1997, as reported by the respondents, amounts to only 0.1% of the total reported amount of hardwood flooring produced.

A simple way to get an idea of the adequacy of a survey is to calculate the percent of the total production accounted for by the respondents. In the case of this study, the 358,698,975 bdft. of non-certified hardwood flooring reported for 1997 by the respondents represents 60% of the total industry production in 1997 of 594,000,000 bdft. That percentage is quite a bit higher than the 22% response rate of the study. There are two possible explanations for that discrepancy. First, a few large firms dominate the hardwood flooring industry. Because those firms responded to the survey, the reported production of all of the firms is higher than the calculated response rate for the survey. This is because the production from those firms counts proportionally more than their individual contribution to the overall response rate. Second, as many manufacturers suggested, the sampling frame for the non-certified manufacturers appears to have been too large. However, it was concluded that including too many firms would not affect the study; missing some firms would have been a critical mistake.

Also, no previous effort has been made to quantify the total amount of certified hardwood flooring available in the U.S. This study presents an opportunity to do just that. With all but one of the certified manufacturers reporting, the reported production of certified hardwood flooring in 1997 was 428,104 bdft. However, an estimate must be made for the company that refused to participate in the study. Based on the total flooring production for that company in 1997 and the average percentage of the total flooring production that was certified for the other producers, an estimate of the certified production for the company that refused to participate can be made. With that amount added to the total reported certified flooring production, a total estimated certified flooring production level in 1997 of 435,579 bdft. is calculated.

**Table 2-4: Reported 1997 Hardwood Flooring Production (bdft) by Type of Company**

| Type of Company | Mean       | Median    | Maximum     | Minimum |
|-----------------|------------|-----------|-------------|---------|
| Non-certified   | 11,660,696 | 1,100,000 | 200,000,000 | 10,000  |
| Certified       | 1,163,274  | 162,500   | 7,100,000   | 10,000  |

Table 2-4 contrasts the distribution of production levels of the certified and non-certified manufacturers. Again, it can be seen that the non-certified companies produced on average ten times the amount of flooring as the certified producers. The average non-certified company produced approximately 11,661,000 bdft of hardwood flooring a year, while the average certified company produced only 1,163,274 bdft of flooring a year. In addition, the maximum non-certified manufacturer produced 200,000,000 bdft of flooring a year, while the maximum certified manufacturer produced only 7,100,000 bdft of flooring a year. That level of production would place the maximum certified manufacturer in only the 65<sup>th</sup> percentile of non-certified manufacturers. Examining the median production levels for the two populations again highlights the tenfold size differential between the certified and non-certified manufacturers. The median production level for the non-certified producers is 1,100,000 bdft, while the median production level for the certified producers is only 162,500 bdft.

**Annual Sales Figures**

The annual sales figures for the different companies in this study are another means of comparing the size of the firms in the different populations. Respondents were asked to select the appropriate range for their annual sales from a given list of choices. Table 2-5 shows the number of respondents falling into each of the categories in the study.

**Table 2-5: Annual Sales (U.S. \$) of Responding Non-certified and Certified Hardwood Flooring Manufacturers**

| Type of Company | 0-100,000 | 100,000-249,999 | 250,000-499,999 | 500,000-999,999 | 1,000,000-4,999,999 | 5,000,000-9,999,999 | 10,000,000 - 49,999,999 | 50,000,000 - 99,999,999 | 100,000,000 + |
|-----------------|-----------|-----------------|-----------------|-----------------|---------------------|---------------------|-------------------------|-------------------------|---------------|
| Non-certified   | 7         | 1               | 1               | 1               | 5                   | 4                   | 10                      | 1                       | 1             |
| Certified       | 3         | 0               | 0               | 1               | 3                   | 0                   | 1                       | 0                       | 0             |

From Table 2-5 it can be seen that there are two distinct groups of companies in each population: those with annual sales in the \$0-\$100,000 range and those in the \$1,000,000-\$50,000,000 range. It does appear, however, that proportionally more of the non-certified manufacturers are at the high end of the \$1,000,000-\$50,000,000 range while the certified manufacturers tend to be clustered around the lower end of that range.

### Days Operating Per Year

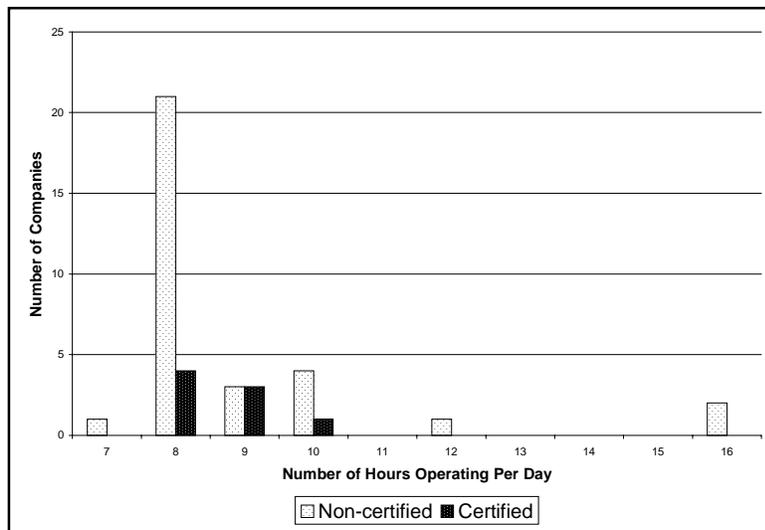
Respondents were also asked to provide the number of days that their facilities operated per year. The results for both populations are shown in Table 2-6. There is not much difference between the two populations, with most of the facilities in both populations operating between 226–250 days per year.

**Table 2-6: Reported Number of Days Operating Per Year by Type of Company**

| Type of Company | 0–199 | 200–225 | 226–250 | 251–275 | 276–300 | 301–325 | 326–350 | 351+ |
|-----------------|-------|---------|---------|---------|---------|---------|---------|------|
| Non-certified   | 1     | 5       | 14      | 9       | 2       | 1       | 1       | 0    |
| Certified       | 0     | 0       | 3       | 2       | 0       | 1       | 0       | 1    |

### Number of Hours Operating Per Day

Respondents were also asked to provide the average number of hours that their facilities operated per day. This information is displayed graphically in Figure 2-1. By examining the results it is obvious that the majority of non-certified hardwood flooring manufacturers operate one eight-hour shift per day, with a few facilities operating slightly longer single shifts. Only two of the manufacturers reported operating sixteen hours per day. The certified manufacturers also reported operating only one shift per day, but did not overwhelmingly operate only eight hours per day. The number of certified manufacturers that reported operating eight hours per day was only slightly higher than the number of manufacturers that reported operating nine hours per day.



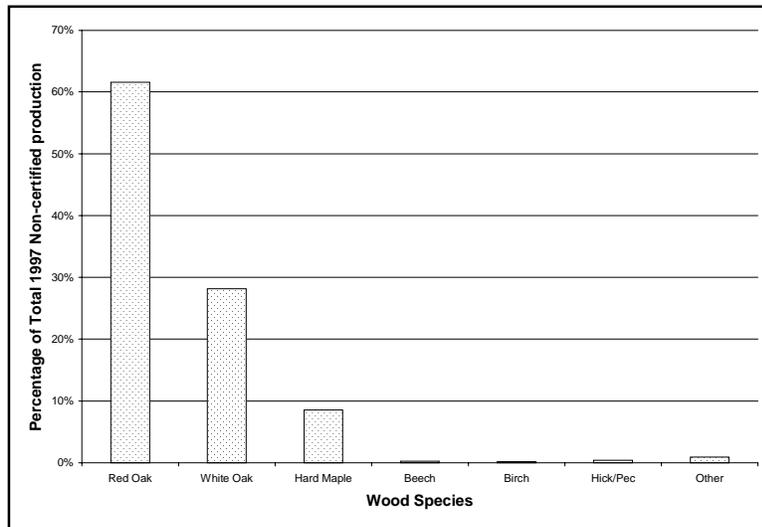
**Figure 2-1: Reported Number of Hours Operating Per Day by Type of Company**

### **Non-certified Hardwood Flooring Production**

Certified and non-certified hardwood flooring manufacturers were asked to provide a breakdown of their total 1997 non-certified flooring production by species and product. It is common for certified manufacturers to maintain production of non-certified flooring and produce only a percentage of their total output as certified flooring, so those manufacturers were included in the non-certified flooring totals. The breakdown of the total 1997 non-certified hardwood flooring production by species is presented in Table 2-7 and graphically in Figure 2-2. By far the most popular species for 1997 non-certified hardwood flooring was red oak with 62% of the total production. The second most popular species for non-certified flooring is white oak, with 28% of the total production. Hard maple, with 9% of the 1997 production, and the “other” category, with 1% of the 1997 production, round out the remainder of the annual production. The wood species represented in the “other” category included ash, cherry, pine, poplar, and walnut.

**Table 2-7: Reported 1997 Non-certified Hardwood Flooring Production by Species**

| <b>Species</b> | <b>Percent of 1997 Production</b> |
|----------------|-----------------------------------|
| Red Oak        | 62%                               |
| White Oak      | 28%                               |
| Hard Maple     | 9%                                |
| Beech          | 0%                                |
| Birch          | 0%                                |
| Hickory/Pecan  | 0%                                |
| Other          | 1%                                |

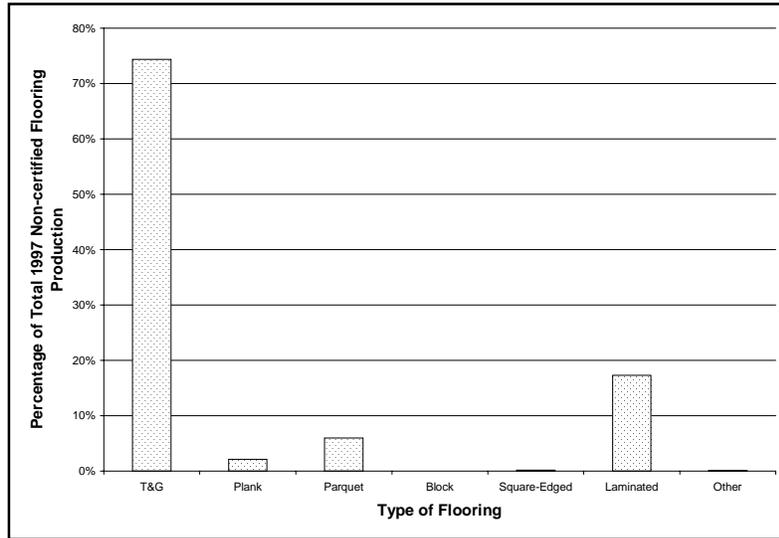


**Figure 2-2: Reported 1997 Non-certified Hardwood Flooring Production by Species**

Respondents were also asked to provide a breakdown of their total 1997 non-certified production by the type of flooring produced. The results of that question are shown in Table 2-8 and graphically in Figure 2-3. It is easy to see that the clear winner as far as the type of flooring produced is finished and unfinished tongue and groove solid strip flooring with 74% of the total annual production of non-certified flooring. The only other type of flooring with an appreciable presence is laminated flooring, which made up 17% of the production. Those two types of flooring together account for 91% of the total amount of non-certified hardwood flooring produced in the U.S. in 1997.

**Table 2-8: Reported 1997 Non-certified Hardwood Flooring Production by Product Type**

| Product Type  | Percentage of 1997 Production |
|---|-------------------------------|
| Finished and Unfinished Tongue & Groove Solid Strip | 74%                           |
| Plank   | 2%                            |
| Parquet   | 6%                            |
| Block   | 0%                            |
| Finished and Unfinished Square-Edged Solid Strip    | 0%                            |
| Laminated   | 17%                           |
| Other   | 0%                            |



**Figure 2-3: Reported 1997 Non-certified Hardwood Flooring Production by Product Type**

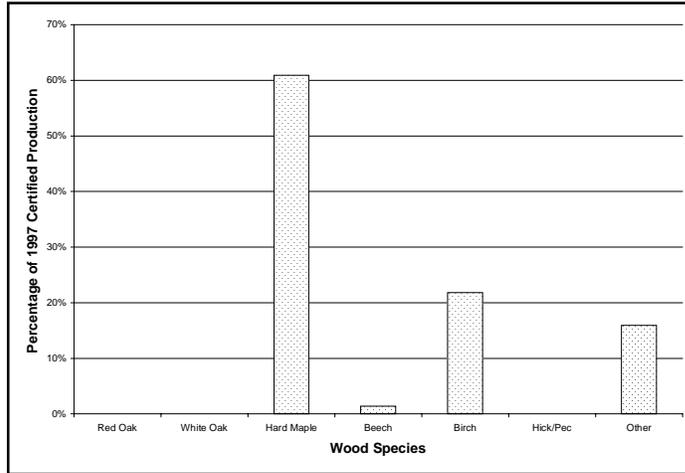
### **Certified Hardwood Flooring Production**

The producers of certified hardwood flooring were also asked to provide information on the amount of certified material that they manufacture. They were asked to provide information on the species they use in the production of their certified material and the certified flooring products that they manufacture.

The certified respondents were first asked to provide the percentage of flooring in each species that was produced as certified flooring. As a group, the certified manufacturers produced a total of 9,306,195 bdft of hardwood flooring (both certified and non-certified) in 1997. Of that amount, 428,104 bdft, or 4.6%, was produced as certified material. The breakdown of the certified flooring by species is given in Table 2-9 and graphically in Figure 2-4.

**Table 2-9: Reported 1997 Certified Flooring Production by Species**

| <b>Wood Species</b> | <b>Percentage of Total 1997 Certified Production</b> |
|---------------------|--|
| Red Oak             | 0%   |
| White Oak           | 0%   |
| Hard Maple          | 61%  |
| Beech               | 1%   |
| Birch               | 22%  |
| Hickory/Pecan       | 0%   |
| Other               | 16%  |

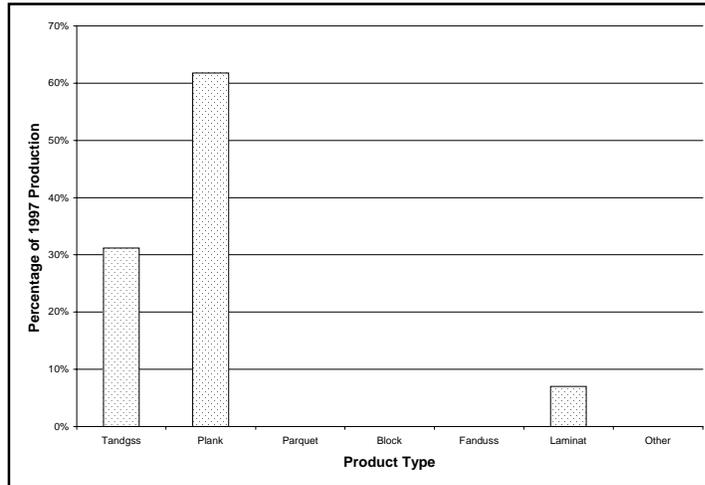


**Figure 2-4: Reported 1997 Certified Flooring Production by Species**

The certified manufacturers were also asked to provide the breakdown for their certified material between the different flooring products. This information can again be compared to the response to the same question for non-certified flooring to see if there is any difference between the two products. The results for this question are given in Table 2-10 and graphically in Figure 2-5.

**Table 2-10: Reported 1997 Certified Flooring Production by Product Type**

| Product Type  | Percentage of 1997 Certified Production |
|---|---|
| Finished and Unfinished Tongue & Groove Solid Strip | 31%                                     |
| Plank   | 62%                                     |
| Parquet   | 0%                                      |
| Block   | 0%                                      |
| Finished and Unfinished Square-Edged Solid Strip    | 0%                                      |
| Laminated   | 7%                                      |
| Other   | 0%                                      |



**Figure 2-5: Reported 1997 Certified Flooring Production by Product Type**

The most popular types of certified flooring produced in 1997 were plank, with 62% of the production, and finished and unfinished tongue and groove solid strip, with 31% of the production. When comparing the results for the certified flooring production with the non-certified flooring production, marked differences do emerge. The percentage of certified flooring produced as plank (62%) is much higher than the percentage of non-certified flooring produced as plank flooring (2%). Parquet flooring, which had 6% of the non-certified production, was not even produced in a certified form. Finally, the most produced type of non-certified flooring, finished and unfinished tongue and groove solid strip, only accounts for 31% of the certified flooring production.

### **Attitudes of Certified and Non-certified Hardwood Flooring Manufacturers Towards Green Certification**

In addition to providing descriptive information about their companies and production, the respondents were also asked to rate their level of agreement or disagreement with a number of statements about green certification. This information is useful when examining whether differences in attitudes exist between the two populations.

#### **Preference for Regulating Bodies**

The respondents were asked to rate their preference between five different regulating entities. The respondents were to rank the entities based on their perceived ability to regulate the environmental certification claims of wood products manufacturers. The five entities the respondents were asked to rank were: a private third-party certification company, an agency of the Federal Government, the wood products companies themselves, an environmental organization, and wood products industry trade

associations. The respondents were asked to rank the entities in order from 1 to 5 (1 showed the respondents trusted the entity the most) based on their level of trust of the entity.

In the first data analysis step, ANOVA tests were used to determine whether or not statistical differences existed within the rankings for each population. It was determined that there were significant differences at the 0.05 level in the rankings of both populations. After it was determined that the rankings were statistically different, Tukey’s HSD test was run on the results for the two populations to group the different entities. Tukey’s allows the researcher to group the results by determining which means in the experiment are statistically similar. The results for the Tukey’s analysis on the responses from the non-certified manufacturers are given in Table 2-11.

**Table 2-11: Preference for Regulating Bodies by Non-certified Manufacturers**

| Entity                      | Mean | Similar | Similar |
|-----------------------------|------|---------|---------|
| Industry Association        | 2.25 | *       |         |
| 3rd Party Certifier         | 2.56 | *       |         |
| Wood products companies     | 2.81 | *       |         |
| Federal Government          | 3.95 |         | *       |
| Environmental Organizations | 4.38 |         | *       |

The non-certified manufacturers rated the industry associations, independent third-party certification programs, and the wood products companies themselves as statistically equivalent in the level of trust they have in regulating environmental certification claims. Those groups were rated together at the top of the list. The Federal Government and environmental organizations were also rated as statistically similar, but fell at the bottom of the scale.

The certified flooring manufacturers were also asked to rank their preference for regulating bodies. Their responses are shown in Table 2-12.

**Table 2-12: Preference for Regulating Bodies by Certified Manufacturers**

| Group                       | Mean | Similar | Similar | Similar |
|-----------------------------|------|---------|---------|---------|
| 3rd Party Certifiers        | 1.1  | *       |         |         |
| Environmental Organizations | 2.5  |         | *       |         |
| Federal Government          | 3.5  |         | *       | *       |
| Industry Associations       | 3.5  |         |         | *       |
| Wood products Companies     | 4.4  |         |         | *       |

The responses for the certified manufacturers are quite different from those of the non-certified manufacturers. The certified manufacturers rated the third-party certifiers as the most trustworthy regulating body, a rating statistically significant from all of the other ratings. This is reassuring given all of the manufacturers have voluntarily chosen to undergo third-party certification. The manufacturers feel, as shown through their actions and their response to this question, that independent third-party certification programs are the best way to regulate certified flooring. The certified manufacturers second grouping of regulating bodies is a surprise, however. They rated the environmental organizations and the Federal Government together as the second-most trustworthy entities.

Finally, the certified manufacturers' bottom group of regulating bodies contains two entities within the wood products industry: the industry associations and the wood products companies themselves.

After the individual comparisons of the responses were completed, t-tests comparisons were conducted to determine any statistical differences in the ratings of the regulating entities by the two populations. Some may question the use of parametric statistical methods with a study population of thirteen. However, parametric tests are commonly used with small populations. Frick (1998) and Kerlinger (1973) have suggested that parametric statistical tests are always appropriate because every population is infinite and constantly changing. Therefore, any study we conduct will only ever be a sample of this ever-changing population.

In addition, it has long been established that moderate violations of parametric assumptions have little or no effect on the outcome of the test (Cohen 1969). Given the fact that the t-test is a more powerful test than the corresponding two-sample non-parametric tests (Edgington 1995, Hodges and Lehmann 1956, Tanizaki 1997, Glass and Hopkins 1996, Zimmerman 1998, Johnson 1995) and that the parametric assumptions are commonly violated in research (Micceri 1989, Breckler 1990, Keselman et al. 1998), the t-test will be used for the statistical analysis in this study.

Of the five choices for regulating bodies in the study, the two populations gave statistically similar rankings to only one regulating body: the Federal Government. The non-certified manufacturers rated the Federal Government as fourth out of the five choices, and the certified manufacturers rated it third out of five.

The two groups gave statistically different rankings to the remaining four entities, and the comparison of those responses present some interesting differences of opinion. Both populations rated the third-party certification programs near or at the top of the list. The certified manufacturers rated the third-party programs at the top of the list, and the non-certified manufacturers rated them second on their list.

While the non-certified manufacturers rated the wood products companies in the middle of their list, the certified manufacturers rated them as the least trustworthy group. The non-certified manufacturers appear willing to consider allowing the wood products companies to regulate their own certification claims, while the certified manufacturers appear opposed to allowing the wood products companies to regulate themselves.

The mistrust of industry-affiliated organizations by the certified manufacturers is also evident in the ratings given to the industry associations. The certified manufacturers rated the industry associations as the second-least trustworthy regulating body, while the non-certified manufacturers rated the industry associations as the most trustworthy entity.

The two groups also disagreed on their preference for the environmental organizations. The certified manufacturers rated the environmental organizations as their second-most trusted regulating body, while the non-certified manufacturers placed the environmental groups at the bottom of their list.

**Non-certified Manufacturers’ Feeling Towards Environmental Stewardship**

The non-certified manufacturers were asked whether or not they felt that their company had made a commitment to environmental stewardship. This question was only posed to the non-certified manufacturers because the certified manufacturers had shown through becoming certified that they had made a commitment to environmental stewardship. The results of that question are shown in Table 2-13. Seventy-one percent of the respondents felt that their company had made a commitment to environmental stewardship, while 29% of the respondents did not believe that their company had made a commitment to environmental stewardship.

**Table 2-13: Percentage of Non-certified Manufacturers Who Feel Their Company has made a Commitment to Environmental Stewardship**

| <b>Commitment to Stewardship?</b> | <b>Percentage</b> |
|-----------------------------------|-------------------|
| Yes                               | 71%               |
| No                                | 29%               |

The 71% of the non-certified manufacturers who made a commitment to environmental stewardship were then asked to rate why their company had made the commitment to environmental stewardship. They were given seven possible reasons for their commitment and were asked to rate their level of agreement or disagreement with each of the reasons as the basis for their commitment to the environment. The seven possible reasons were: the commitment of top management, Federal or state legislation, public pressure, customer demands for “green” products, potential cost savings, the desire to

protect out company image, or the desire to gain or sustain a competitive advantage in the marketplace. After an ANOVA test was run on the results of this question and it was determined that statistical differences did exist between the results, Tukey’s HSD test was run to group the responses. The results of this question are shown in Table 2-14.

**Table 2-14: Reasons for Non-certified Manufacturers' Commitment to Environmental Stewardship**

| Reason                     | Mean | Similar | Similar | Similar | Similar |
|----------------------------|------|---------|---------|---------|---------|
| Top Management             | 4.40 | *       |         |         |         |
| Protect Company Image      | 3.76 | *       | *       |         |         |
| Gain Competitive Advantage | 3.00 |         | *       | *       |         |
| Legislation                | 2.44 |         |         | *       | *       |
| Customer Demands           | 2.32 |         |         | *       | *       |
| Cost Savings               | 2.16 |         |         | *       | *       |
| Public Pressure            | 1.64 |         |         |         | *       |

The top grouping of reasons given by the non-certified manufacturers for their commitment to environmental stewardship contained the commitment of top management and the desire to protect the company image. The potential reasons that came from outside the company were all grouped together in the last grouping, with the manufacturers strongly disagreeing with the statement that their environmental commitment came about as a result of public pressure.

**Non-certified Manufacturers' Willingness to Pay for Certified Raw Material**

The non-certified manufacturers were also queried on their willingness to pay a price premium for certified raw material for use in the manufacture of certified hardwood flooring. The manufacturers’ were given three possible responses from which to choose. The responses and the percentage of non-certified manufacturers choosing each response are given in Table 2-15.

**Table 2-15: Non-certified Manufacturers' Willingness to Pay for Certified Raw Material**

| <b>Response</b>  | <b>Percentage of Non-certified Manufacturers Agreeing with Response</b> |
|--|---|
| My company would be willing to purchase certified raw material at any price premium.             | 0%  |
| My company would be willing to pay a maximum premium for certified raw material.                 | 20%   |
| My company would not be willing to pay any price premium when purchasing certified raw material. | 80%   |

None of the respondents was willing to pay an unlimited price premium when purchasing certified raw material, and 80% of the respondents responded that they would not be willing to pay any price premium when purchasing certified raw material.

The 20% of the respondents that mentioned that they would be willing to pay a price premium were asked to provide the maximum price premium that they would be willing to pay. The range of responses to that question are given in Table 2-16.

**Table 2-16: Maximum Price Premium (Percentage Above the Market Price for Non-certified Raw Material) that Non-certified Manufacturers are Willing to Pay for Certified Raw Material**

| <b>Minimum</b> | <b>Mean</b> | <b>Median</b> | <b>Maximum</b> |
|----------------|-------------|---------------|----------------|
| 1%             | 5%          | 5%            | 15%            |

The average price premium for certified raw material that the non-certified manufacturers are willing to pay is 5% above the market price for non-certified material. The responses ranged from a low of 1% above the non-certified price to a high of 15% above the non-certified market price.

**Non-certified Manufacturers' Willingness to Pay for Chain-of-Custody Certification**

The non-certified manufacturers were asked to indicate their willingness to pay for chain-of-custody certification. Again, the manufacturers were given three choices and were asked to select only one. The responses and the percentage of non-certified manufacturers choosing each response are given in Table 2-17.

**Table 2-17: Non-certified Manufacturers' Willingness to Pay for Chain-of-Custody Certification**

| Response  | Percentage of Non-certified Manufacturers Agreeing with Response |
|---|--|
| My company would be willing to undergo chain-of-custody certification if it were free.  | 31%  |
| My company would be willing to incur a maximum cost for chain-of-custody certification. | 17%  |
| My company would be unwilling to undergo chain-of-custody certification at any cost.    | 51%  |

Thirty-one percent of the respondents said that they would consider undergoing chain-of-custody certification for their company if the process were free, while 51% of the respondents said that they would be unwilling to undergo chain-of-custody certification no matter what the cost.

Seventeen percent of the respondents said that they would be willing to consider chain-of-custody certification, but would cap the amount of money that they were willing to pay for the certification. Those respondents were asked to provide the maximum amount of money that they would be willing to pay to become certified. The range of those responses is given in Table 2-18.

**Table 2-18: Total Amount that Non-certified Manufacturers Would be Willing to Pay to Undergo Chain-of-Custody Certification**

| Minimum | Mean    | Median  | Maximum  |
|---------|---------|---------|----------|
| \$1,000 | \$4,600 | \$1,000 | \$15,000 |

Although it appears that the non-certified manufacturers would be willing, on average, to spend up to \$4,600 to become certified, that number appears to be influenced by the \$15,000 outlier response. The median response to the question is \$1,000, which appears to be a better representation of the true amount that non-certified manufacturers would be willing to pay to become certified.

**Price Premium Non-certified Manufacturers Would Require in Order to Begin Production of Certified Hardwood Flooring**

Finally, the non-certified manufacturers were asked what price premium for certified flooring they would need to receive from customers in order to begin producing certified flooring. The manufacturers were again given three possible responses and

were asked to choose one of the responses. The responses and the percentage of the manufacturers selecting each response are given in Table 2-19.

**Table 2-19: Certified Hardwood Flooring Price Premium Necessary for Non-certified Manufacturers to Begin Production of Certified Flooring**

| <b>Response</b>  | <b>Percentage of Non-certified Manufacturers Agreeing with Response</b> |
|--|---|
| My company would manufacture certified hardwood flooring even if there were no price premium.        | 3%  |
| My company would have to receive a price premium to begin production of certified hardwood flooring. | 51%   |
| My company would not manufacture certified hardwood flooring for any price premium.                  | 46%   |

Three percent of the non-certified manufacturers surveyed said that they would be willing to manufacture certified hardwood flooring even if there were no price premium, but 46% of the manufacturers said that they would be unwilling to manufacture certified flooring for any price premium. However, a majority of the non-certified manufacturers that participated in the study said that they would be willing to produce certified hardwood flooring if they were able to get a price premium for the certified flooring.

Those manufacturers that responded that they would require a price premium from customers to begin production of certified flooring were asked how much of a price premium they would need to begin production. The range of responses given is presented in Table 2-20.

**Table 2-20: Price Premium (Percent Above the Market Price for Non-certified Flooring) Necessary for Non-certified Manufacturers to Consider Producing Certified Hardwood Flooring**

| <b>Minimum</b> | <b>Mean</b> | <b>Median</b> | <b>Maximum</b> |
|----------------|-------------|---------------|----------------|
| 2%             | 24%         | 15%           | 100%           |

As shown in Table 2-20, there is quite a range of responses to the question of the price premium necessary to consider production of certified flooring. While the responses ranged from a low of 2% to a high of 100% above the market price for non-certified

hardwood flooring, the median response was 15%. That indicates that if consumers of certified hardwood flooring were willing to pay 15% more for the product vs. non-certified flooring, some non-certified manufacturers might be willing to begin producing certified hardwood flooring.

**Attitudes of the Manufacturers Towards Certification**

The certified and non-certified manufacturers were asked to rate their agreement or disagreement with a number of statements about the certification movement. This question was designed to illuminate the manufacturers’ attitudes and opinions towards the certification movement. The responses from each group were analyzed using an ANOVA test to see if differences existed, and it was found that there were significant differences among the responses for the two populations. The responses were then analyzed using Tukey’s HSD test to group the responses. A t-test was then used to determine whether or not there were statistical differences in the responses to each statement between the two populations. The results from the Tukey’s tests for the two populations are shown in Table 2-21 and Table 2-22.

**Table 2-21: Ranking of Certification Statements by Non-certified Manufacturers (1=Strongly disagree, 5=Strongly agree)**

| Item  | Mean | Similar | Similar | Similar | Similar |
|---|------|---------|---------|---------|---------|
| Understands the concept of certification                        | 3.80 | *       |         |         |         |
| Company has an environmental policy                             | 3.54 | *       | *       |         |         |
| Is following the status of certification                        | 2.89 | *       | *       | *       |         |
| Understands the costs of certification                          | 2.86 | *       | *       | *       |         |
| Trusts environmental claims of wood suppliers                   | 2.66 |         | *       | *       | *       |
| Feels pressure from outside groups to produce certified product | 2.46 |         |         | *       | *       |
| Believes certification will sustain health of US forests        | 2.40 |         |         | *       | *       |
| Believes there is a need for certification of US forests        | 2.29 |         |         | *       | *       |
| Seeks suppliers of certified products                           | 2.17 |         |         | *       | *       |
| Purchased certified products in the last year                   | 2.14 |         |         | *       | *       |
| Feels pressure from customers to produce a certified product    | 2.06 |         |         | *       | *       |
| Believes customers will pay premium for certified products      | 1.91 |         |         | *       | *       |
| Would pay more for certified raw materials                      | 1.71 |         |         |         | *       |

**Table 2-22: Ranking of Certification Statements by Certified Manufacturers (1=Strongly disagree, 5=Strongly agree)**

| Item  | Mean | Similar | Similar | Similar |
|---|------|---------|---------|---------|
| Understands the costs of certification                          | 4.75 | *       |         |         |
| Understands the concept of certification                        | 4.50 | *       | *       |         |
| Is following the status of certification                        | 4.50 | *       | *       |         |
| Purchased certified products in the last year                   | 4.25 | *       | *       | *       |
| Believes there is a need for certification of US forests        | 4.00 | *       | *       | *       |
| Believes certification will sustain health of US forests        | 4.00 | *       | *       | *       |
| Company has an environmental policy                             | 3.88 | *       | *       | *       |
| Seeks suppliers of certified products                           | 3.88 | *       | *       | *       |
| Would pay more for certified raw materials                      | 3.88 | *       | *       | *       |
| Feels pressure from customers to produce a certified product    | 3.00 |         | *       | *       |
| Feels pressure from outside groups to produce certified product | 3.00 |         | *       | *       |
| Believes customers will pay premium for certified products      | 3.00 |         | *       | *       |
| Trusts environmental claims of wood suppliers                   | 2.75 |         |         | *       |

Examining the responses to the certification statements by the two populations reveals some interesting and surprising differences. To begin with, the non-certified manufacturers disagreed (a rating below 3.00) with all of the statements except “My company understands the concept of environmental certification” and “My company has an environmental policy,” whereas the certified manufacturers agreed with all of the statements except “My company trusts environmental claims made by wood suppliers.” There was no statistical difference in the responses of the two groups to the statement asking them whether or not they understood the concept of environmental certification (#1 ranking for non-certified manufacturers and #2 spot for certified manufacturers). That agreement is good because it means that the manufacturers are in a position to critically judge the movement and accurately set their opinions. If the manufacturers stated that they did not understand the concept of certification, then it would be difficult to put any merit in their responses to the other statements.

In addition to agreeing that they understand the concept of environmental certification, there was no statistical difference between the responses of the two populations to the statements “My company has an environmental policy” (both groups agreed with the statement), “My company trusts environmental claims made by wood suppliers” (both

groups disagreed with the statement), and “My company feels pressure from outside groups (other than customers) to produce an environmentally certified product” (both groups disagreed with the statement).

The two populations provided statistically different responses to all of the remaining statements. The certified manufacturers neither agreed nor disagreed (a mean response of 3.00) with the statement “My company feels pressure from our customers to produce an environmentally certified product” while the non-certified manufacturers disagreed (a mean response of 2.06) with the same statement. In response to the statement “My company believes our customers will pay a premium for an environmentally certified product,” the certified manufacturers again neither agreed nor disagreed (a mean response of 3.00) with the statement while the non-certified manufacturers disagreed with the statement (a mean response of 1.91). It is significant to note that neither group feels pressure from their customers to produce a certified product or believes that their customers would pay a premium for a certified product.

The certified manufacturers strongly agreed with the statements “My company is actively following the status of environmental certification in the US” and “My company understands the costs involved in certification” while the non-certified manufacturers disagreed slightly with both statements. Those responses are understandable given the choices each group has made. Having chosen to become certified, one would expect that the certified manufacturers have a good handle on the costs involved in the certification process. By the same token, it should be expected that the non-certified manufacturers have a somewhat foggier understanding of the costs associated with certification. The non-certified manufacturers have admitted that they understand the concept of certification so it can be assumed that they have a basic understanding of the process, but they should not be expected to know the particulars about the costs involved. In addition, having weighed the choices and made the decision not to become certified, we would expect that the non-certified manufacturers are not keenly interested in actively following the status of the certification movement. However, having invested significant time, effort, and money in becoming certified, the certified manufacturers have a vested interest in getting the most out of their investment. Therefore, they are strongly interested in following the status of the movement and keeping up with new developments.

The two groups also differed on their views towards the needs and benefits of certification. The certified manufacturers agreed with the statements “My company believes there is a need for environmental certification of US temperate forests” and “My company believes that environmental certification can help sustain the health of US forests,” while the non-certified manufacturers disagreed with both statements. These statements can help explain why the certified manufacturers have chosen to produce a certified product when both populations of manufacturers agreed that there is no customer demand for certified products and that customers are unwilling to pay a

premium for certified products. If there is no outside pressure to become certified, then the decision to go ahead with certification must come from the top management inside the company. If management feels that there is a need for certification and that it is a good thing for the environment, then there is a compelling reason for the company to go ahead and become certified. The certified manufacturers feel that certification is a beneficial program, which is why they have chosen to go ahead with it in the face of limited external demand for certified products.

Finally, the two populations disagreed on the very real-world functional aspects of certification. When asked to agree or disagree with the statements “My company has purchased environmentally certified wood products or raw materials in the past year,” “My company seeks suppliers of environmentally certified wood products or raw materials,” and “My company would pay more for certified wood products or raw materials,” the certified manufacturers agreed with all three statements and the non-certified manufacturers disagreed with all three statements. In fact, the non-certified manufacturers disagreed rather vehemently with the last statement, rating it last out of all of the statements with a mean rating of 1.71. This is to be expected, however, given the choices the manufacturers have made. The non-certified manufacturers have chosen not to certify their products. Therefore, they would not have any reason to purchase certified products or seek suppliers of certified materials. In addition, because they do not feel that certified products offer any benefits over non-certified products they would certainly not be interested in paying more for them. We would expect, however, that the certified manufacturers had sought out suppliers of certified raw materials and purchased from them in the last year, as is the case. The certified manufacturers strongly agreed (mean value 4.25) with the statement that their company had purchased certified products or raw materials within the last year. The certified manufacturers also agreed that they sought suppliers of certified material and would be willing to pay more for certified raw materials. Given the fact that those manufacturers produce certified flooring it should come as no surprise that they seek suppliers of certified raw materials with which to make the flooring. However, it is interesting that they are willing to pay more for the certified raw materials. It would seem that the certified manufacturers would be as uninterested in paying more for their raw materials as the non-certified manufacturers are, especially given the fact that they did not believe that their customers were willing to pay a premium for the certified products. Therefore, the manufacturers are willing to pay more for the raw materials without being able to pass those cost increases along to their customers.

## **Conclusions**

This study had two objectives: to define the general characteristics of U.S. manufacturers of certified and non-certified hardwood flooring and to compare and contrast the attitudes of those manufacturers towards the green certification movement.

These objectives were met through a mail survey of certified and non-certified hardwood flooring manufacturers.

The mail survey of the non-certified manufacturers generated a response rate of 22% of the firms in the population while 89% of the certified firms responded to the survey.

Of the 359,127,079 bdft of hardwood flooring reported in the survey, 428,104 bdft was certified. That works out to 0.1% of the total production, which is in line with other estimates of the amount of certified product available worldwide. This study also presents an opportunity to make an estimate of the total amount of certified hardwood flooring produced in the U.S. in 1997. No such estimate has previously been made. The total amount of certified hardwood flooring produced in the U.S. in 1997 is estimated to be 435,579 bdft.

On average, the certified producers were smaller than the non-certified manufacturers. The median number of full time employees employed by non-certified manufacturers was 50, while the median number employed by certified manufacturers was only 8. In addition, the median annual production for non-certified manufacturers was 1,100,000 bdft, while the median annual production for certified producers was 162,500 bdft. All of the statistics imply that smaller hardwood flooring manufacturers are more likely to become certified. This could be due to their desire to establish a competitive advantage in a difficult industry. Because the smaller manufacturers are not able to compete directly with the large manufacturers on a production efficiency basis, they need to try to find another means of differentiating themselves. Another reason for the apparent propensity for smaller companies to become certified may be that in a smaller company the decision-makers often have more influence than in a larger company. Therefore, if the sole owner of a company believes in certification and wants to give it a try, it is much easier for him to implement the change than it is for a single individual in a large corporate structure.

The other objective of this research was to explore the beliefs that the manufacturers hold about certification. The manufacturers were first asked to rate their preference for the possible certification regulating entities. This is the first time that an attempt has been made to measure manufacturers' opinions of potential regulating entities. The non-certified manufacturers rated the independent, objective choices (industry associations and third-party certifiers) at the top of the list and the organizations that traditionally generate strong emotional reactions from wood products companies (the Federal Government and environmental organizations) at the bottom of the list. This is not surprising given the non-certified manufacturers' resistance to certification. They apparently feel that if an organization is going to regulate the industry, it must be an organization that can be objective and fair. This attitude is in direct contrast to the rankings given by the certified manufacturers, who rated the environmental organizations and Federal Government second only to the third-party certifiers. The

certified manufacturers put the industry associations and the wood products companies themselves at the bottom of the list, demonstrating their distrust of any statements coming directly from the wood products industry. Topping the certified list was the third-party certifiers. It is interesting to note that both certified and non-certified manufacturers rated third-party certification programs as very trustworthy. This suggests that the third-party certification programs have succeeded in establishing themselves as independent regulators of the certification movement and are trusted by manufacturers to oversee certification within the industry.

Although the non-certified manufacturers rated the third-party programs as trustworthy entities, additional research into this question is appropriate. Specifically, the non-certified manufacturers should be queried as to whether or not they considered the FSC to be an independent, third-party certification program when completing this survey. Within the industry, conventional wisdom has the FSC as an arm of the environmental movement and not generally viewed in a favorable light. However, if the non-certified manufacturers in this study were indeed considering the FSC to be an independent third-party program when answering this question, then their responses indicate that the FSC is not as vilified as that conventional wisdom would suggest. Whether or not the FSC can build on that acceptance and create widespread trust with a few minor image adjustments is a question for a future study.

The fact that the non-certified manufacturers rated industry associations at the top of their list of regulating entities is also quite interesting. That suggests that non-certified manufacturers may be more willing to become certified by industry-sponsored certifying programs such as AF&PA's SFI program than by other regulating bodies. Because the SFI program was an industry-run program, the certification movement has tended to disregard it in favor of independent third-party certification programs. However, the recent decision by the SFI program to become an independent third-party certification program opens the door for the certification movement to embrace this program. Whereas the public may have been hesitant to accept an industry-run program, establishing the SFI program as an independent third-party organization combines the best elements of an industry association program and an independent program. This puts the program on par with the other certification programs and helps create public acceptance and a willingness by forest products companies to participate.

Although the non-certified manufacturers in this study had chosen not to become certified, many of them had made commitments to environmental stewardship. It is important to understand why companies make environmental decisions if one is to understand how they might approach the certification decision. Therefore, the non-certified manufacturers were asked to rate whether or not their company had an environmental policy and, if they did, why they adopted it. Seventy-one percent of the non-certified manufacturers felt that their company had made a commitment to environmental stewardship, and the top reason given was the commitment of top

management to the environment. The manufacturers stated that their environmental policies were not a response to any outside pressure from customers, the public, or legislation. Aside from the commitment by top management, the other highly rated reasons given by the manufacturers for their environmental commitments were to protect the company's image or gain a competitive advantage in the marketplace. These responses indicate that, if there is limited outside pressure on a firm to develop an environmental policy, there must be an internal impetus for management to adopt an environmental policy. The management must feel that there's a need for the company to develop a policy and that the company will realize a benefit from developing the policy. In other words, given limited outside pressure, management will only choose to implement an environmental policy if they feel their company will realize a competitive benefit as a result.

Both populations of manufacturers were asked to give their opinions on a number of statements about green certification. These results can be compared against those of the study conducted in 1996–1997 by Stevens, Ahmad, and Ruddell (1998) to see if anything changed in the year between the studies.

The Stevens et al study found that only 36% of the non-certified respondents felt that they had a working knowledge of certification. However, in this study the non-certified manufacturers agreed most strongly with the statement "My company understands the concept of certification," giving it a 3.80 mean rating out of a possible 5.00. That increase in measured awareness of certification suggests that non-certified companies are paying more attention to the developing certification movement. As certification and environmental issues continue to garner coverage in the media and generate strong interest among the general public, we would expect this increasing awareness of certification among non-certified manufacturers to continue.

In this study, non-certified manufacturers agreed that they understood the concept of certification but felt that there is no need for certification in the U.S. and that certification will do nothing additional to help the state of our forests. Also, the non-certified manufacturers strongly disagreed with the statements that their customers want a certified product and are willing to pay more for such a product.

These results compare favorably with the Stevens et al study. That study found that the primary reason manufacturers chose not to become certified was because their customers weren't demanding certified products. The second most important reason that companies didn't certify was that they didn't feel that there was a need for certification. Finally, the third most important reason highlighted by the Stevens et al study for the non-certified manufacturers' refusal to certify was that they were unwilling to pay to become certified. In the current study, the non-certified manufacturers disagreed most strongly with the statement "My company would pay more for certified raw materials."

The agreement between these studies suggests that these findings are valid and that the attitudes that non-certified manufacturers hold towards certification are well thought out and slow changing. The results of these two studies provide a benchmark against which future measurements of the manufacturers' beliefs can be measured.

The certified manufacturers agreed with the non-certified manufacturers that customers are not demanding a certified product and are not willing to pay more for a certified product. However, the certified manufacturers believe that there is a need for certification in the U.S. and that certification will help sustain the health of U.S. forests.

As was shown in the response to the question on developing an environmental policy, a company will undertake an action if it feels an internal or external pressure to take action. Both groups of manufacturers agree that there is no external pressure to become certified (as there is no demand from customers) but they disagree on the internal pressures for certification. The certified manufacturers feel that certification is necessary to help sustain the health of U.S. forests and is therefore the right thing to do, while non-certified manufacturers feel that there is no need for certification. Because the certified manufacturers felt internal pressure, they made the decision to go ahead and become certified even though there was no external pressure.

Additionally, the non-certified manufacturers in the current study were asked if they would be willing to pay to become certified, if they would be willing to pay more for certified raw material vs. non-certified material, and what kind of price premium they would need to receive to consider producing certified hardwood flooring. The Stevens et al study also asked non-certified manufacturers if they would consider producing a certified product if they received a price premium, but the results from the two studies are somewhat different. In the Stevens et al study, 22% of the respondents said that a price premium would motivate them to sell certified wood products. However, in the current study 54% of the respondents said that they would consider producing certified flooring for a minimum price premium. It is possible that the increased awareness of certification that the respondents in the current study possess is the reason that more of them are willing to consider beginning production of a certified product. By being more aware of the certification movement, the respondents in this study don't have their apprehension about the movement holding them back. They only need to decide if the product will benefit their business. When offered the possibility of a price premium, more than half of the respondents are willing to consider producing certified flooring.

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# **Chapter 3 — Exploring the Decision to Produce Environmentally Certified Products: A Case Study of the U.S. Hardwood Flooring Industry**

## **Problem Statement and Justification**

Timber certification is rapidly becoming a well studied phenomenon. Research has examined the consumer's perspective on certification, the manufacturer's perspective on certification, and the business strategies of the certifying organizations. However, to date one aspect of the phenomenon has been unexplored: how manufacturing decision-makers approach the internal decision whether or not to certify. This paper explores that aspect of certification.

As stated in Chapter 1, the manufacturer's decision whether or not to certify is a business level strategic decision. As such, it is of crucial importance to the success of the firm. Therefore, exploring how decision-makers approach the certification decision and offering them guidance in making it will provide significant value to troubled individuals facing that decision. This work will offer guidance by giving decision-makers a tool that they can use to suggest a solution to the decision.

The Analytic Hierarchy Process (AHP) will be used to model the decision. The benefit of using the AHP is that it allows the researcher to decompose the decision into its important components and mathematically describe their relationship. By examining the decision in this manner, the resulting prescriptive model becomes a tool that struggling decision-makers can use to help simplify a bewildering situation and guide them in a challenging process. By entering their own judgements into the model, the decision-makers will be provided with a suggested outcome to the decision that can be incorporated into the decision-making process.

In the case of this study, it is expected that the model would suggest that the non-certified flooring manufacturers should produce only non-certified hardwood flooring and that the certified flooring manufacturers should produce both certified and non-certified hardwood flooring.

## **Objectives**

The objectives of the research reported in this paper were:

- To determine the important factors in the hardwood flooring manufacturers' decision-making process when deciding whether or not to produce certified flooring
- To model the manufacturers' decision-making process using the Analytic Hierarchy Process
- To determine any differences in the decision-making process of certified and non-certified hardwood flooring manufacturers

## Methods

### Population

There were two populations of interest in this study: U.S. manufacturers of non-certified hardwood flooring and U.S. manufacturers of certified hardwood flooring. For the purposes of this research, U.S. manufacturers of certified hardwood flooring were identified as those manufacturers producing flooring certified by a Forest Stewardship Council-certified third-party certification agency at the time data were collected in the spring of 1998.

### Sampling Frame

The sampling frame for the U.S. manufacturers of non-certified hardwood flooring was the 1997 Directory of the Wood Products Industry and the membership lists for the following industry trade associations: the National Oak Flooring Manufacturers Association, the Maple Flooring Manufacturers Association, and the National Wood Flooring Association. Any company identified in the Directory of the Wood Products Industry as manufacturing hardwood flooring was included in the sample frame. The membership lists from the industry associations were cross-referenced with the list taken from the Directory of the Wood Products Industry to ensure the completeness and validity of the sample frame. This process resulted in a total of 244 firms identified as U.S. manufacturers of non-certified hardwood flooring. Although discussions with industry experts revealed that this number might be high, it was decided to include all 244 firms on the mailing list. The sample frame was quite small and manageable and the first question on the mail questionnaire asked the respondents whether or not they produced hardwood flooring. Therefore, there was no danger in including firms that did not manufacture hardwood flooring in the study and allowing them to opt out of the survey.

For the purposes of this research the second target population, U.S. manufacturers of certified hardwood flooring, was defined as those U.S. flooring manufacturers that were manufacturing hardwood flooring that had been evaluated and certified by an independent, third-party, Forest Stewardship Council accredited certifying agency at the time this research was conducted in the spring of 1998. In the U.S., the Rainforest Alliance's *Smart Wood Program* and Scientific Certification Systems' *Forest Conservation Program* were the only two Forest Stewardship Council accredited certifying agencies in the spring of 1998. The sampling frame for this population was therefore the directories of the Rainforest Alliance's *Smart Wood Program*, Scientific Certification Systems' *Forest Conservation Program*, and the Good Wood Alliance. The Good Wood Alliance was an association of individuals and organizations that acted as an international clearinghouse for information on responsible wood use. Because the Good Wood

Alliance did not have the ability to certify firms itself, any hardwood flooring manufacturer identified in the Good Wood Directory should be represented on either the Rainforest Alliance's or Scientific Certification Systems' lists. Those two lists therefore formed the basis for identifying the firms of interest, and both lists were cross-referenced with the Good Wood Directory to check for completeness. This process identified 14 firms as U.S. manufacturers of certified hardwood flooring.

### **Data Collection**

Data collection began with a review of the current literature pertaining to decision-making and the factors driving the decision to enter the certification movement. This information was useful in developing the factors and structure of the AHP model used in the mail questionnaire.

To achieve the research objectives, an AHP decision model and questionnaire were developed. That model was presented to both populations to determine if there were differences in how the two populations approached the decision-making process.

### **Development of the AHP Model**

In order to use the AHP to model the decision-making process, the decision had to be decomposed into its constituent parts and a hierarchy created. An AHP hierarchy consists of three parts: the goal (a statement of the decision to be made), the important decision factors that must be considered in the decision, and the possible alternatives that are being considered. The respondents then rank the decision factors and alternatives in the model through a series of pairwise comparisons. After the respondents complete the rankings, weights are calculated for the decision factors and alternatives and a preferred alternative is suggested based on the calculated weights.

### **Initial Development of the AHP Factors**

The first step in model development was the identification of the important factors that a hardwood flooring manufacturer would consider when deciding whether or not to produce certified flooring. Those factors form the basis of the model and provide the first level of pairwise comparisons to be completed by the respondents. The process began in August 1997 by contacting 14 representatives from the certification programs, academic institutions, Federal government agencies, industry associations, and private companies and asking them to brainstorm a list of all of the factors that a manufacturer might consider in their decision whether or not to certify. The representatives were contacted through telephone calls in a single contact approach in which they were asked to provide the list of the factors they considered important. This process resulted in the following 13 factors that the experts deemed important considerations when a company is considering producing certified flooring:

- Monetary cost of certification
- Cost in terms of time and manpower effort lost
- Personal convictions or idealism of top management
- Reaction from peers in the industry
- Avert future adverse consequences
- Effect on current suppliers
- Cost of obtaining new suppliers and tracking system
- Demand in existing markets
- Cost to develop new markets
- Profit potential
- Marketing/competitive advantages
- Access to new markets
- Publicity/image impacts

### **Reduction of AHP Factors**

The next step was to reduce the list of 13 factors to six factors that would be included in the model. Six factors is the accepted size for an AHP model in order to decrease the number of comparisons that a respondent must make (Harker 1989). In an AHP model with six factors, the respondents must make 15 separate factor comparisons. However, in an AHP model with seven factors, the respondents must make 21 separate factor comparisons. So, the addition of only a single factor significantly increases the time a respondent must spend completing the study. Therefore, a model was developed with six factors to increase the likelihood that the respondents would complete and return the questionnaire.

The factor reduction process was accomplished by having the same panel of experts rank the 13 identified factors on the basis of their relative importance. The experts were asked to assign each of the factors a number between 0 and 100 (higher numbers indicated more importance) so that the sum total of all of the factor ratings equaled 100 (i.e. distribute 100 points among the factors). The complete list of factors and an instruction sheet were sent via facsimile to the panel of experts in mid-September 1997. Follow-up facsimiles were sent at the end of September to those that had not responded, and telephone calls were placed to the non-respondents urging them to return the questionnaire. By mid-October all of the experts had responded. The ratings for each factor were combined into a total score for the factor and the factors with the top six combined scores were selected for the model. The ratings assigned to the factors by the experts are shown in Table 3-1. The experts were allowed to suggest new factors at this stage, which accounts for the addition of two factors.

**Table 3-1: Factor Ratings for the Development of the AHP Model**

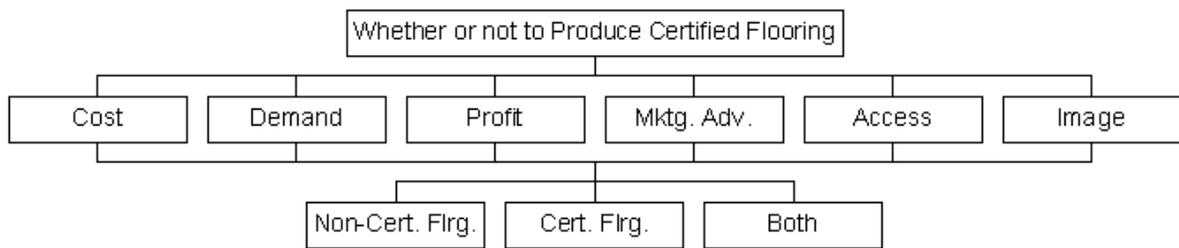
| <b>Factor</b>  | <b>Total Rating</b> |
|--|---------------------|
| 1. Demand in existing markets                          | 92                  |
| 2. Marketing/competitive advantages                    | 75                  |
| 3. Access to new markets                               | 50                  |
| 4. Publicity/image impacts                             | 47                  |
| 5. Profit potential                                    | 45                  |
| 6. Monetary cost of certification                      | 42                  |
| 7. Cost to develop new markets                         | 30                  |
| 8. Personal convictions of top management              | 26                  |
| 9. Cost of obtaining new suppliers and tracking system | 24                  |
| 10. Effect on current suppliers                        | 19                  |
| 11. Cost in terms of time and manpower effort lost     | 18                  |
| 12. Availability of raw material                       | 10                  |
| 13. Avert future adverse conditions                    | 10                  |
| 14. Reaction from peers in the industry                | 9                   |
| 15. Export advantages                                  | 3                   |

The six most important factors, their abbreviations, and their descriptions are listed below:

- **Demand in existing markets (Demand)**—The demand for certified hardwood flooring in the markets that your firm currently serves.
- **Marketing/competitive advantages (Marketing Advantages)**—Any marketing or competitive advantages in current markets that your firm may realize as a result of undergoing the certification process and manufacturing certified hardwood flooring.
- **Access to new markets (Access)**—Any new markets that may become accessible to your firm as a result of manufacturing certified hardwood flooring.
- **Publicity/image impacts (Image)**—Any positive publicity or image enhancement effects that your firm might receive as a result of manufacturing certified hardwood flooring.
- **Profit potential (Profit)**—The estimated long-term profit potential of certified hardwood flooring.
- **Monetary cost of certification (Cost)**—The total monetary cost to your company for the initial chain-of-custody certification inspection, any improvements that must be made to become certified, and annual re-certification.

### **The Finished AHP Model**

After the list of factors had been narrowed down to the six that would be used in the model, the structure of the model was constructed with the help of experts at Virginia Tech. As stated, the model consisted of the ultimate goal of the exercise, the decision factors that were to be considered when making the decision, and the alternatives that the respondents were to consider. The goal of the model was to determine whether or not the company should begin producing certified flooring, and the alternatives were therefore to produce only non-certified flooring, produce only certified flooring, or to produce both certified and non-certified flooring. The complete model is shown in Figure 3-1.



**Figure 3-1: Structure of the Developed AHP Model**

### **Collection of Primary AHP Data**

The next phase of data collection was the procurement of primary data from the certified and non-certified manufacturers. The primary data for both groups of manufacturers were collected by means of a mail questionnaire. Because the top management of each firm sets the corporate strategic direction (Dess and Davis 1984, Hambrick 1981) and would make the decision whether or not the firm would produce certified flooring, the questionnaire was sent to the president or chief executive officer of each firm. Respondents were provided with explanations of the six AHP decision factors in the model and were asked to assume that their firm is trying to decide whether or not to produce certified flooring. The respondents were told that they should assume that they had gathered all of the information necessary to make their decision. They were then asked to rate each of the factors against the others and indicate which would be more important to them in their decision whether or not to produce certified flooring. The respondents were also asked to rate the three possible alternatives (producing only non-certified flooring, producing only certified flooring, or producing both certified and non-certified flooring) against each other. This would indicate which was more preferable to them when considering each of the decision factors.

The questionnaire was assessed for clarity, completeness, and content by industry experts before being finalized and was frequently revised based on the suggestions

received. The completed questionnaire was pre-tested by seven industry experts in March 1998 and any further suggested refinements were made before conducting the study. Methods suggested by Jobber (1986) and Mangione (1995) were used to increase the response rate for the mail questionnaire. Such methods included:

- A good cover letter
- Prepaid return postage for the questionnaire
- Guarantees of anonymity/confidentiality
- Reminders
- Clean, well written questionnaire

The initial wave of questionnaires was mailed to the 244 non-certified hardwood flooring manufacturers in May 1998. The questionnaires were mailed first class along with a cover letter in a standard 10x13 inch envelope. Respondents were guaranteed anonymity and confidentiality and were told that their response was crucial to the success of the study.

Two weeks after the first wave of questionnaires was mailed, a simple reminder postcard was mailed to those companies that had not yet responded to the survey. The postcard again stressed the importance of the survey research and asked the respondent to please take the time to complete and return the survey. In addition, a "Thank You" postcard was sent to those companies that returned the questionnaire.

In June 1998 the second wave of questionnaires was mailed to those companies that had not yet responded. The cover letter again stressed the importance of the research and reminded the respondent that their input was crucial to the success of the survey.

Two weeks after the second wave of questionnaires was sent, a final reminder postcard was mailed to those companies that had failed to respond. In addition to those postcards, "Thank You" postcards were continually sent to those companies that returned completed questionnaires.

The collection of primary data from the U.S. manufacturers of certified hardwood flooring took place after the non-certified survey had been completed. Due to the small number of manufactures in this population it was crucial to obtain a high response rate. Therefore, each potential respondent was contacted by telephone beginning in July 1998 to introduce the survey and impress upon them the importance of their response. After the telephone calls were made, the questionnaire form was faxed to the individual respondents for completion. Follow-up phone calls were made if needed.

## **Data Analysis**

Completed questionnaires were first checked for errors and omissions before being cataloged and coded. The software package Expert Choice was used to analyze the data, but the data were first entered into an MS Excel spreadsheet to facilitate initial analysis. The respondents' factor and alternative preferences are entered into Expert Choice, and the software computes the factor weights and the overall preference for alternatives. The software also allows the researcher to conduct sensitivity analysis on the results to see how varying the importance of the various decision factors affects the overall preference for alternatives. The AHP results from the two populations of interest, certified and non-certified manufacturers of hardwood flooring, were compared and contrasted to determine whether or not differences existed between the two groups.

## **Results and Discussion**

### **Validity and Response Rate**

A researcher must be concerned with two types of validity: internal and external. Internal validity refers to the appropriateness of the research instrument and the compatibility of the different research groups used in the study. External validity refers to the confidence one has regarding the application of small-sample research results back to the whole population (Malhotra 1996).

Dooley (1990) has identified several threats to internal validity: reverse causation and time, group, and mortality threats. However, he states that the identified threats are only a concern for experimental research designs. Because the current study involved only a simple mail questionnaire and personal interviews, questions of internal validity were minimized. In addition, the use of established methods of increasing the survey response rate increased the number of useable responses and reduced concerns of external validity and sampling errors in the research.

Of the 244 questionnaires mailed to the non-certified manufacturers, 13 were returned with bad addresses or were otherwise undeliverable. The first question on the survey asked the respondents whether or not they produced hardwood flooring and asked them to check "Yes" or "No." If the respondent checked "No," they were thanked for their time and asked to return the questionnaire. Seventy-nine respondents either responded "No" to that initial question or phoned to say that they did not manufacture hardwood flooring. Of the remaining 152 surveys, 33 were returned completed and were deemed useable for the study. The returned surveys represent a 22% response rate to the mail survey. This response rate was calculated by subtracting bad addresses and "No" responses from the total number of surveys and dividing the number of useable completed surveys by the remaining amount.

Of the 14 companies initially identified as U.S. manufacturers of certified hardwood flooring, the phone calls in July 1998 revealed that 1 company had gone out of business, 1 company refused to participate in the survey, and 4 companies identified as manufacturers actually did not manufacture certified flooring. That left a total of 8 companies that participated in the survey for a calculated response rate of 89%.

### **Non-Response Bias**

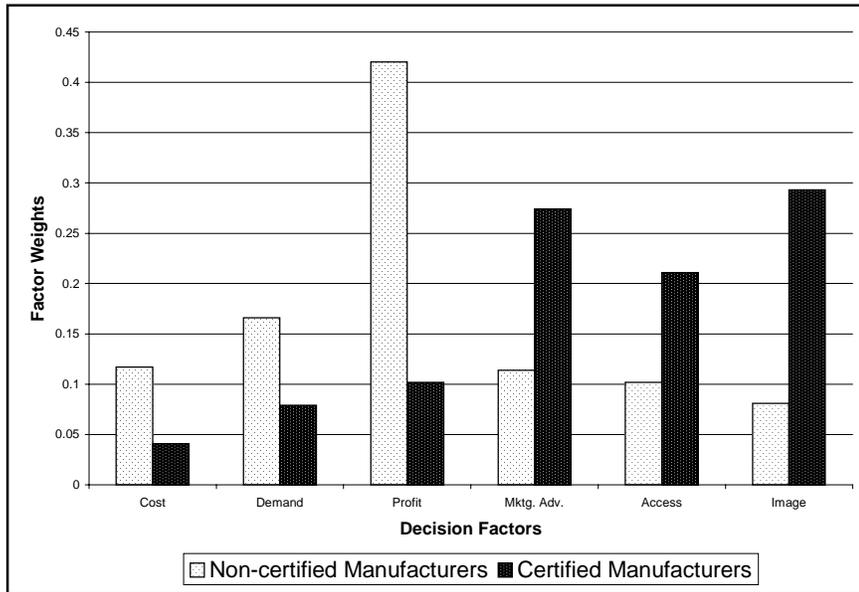
Telephone calls were made to randomly selected companies that did not respond to the survey to evaluate potential non-response bias. Calls were made until five companies agreed to answer the questions. Using non-parametric statistics to analyze the differences, no significant differences were found between the respondents and non-respondents.

### **Inconsistency Ratios**

Because the AHP decision modeling process asks humans to make comparisons between multiple alternatives, there is always the danger that the responses will be affected by human error. However, the AHP has a built-in measure of the amount of inconsistency in the results. The Expert Choice software used to analyze the AHP results provided a measure of the inconsistency of the responses of the two populations. Harker (1989) suggests that 0.1 is the accepted upper limit for the calculated inconsistency ratio. The inconsistency ratio for the non-certified responses was 0.01 and the inconsistency ratio for the certified responses was 0.02. As both of those values are well below the accepted upper limit, it can be assumed that the respondents answered the questions in a consistent and rational manner.

### **Factor Weights**

When modeling using the AHP, the first step is to determine the weights of the decision factors in the model. In this study, there were six decision factors that the respondents were to compare: demand, marketing advantages, access, image, profit, and cost. Each respondent was asked to compare the factors in a series of pairwise comparisons to determine the importance of each factor in their decision. Those individual comparisons are then combined for each population through the use of geometric means, and an overall series of decision factor weights for each population is calculated. The weights show the overall importance that that population of manufacturers ascribes to each of the decision factors in the decision-making process. The results of the decision factor pairwise comparisons are shown in Figure 3-2.



**Figure 3-2: AHP Decision Factor Weights for Certified and Non-certified Manufacturers**

From the results in Figure 3-2, we can see that some very distinct differences exist in the importance that the two populations place upon the different factors. The greatest differences are evident in the factors that the two populations rate most important in their decision. The non-certified manufacturers rate the profit factor as the most important factor in their decision, whereas the certified flooring manufacturers rated the profit factor a distant fourth in importance. From previous research it was determined that the non-certified manufacturers feel strongly that there is limited customer demand for certified flooring and that customers are unwilling to pay more for a certified product. Because those manufacturers place such importance on the profit factor, those beliefs will play heavily in their decision.

The results for the certified manufacturers are quite different. The certified manufacturers rated the marketing advantages and image factors as almost equally important in their decision to produce certified flooring, and the access factor was given a similar magnitude of importance. By comparison, the non-certified flooring manufacturers rated those three factors as the three least important, with the image factor the least important factor of the six. From previous research it was determined that the certified manufacturers agree with the non-certified manufacturers that there is limited demand for certified products from the customers and that customers are unwilling to pay more for certified products. However, based on the importance ascribed to the decision factors in this study, it appears that the profit potential of the product is not the primary determinant in the certified manufacturers' decision. Instead, they appear to be basing their decision to certify on the image and marketing

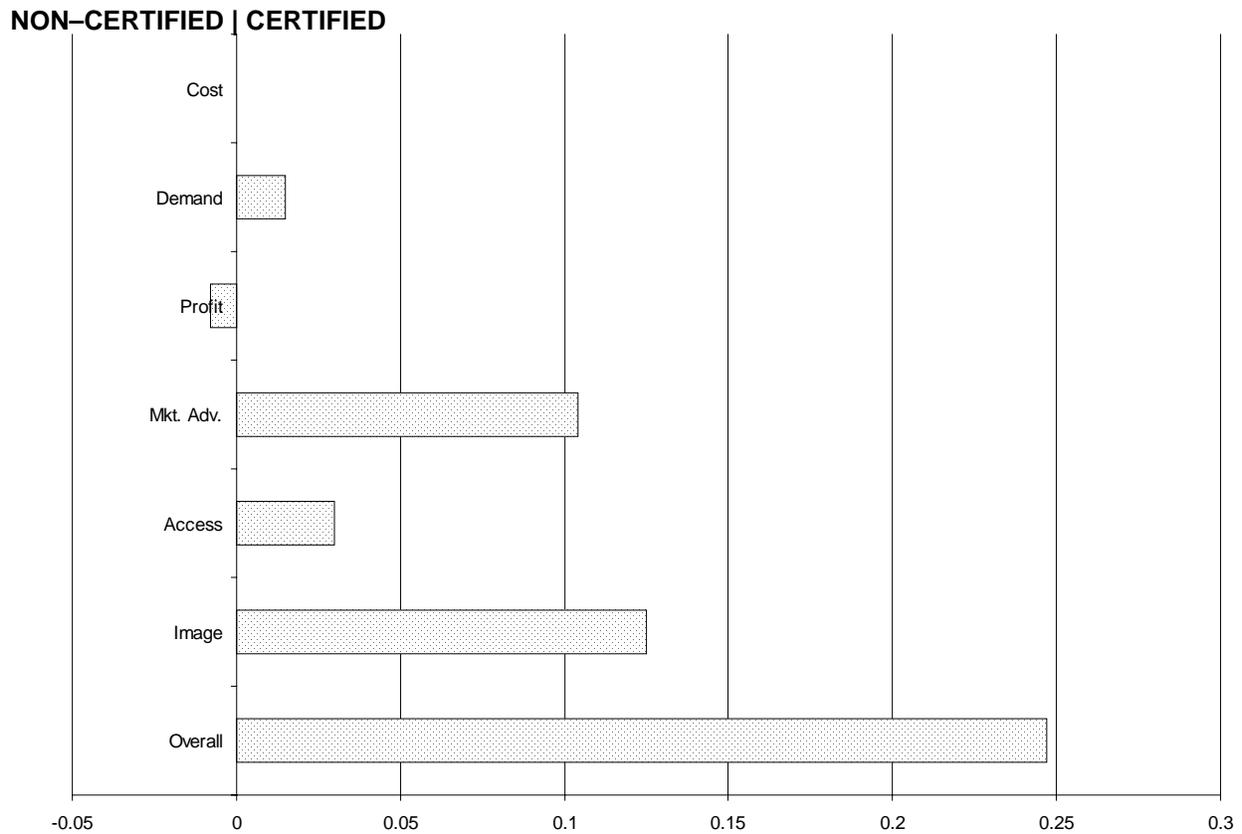
benefits that certification provides them. This suggests that the certified manufacturers made the decision to produce certified flooring because they believed that it would provide the company with positive publicity and would open up new markets for them and give them a competitive marketing advantage in existing markets.

One interesting finding that this study uncovered is that both populations place limited importance on the cost factor in their decision. It is also interesting to note that neither group of manufacturers places primary importance on the demand factor. The non-certified manufacturers rate demand a distant second in importance in their decision-making process, and the certified manufacturers rate the demand factor as the second to last factor in importance. This may be explained by the knowledge that both populations realize that there is limited consumer demand for certified products. Therefore, the importance that the manufacturers place on this factor is necessarily decreased.

### **Pairwise Comparisons of Alternatives**

As the next step in the study, responding manufacturers were given three alternatives to the certification decision that they were to consider: producing only non-certified flooring, producing only certified flooring, or producing both non-certified and certified flooring. The alternatives were presented in a series of pairwise comparisons, and the respondents were asked to consider each decision factor in turn and indicate which alternative was preferable under that decision factor. For example, the respondents were asked, "When considering only cost, is producing only certified flooring preferable to producing both types of flooring?" From those preference ratings, a series of weights were calculated that indicate the preference for each alternative with respect to the decision factors.

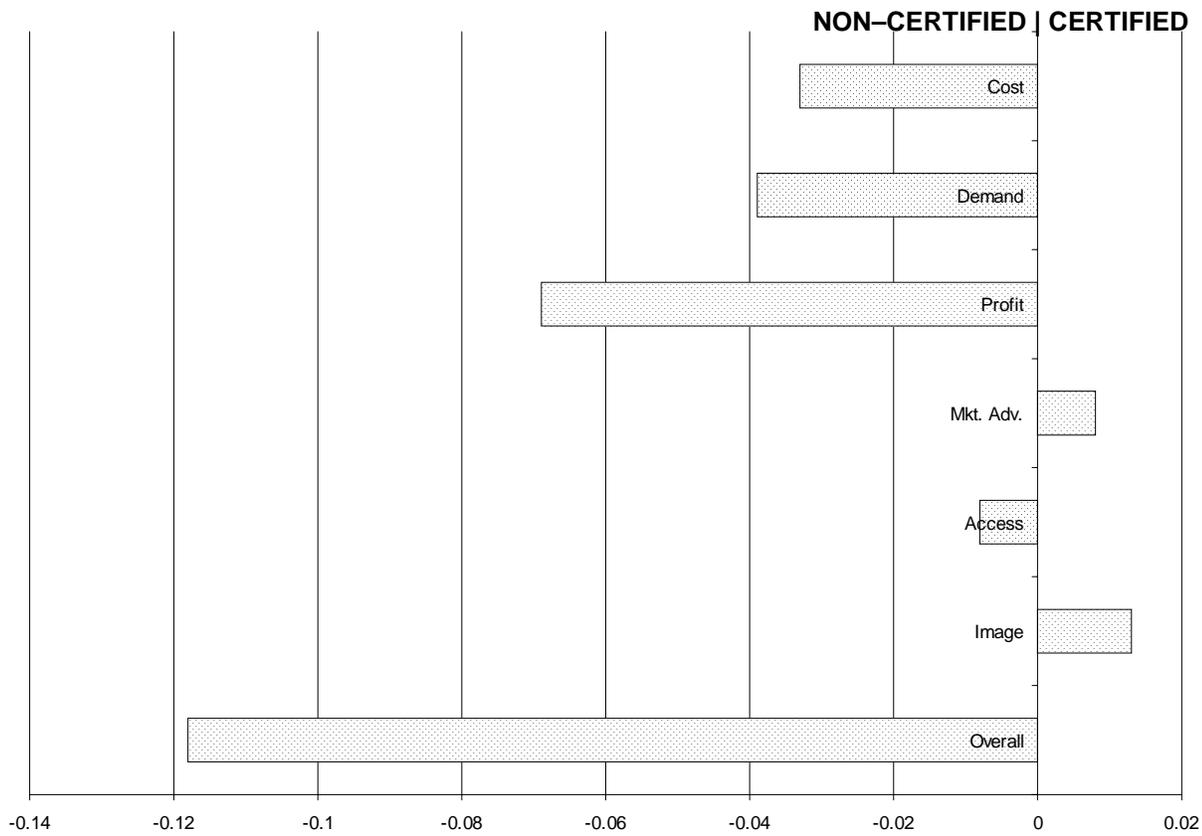
What follows are a series of charts showing each of the pairwise comparisons of alternatives and the six decision factors in the model. The alternatives are presented on each side of a central axis, and the decision factors are arranged along the axis. The direction of each decision factor's bar indicates the preferred alternative for that decision factor, and the size of the bar indicates the magnitude of the preference. In addition, an overall preference is given at the bottom of the figure that combines the weighted preference with respect to each decision factor with the weighted importance of the decision factor calculated in the previous section.



**Figure 3-3: Certified Manufacturers' Comparison of Non-certified vs. Certified Alternatives**

Given the choice of producing only non-certified flooring or only certified flooring, the certified manufacturers give strong preference to producing certified flooring. This is good news from a validity viewpoint, as this model was developed to decompose and explain the decision-making process that certified manufacturers undertook when deciding to become certified.

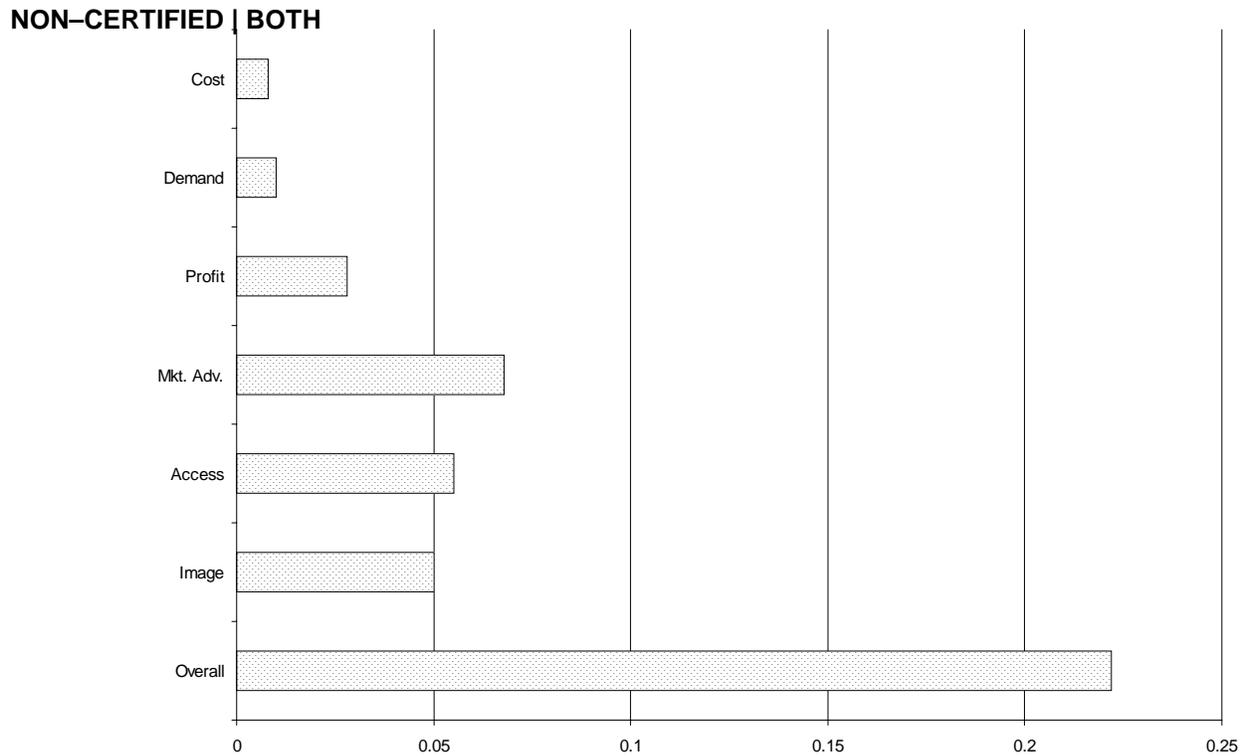
The certified manufacturers' preference for certified flooring is led by strong preference for certified flooring when the factors marketing advantages, image, and access are considered. These factors were the most important in the certified manufacturers' decision, and for each factor the preference is given to certified flooring. An explanation for this may be that the manufacturers looked to certification to provide them with an advantage in all of those areas, so they would naturally favor the certification alternative. It is interesting to note that when considering only the profit factor, the manufacturers give a slight preference for producing only non-certified flooring. However, this preference is slight and we should remember that the weight of the profit factor was the third lowest of the six factors.



**Figure 3-4: Non-certified Manufacturers' Comparison of Non-certified vs. Certified Alternatives**

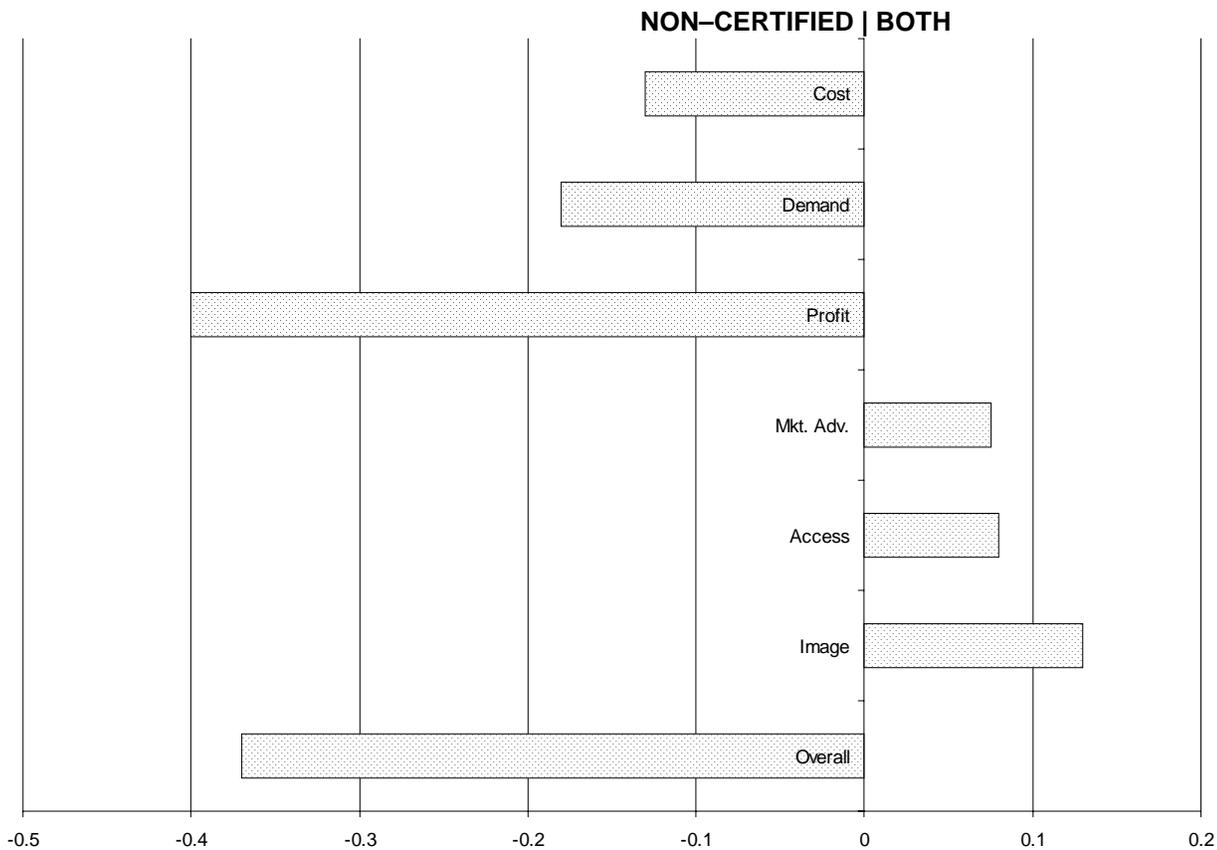
Figure 3-4 shows the non-certified manufacturers' comparison of the non-certified and certified alternatives. Their preferences are quite different from the certified manufacturers' preferences and result in a different overall outcome. When considering all of the factors except marketing advantages and image, the non-certified manufacturers' give their preference to producing only non-certified flooring. The strongest preference for non-certified flooring is given for the profit factor, and profit was the most important decision factor in the manufacturers' decision process. Therefore, the overall decision will be strongly weighted towards producing non-certified flooring. This is important to note, for it again lends validity to our constructed AHP model.

However, it is interesting to note that when considering the marketing advantages and image factors, the manufacturers gave preference to producing certified flooring as the certified manufacturers did. This may be due to the fact that the manufactures realize that there are some publicity benefits to be gained from producing certified flooring.



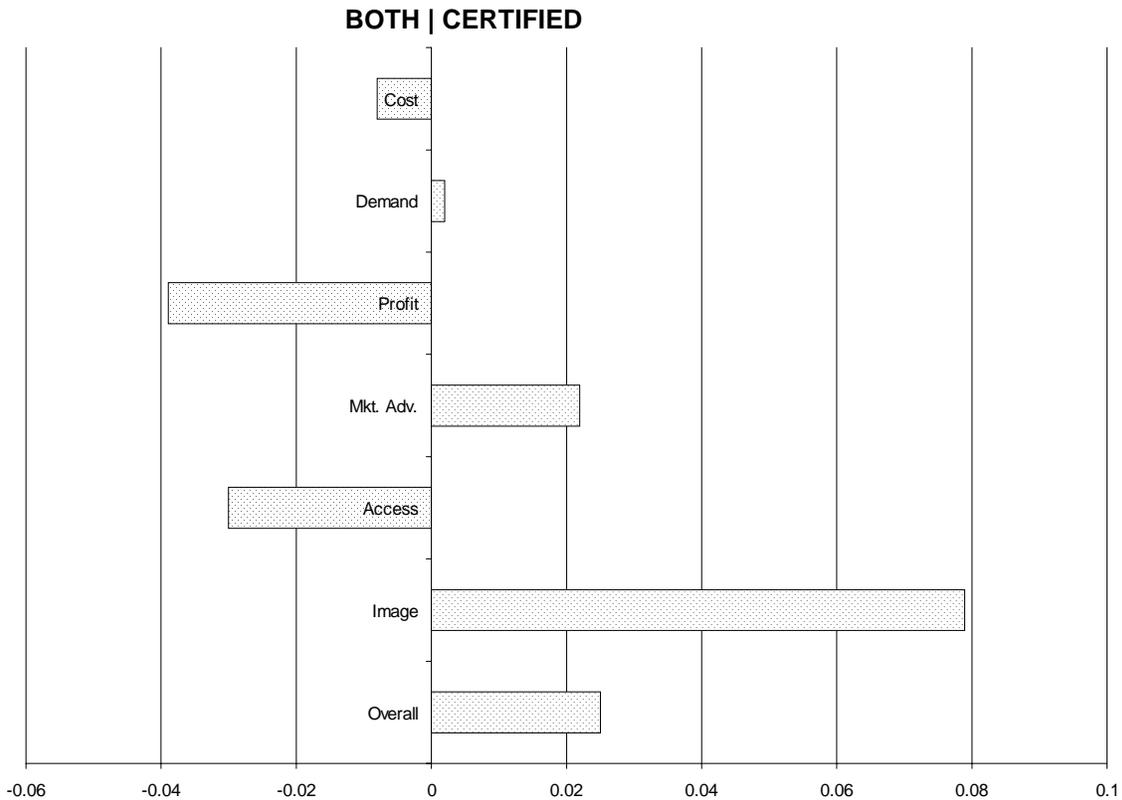
**Figure 3-5: Certified Manufacturers' Comparison of Non-certified vs. Both Alternatives**

When asked to choose between producing only non-certified flooring and producing both certified and non-certified flooring, the certified manufacturers choose to produce both types of flooring. On all of the factors their preference is to produce both types of flooring, which is in fact what they do in real life. By producing both types of flooring, the manufacturers are able to capture the best of all worlds. They are able to produce certified flooring and capture the marketing advantages, image, and access benefits they believe are available, and yet they are able to realize the lower costs and established demand for non-certified flooring.



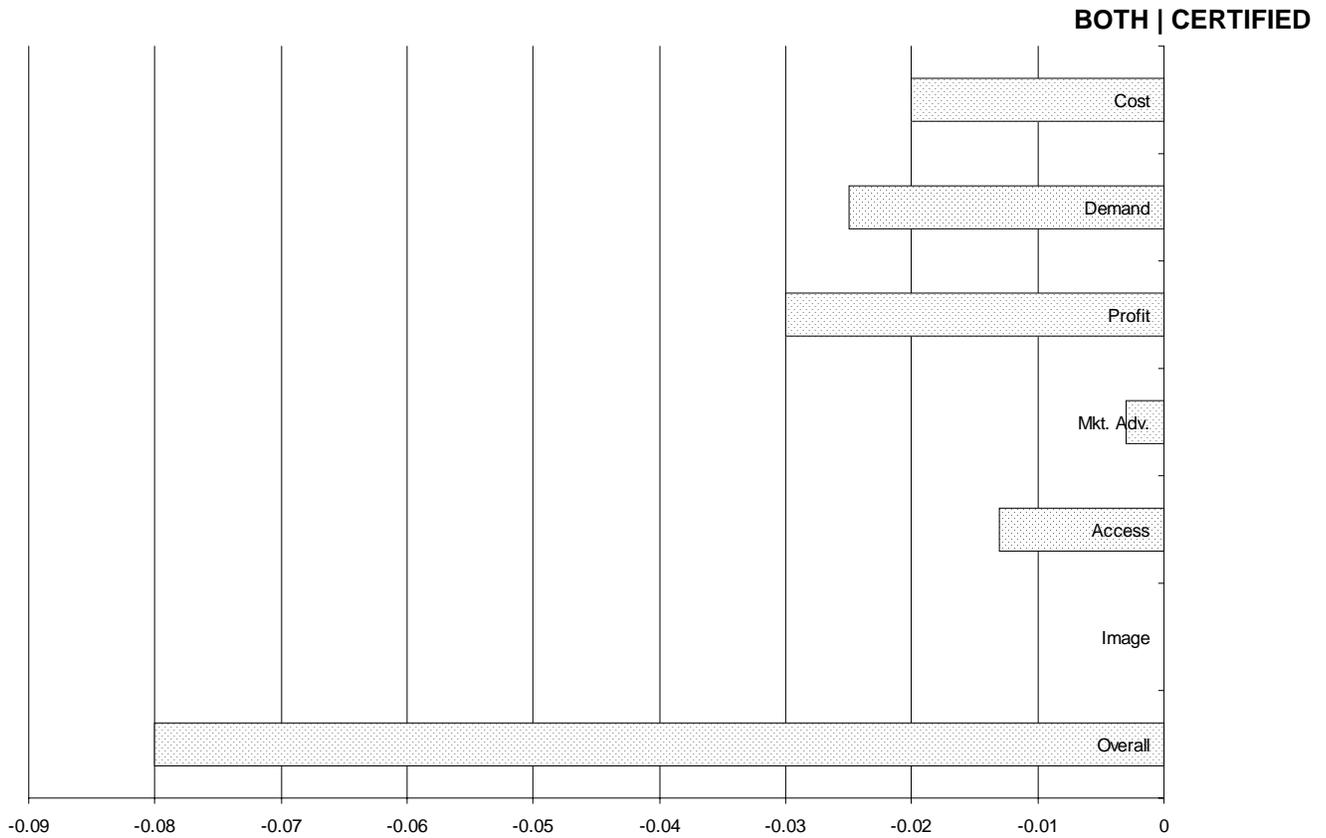
**Figure 3-6: Non-certified Manufacturers' Comparison of Non-certified vs. Both Alternatives**

Figure 3-6 presents some interesting information. When given the choice to produce only non-certified flooring or both non-certified and certified flooring, the non-certified manufacturers choose to produce only non-certified flooring. However, they seem to believe that there are some benefits to producing certified flooring, as they gave preference to producing both types of flooring when considering only the marketing advantages, access, and image factors. However, it must also be remembered that the most important factor for non-certified manufacturers is the profit factor, so the alternative preferred when considering only the profit factor will have overriding weight. Therefore, even though the non-certified manufacturers appear to be willing to produce both types of flooring under certain circumstances, their overall preference is to produce only non-certified flooring.



**Figure 3-7: Certified Manufacturers' Comparison of Both vs. Certified Alternatives**

Although the certified manufacturers prefer to produce both certified and non-certified flooring on some factors, overall they prefer to produce only certified flooring based on a strong preference for the image and marketing advantages factors. However, the manufacturers appear to realize that there is a monetary cost to certification and that to get a profit they need to produce non-certified flooring, as they prefer to produce non-certified flooring when considering only those factors. It is worth noting that the manufacturers gave a slight preference to producing only certified flooring when considering only the demand factor. This is interesting because the manufacturers have admitted that there is limited demand for certified flooring, so it would make sense for them to produce both types of flooring. This is perhaps an area that can be explored in future studies.

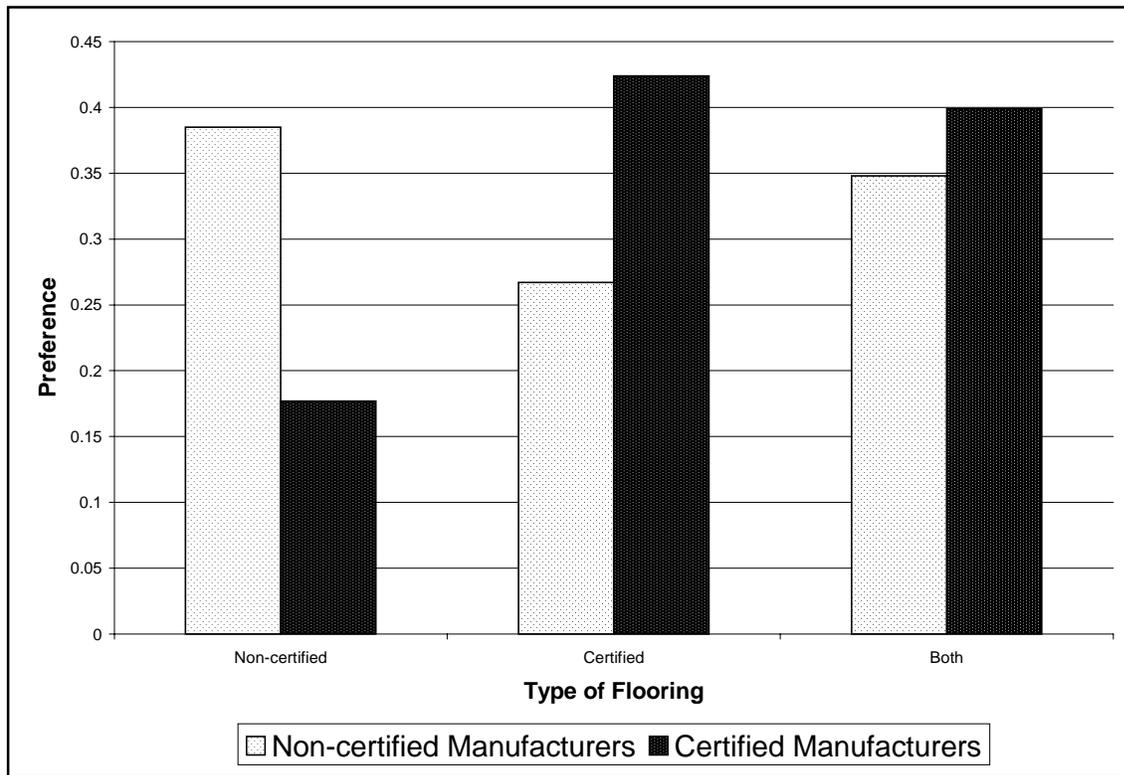


**Figure 3-8: Non-certified Manufacturers' Comparison of Both vs. Certified Alternatives**

Not surprisingly, the non-certified manufacturers favored producing both types of flooring over producing only certified flooring on all of the factors except image, for which they had no preference. The factor with the strongest preference was profit, which was the most important decision factor for the non-certified manufacturers. The three factors on which the manufacturers had sometimes given preference to certified flooring, marketing advantages, access, and image, had the weakest preference ratings of the factors in this comparison but tended slightly towards producing both types of flooring. Based on the strong importance that the manufacturers give to the profit factor, their overall preference was to produce both types of flooring.

### Overall Preference for Alternatives

In the final step of the AHP process, the overall preferences for the alternatives are calculated. The overall preferences are calculated by multiplying the weights of the decision factors by the weights of the alternatives under each decision factor. In this way, a weighted overall preference can be found. The results for the two populations of manufacturers are shown in Figure 3-9.



**Figure 3-9: Overall Preference for Alternatives Based on the Manufacturers' Responses**

From Figure 3-9 we can see that the preferred alternative for the non-certified flooring manufacturers is the production of non-certified flooring, and the preferred alternative for the certified flooring producers is the production of only certified flooring.

For the non-certified manufacturers, this outcome is as expected and helps to validate the AHP model. Those manufacturers have stated that they see no need for certification and don't think that it is necessary to sustain the health of U.S. forests. In addition, the manufacturers don't see any demand from customers for certified products and don't see any profit in the sale of certified products. As the model demonstrates, profit potential is the most important factor in the decision of the non-certified manufacturers

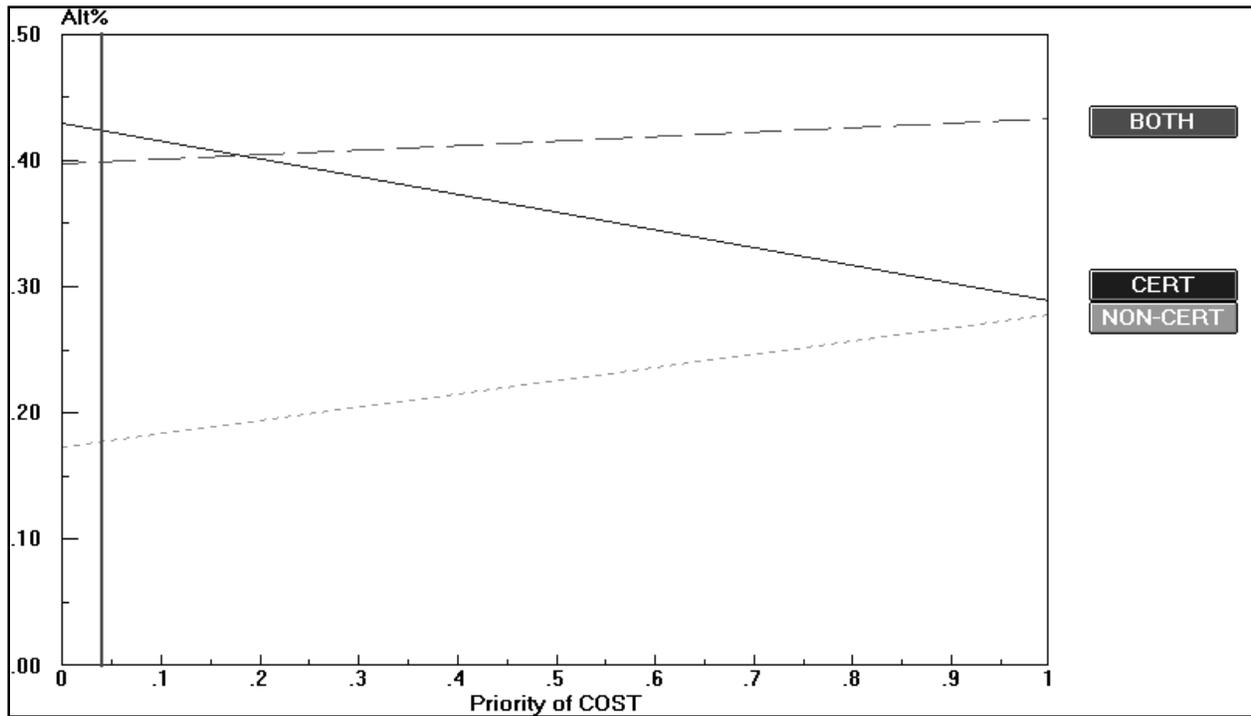
whether or not to produce certified flooring. It may be suggested that because the non-certified manufacturers don't see any profit potential in certified flooring, they are unwilling to produce certified flooring.

For the certified manufacturers the outcome is a bit surprising and is not as expected. None of the certified manufacturers produces only certified flooring, yet their answers to the AHP model questions returned a calculated best alternative of producing only certified flooring. It was expected that the model would return a preferred alternative of producing both certified and non-certified flooring. However, that alternative actually came in as the second-most preferred alternative. The third alternative, producing only non-certified flooring, was ranked third in the calculated preference rankings.

## **Sensitivity Analysis**

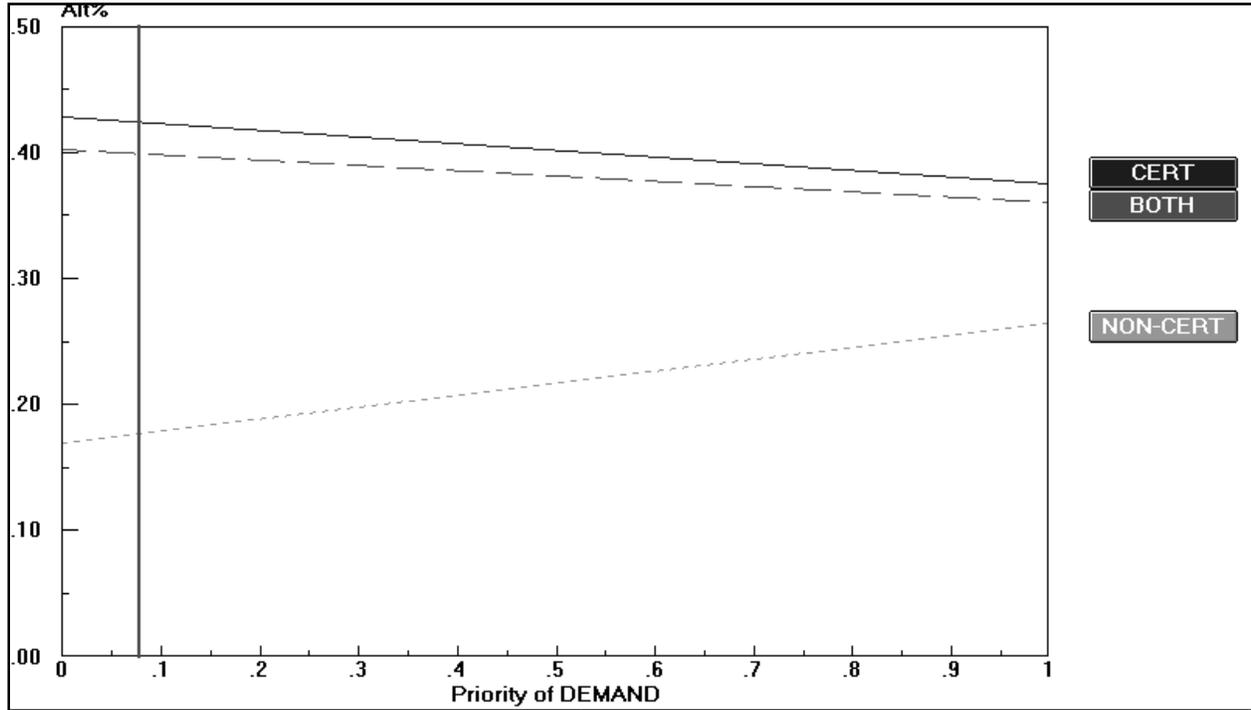
A benefit of the Analytic Hierarchy Process is that it offers the user the chance to perform “what if” analysis on the results using sensitivity analysis. This allows the researcher to see how the overall preference for alternatives changes as the weights of the decision factors in the model are varied. Conducting this analysis can highlight which factors should be targeted to achieve a desired outcome.

That “what if” analysis is shown in the following charts. On each of the charts, the vertical line shows the current priority of the decision factor (the intersection with the X axis) to the manufacturers. The intersection of the vertical line with the horizontal lines shows the preference for the alternatives at the current factor priority. As the factor increases in priority to the manufacturers, moving the vertical line to the right on the chart, the slope of the horizontal alternative lines show whether the alternatives increase or decrease in preference.



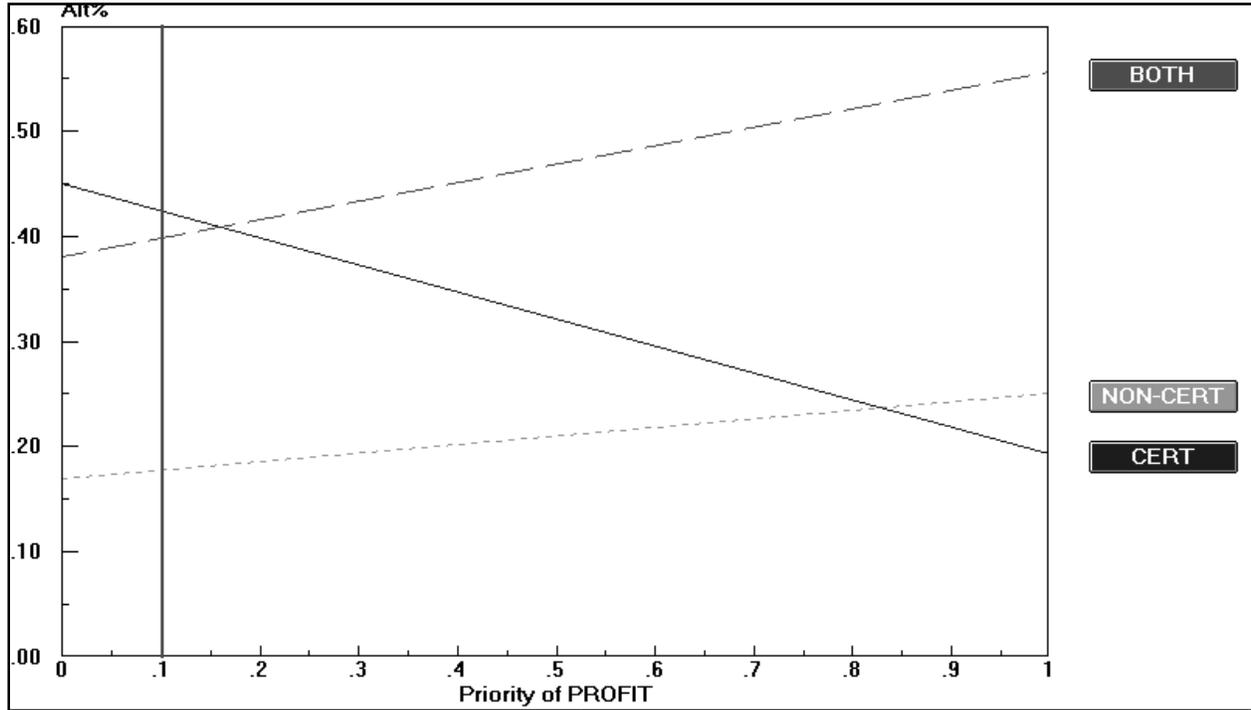
**Figure 3-10: Sensitivity Analysis for Certified Manufacturers to Cost Factor**

Figure 3-10 shows the certified manufacturers' rankings of the alternatives based on the cost factor. We can see that at the current priority level of cost the certified alternative is preferred. However, as the importance of the cost of certification in the decision increases, the certified alternative decreases in preference and the both alternative becomes the preferred alternative.



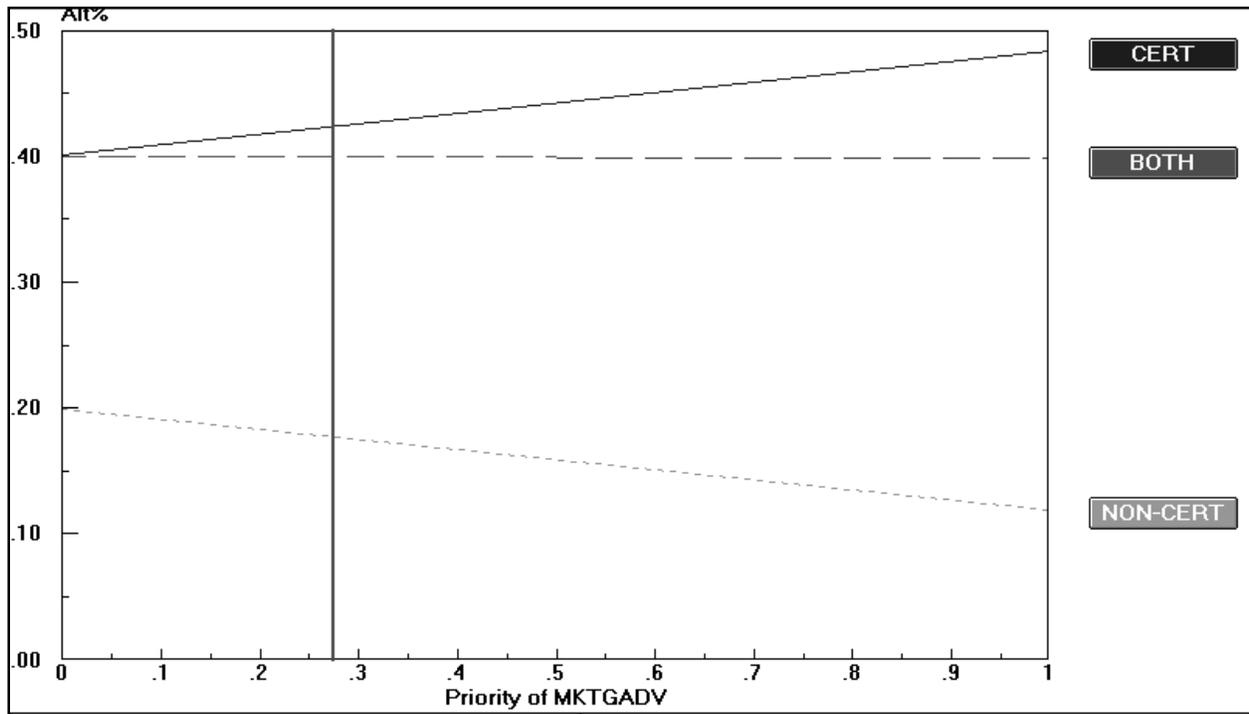
**Figure 3-11: Sensitivity Analysis for Certified Manufacturers to Demand Factor**

Figure 3-11 shows the certified manufacturers' sensitivity analysis for the demand factor. At the current importance of the factor, the certified alternative is preferred. As the factor increases in importance in the decision whether or not to certify, the certified alternative becomes less attractive and the non-certified alternative becomes more attractive, although the decision outcome does not change.



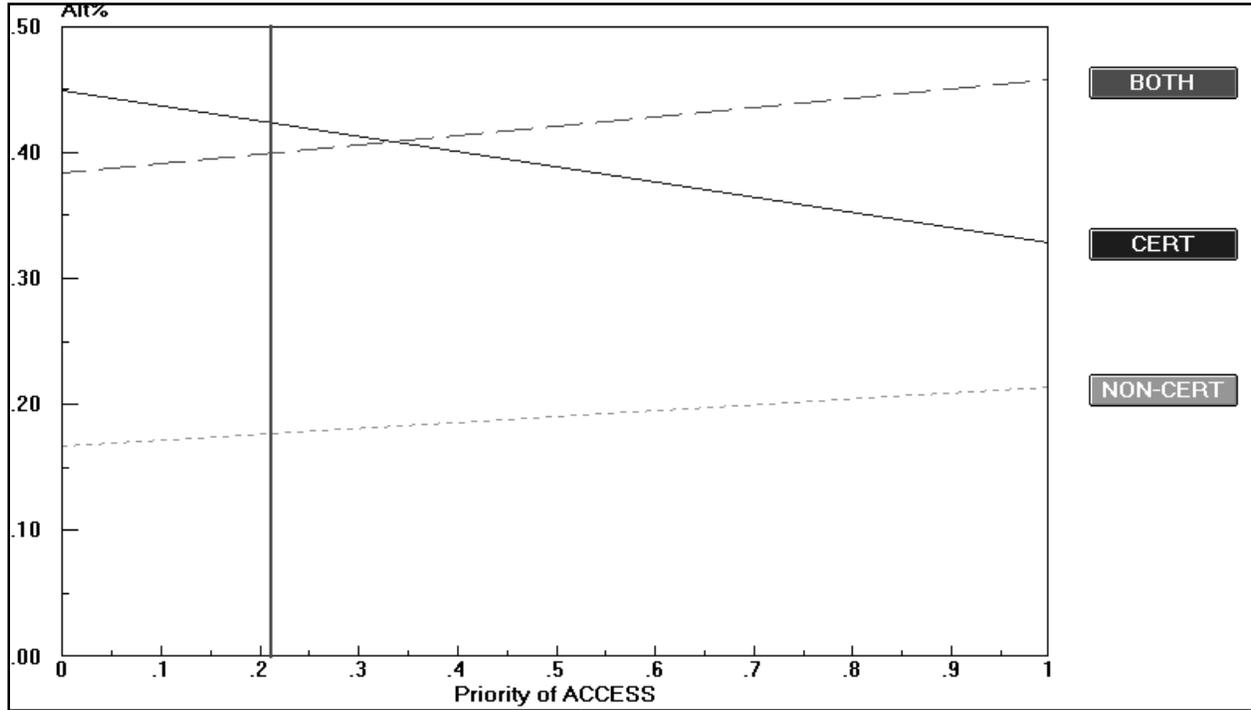
**Figure 3-12: Sensitivity Analysis for Certified Manufacturers to Profit Factor**

The situation for the profit factor is somewhat similar to the demand factor. The manufacturers are aware that there is currently limited profit in certified flooring, yet they are willing to produce the product for other reasons. However, as the importance of profit in their decision increases, they become less willing to produce only certified flooring and prefer producing both types of flooring.



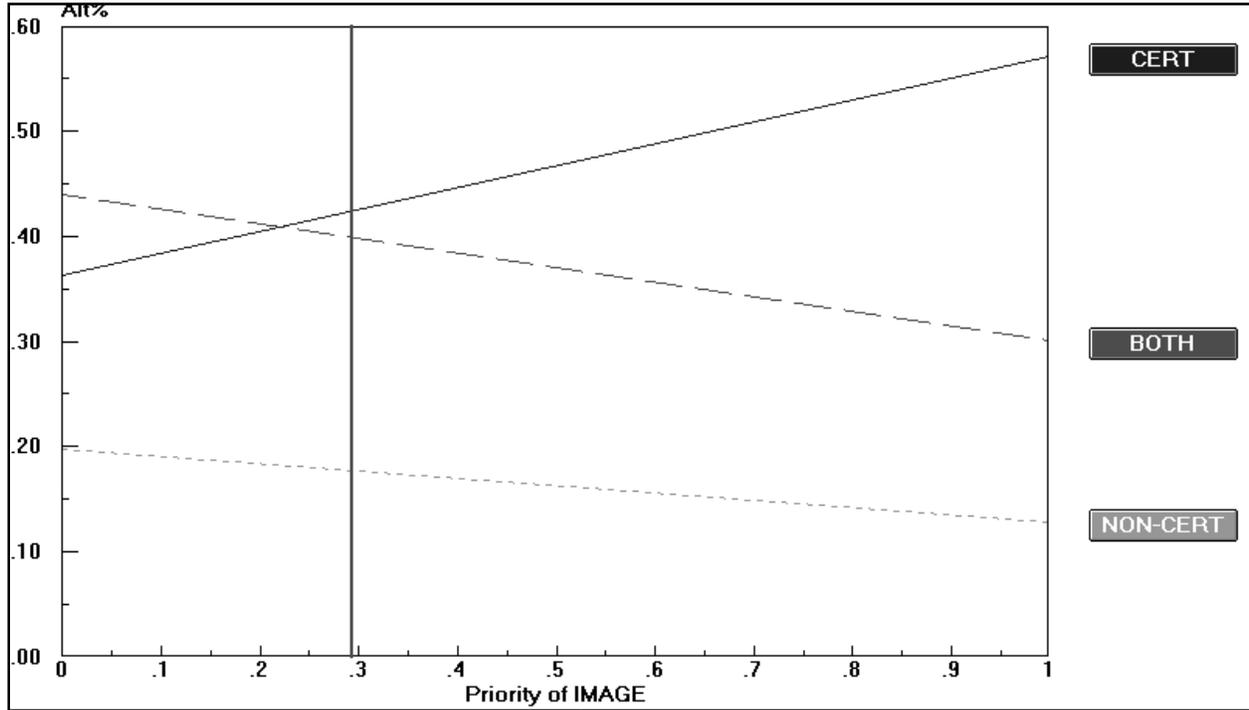
**Figure 3-13: Sensitivity Analysis for Certified Manufacturers to Marketing Advantages Factor**

Certified manufacturers have chosen to produce a certified product on the basis of the marketing advantages, access, and image benefits that the product provides. Therefore, they believe that certified flooring provides them with some competitive marketing advantages over their non-certified rivals. Figure 3-13 shows that as the importance of the marketing advantages factor increases in the decision whether or not to certify, the certified manufacturers' preference for the certified alternative increases and their preference for producing only a non-certified product decreases. This apparently follows from the manufacturers' belief that certification provides them an advantage in the marketplace. Because of that belief, as they put more importance on that factor in their decision the manufacturers are more likely to choose the alternative that they feel provides them with that advantage. It is interesting to note that the certified alternative is the preferred alternative at any importance of the marketing advantages factor, suggesting the certified manufacturers feel that producing certified flooring is the best way to capture a competitive marketing advantage over rivals.



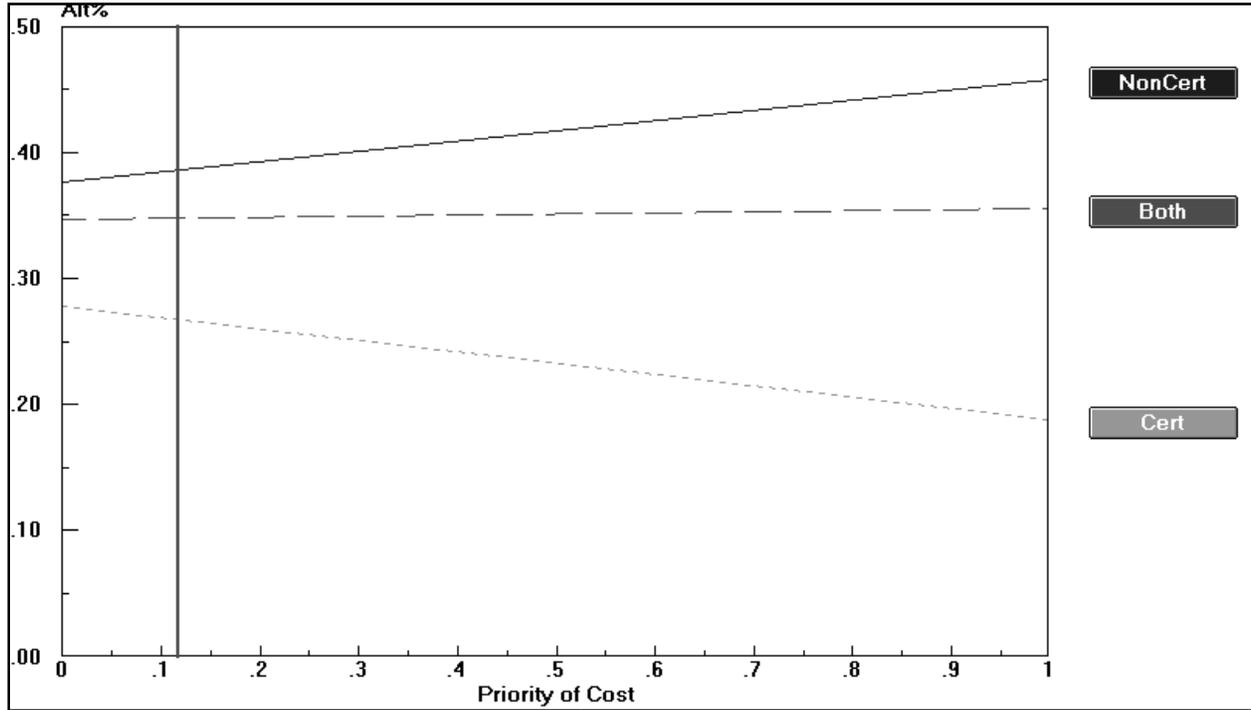
**Figure 3-14: Sensitivity Analysis for Certified Manufacturers to Access Factor**

The certified manufacturers rated the access factor as one of the top three in their decision-making process. Figure 3-14 shows that as the importance of that factor in the decision increases, the attractiveness of the certified alternative decreases and the manufacturers prefer to produce both types of flooring. This may be a result of the manufacturers' belief that market access is maximized by producing products for both certified and non-certified consumers.



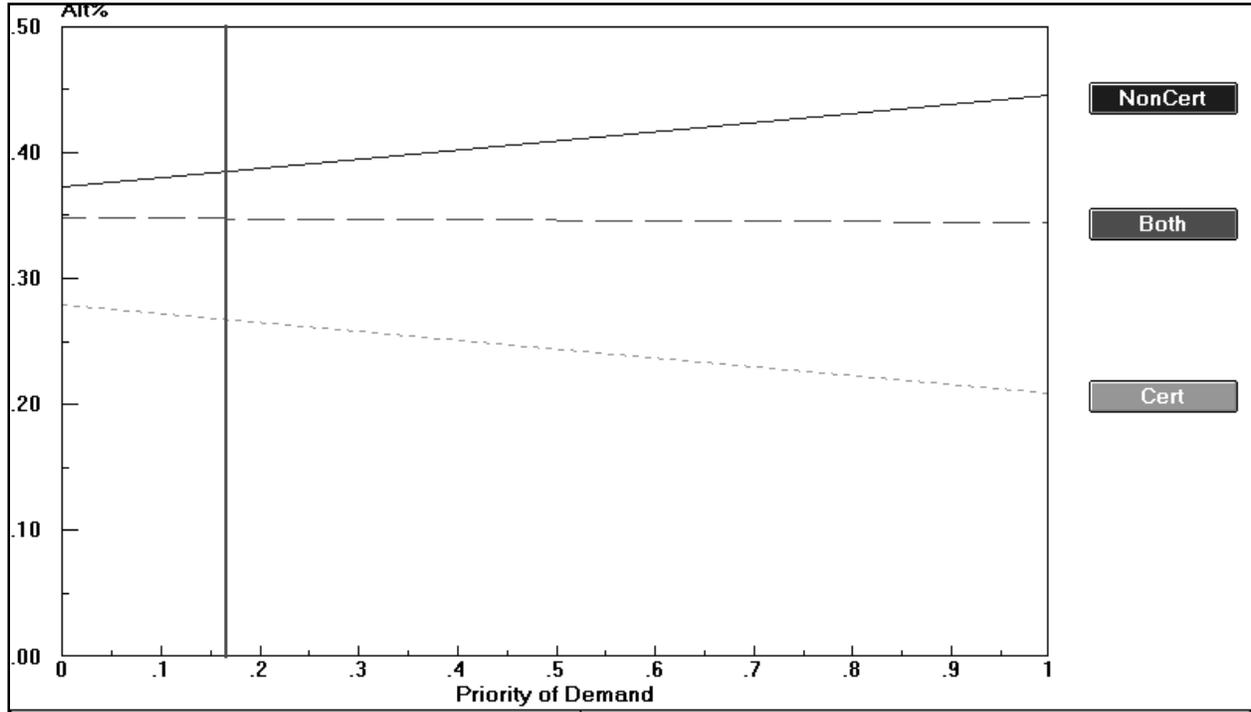
**Figure 3-15: Sensitivity Analysis for Certified Manufacturers to Image Factor**

In the face of limited demand and profit potential for certified flooring, the certified manufacturers have chosen to produce a certified product anyway. They made that decision based on factors other than demand and profit, and one of the primary factors was the image that that decision projected about the company. The manufacturers felt that those positive image enhancements were worth the cost and hassle of becoming certified. This is shown in Figure 3-15, which demonstrates that as the importance of the image factor increases, the manufacturers become less willing to produce both types of flooring and prefer to produce only certified flooring. They apparently feel that the image benefits they get from being perceived as “environmentally friendly” and producing certified flooring are worth giving up the non-certified flooring product completely.



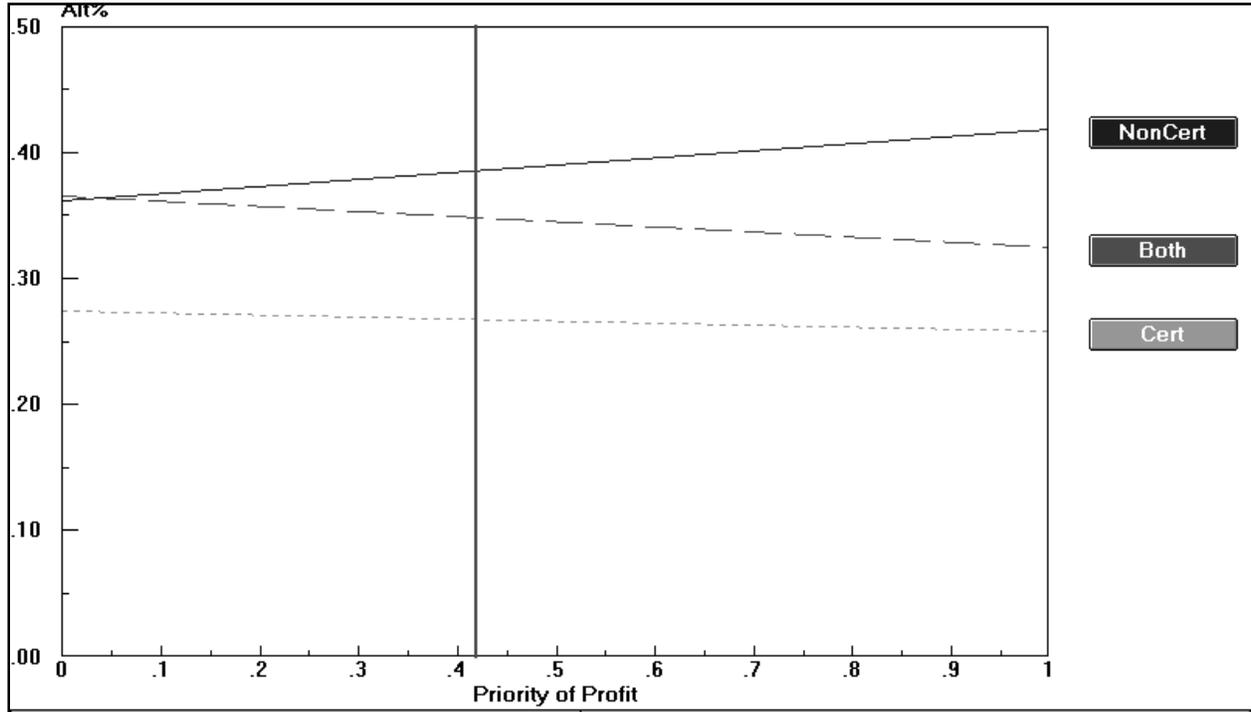
**Figure 3-16: Sensitivity Analysis for Non-certified Manufacturers to Cost Factor**

Not surprisingly, as the importance of the cost factor is increased in the non-certified manufacturers' decision process the certified alternative becomes less preferable and the non-certified alternative becomes more preferable. The non-certified manufacturers have stated that they do not think that there is a need for certification and feel limited demand from customers to produce a certified product. Therefore, it is understandable that they would be resistant to paying to become certified, and as that factor takes on increased importance that resistance would increase. The non-certified alternative is preferred at all levels of importance of the cost factor.



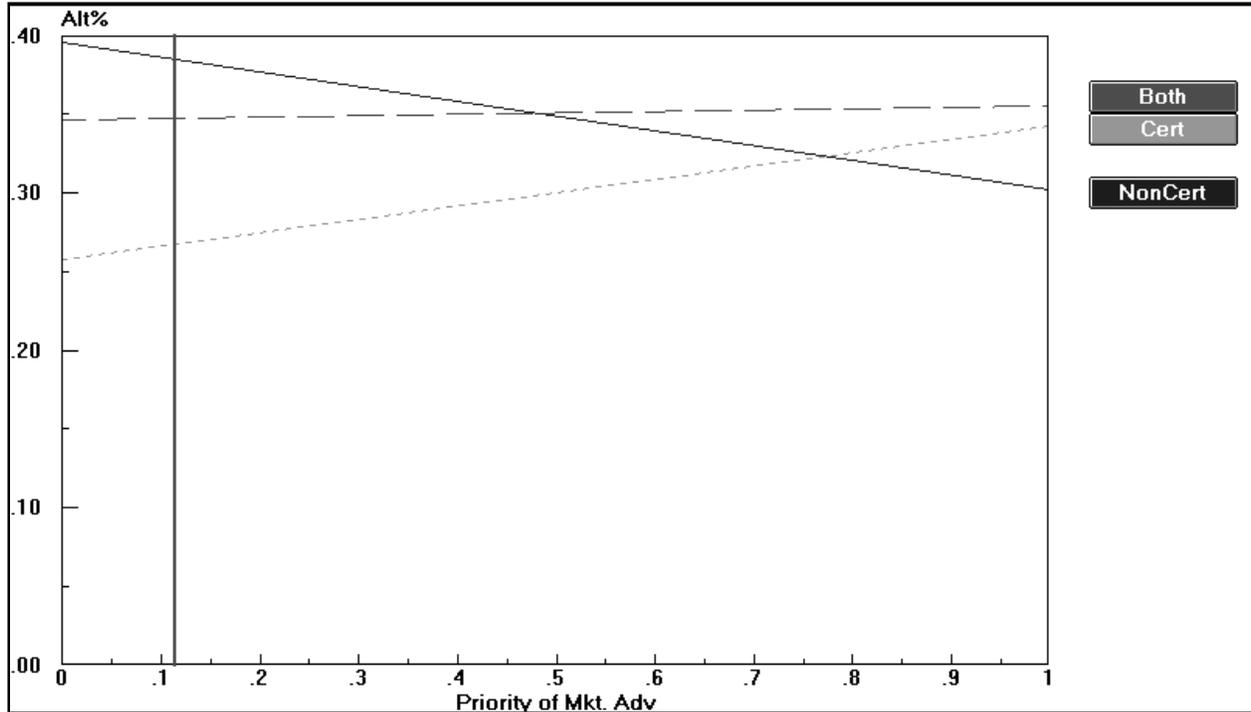
**Figure 3-17: Sensitivity Analysis for Non-certified Manufacturers to Demand Factor**

The non-certified manufacturers have stated that they feel limited demand for certified flooring. Therefore, they feel a limited need to certify. As the priority of demand in their decision-making process increases, they lean away from certification and increasingly prefer to produce only non-certified flooring. Figure 3-17 demonstrates that, at the current level of demand for certified flooring, the non-certified manufacturers' preference will always be to produce only non-certified flooring.



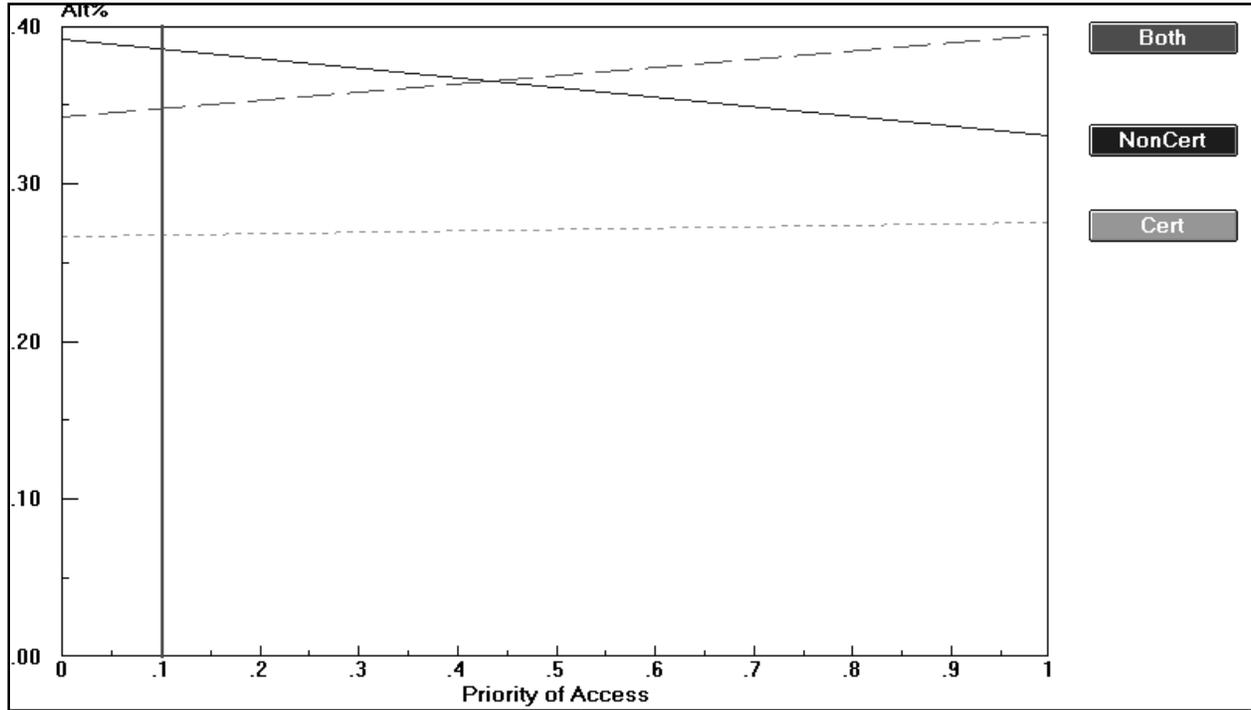
**Figure 3-18: Sensitivity Analysis for Non-certified Manufacturers to Profit Factor**

As Figure 3-18 shows, the non-certified manufacturers feel that there is limited profit potential in producing only certified flooring. When considering only that factor, the manufacturers prefer to produce non-certified flooring over producing both types or only certified flooring, and their preference for non-certified grows along with the importance of the factor in the decision. It appears that at a very low importance of the profit factor the manufacturers prefer to produce both types of flooring. However, as the importance of the profit factor in the decision grows, the manufacturers prefer to produce only non-certified flooring over producing both.



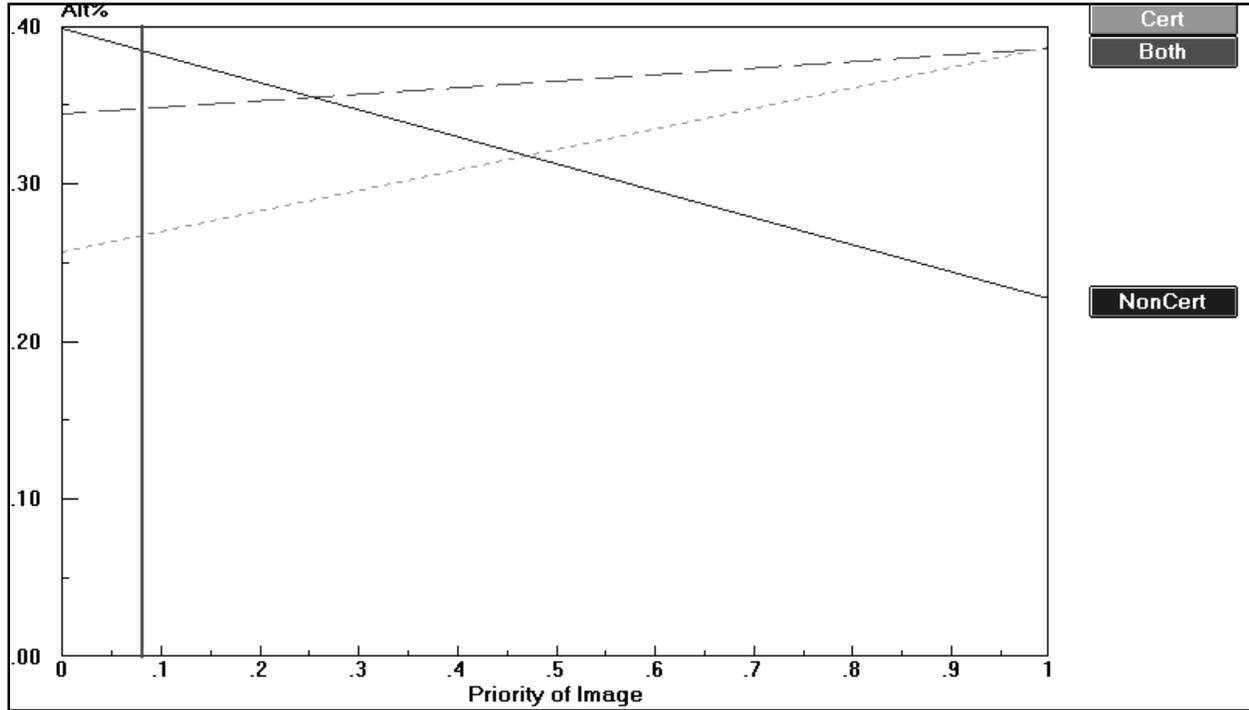
**Figure 3-19: Sensitivity Analysis for Non-certified Manufacturers to Marketing Advantages Factor**

The non-certified manufacturers seem to believe that there are some marketing advantages that can be had by producing certified flooring. Figure 3-19 demonstrates that as the importance of the marketing advantages factor increases, the manufacturers prefer to produce both types of flooring over producing only non-certified. In fact, as the marketing advantages factor assumes absolute importance (a value of 1), the non-certified manufacturers actually rank the production of non-certified flooring as the least preferred alternative—the first time that the non-certified manufacturers have preferred producing certified flooring over non-certified.



**Figure 3-20: Sensitivity Analysis for Non-certified Manufacturers to Access Factor**

Figure 3-20 shows the sensitivity analysis of the non-certified manufacturers towards the access factor. The manufacturers appear to be taking a very practical approach to this factor, as they favor producing both certified and non-certified flooring as this factor increases in importance. In essence, the manufacturers apparently want to cover all of their bases by producing everything so that they can fulfill the needs of any market. However, it appears that the manufacturers do see some value in having certified flooring in their product mix. When the access factor is unimportant the manufacturers favor producing only non-certified flooring. But as the factor increases in importance in the decision, they prefer to produce both types of flooring.



**Figure 3-21: Sensitivity Analysis for Non-certified Manufacturers to Image Factor**

The image decision factor is the only decision factor for which the non-certified manufacturers prefer all three alternatives as the importance of the factor changes. At low levels of importance, the manufacturers prefer to produce only non-certified flooring. However, as the importance of the factor in the decision grows, the manufacturers prefer to produce both types of flooring. As the factor assumes complete importance in the decision, the manufacturers favor the production of only certified flooring. This is the first time in the sensitivity analysis that the certified alternative is the preferred alternative for the non-certified manufacturers.

## Conclusions

The purpose of this study was to explore the decision-making process that a hardwood flooring manufacturer goes through when deciding whether or not to produce certified flooring. The Analytic Hierarchy Process (AHP) was used to decompose and examine the decision. The AHP was chosen for its ability to break a complex decision down into simple components and identify the impact that those individual components have on the overall decision. Once the model is constructed, it can be used as a tool by decision-makers to help them determine if certification may be appropriate for their firm.

Two different groups of manufacturers were asked to complete the survey. The first population consisted of manufacturers of non-certified hardwood flooring and the second population consisted of manufacturers of certified hardwood flooring. Both groups were given the same questionnaire and their responses were entered into the same model for analysis. It was expected that the results for each population as calculated by the model would align with their chosen manufacturing orientation—that is, the model would suggest that the non-certified manufacturers should produce only non-certified flooring and the certified manufacturers should produce both types of flooring.

As the first step in the modeling process, a panel of industry experts was used to develop the list of decision factors used in the model. This process resulted in the selection of 6 decision factors for use in the model: cost, demand, profit, marketing advantages, access, and image. Those 6 factors, identified as the important decision factors that a decision-maker considers when deciding whether or not their company will begin production of certified flooring, agree well with the factors identified by Stevens, Ahmad, and Ruddell (1998). Stevens et al queried certified manufacturers on the reasons that they begin selling certified products. Their research uncovered five main reasons for entering the certified marketplace: market access, public image, consumer demand, responsible thing to do, and niche market advantages. Those reasons are almost identical to the decision factors developed for this research, indicating the appropriateness of the decision factor development process.

As the first step in the modeling process, the manufacturers surveyed were asked to rate their preference for each of the six decision factors through a series of pairwise comparisons. There were found to be interesting differences between the two groups. The non-certified manufacturers rated the profit factor as the single most important factor of the six and were less concerned with the other factors. However, the certified manufacturers rated the marketing advantages, access, and image factors as almost equal in importance to them and placed less importance on the cost, demand, and profit factors. This suggests that the non-certified manufacturers make their decisions on certification based largely on the profit potential of the new product. However, the certified manufacturers make their decisions by considering a combination of factors: whether or not the new product will provide them with any marketing advantages over competitors, whether or not the new product will open up any new markets to them, and whether or not the new product will provide the company with any publicity or image benefits.

Both groups of manufacturers were then asked to consider each decision factor and rate their preference for 3 alternatives. The preferences for the alternatives were then weighted with the importance of the decision factors to arrive at an overall alternative preference for the model.

The calculated model outcome for the non-certified manufacturers was to produce only non-certified flooring, which is what was expected. This agreement of the model's suggested alternative with the real-world actions of the manufacturers provides a check on the model's development and lends validity to its use.

However, the model outcome for the certified manufacturers is more interesting. The AHP model suggests that they should produce only certified flooring, yet none of the manufacturers produces only certified flooring. All of them produce both certified and non-certified flooring. The desire to produce both types of product was also documented in the Stevens et al study. They found that some certified manufacturers were hesitant to produce only certified product because of the uncertainty in the certified marketplace. Until certified products become commonplace and the demand for them is well established, it appears that manufacturers will be hesitant to abandon production of non-certified products no matter how strongly they feel about the movement.

The decision to become certified is a difficult one and can have a significant impact on the success of a firm. Therefore, decision-makers need help when making the decision. The AHP model developed in this study can provide that assistance. Decision-makers can enter their own judgements into the model and use the calculated suggested outcome as a tool in their decision-making process.

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## **Chapter 4 — The Experiences of Certified U.S. Hardwood Flooring Manufacturers with Certification**

## **Problem Statement and Justification**

If one is to speak knowledgeably about certification, then the effects on a company of the decision to certify must be understood. It is vitally important to understand the genesis and basic principles of the certification movement, the beliefs of the various stakeholders hold towards certification, and whether or not consumers would be interested in certified products. However, it is equally important to understand the effects that the decision to certify has on a company.

Because the timber certification movement is a relatively new phenomenon, certified manufacturers have rarely been given a voice to discuss their experiences. However, such exploratory research is necessary when studying a new phenomenon as it allows us to illuminate previously unexplored areas and identify broad trends and issues that warrant future study.

This study provides that necessary exploratory research by determining the experiences of certified flooring manufacturers in several key operational areas: the product, customers, raw materials, competitors, and the certification process itself. The product questions examine the manufacturers' thoughts on how certified flooring fits in their product mix; the customer questions examine the response from customers to the certified product; the raw material questions concern the manufacturers' sources for certified raw material; the competitor questions ask the manufacturers to describe the response from their competitors; and the questions on the certification process give the manufacturers the opportunity to reflect on the certification process that they have all gone through.

## **Objective**

The objective of the research reported in this paper was:

- To examine the experiences of hardwood flooring manufacturers that have chosen to become certified

## **Methods**

### **Population**

The population of interest in this study was U.S. manufacturers of certified hardwood flooring. For the purposes of this research, U.S. manufacturers of certified hardwood flooring were defined as those manufacturers producing flooring certified by an FSC-certified third-party certification agency at the time this research was conducted in the spring of 1998. The study was limited to FSC-certified companies because, in the

spring of 1998, the FSC was the only program that had made significant progress certifying companies.

### **Sampling Frame**

In the U.S., the Rainforest Alliance's *Smart Wood Program* and Scientific Certification Systems' *Forest Conservation Program* were the only two Forest Stewardship Council accredited certifying agencies in the spring of 1998. The sampling frame for this population was therefore the directories of the Rainforest Alliance's *Smart Wood Program*, Scientific Certification Systems' *Forest Conservation Program*, and the Good Wood Alliance. The Good Wood Alliance was an association of individuals and organizations that acted as an international clearinghouse for information on responsible wood use. Because the Good Wood Alliance did not have the ability to certify firms itself, any hardwood flooring manufacturer identified in the Good Wood Directory should have been represented on either the Rainforest Alliance's or Scientific Certification Systems' lists. Those two lists therefore formed the basis for identifying the firms of interest, and both lists were cross-referenced with the Good Wood Directory to check for completeness. This process identified 14 firms as U.S. manufacturers of certified hardwood flooring.

### **Data Collection**

An open-ended interview format was used to collect the information for this study. Data collection began with a review of the current literature pertaining to timber certification. This information was used to develop the interview questions for the study.

A review of the available literature revealed that there were continuing questions about certification. Although many authors suggested that certified products could command a price premium, that premium appeared to be illusory. In addition, there appeared to be questions about the actual demand for certified products and the availability of certified raw materials. That identified lack of knowledge about the experiences of certified manufacturers pointed the way to interview questions drafted for use in this study.

After the review of the certification literature was completed, the actual interview questions were created. Personal interviews were employed as the means of data collection. Because the president or chief executive officer of each firm sets the corporate strategic direction (Dess and Davis 1984, Hambrick 1981) and is intimately informed as to the current status of the company, that individual was targeted for the interview. The data collected in the interviews were exploratory and were used to make general statements about the firms that have decided to enter the certified flooring industry.

When developing a research procedure, an investigator has a number of different interview types from which to choose. These different interview types, however, can be broadly classified into two categories—standardized and non-standardized formats. Standardized interviews tend to be formal, strictly-formatted question-and-answer sessions with the purpose of extracting specific quantitative information from the respondent (Fowler and Mangione 1990). Non-standardized interviews are more informal, discussion-based sessions that are used to increase the interviewer's general knowledge on a particular subject. Fowler and Mangione (1990) suggest that a standardized interview is inappropriate when conducting exploratory research. Mishler (1986) goes farther by stating that strictly standardized interviews intentionally suppress the simple discussion between two people and limit the amount of information that can be collected. Therefore, it was decided that a non-standardized interview format would be used to conduct the exploratory personal interviews in this research. That format would give the respondents the opportunity to freely discuss their experiences without being forced to choose from pre-defined, structured responses.

To guide the interviews and facilitate comparability among the different respondents, an interview template with the questions to be asked was created. The interview questions were developed to gather exploratory information about the experiences of the certified manufacturers, yet be manageable enough that a busy executive could take the time to answer them without being overly inconvenienced. It was quickly determined that the interviewees were quite busy, so a simple, quick interview form was crucial to get a response. The first step in developing the interview questions was identifying the broad topics of interest in the study. Those topics were: the impact of the decision to certify on the company's product, the impact of the decision to certify on the company's customers, the impact of the decision to certify on the company's suppliers, the response from the company's competitors to the decision to certify, and the company's experiences during the certification process itself. Once those categories had been developed, the individual questions were created. After a draft of the complete interview template was developed, the questions and format were critiqued and revised by members of the faculty at Virginia Tech. In order to encourage more participation in the study, two forms of the interview questions were developed: a telephone template and a fax-back form. The fax-back form was used for those interviewees that wanted a copy of the interview questions that they could complete on their own time and return by facsimile to the researcher.

It was determined that a telephone interview of the certified manufacturers would be the best way to conduct the interview. The interview procedure outlined by Mishler (1986) was used as a guide when developing the format for the phone interviews. The procedure is broken down into the following steps:

- 1) Develop a two-way dialogue between interviewer and respondent.
- 2) Keep an accurate record of the interview exchange.
- 3) Systematically and accurately transcribe the dialogue.

Beginning in July 1998, the interviewees were contacted by phone to introduce the study and request their assistance. It was during the initial call that the interviewees were asked if they would like to conduct the interview over the phone at a later date or if they would prefer to receive a copy of the interview questions that they could complete and return via fax. If the interviewees preferred to conduct the interview over the phone, a date and time was set for the actual interview. Before the scheduled interview, the interviewees were sent an outline of the questions so that they would know what to expect and would have time to prepare their responses. During the phone interview, the interviewer asked the questions in the same order as the template sent to the interviewees and recorded the answers as the discussion developed.

If the interviewees chose to receive the fax-back form and answer the questions themselves, the form was faxed to them with a note thanking them for agreeing to participate in the study. Directions for completing and returning the form were also included. Follow-up phone calls were made to those interviewees that had not returned the forms encouraging them to complete and return the questionnaires. Those phone calls were made until the completed forms were returned, and the final questionnaire was returned in mid-September 1998. Of the eight manufacturers that agreed to participate in the study, three chose to conduct the interview over the phone and five asked to use the fax-back form of the questionnaire.

### **Data Analysis**

As Strauss and Corbin (1990) and Patton (1990) have shown, qualitative methods are most appropriate for analyzing exploratory data. However, qualitative analysis of data tends to be somewhat more difficult than analysis of quantitative data due to the amorphous nature of exploratory data. Mostyn (1985) suggests using content analysis when dealing with qualitative data. Content analysis is a general process of synthesizing and analyzing the wealth of qualitative material generated during an open-ended interview. Although there are many ways of conducting content analysis, all of them provide the same desired result—interpretation of the collected data.

In this case, the interviews were first transcribed to a computer file to make them easier to work with. The responses to the questions were then combined together under each question to facilitate further analysis. All of the individual responses to the questions were then analyzed together to determine the differences and trends that existed. Those results were then used to evaluate the impact that the switch to a certified product had on the business operations of hardwood flooring manufacturers.

## **Results and Discussion**

### **Validity and Response Rate**

A researcher must be concerned with two types of validity when conducting a research study: internal and external. Internal validity refers to the appropriateness of the research instrument and the compatibility of the different research groups used in the study. External validity refers to the confidence one has regarding the application of small-sample research results back to the whole population (Malhotra 1996).

Dooley (1990) has identified several threats to internal validity: reverse causation and time, group, and mortality threats. However, he states that the identified threats are only a concern for experimental research designs. Because the current study involved only personal interviews, questions of internal validity were minimized. In addition, the high response rate of the study reduced concerns of external validity and sampling errors in the research.

Of the 14 companies initially identified as U.S. manufacturers of certified hardwood flooring, the phone calls in July 1998 revealed that 1 company had gone out of business, 1 company refused to participate in the survey, and 4 companies identified as manufacturers actually did not manufacture certified flooring. That left a total of 8 companies that participated in the survey for a calculated response rate of 89%.

### **Non-Response Bias**

The single company that refused to participate in the study also refused all subsequent attempts to contact and test non-response bias. Therefore, the responses from that company were never tested.

### **The Impact of Certification on U.S. Manufacturers of Certified Hardwood Flooring**

The interviewees were asked to respond to exploratory questions designed to gain an understanding of their experiences since making the decision to produce certified flooring. This information included the impact that the decision to certify had had on their product, customers, suppliers, and competitors. The study participants were also asked for their thoughts on certification and the certification process itself.

#### **A Profile of the Certified Manufacturers**

The first question the respondents answered asked them how long they had been in the hardwood flooring business. The answers given ranged from 3 years to 25 years, with

an average of 12 years in the business. Two of the companies had only been in the hardwood flooring business for 3 years, one of the companies had been in the business for 6 years, and one company had been in the business for 9 years. The remaining four companies had each been in the hardwood flooring business for 12 or more years, creating quite a wide range of histories in the industry.

The interviewees were next asked when their companies became certified. The answers to this question were much more clustered than the answers to the first question. Two of the companies responded that they had become certified in 1994, four of the companies responded that they had become certified in 1996, and the remaining two companies responded that they had become certified in 1998. It is surprising that two of the companies became certified in 1994, as the certification movement was at a very nascent stage at that time. Those companies that chose to certify then were true visionaries. However, when looking at the certification dates of all of the companies, it becomes clear that the bulk of the companies certified chose to do so fairly early in the certification movement. This may demonstrate that the decision to use the U.S. hardwood flooring industry as a vehicle of study in this research was a good one, as the companies in the industry are proactive and interested in staying ahead of the movements in the wood products industry.

#### **The Impact of the Decision to Certify on the Product Manufactured**

Interviewees were asked whether they viewed certified flooring as simply a differentiated flooring product or as an entirely new product with new customers, channels, pricing, and promotion strategies. This is a very basic question that gets to the heart of the manufacturers' view of how certification fits into their marketing strategy. If the decision to certify creates an entirely new product, a completely new marketing strategy must be developed. However, if certified flooring is simply another flooring product, it can be used to add breadth to an existing product line and the company's marketing strategy already in place can be expanded to incorporate the new certified product. The manufacturers responded unequivocally that certified flooring is not a new product, but is simply an extension of the company's existing flooring product line. Only one of the interviewees responded that they considered certified flooring to be an entirely new product that needed a new marketing strategy; and even then the manufacturer admitted that that new strategy was just a marketing ploy because the wood is the same as uncertified wood except for the sticker. The remaining manufacturers believed that certified flooring was just another flooring product to add to their mix of products. They also believed that the certified product was essentially the same product as the uncertified flooring; one of the manufacturers even admitted that, although the price for the certified flooring was generally higher, they had substituted certified flooring for regular stock at the same price in an effort to get market exposure. Three of the manufacturers who believed certified flooring was not a new product said that they did feel that certified flooring was targeted at a slightly different customer base and admitted that they had "tweaked" their promotions

slightly to accentuate the certified product. The other manufacturers felt that certified flooring served the same customers as non-certified flooring. Because the manufacturers felt that certified flooring was not a new product, they did not have to spend any energy developing a new marketing strategy, but were able to fold the product in to their existing strategy.

The certified manufacturers were then asked how certified flooring fit into their marketing strategies. The manufacturer that believed certified flooring was a new product said that they were able to build a new strategy around the certified product and promote the environmental advantages of the product to gain an advantage over their competitors. They also said that they were looking to the SmartWood certification program and the environmental groups for help in generating excitement for the new product. Of the remaining manufacturers, two replied that they had not changed their marketing strategies at all after beginning production of certified flooring. One of those manufacturers said that they did not have the time to spend modifying their marketing strategy as they were simply too busy investing time and energy into “building, tooling, and learning the business.” That manufacturer also mentioned that they could not keep up with the “word of mouth” demand for their certified product as it was, so they saw no need to modify their marketing strategy or advertise the certified product. The other manufacturers responded that they had made some modifications to their marketing strategy since the introduction of the certified product. One of the manufacturers said that before they became certified, they made sure that they could get a steady supply of the raw material they needed to produce the certified product. They sold their product through distributors, and they wanted to show them that they were serious about producing the product from the start. Now that they are up and running, they have worked on getting their distributors excited about the product so that they can do the selling for them. Another manufacturer said that they anticipated getting some marketing advantages due to their involvement in the certification program. To generate knowledge and excitement for the product, they had begun to send certified product out to customers who buy regular stock along with a certificate and letter explaining their participation in this program. It is interesting to note that, while the manufacturers were equally interested in generating excitement for their new product, they went about it in different ways. Some looked to the certification programs for help, some looked to their distributors, while others relied on the product itself or word-of-mouth to increase the public’s awareness.

The respondents were then asked to discuss how they had gone about promoting their certified product. In addition to the one manufacturer who said that they got all the business they could handle through word-of-mouth, there was one other company that said that they did not need to do any advertising or promoting of the product. However, that company also said that they were conducting market research to see how they should proceed with their advertising. Even though they had not done any advertising, they had been getting calls about the product and felt they had received a

good response to their decision to certify. The rest of the companies advertised their product through the following avenues: company literature, salesman word-of-mouth, ads in trade magazines, the Internet, letters, certificates sent along with invoices, magazine ads, direct mail, publications, fairs and shows, direct sales calls, and marketing ads through distributors. One of the companies offered this thought on the benefit they get from advertising their certification program: “We believe that the image provided to us by the program is the greatest benefit and is our greatest promotion. We are very sensitive to our customer and the general public’s understanding of the hardwood renewable resource. This program is ‘proof in the pudding’ that we are a participant in a sustainable growth forestry policy.” The use of such a wide variety of promotion methods indicates the interest that the manufacturers have in creating awareness for the product. Apart from the one manufacturer that felt that they did not have to do any advertising, the rest were actively promoting the product and trying to generate consumer demand. Consumer demand for certified products has historically been weak, so it is critical that the manufacturers create awareness and excitement on their own for the product.

#### **The Impact of the Decision to Certify on the Manufacturers’ Customers**

The next set of interview questions asked the respondents to talk about the impact that the decision to offer a certified product has had on their customers.

The manufacturers were first asked to talk about how their customers had responded to the certified product. Other than the manufacturer that couldn’t keep up with the word-of-mouth demand, the responses were favorable, although there did not appear to be much enthusiasm behind the answers. Many of the manufacturers said that their customers were “pleased” with the product or had responded “favorably” or “positively” to the certified flooring. However, none of the manufacturers said that they had been overwhelmed by the response from the customers. One of the manufacturers stated that while their high-end customers like what they see, the bulk of their existing customers really don’t care about the certified product. Another said that most of their customers had never heard of certification and that the demand for the product was currently very low. That manufacturer expected the demand to rise as more end users become familiar with the program. Finally, one manufacturer stated that the response from customers wasn’t too different than for the non-certified product. That manufacturer went on to say that the quality of the wood and milling in the product is still more important than the origin. The promotional activities that the manufacturers are undertaking become even more important in the face of such lackluster consumer demand. It is difficult for a product to succeed when nobody wants it.

In the next question, the interviewees were asked if they served the same markets since offering certified flooring as they did when offering only non-certified flooring. The answers to this question were evenly split, with four of the manufacturers saying that

they did serve the same markets as before and four saying they served new markets after introducing the certified flooring. Those that served new markets identified the new markets as upper-end, educated, urban, environmental purchasers, although one of the manufacturers serving a new market said that most of their certified product was going to California because there was more interest for it there. These responses are in line with other studies that have shown stronger interest in certified products from well-to-do, educated consumers.

The interviewees were then asked to discuss whether they had to actively seek customers for the certified product, or whether customers came to them seeking the product. The responses to this question were mixed, with two of the companies saying that they had to go out and actively seek new customers, three of the companies responding that they had been contacted by new customers, and the rest saying that they used a combination of methods to find customers for the certified product. Those that were contacted by customers mentioned that they were listed on the certified lists and customers were finding them through those lists. One of the companies that was actively searching for new customers mentioned that they expect that their participation in the certification program will help them close deals with customers in the future. In fact, they mentioned that they had already recaptured a large former customer of theirs due to their participation in the program. The answers here return to the question about promoting the product and demonstrate the assistance that the manufacturers are getting from the certification programs. Although demand for certified flooring is weak, the certification programs and their manufacturing lists are key elements in linking consumers and manufacturers. The certification programs are natural points of contact for information on certification, so it is only appropriate that interested consumers are turning to them for guidance.

The manufacturers were then asked if they charged a price premium for their certified flooring. Surprisingly, the responses were evenly split, with four of the companies charging a premium and four choosing not to charge a premium. For those companies that did charge a premium, the premiums charged ranged between 5% and 10% of the sales price. However, even those companies that charged a premium admitted that much of their certified product was being sold as non-certified product so they were unable to collect the premium on much of the certified material. For those companies that did not charge a premium, two of them said that they were unable to charge any price premium and another mentioned that they felt a premium was unnecessary as their raw material was harvested through a co-op arrangement which resulted in lower costs for the wood. The other firm simply stated that they had determined that the time was just not right yet to charge a premium on certified flooring. These results are in line with previous studies that have shown the “green premium” to be non-existent or minimal.

As a follow-up question, those companies that charged a premium were asked how their customers had responded to the premium on the certified flooring. For the most part, the customers seemed happy to pay the premium. It appears that the customer that is informed enough to seek out certified flooring will be willing to pay the premium to get the product. One of the companies responded, “the customers who are interested in certified flooring pay the premium.” Another mentioned that “most customers understand the process and the expense” that goes along with certified flooring and are therefore willing to support it, while a third manufacturer said that their customers “paid [the premium] with no problem.” The fourth manufacturer that charged a premium said that they didn’t even think that their customers knew that they were paying a premium for the wood because the company had changed their quantity discount rates and freight rates to lessen the impact of the premium.

Interestingly, one of the companies that mentioned that they were unable to charge a premium said that they had tried to get a premium for the product but that their customers had reacted negatively to the increase so they no longer charge a premium. As a result, the higher costs associated with their certified flooring line make it less profitable than non-certified flooring. The fact that some certified flooring customers were willing to pay a slight premium is interesting, and goes back to the type of customer that is seeking certified flooring. The manufacturers have stated that those customers are well off and educated and are knowledgeable about the certification movement. Therefore, they understand the certification process and the costs involved and are willing to pay more for the product, whereas the general consumer is unwilling to pay more for the product just because it is certified.

Finally, the interviewees were asked to discuss what effect the production of a certified flooring product had had on the firm’s sales and profits. Two of the firms responded that it was still too early for them to determine what impact the certified product was going to have on their sales and profit. Another said that there had been no effect because their raw materials do not cost any more and they didn’t feel the time was right to charge a premium. Two of the companies interviewed said that by selling certified flooring they had increased their sales yet depressed their profits. One of those companies mentioned that they charged a maximum 5% premium for their certified flooring, yet to reach the customers interested in certified flooring they had to ship the product quite a distance. As a result, the increased shipping charges overwhelmed their price premium and were hurting profits. Two of the companies mentioned that both their sales and profit margins had increased due to the certified product line. One of those companies mentioned that they were realizing an increase in gross profit of approximately 7.5% on their certified product. Finally, the last company said that sales of their certified flooring were booming. In fact, they were unable to offer certified flooring to all the customers who requested it.

### **The Impact of the Decision to Certify on Finding a Raw Material Source**

In addition to producing a new product and cultivating customers for that product, each of the manufacturers of certified flooring had to find a certified source for the raw materials for their product. The next two interview questions asked the manufacturers to describe their experiences in finding a source of certified raw material.

The respondents were first asked if they had encountered any difficulty in finding a steady supply of acceptable raw material. In another surprising twist, the responses were split evenly, with four companies saying that they had run into problems finding a steady supply of certified raw material, and four saying that they had not run into any problems. It is interesting to note, however, that three of the four companies that responded that they had not had any problems finding raw material mentioned that the reason was because they had entered into agreements with certified sources to receive their certified material (the fourth company chose not to discuss their supply arrangements). However, even given those arrangements one of the companies predicted that their supply situation would change for the worse in the future because one of their sources was beginning to look like it was going to dry up. One of the other companies that said that they hadn't run into any problems mentioned that they had done their research before becoming certified and had made sure that they had a source that could supply a steady stream of logs. Finally, the last company that discussed their supply situation said that they were members in a co-op that harvests certified wood so they had not run into any problems with supply. The remaining four companies responded that they had definitely run into problems securing certified raw material. One of the companies mentioned that part of their problem stemmed from the fact that they relied upon state forests for many of their logs and that not all of the state forests in their procurement area had been certified by the SmartWood program, so they were finding it difficult to maintain their raw material supply.

Next, the companies were asked if they found that the certified raw material cost them more than non-certified raw material. The majority of companies said yes, with six of the companies responding that they were paying more for certified raw material. One of the companies mentioned that they were not initially paying a premium for their logs, but their supplier had recently begun charging them more for them. And, while their raw material costs were going up, they were unable to charge a price premium for their certified flooring to recover the cost increase. Another of the companies that responded that they were paying more for their logs said that they understood that it cost more money to do a good job in the forest, but that their raw material costs were double those of their competitors so they were starting at a competitive disadvantage. Another company suggested that their raw material costs were not as severe as double, but that they were paying more nonetheless. They said that they were paying about 5% more for their #1 and #2 common material, but only about 2% more for uppers (selects and FAS). Finally, another company stated that not only were they paying more for the raw material, but that on average the grade was about 5% lower than non-certified

material. With such a limited supply of certified material, it is not surprising that there are price and quality concerns with the raw material. It all flows from the demand—if there is limited demand for certified products, then there is little incentive to efficiently produce a stream of quality raw material at a competitive price.

### **The Response from Competitors to the Decision to Certify**

The eight companies were asked to describe how their competitors had reacted to their decision to become certified. Three of the companies responded that they didn't care what their competitors thought and had paid no attention to what their competitors were doing. Of the remaining five companies, three of them reported negative responses from competitors and only two companies reported receiving a positive response from competitors. Both of the companies that saw a positive response from their competitors to their decision to become certified said that they saw a greater interest in certification from their competitors as a result of their decision. One of the companies mentioned that some of their competitors were interested in trying certification on their own. The remaining three companies all encountered negative reactions from their competitors. One company stated that they saw a heightened awareness of certification from their competitors, but that none of the companies had chosen to participate in the SmartWood program. Another felt that the big players in the flooring industry were trying to "squash the little certified guys." They mentioned getting the "cold shoulder and resistance" from both industry and government. "The private landowners want to do what's right," they said, "but there's too much misinformation about certification for them to figure out what to do." The final interviewee closed by saying, "Most [competitors] think I am crazy. Some are mad that I am implying that some wood is 'bad' as opposed to FSC and SmartWood certified lumber which is better." It is easy to see in these responses the deep levels of mistrust, misinformation, and misunderstanding that surround the certified debate. Companies and individuals have very strong beliefs about certification, and until all of those differing opinions can be brought to the table and dealt with, divisions will continue.

### **Reactions to the Certification Process Itself**

After talking about the individual company's experiences with the product, customers, suppliers, and competitor responses, some time was spent talking about the certification process itself. Very few hardwood flooring companies have chosen to undergo certification, so most non-certified companies have no idea what the practical ramifications of the decision are. These questions were designed to get some thoughts on certification from the people who have actually lived through it.

The respondents were first asked to discuss the driving reason behind their decision to certify. The responses fell into two clear categories: environmental stewardship and access to new markets. Two of the companies said that they became certified to try and tap into new markets previously unavailable to them. One of those companies said that they wanted to capitalize on the new "green" mentality, but so far had had no luck

gaining access to any of the new markets. Five of the companies said that they decided to become certified out of a feeling of social or environmental responsibility. Two of those companies specifically mentioned that they wanted to avoid logs that came from clearcutting operations. One of them said that they saw the forest resource being “decimated” and wanted to follow a market-driven incentive to “do it right.” They viewed certification as the means to achieve that goal and felt that certification would be a “big friend” that would be an ally in their quest for forest stewardship. Another of the companies that cited forest stewardship as their reason for becoming certified mentioned that they were conscious of doing all they could to portray proper forest stewardship and the responsibilities that are involved with taking care of our renewable natural resource, and felt that certification would go a long way to demonstrating their commitment. The final company chose to become certified not because of a desire to promote forest stewardship or tap into new markets, but because someone asked them to do it. They met a certified company that was interested in selling certified flooring and needed a manufacturer to make it for them.

While it is refreshing to see that the vast majority of companies became certified out of a feeling of environmental stewardship, it is surprising that none of the companies mentioned consumer demand as the driving force behind their decision. This implies that the early adopters of certification did so not out of a response to consumer demand, but because the top management of the company felt it was the right thing to do for the environment.

After discussing why the companies began the certification process, the companies were asked how much they knew about certification before they made the decision to pursue the process. Four of the companies responded that they knew little or nothing at all about certification when they made the decision to pursue it. However, the other four companies all responded that they had studied the movement and knew quite a bit about it when they made the decision to go ahead with the certification.

Having made the decision to become certified, the respondents were next asked how long the entire certification process took. The responses given ranged from only a month to over a year, with a fairly equal distribution in between. Two of the companies responded that the entire process only took them a month to complete. Three of the companies responded that it took them 3 months to complete the process, and it took two of the companies six to eight months to get their certification. One of the companies responded that it took them over a year to become certified, but they reported having problems with a member of the certification team. However, in a gesture of complete magnanimity, that company added that the delay was welcomed because they learned a lot during their extended certification process.

The interviewees were then asked how much it actually cost them to undergo the certification process. The responses to that question ranged from a low of \$200 to a high

figure of \$6200, although there were three general categories of amounts. Two of the companies responded that it cost them \$200 and \$500 respectively to become certified, which placed them at the bottom of the cost scale. The next group of companies fell into the \$1000–\$1500 range, with four companies in that group. It cost those companies \$1000, \$1100, \$1200, and \$1500 to become certified. One of those companies, however, mentioned that there were some hidden production costs that were required for them to meet the SmartWood requirements that were not included in the certification charge. However, that company felt that the total cost, even with the additional production expense, was very reasonable and certainly worth it. The final two companies occupied the top two cost spots, with costs of \$5000 and \$6200 for their chain-of-custody certification. The company that spent \$6200 on their certification applied for and received chain-of-custody, source (for 50,000 acres), resource manager, and rediscovered wood certifications. That company is the same one that mentioned previously that it took them a year to become certified. In the discussion about this question they mentioned that, because of the extra time and trouble that it took to become certified, the true expense in time and money was around \$30,000 and one man year. However, it was again mentioned that the entire process was a learning experience and that they were happy to have gone through it. It is interesting to note that apart from the company that had problems during the certification process, the process was relatively quick and inexpensive for the other companies. Of course, it is important to note that how much it costs to become certified is in a large part dependent upon the state of the company when beginning the process.

As a follow-up question, the respondents were asked what their annual costs were to maintain their certification. Two of the companies were not sure what their costs were and couldn't answer the question. The remaining six companies responded with a range of annual recertification costs spread from \$200 to \$1100 (\$200, \$500, \$600, \$750, \$850, and \$1100). However, one of the companies wanted to point out that if anyone complains to SmartWood about their operation, SmartWood can conduct an additional random audit and charge the company the full cost of the audit.

The respondents were asked if, overall, they were satisfied with their decision to become certified. The unequivocal answer was: yes, they are very satisfied with their decision. In fact, not one of the companies responded that they were unhappy with their decision. However, one of the respondents mentioned that although he was happy with his decision, he became certified for the marketing gains and hadn't seen any benefit yet from becoming certified. But he went on to say that the entire process was not too expensive and maybe those benefits would come in the future. Another respondent said that he feels good being certified. He went on to say that most people don't like what they think is happening in the forest industry, and that he doesn't know how necessary certification is, but if it helps or educates the general public then "let's do it."

It's a good sign that, although there have been some stumbles along the way, the manufacturers are pleased with their decision to become certified. However, it is important to remember that most of the companies became certified because they felt it was the "right thing to do." As a result, their needs were met as soon as they became certified, so they should be satisfied with their decision. One of the two companies that became certified to tap into new markets expressed dissatisfaction with the result, indicating that if companies become certified for reasons other than a desire to be environmentally friendly, they may be disappointed.

The respondents were next asked if there was anything that they would like to see changed in the certification process. Only one of the companies responded that there was nothing that they would like to see changed in the process. That company said that they were very comfortable with the services of SCS and have a good working relationship with them. The other companies all mentioned that there was something that they would like to see changed about the certification process. One of the companies mentioned that they would like to see the public better educated about certification. They also mentioned that they thought SFI and the other certification program competitors to the FSC were "keeping people out of certification." Another company said that they had problems reconciling their real world situation with the theoretical plans required by the SmartWood audit team and ran into a lot of problems during the certification process. They also mentioned that there is too much paperwork to do during the process. That frustration with reconciling the real world with the requests of the certification team was echoed by another company that wanted to see a greater awareness of the real world costs associated with conforming to the rules and ideas of certification by the certification programs. Another company suggested that there should be an effort made to increase the amount of land area certified and get more state-held, local government, and private lands certified to provide more raw material. The desire for more certified material was also shared by another company. They mentioned that they would like to see a greater supply of material and greater public awareness of the certification movement. Finally, the last company thought that the requirements for SmartWood certification needed to be more stringent. He said that he thought "they are too willing to give just about anyone a certification sticker."

The manufacturers were then asked how they viewed the future of certification in the hardwood flooring industry. Of the eight manufacturers, two were optimistic about the future of certification in the hardwood flooring industry, two were pessimistic, and four had no strong feelings one way or the other. Those that had no strong feelings hoped that certification would catch on, but had decided to just wait it out and keep plugging away no matter what happened. One even mentioned that much of the certified cherry flooring that they were producing was sold as non-certified product, but that didn't bother them as they had their sights set on the larger picture. "Our interest has been to create a relationship with a reliable supply of certified lumber first, then gradually introduce the certified product to our customers," he said. "We have had to determine

availability of raw material first in order to predict how much volume of product we can produce.” The pessimistic manufacturers cited the lack of consumer demand and difficulty reaching the end user as the reasons for their disillusionment. One of them mentioned, “I do not think certification will reach more than 10% of the suppliers in the near future—the demand from the general public just is not there yet.” The other manufacturer said that he thought others would jump on the certification bandwagon, but so far few have. He went on to say that the problem is that the flooring manufacturers don’t deal with the end user of the product. “The end user makes or breaks certification but we can’t reach them. We have been unable to convince people to pay more for certified and buy much of it. In fact, we have shipped certified product to non-certified customers because we needed to fill an order. Certification hasn’t benefited us much at all, if any, and is a lot of paperwork. But, it’s cheap enough that it doesn’t really matter.” But the remaining two manufacturers remained optimistic about the future of certification in the hardwood flooring industry. Both admitted that there is not much demand now but thought that it would pick up in the future. One of them also felt that more certified supply would become available. “The hardwood flooring industry has considerable potential to promote certified products, because a large volume of lumber goes into flooring,” he said. “On the other hand, it is a highly competitive mature industry with many players and stiff, relatively inelastic price competition which weeds out high-priced producers. To the extent that certified flooring manufacturers can effectively control costs they will be successful, but the phantom ‘price premium’ is not a reliable savior of inefficient operations.”

Finally, the manufacturers were asked for their thoughts on the future of certification in general. Here the manufacturers were more optimistic. Six of the eight manufacturers were positive about the future of the certification movement, and only two of them had anything negative to say about the movement. The two that were pessimistic about certification cited the lack of demand and few marketing advantages as their reasons for their pessimism. However, the other six manufacturers all said that certification would continue to grow in popularity and there would be more and more certified operations. They also mentioned that, as the movement grew, there would be more public awareness of the movement and that would help as well. “Everything we see is positive,” said one manufacturer. “The educational value of teaching landowners [about forestry] is very important to us.” Another manufacturer closed by saying, “If it helps people feel better about their purchase, then that’s good.”

## **Conclusions**

The purpose of this study was to examine the experiences of certified hardwood flooring manufacturers since becoming certified. As the certification movement continues to develop and impact the wood products industry, it is useful to understand how the decision to become certified affects manufacturers.

All of the certified flooring manufacturers surveyed in this study were satisfied with their decision to become certified. Some of the manufacturers mentioned running into a few problems along the way, but overall they felt good about being certified. Two of the companies surveyed became certified to tap into new consumer markets, and five of the companies chose to become certified out of a desire to be environmentally responsible. These results agree with the results found by Stevens, Ahmad, and Ruddell (1998), who found that the number one reason certified manufacturers gave for selling certified wood products was to gain market access. The second most important reason was because the company felt that certification was the right thing to do. The fact that Stevens et al allowed multiple responses in their study may account for the reversal of the two factors in the different studies. However, it is clear that both the desire to be environmentally responsible and the desire to gain market access are the driving forces behind the decision of a manufacturer to certify. It is interesting to note that consumer demand for certified products was not mentioned in either study as one of the top reasons for selling certified products.

On average, this study found that it took only a couple of months and cost around \$1000 for the companies to complete the certification process.

No previous research into the opinions certified manufactures hold towards the certification process has been conducted. This study presented an opportunity to do that research. Only one of the companies surveyed said that there was nothing that they would like to see changed in the certification process; the rest of the companies would like to see changes made. Among the items that the companies said that they would like to see changed were: better public education about certification, better reconciliation of the real world with the theoretical plans required by the SmartWood audit team, less paperwork during the process, and a concerted effort to increase the amount of land area certified and get more state-held, local government, and private lands certified to provide more raw material.

As far as the product itself, only one of the companies surveyed felt that certified flooring was an entirely new product that required a new marketing strategy. The other manufacturers felt that the certified flooring product was simply another flooring product that could be incorporated into their existing mix of products. They admitted that so far they had seen lackluster consumer demand for the certified product, and that the consumers that were interested in certified flooring were knowledgeable about the certification movement and were actively seeking out companies that manufactured certified products. Those consumers also tended to be upper-end, educated, urban, environmentally aware consumers. These findings agree with those as reported by Ozanne and Vlosky (1997), who found the same consumer segments for certified products. Stevens et al also found that the West Coast is the primary region from which consumers request certified products. That finding was borne out by the results of the current study. Because the consumers were actively interested in the certification

movement, the lists of manufacturers published by the certification programs played a large role in directing consumers to the certified manufacturers. The certified programs therefore became natural focal points for information on certification, and many of the certified flooring companies looked to the certification programs to help with publicity of the product and the education of the public.

The companies surveyed had been unable to obtain much of a “green premium” for their certified flooring. One half of the companies surveyed had indeed charged a green premium, but they admitted that it was small (around 5% of the sales price) and that they had had some difficulty collecting on the premium. They also said that the consumers who are willing to purchase certified wood are educated about the certification process and are therefore willing to pay the premium to support the movement. They were not so sure that the general public would be as willing to pay the premium. In addition, the companies agreed that the certified raw material costs them more than non-certified raw material, and half of the companies admitted finding it difficult to secure a steady supply of adequate raw material. The other companies found it easier to secure certified raw material because they had worked out arrangements with suppliers to keep them supplied with certified raw material. These results again mirror those in Stevens et al. That research found that the average price premium received for certified materials was estimated to be around 5.4%. In addition, the certified manufacturers in that study also mentioned the difficulties they had securing enough certified raw material. These trends bear watching as the certification movement continues to progress. It is likely that as the movement gains ground, more certified material will become available to manufacturers.

Because of the mixed experiences with the supply and demand for their certified flooring, the impact of the decision to become certified on the sales and profits of the companies surveyed was mixed. Three of the companies responded that the decision to certified had increased their sales and profits; three of the companies surveyed admitted that there had been no effect on their sales and profits or that it was too early to tell what the impact would be; and the final two companies said that the decision to produce certified flooring had increased their sales but had decreased their profits.

This study represented the first time that certified hardwood flooring manufacturers had been given the opportunity to discuss their thoughts on certification. When asked for their thoughts on the future of certification, the manufacturers were able to see beyond the difficulties that they had encountered and were, for the most part, optimistic about the future of certification. Most of the companies felt that certification was the right thing to do for the environment and the future and were therefore happy to be a part of the movement. The manufacturers cited the current lack of demand, but felt that the movement would continue to grow in popularity and that demand would follow from that increased awareness. Because they felt that certification was the right

thing to do, they were happy to be certified no matter what that meant for their company.

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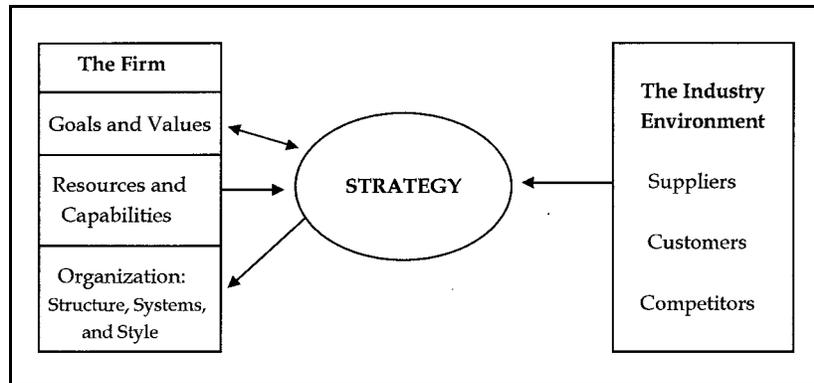
# **Chapter 5 — The Impact of Environmental Certification on U.S. Hardwood Flooring Manufacturers**

## Research Summary

The purpose of this research was to explore the timber certification movement and its impact on U.S. hardwood flooring manufacturers. There were two expressed objectives of the research: to determine the influence of selected factors on a manufacturer's decision to produce certified hardwood flooring and to assess the impact that the decision to enter the certified hardwood flooring market has had on the business operations of those manufacturers producing certified hardwood flooring. These objectives were chosen because the certification movement is a quickly changing but often misunderstood movement, and there exist numerous questions about the movement even today. By examining the impact of the decision to certify on manufacturers, insight into the phenomenon can be gained and assistance can be provided to those struggling with the decision.

When examining a phenomenon as misunderstood as certification, it is useful to have a framework to guide discussion. Grant (1995) has developed a framework for business strategy analysis that is useful in this case. The decision to certify is indeed a strategic business decision and is very important to the success of the firm, so the use of this framework is appropriate. Grant's framework, shown in Figure 5-1, demonstrates that the strategy that a firm chooses (in this case the decision whether or not to certify) is arrived at by examining the influence of a number of internal and external factors on the firm. The internal factors under consideration (shown on the left side of Figure 5-1 under the heading "The Firm") are the goals and values of the firm, the resources and capabilities of the firm, and the organization of the firm. The external factors under consideration (shown on the right side of Figure 5-1 under the heading "The Industry Environment") are the interaction of suppliers, customers, and competitors with the firm. The direction of the arrows in the diagram indicate the direction and type of interaction (one-way vs. two-way).

Examining the interaction of each of these influences can help guide the firm in choosing an appropriate strategy. However, it should be kept in mind that the purpose of this study was not to define the actions that any particular firm should take, but rather to examine an aspect of the certification phenomenon that has been unexplored until now.



**Figure 5-1: Strategy as the Link Between Internal (the Firm) and External (the Industry Environment) Factors**

### **The Influence of the Goals and Values of the Firm**

As shown in Figure 5-1, the decision to certify can be influenced by internal or external factors. The external factors acting on the firm—the suppliers, demand from customers, and actions of competitors—will be discussed in detail later. However, the research in this study suggested that those factors had minimal impact on the decisions of the certified firms. One of the most important factors in whether or not the firms chose to become certified was the beliefs and values of the top management of the firm. Illuminating the beliefs held by top management was a stated purpose of this research.

The goals and values of the firm are the manifestation of the beliefs and desires of the firm’s top management and play a significant role in the strategic certification decision undertaken by the firm. The influence of this factor works two ways—that is, the strategy chosen must be appropriate given the goals and values of the firm, and the goals and values of the firm must agree with the chosen strategy.

If the decision-makers in the firm believed that there was a need for certification in the U.S. and that it would help sustain the health of our forests, as the certified manufacturers did, then they were more likely to become certified. By setting the corporate goals, the top management sets the tone of the company as well. In doing so, they define what the firm stands for and what motivates the company. This, in turn, determines how the firm will be perceived by outsiders. Through becoming certified, the decision-makers in the certified organizations have chosen to establish their firms at the forefront of the publicly recognized environmental stewardship movement and declare publicly that their products do not harm the environment. The belief that certification was the “right thing to do” was not held by the non-certified manufacturers.

The values that a firm holds will also influence the philosophy that the firm follows. In the case of this research, two distinct corporate philosophies emerged when comparing

the certified and non-certified manufacturers. The non-certified manufacturers rated profit as the most important factor in their decision, while the certified manufacturers rated the image factor as most important. That difference speaks volumes about the contrasting values of the manufacturers. By focusing primarily on profit, the non-certified manufacturers will choose a strategy that satisfies that need, and that currently is not certification. However, the certified manufacturers considered more than just the profit potential in certification. They are concerned with how the public views their firm. By adopting a shield of environmental stewardship, they believe customers will be moved by the certification logo and will feel good about purchasing certified hardwood flooring.

There is another aspect to this value decision that is worth mentioning. The decision to certify is intended to do more than just help customers feel good about their flooring purchase; it is intended to make the firm's employees feel good about the work they do and the company for which they work. To become certified, a firm's employees must be acting in an environmentally conscious manner and sustainably managing their raw materials. The certification sticker is therefore a public affirmation of a job well done and creates pride within an organization. By fostering an organizational philosophy that values environmental stewardship and publicly recognizes a job well done, the management of a certified firm creates a pleasant and inviting work environment.

### **The Influence of the Resources and Capabilities of the Firm**

The decision to become certified involves more than just a redefinition of corporate philosophy, however. There are very real resource concerns that the firm must consider when making the decision. The resources necessary to go ahead with certification must be available or attainable before a strategy is chosen.

Although the research conducted in this study suggests that the direct monetary and time expense involved in becoming certified is not overly taxing (on average it took only a few months and cost \$1000 for the companies to complete the certification process), a commitment of time and money to the process is required nonetheless. Of course, the amount of time and money involved is directly related to the state of the company at the beginning of the process. Also, when conducting the certification audit the certification teams will examine the firm's past records and actions, so that documentation must be comprehensive and easily accessible. In addition, the firm must be willing to make any changes or improvements in existing buildings and equipment suggested by the certification team. The firm must also be willing to erect new buildings, purchase new equipment, or implement new manufacturing practices as required by the certification team. For one of the companies in this study, that extra hidden time and expense amounted to approximately \$30,000 and one year of extra work.

There is also an ongoing time and money expense involved in becoming certified that the firm must be willing to make. The annual recertification fees that the firms in this study paid ranged from \$200 to \$1100. However, the firms must also maintain the proper paperwork on their certified product and keep that information up-to-date. Finally, if anyone lodges a complaint with SmartWood about a firm, SmartWood can perform another complete audit of the company and its practices at the company's expense.

There is yet another resources aspect of the strategic decision that should be considered. The employees of a firm are a significant resource, and keeping them happy and satisfied in their jobs can have a large impact on the success of a firm. The certified respondents in this report mentioned that being certified makes them "feel good" about the work that they do. Therefore, after the strategic decision to certify has been made, the employees may receive a morale boost which can create a proud and productive workforce. That, in turn, can have a significant positive impact on the firm.

### **The Influence of the Organization of the Firm**

The structure, systems, and style under which a company operates must be considered when making the decision whether or not to certify. The strategy chosen by the firm will dictate how the organization operates, so the firm must be willing to make the changes necessary to operate under the new strategy. This is especially important in the decision to certify because the firm is potentially inviting an external organization in to monitor their work practices.

The company first has to determine whether they have an acceptable management system in place to pass the certification audit. At its basic level, that is what the certification process is measuring—whether the company has a management system in place that accounts for all of the principles and criteria under consideration. If that management system is lacking, it must be addressed before beginning the certification process.

The firm must also consider which certification program they would like to apply to. Both certified and non-certified manufacturers rated independent, third-party certification programs as trustworthy in this study. Those results indicate that those programs, such as the FSC and the independent arm of the SFI, have positioned themselves as unbiased regulators of certification. However, the manufacturers disagreed on their evaluations of the other program types. Certified manufacturers rated the environmental organizations and the Federal Government as second to the third-party certifiers in their level of trust, while the non-certified manufacturers rated those organizations at the bottom of their list. The non-certified manufacturers rated

the industry association programs, such as the SFI program, and the claims made by the companies themselves as equally trustworthy as the third-party certification programs. This difference in opinion must be resolved if the certification movement is to continue to gain acceptance. There are a number of mutual recognition initiatives underway to foster acceptance among the different certification programs. However, so far the FSC has been unwilling to work with competing certification programs on mutual recognition. The failure of the certification programs to develop a mutual recognition scheme will only serve to foster animosity and confusion among manufacturers and hinder the progress of the movement.

In addition to choosing a certification program, the firm must decide if certification fits their corporate style. Many of the non-certified manufacturers in the study mentioned that they feel that the North American hardwood resource is healthy and that there is no need for certification. Those manufacturers are likely to be unwilling to allow an outside entity to examine their corporate practices and continually monitor their activities. If the manufacturers maintain a closed-door style, then any certification program will have difficulty convincing them to become certified.

### **The Influence of the Firm's Suppliers**

The remaining influences on the strategy a company adopts—the suppliers, customers, and competitors—comprise the external environment surrounding the firm. These influences necessarily act only upon the formation of strategy; they are not influenced themselves by the strategy the firm chooses.

Half of the certified manufacturers surveyed in this study mentioned that they had run into problems finding a steady supply of acceptable raw material. Those companies that did not mention having supply difficulties said that the reason was that they had entered into agreements with certified sources to receive their certified material. One of those companies mentioned that they “had done their research” before becoming certified to make sure that they could find an acceptable source for a steady stream of raw material. Given the difficulty in finding certified raw material, alliances such as those formed by these manufacturers become quite important. However, it is important for companies to explore the sources for certified raw material before becoming certified. If the sources for certified material do not grow along with the number of secondary manufacturers that are becoming certified, then no alliance formed can supply the certified material needed to keep the operations running. Therefore, it is crucial that manufacturers explore the availability of the certified raw they need before beginning the certification process.

In addition, 75% of the certified respondents mentioned that they were paying more for their certified raw material, and one mentioned that they were paying more and the

quality of the raw material was below that of non-certified raw material. The impact of these challenges must be taken into consideration before making the decision to become certified. Failing to plan for an adequate supply of certified raw material can render even the best laid plans useless and will only serve to frustrate and annoy the manufacturing company.

### **The Influence of the Firm's Customers**

The demand for certified flooring is another important element in the strategic decision that a firm must consider. Both the certified and non-certified manufacturers in this study were asked if their customers were demanding a certified product and whether they would pay more for certified flooring. Both groups of manufacturers agreed that their customers were not demanding certified flooring and were not willing to pay more for it. The certified manufacturers stated that, while the majority of their customers were not interested in the certified product, the customers that were interested tended to be well-to-do, educated customers who were familiar with the certification movement and were actively seeking certified products. The membership lists for the certification programs were natural points of contact for those customers and were effective in driving business to the certified companies.

While the consumer demand for certified flooring is rather weak, there does appear to be demand for certified products from other sources. The environmental groups have been very successful in developing buyer's groups that target retailers and encourage them to specify certified products. Under pressure from environmental groups, many of the major wood products retailers in the U.S. have developed environmental policies. However, those retailers have encountered the same supply problems as the certified manufacturers and have had difficulty finding an adequate supply of certified products. Those difficulties only reinforce the need to achieve mutual recognition among the competing certification programs.

It appears that the primary benefit of certification in the U.S. is to reassure a confused, concerned, and uneducated public that our national forest resource is being sustainably managed. However, there are other means of achieving that goal besides becoming certified. The forest products industry has united behind a number of educational initiatives designed to communicate the true state of our forest resource to the general public. If those initiatives are successful, the need for certification in the U.S. is decreased. While the environmental goals of certification are certainly laudable, it would be difficult to find a forest products company in the U.S. that is not already deeply concerned about maintaining the health of our forest resource. The true benefit of certification is helping develop sustainable forest practices in developing nations around the world where existing forestry practices and oversight are weak. That is where the customer concern should lie and where certification can make a difference.

### **The Influence of the Firm's Competitors**

The purpose of any strategy adopted by a firm is to gain a sustainable competitive advantage over rival firms (Grant 1995). Therefore, the decision to certify should be evaluated with that goal in mind. A firm may achieve a competitive advantage through operating effectiveness or competitive positioning, and becoming certified is an attempt to achieve an advantage through competitive positioning. Indeed, two of the certified manufacturers in this study stated that they had become certified to gain access to new markets previously unavailable to them. However, those manufacturers unfortunately had to admit that those markets had not materialized.

The difficulty in using certification as a means of achieving a competitive advantage lies in the inability of the general public to understand exactly what certification is. It is therefore difficult to gain a competitive advantage over rival firms on the basis of a distinction for which the general public has little interest. The price and quality of flooring, not its certification status, continue to be the important factors in the consumers' decision to buy. Therefore, when given the choice between certified and non-certified flooring, most consumers will choose to purchase the non-certified flooring because it is more readily available, possibly cheaper, and probably of higher quality than the certified flooring.

### **Managerial Implications of this Study**

This research had as one of its objectives to develop a model that could be used to decompose the certification decision. The AHP process was used for that purpose because of its ability to deconstruct a complex decision into its component factors and evaluate the interactions those factors have in the decision. In the case of the decision to certify, six important decision factors were identified: cost, demand, profit, marketing advantages, access, and image.

The model developed in this research can be used by decision-makers as a tool to help them evaluate whether certification is appropriate for their firm. After entering their judgements in the model, they will be given a suggested outcome that can help guide them to a decision. This can help troubled decision-makers grapple with a challenging decision and arrive at the appropriate solution for their company.

### **Research Limitations**

During the course of this research, it was suggested that the estimated number of firms in the sample frame was too large. It might therefore be a good idea to revisit the sampling frame used in this research and refine it. This could be accomplished by using

government SIC industry designations or other figures to attempt to better define the true number of firms in the industry.

The certified manufacturers in this study were defined as only those firms that had achieved FSC certification for their flooring product. The FSC was the only program used in the study because, in the spring of 1998, the FSC was the only program to have achieved significant inroads with manufacturers. However, in the intervening years a number of manufacturers have chosen to become certified under competing certification programs. Therefore, it would be useful to conduct this research with a broader definition of certification programs to include all current certified manufacturers.

The development and reduction of the AHP decision factors in this study was conducted with the help of a panel of industry experts. However, it may be beneficial to poll the flooring manufacturers themselves and have them develop the list of decision factors. That method would ensure that the factors in the model are truly representative of the factors that a manufacturer would consider when making the decision whether or not to certify.

Finally, the certified manufacturers in this study were asked to discuss the impact that the decision to certify has had on their customers. However, the term “customer” was not clearly defined. Therefore, some of the respondents in the study may have been thinking of their immediate customers (i.e. distributors) while others may have been considering the final end consumer. This potential for confusion should be clarified in future studies so that all parties have a clear understanding of the meaning of the question.

### **Ideas for Future Research**

This study included an in-depth look at the experiences of certified manufacturers after becoming certified, but only a survey of the attitudes of non-certified hardwood flooring manufacturers towards certification. One logical extension of this research would be to conduct an in-depth study of the reasons why non-certified manufacturers have chosen to dismiss certification. That research could explore the continuing reservations that non-certified manufacturers have towards certification.

Another idea for future research is to conduct a comparison of competing certification programs to determine their similarities and differences. As the mutual recognition movement continues to gain ground, that kind of direct measurement of the objective differences in programs will be invaluable for fostering a spirit of cooperation.

Also, future research should include an attempt to compare the experiences of the certified hardwood flooring manufacturers profiled in this study with the experiences of certified manufacturers of other wood products.

Research should also be conducted into how consumers perceive a wood product that has been certified. Although the certification process does not attempt to quantify the quality of an item, many consumers may conclude that because a product has been certified it is superior in quality to non-certified products. If this misperception exists in the marketplace, then it should be illuminated so that it can be dealt with.

Finally, research should be conducted on whether certification is the only means by which consumers can be reassured about the state of our forest resource. There may be other means of accomplishing that reassurance besides the certification of forest products. If consumers will respond to other educational programs, then those methods should be implemented and tried as well. No matter what opinion one holds of certification, all of us want to do the best job we can in the forest and ensure that future generations can enjoy the same benefits from our forests that we do today. It must be remembered that the absence of a certification sticker does not necessarily mean that forests are being mismanaged or that wood products cause irreparable damage to the environment. Therefore, our goal should be to make sure that our forests are being sustainably managed. After that goal is met, we need to join together to present that information to the general public through the best means possible. If it turns out that that vehicle is certification, then the focus should be to develop a mutually agreeable standard. If that vehicle turns out to be some other method, then effort should be given to that method as well.

## References

Grant, Robert. 1995. Contemporary Strategy Analysis: Concepts, Techniques, Applications. Blackwell. Malden, MA.

## **Appendix A — Mail Survey for Non-certified Hardwood Flooring Manufacturers**

# Study of Flooring Manufacturers' Attitudes Towards Green Certification



Photo courtesy of Kentucky Wood Floors

Center for Forest Products Marketing and Management  
Department of Wood Science and Forest Products  
Virginia Polytechnic Institute and State University  
Blacksburg, VA 24061

If you have any questions, please contact

**Curt Alt**

Phone: (540) 231-5876; Fax: (540) 231-8868

E-mail: [calt@vt.edu](mailto:calt@vt.edu)



Non-certified Manufacturer Questionnaire Cover

**SECTION I**

**1. Does your company manufacture hardwood flooring?**

No → Please **STOP** now and return this questionnaire by following the instructions on the last page. Thank you for your time.

Yes → Please continue.



The following questions ask about **environmentally (green) certified wood**. By this we mean wood that is certified as coming from sustainably managed forests and from trees harvested in an environmentally sound manner.

**2. How much trust does your company have in the ability of the following entities to regulate the environmental certification claims of wood products manufacturers?**  
*(Please rank the following entities from 1 to 5 using each number only once.)*

**1 = I trust this entity the MOST    to    5 = I trust this entity the LEAST**

- \_\_\_ A private third-party certification company
- \_\_\_ An agency of the Federal Government
- \_\_\_ Wood products companies themselves
- \_\_\_ An environmental organization
- \_\_\_ Wood products industry trade associations

3. Some companies today have developed policies to foster environmental stewardship. If you believe your company *has* made a commitment to environmental stewardship, please indicate your level of agreement or disagreement with each of the following statements by circling the single most appropriate number after each statement.

If you *do not* feel your company has made a commitment to environmental stewardship, please skip this page.

*My company has made a commitment to environmental stewardship because of ...*

|  | Strongly disagree |   | Neither agree nor disagree |   | Strongly agree |
|--|-------------------|---|----------------------------|---|----------------|
| ... the commitment of top management   | 1                 | 2 | 3                          | 4 | 5              |
| ... Federal or state legislation   | 1                 | 2 | 3                          | 4 | 5              |
| ... public pressure (for example, publicity, boycotts)                       | 1                 | 2 | 3                          | 4 | 5              |
| ... customer demands for "green" products                                    | 1                 | 2 | 3                          | 4 | 5              |
| ... potential cost savings   | 1                 | 2 | 3                          | 4 | 5              |
| ... the desire to protect our company image                                  | 1                 | 2 | 3                          | 4 | 5              |
| ... the desire to gain or sustain a competitive advantage in the marketplace | 1                 | 2 | 3                          | 4 | 5              |

Please continue on the next page.

4. Do you agree or disagree with the following statements? (Please indicate your level of agreement or disagreement by circling the single most appropriate number after each statement.)

| <i>My company ...</i>   | <b>Strongly disagree</b> |   | <b>Neither agree nor disagree</b> |   | <b>Strongly agree</b> |
|---|--------------------------|---|-----------------------------------|---|-----------------------|
| ... has an environmental policy   | 1                        | 2 | 3                                 | 4 | 5                     |
| ... understands the concept of environmental certification  | 1                        | 2 | 3                                 | 4 | 5                     |
| ... is actively following the status of environmental certification in the US                                 | 1                        | 2 | 3                                 | 4 | 5                     |
| ... believes there is a need for environmental certification of US temperate forests                          | 1                        | 2 | 3                                 | 4 | 5                     |
| ... believes environmental certification can help sustain the health of US forests                            | 1                        | 2 | 3                                 | 4 | 5                     |
| ... has purchased environmentally certified wood products or raw materials in the past year                   | 1                        | 2 | 3                                 | 4 | 5                     |
| ... seeks suppliers of environmentally certified wood products or raw materials                               | 1                        | 2 | 3                                 | 4 | 5                     |
| ... would pay more for certified wood products or raw materials   | 1                        | 2 | 3                                 | 4 | 5                     |
| ... trusts environmental claims made by wood suppliers  | 1                        | 2 | 3                                 | 4 | 5                     |
| ... feels pressure from our customers to produce an environmentally certified product                         | 1                        | 2 | 3                                 | 4 | 5                     |
| ... feels pressure from outside groups (other than customers) to produce an environmentally certified product | 1                        | 2 | 3                                 | 4 | 5                     |
| ... believes our customers will pay a premium for an environmentally certified product                        | 1                        | 2 | 3                                 | 4 | 5                     |
| ... understands the costs involved in certification   | 1                        | 2 | 3                                 | 4 | 5                     |

In order to manufacture certified hardwood flooring, your company must first find a source for certified raw material and then be able to show that the raw material is kept separate from non-certified material throughout the production process (through a process known as **chain-of-custody** certification).

5. **What price premium would your company be willing to pay for environmentally certified raw material for use in the manufacture of certified hardwood flooring?** (By "premium" we mean an amount above the market price for non-certified raw material. Please select **only one** choice from the following list.)

*My company ...*

- would be willing to purchase certified raw material at **any price premium**
- would be willing to pay a **maximum premium of \_\_\_\_\_%** above the market price for non-certified raw material
- would **not** be willing to pay **any price premium** when purchasing certified raw material

6. **What is the *total* cost your company would be willing to incur to undergo chain-of-custody certification for certified hardwood flooring?** (Please select **only one** choice.)

*My company ...*

- would be willing to undergo chain-of-custody certification if it were **free**
- would be willing to incur a **total cost** of no more than \$ \_\_\_\_\_
- would be unwilling to undergo chain-of-custody certification at **any cost**

7. **What price premium would your company need to receive in order to begin manufacturing environmentally certified hardwood flooring?** (By "premium" we mean an amount above the market price for non-certified hardwood flooring. Please select **only one** choice from the following list.)

*My company ...*

- would manufacture certified hardwood flooring even if there were **no price premium**
- would manufacture certified hardwood flooring **if the premium were \_\_\_\_\_% or more** above the market price for non-certified hardwood flooring
- would **not** manufacture certified hardwood flooring for **any price premium**

## SECTION II

The following question asks you to make comparisons among six different factors related to certification. When answering, *please assume that your firm is trying to decide whether or not to begin manufacturing certified hardwood flooring.*

The six factors we are asking you to consider are:

**Cost**

The total monetary cost to your company for the initial chain-of-custody certification inspection, any improvements that must be made to become certified, and annual re-certification.

**Demand**

The demand for certified hardwood flooring in the markets that your firm currently serves.

**Profit**

The estimated long-term profit potential of certified hardwood flooring.

**Marketing Advantages (Mktg. Adv.)**

Any marketing or competitive advantages in current markets that your firm may realize as a result of undergoing the certification process and manufacturing certified hardwood flooring.

**Access**

Any new markets that may become accessible to your firm as a result of manufacturing certified hardwood flooring.

**Image**

Any positive publicity or image enhancement effects that your firm might receive as a result of manufacturing certified hardwood flooring.

When answering the following question, please assume that you have gathered all necessary information regarding each of the factors. Therefore, you should rate each of the factors on its *perceived importance* to the decision and *not* on which of the factors are most familiar to you.

8. In each of the following pairs of factors, which factor would be the most important to you when deciding whether to manufacture certified hardwood flooring?  
 (Please indicate your level of preference for the more important factor by selecting a value from that factor's scale.)

For example, a couple is buying a new car. Two of the factors they are considering in their decision are the *price* and *size* of different cars. If the couple decided that the *price* of a car was very strongly more important than the *size* of a car, they would indicate their level of preference in the following manner:

|      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |       |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|
| Size | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Price |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|

|            | This factor is extremely more important than the opposite factor |   |   |   |   |   |   |   |   | The two factors are equally important |   | This factor is extremely more important than the opposite factor |   |   |   |   |   |   |   |            |  |
|------------|--|---|---|---|---|---|---|---|---|---------------------------------------|---|--|---|---|---|---|---|---|---|------------|--|
|            | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 |            |  |
| Cost       | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Demand     |  |
| Cost       | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Profit     |  |
| Cost       | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mktg. Adv. |  |
| Cost       | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Access     |  |
| Cost       | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Image      |  |
| Demand     | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Profit     |  |
| Demand     | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mktg. Adv. |  |
| Demand     | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Access     |  |
| Demand     | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Image      |  |
| Profit     | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mktg. Adv. |  |
| Profit     | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Access     |  |
| Profit     | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Image      |  |
| Mktg. Adv. | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Access     |  |
| Mktg. Adv. | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Image      |  |
| Access     | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1                                     | 2 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Image      |  |

9. Please assume again that you are trying to decide whether to manufacture certified hardwood flooring. You are considering three alternatives:

- 1) Non-certified flooring (Non-Cert. Flrng.): Producing only non-certified hardwood flooring
- 2) Certified flooring (Cert. Flrng.): Producing only certified hardwood flooring
- 3) Both: Producing both certified and non-certified hardwood flooring

In the following tables these alternatives are listed in pairs under each factor. For each pair, please indicate which alternative you prefer, considering only the factor under which it is listed.

For example, please consider again the couple buying the car. The first factor they are considering is *price*. When answering this question the couple would say, "When considering only *price*, the Ford is moderately preferred over the Chevy." They would indicate their level of preference as follows:

Factor: PRICE

|      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |       |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|
| Ford | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Chevy |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|

|                  |  |   |   |   |   |   |   |   |  |   |   |   |   |   |   |   |   |              |
|------------------|--|---|---|---|---|---|---|---|--|---|---|---|---|---|---|---|---|--------------|
|                  | <i>This alternative is extremely preferred over the opposite alternative</i> |   |   |   | <i>The two alternatives are equally preferred</i> |   |   |   | <i>This alternative is extremely preferred over the opposite alternative</i> |   |   |   |   |   |   |   |   |              |
| Factor: COST     | ↓  |   |   |   | ↓   |   |   |   | ↓  |   |   |   |   |   |   |   |   |              |
| Non-Cert. Flrng. | 9  | 8 | 7 | 6 | 5   | 4 | 3 | 2 | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Cert. Flrng. |
| Non-Cert. Flrng. | 9  | 8 | 7 | 6 | 5   | 4 | 3 | 2 | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |
| Cert. Flrng.     | 9  | 8 | 7 | 6 | 5   | 4 | 3 | 2 | 1  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |

Factor: DEMAND

|                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |
|------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Cert. Flrng. |
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |
| Cert. Flrng.     | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |

Factor: PROFIT

|                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |
|------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Cert. Flrng. |
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |
| Cert. Flrng.     | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |

Factor: MARKETING ADVANTAGES

|                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |
|------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Cert. Flrng. |
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |
| Cert. Flrng.     | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |

Factor: ACCESS

|                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |
|------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Cert. Flrng. |
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |
| Cert. Flrng.     | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |

Factor: IMAGE

|                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |
|------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Cert. Flrng. |
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |
| Cert. Flrng.     | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |

**SECTION III**

10. On average, how many people were employed in your company's hardwood flooring operations during 1997? (Please include production, maintenance, management, and sales employees.)

\_\_\_\_\_ part-time employees  
 \_\_\_\_\_ full-time employees

11. What was the total amount of hardwood flooring produced by your company in 1997?

\_\_\_\_\_ board feet of hardwood flooring

12. What percentage of your company's total hardwood flooring production in 1997 consisted of each of the following species?

| <u>Species</u> | <u>Percentage of Total 1997 Flooring Production</u> |
|----------------|---|
| Red Oak        | _____ %   |
| White Oak      | _____ %   |
| Hard Maple     | _____ %   |
| Beech          | _____ %   |
| Birch          | _____ %   |
| Hickory/Pecan  | _____ %   |
| Other _____    | _____ %   |
| <b>TOTAL:</b>  | <b>100 %</b>  |

13. What percentage of your company's total hardwood flooring production in 1997 consisted of each of the following products?

| <u>Flooring Product</u>                             | <u>Percentage of Total 1997 Flooring Production</u> |
|---|---|
| Finished and Unfinished Tongue & Groove Solid Strip | _____ %   |
| Plank   | _____ %   |
| Parquet   | _____ %   |
| Block   | _____ %   |
| Finished and Unfinished Square-Edged Solid Strip    | _____ %   |
| Laminated   | _____ %   |
| Other _____   | _____ %   |
| <b>TOTAL:</b>                                       | <b>100 %</b>  |





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ATTN: CURT ALT  
PO BOX 850  
BLACKSBURG VA 24063-9985



-----  
Please fold along the dotted line

Please return the questionnaire after folding along the dotted line and taping the ends together (please **DO NOT STAPLE**). Before mailing, please make sure that the return address is visible. **Postage is prepaid.**

THANK YOU!



VIRGINIA POLYTECHNIC INSTITUTE  
AND STATE UNIVERSITY

CENTER FOR FOREST PRODUCTS  
MARKETING AND MANAGEMENT

Department of Wood Science and Forest Products  
1650 Ramble Rd., mail code 0503  
Blacksburg, Virginia 24061  
Phone: (540) 231-5876 Fax: (540) 231-8868  
ctrfpmjo@vt.edu <http://vtwood.forprod.vt.edu/>

May 6, 1998

Name  
Address  
City, State

Salutation:

For the past couple of years, debate has raged throughout the forest products industry over the usefulness and necessity of third-party timber certification. Third-party timber certification is the certification and labeling of forest products from sustainably managed forests by independent organizations such as SmartWood and SCS. Proponents of this issue have declared that timber certification is necessary to ensure the long-term health of the country's forest resource, while opponents have countered by saying that certification is both unnecessary and inappropriate.

Many people have asked consumers how they feel about this issue, and the certification organizations have often voiced their opinions. However, the forest products manufacturers themselves have rarely been given the chance to voice how they feel about timber certification. **That is why I am writing to ask for your help today.** The enclosed questionnaire asks you for your thoughts and opinions about timber certification. By completing the questionnaire, you will finally be able to voice your opinion about the usefulness and necessity of certification.

The questionnaire is split into three sections. Section 1 contains general questions about your thoughts and opinions on timber certification. Section 2 contains questions relating to the decision process that a manufacturer might go through when deciding whether to produce certified flooring. Section 3 contains some general questions about your company. Although the questions in Section 2 may appear complex, I'm sure that you will find them quite easy to answer.

Because only a small number of manufacturers are being contacted in this study, **your response is essential** to the success of this study and the completion of my graduate degree here at Virginia Tech. I can assure your complete confidentiality. Each questionnaire has been marked with an identification number that will allow me to track the surveys without connecting them with any individual names or companies. In addition, no individuals or companies will be mentioned in the study results.

I would be happy to provide you with a summary of the research results if you would like them. To obtain a copy, please attach your business card or write your address in the comments section on the last page of the survey. I would also be more than happy to answer any questions that you may have about this study. Please feel free to call me at (540) 231-5876 or fax me at (540) 231-8868.

Once again, thank you very much for your help with this study.

Sincerely,

Curt Alt  
Doctoral Candidate

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

Non-certified Manufacturer Questionnaire Cover Letter



VIRGINIA POLYTECHNIC INSTITUTE  
AND STATE UNIVERSITY

CENTER FOR FOREST PRODUCTS  
MARKETING AND MANAGEMENT

Department of Wood Science and Forest Products  
1650 Ramble Rd., mail code 0503  
Blacksburg, Virginia 24061  
Phone: (540) 231-5876 Fax: (540) 231-8868  
ctrfpmjo@vt.edu <http://vtwood.forprod.vt.edu/>

June 8, 1998

Name  
Address  
City, State

Salutation:

**Please help!** Recently, I sent you a questionnaire concerning your thoughts and opinions about the state of timber certification here in the U.S. As of today, I have not received your completed questionnaire. Therefore, I am writing to urge you to complete the questionnaire and return it to me soon. It will only take you a couple of minutes.

Because only a small number of flooring manufacturers are being contacted in this study, **your response is essential** to the success of this study and the completion of my graduate degree here at Virginia Tech. I can assure your complete confidentiality. Each questionnaire has been marked with an identification number that will allow me to track the surveys without connecting them with any individual names or companies. In addition, no individuals or companies will be mentioned in the study results.

Another questionnaire is enclosed in case the original has been misplaced. I would be happy to provide you with a summary of the research results if you would like them. To obtain a copy, please attach your business card or write your address in the comments section on the last page of the survey. I would also be more than happy to answer any questions that you may have about this study. Please feel free to call me at (540) 231-5876 or fax me at (540) 231-8868.

Your help with this study is greatly appreciated.

Sincerely,

Curt Alt  
Doctoral Candidate

P.S. If you have recently completed and mailed the original questionnaire please ignore this letter.

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Non-certified Manufacturer Questionnaire Second Letter

**Appendix B — Certified Manufacturer Questionnaire**

## The Impact of Timber Certification on U.S. Hardwood Flooring Manufacturers

### Written Questionnaire

**Thank you very much** for agreeing to help me with my research. This questionnaire includes questions regarding your thoughts and opinions on certification. Please complete it and fax it back to me at (540) 231-8868. I can assure you that all answers will be held in the strictest confidence and that no individual or company names will be used anywhere in the research results. Please do not hesitate to call me at (540) 231-5876 or email me at calt@vt.edu with any questions or concerns you may have.

1. **How much trust does your company have in the ability of the following entities to regulate the environmental certification claims of wood products manufacturers?**  
*(Please rank the following entities from 1 to 5 using each number only once.)*

**1 = I trust this entity the MOST to 5 = I trust this entity the LEAST**

- \_\_\_ A private third-party certification company
- \_\_\_ An agency of the Federal Government
- \_\_\_ Wood products companies themselves
- \_\_\_ An environmental organization
- \_\_\_ Wood products industry trade associations

**2. Do you agree or disagree with the following statements?** (Please indicate your level of agreement or disagreement by circling the **single** most appropriate number after each statement.)

| <i>My company ...</i>   | <b>Strongly disagree</b> |   | <b>Neither agree nor disagree</b> |   | <b>Strongly agree</b> |
|---|--------------------------|---|-----------------------------------|---|-----------------------|
| ... has an environmental policy   | 1                        | 2 | 3                                 | 4 | 5                     |
| ... understands the concept of environmental certification  | 1                        | 2 | 3                                 | 4 | 5                     |
| ... is actively following the status of environmental certification in the US                                 | 1                        | 2 | 3                                 | 4 | 5                     |
| ... believes there is a need for environmental certification of US temperate forests                          | 1                        | 2 | 3                                 | 4 | 5                     |
| ... believes environmental certification can help sustain the health of US forests                            | 1                        | 2 | 3                                 | 4 | 5                     |
| ... has purchased environmentally certified wood products or raw materials in the past year                   | 1                        | 2 | 3                                 | 4 | 5                     |
| ... seeks suppliers of environmentally certified wood products or raw materials                               | 1                        | 2 | 3                                 | 4 | 5                     |
| ... would pay more for certified wood products or raw materials   | 1                        | 2 | 3                                 | 4 | 5                     |
| ... trusts environmental claims made by wood suppliers  | 1                        | 2 | 3                                 | 4 | 5                     |
| ... feels pressure from our customers to produce an environmentally certified product                         | 1                        | 2 | 3                                 | 4 | 5                     |
| ... feels pressure from outside groups (other than customers) to produce an environmentally certified product | 1                        | 2 | 3                                 | 4 | 5                     |
| ... believes our customers will pay a premium for an environmentally certified product                        | 1                        | 2 | 3                                 | 4 | 5                     |
| ... understands the costs involved in certification   | 1                        | 2 | 3                                 | 4 | 5                     |

## SECTION II

The following question asks you to make comparisons among six different factors related to certification. When answering, *please consider your firm's decision to begin manufacturing certified hardwood flooring.*

The six factors we are asking you to consider are:

**Cost**

The total monetary cost to your company for the initial chain-of-custody certification inspection, any improvements that must be made to become certified, and annual re-certification.

**Demand**

The demand for certified hardwood flooring in the markets that your firm currently serves.

**Profit**

The estimated long-term profit potential of certified hardwood flooring.

**Marketing Advantages (Mktg. Adv.)**

Any marketing or competitive advantages in current markets that your firm may realize as a result of undergoing the certification process and manufacturing certified hardwood flooring.

**Access**

Any new markets that may become accessible to your firm as a result of manufacturing certified hardwood flooring.

**Image**

Any positive publicity or image enhancement effects that your firm might receive as a result of manufacturing certified hardwood flooring.

When answering the following question, please assume that you have gathered all necessary information regarding each of the factors. Therefore, you should rate each of the factors on its *perceived importance* to the decision and *not* on which of the factors are most familiar to you.

3. In each of the following pairs of factors, which factor was the most important to you when deciding whether or not to manufacture certified hardwood flooring?  
 (Please indicate your level of preference for the more important factor by selecting a value from that factor's scale.)

For example, a couple is buying a new car. Two of the factors they are considering in their decision are the *price* and *size* of different cars. If the couple decided that the *price* of a car was **very strongly** more important than the *size* of a car, they would indicate their level of preference in the following manner:

|      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |          |   |   |       |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------|---|---|-------|
| Size | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | <b>7</b> | 8 | 9 | Price |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----------|---|---|-------|

|  |   |  |                            |
|--|---|--|----------------------------|
| This factor was <b>extremely</b> more important<br>than the opposite factor<br>↓ | The two factors were<br><b>equally</b> important<br>↓ | This factor was <b>extremely</b> more important<br>than the opposite factor<br>↓ |                            |
| Cost   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Demand     |
| Cost   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Profit     |
| Cost   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Mktg. Adv. |
| Cost   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Access     |
| Cost   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Image      |
| Demand   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Profit     |
| Demand   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Mktg. Adv. |
| Demand   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Access     |
| Demand   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Image      |
| Profit   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Mktg. Adv. |
| Profit   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Access     |
| Profit   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Image      |
| Mktg. Adv.   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Access     |
| Mktg. Adv.   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Image      |
| Access   | 9 8 7 6 5 4 3 2                                       | 1  | 2 3 4 5 6 7 8 9 Image      |

4. Please refer again to your firm's decision to produce certified hardwood flooring. Please assume that you are considering three alternatives:

- 1) **Non-certified flooring (Non-Cert. Flrng.):** Producing only non-certified hardwood flooring
- 2) **Certified flooring (Cert. Flrng.):** Producing only certified hardwood flooring
- 3) **Both:** Producing both certified and non-certified hardwood flooring

In the following tables these alternatives are listed in pairs under each factor. For each pair, please indicate which alternative you prefer, considering **only** the factor under which it is listed.

For example, please consider again the couple buying the car. The first factor they are considering is *price*. When answering this question the couple would say, "When considering only *price*, the Ford is **moderately** preferred over the Chevy." They would indicate their level of preference as follows:

Factor: **PRICE**

|      |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |       |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|
| Ford | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Chevy |
|------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|

|                     |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |  |  |  |  |  |  |  |  |  |
|---------------------|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|--|--|--|--|--|--|--|--|--|
|                     | <i>This alternative is extremely preferred over the opposite alternative</i> |   |   |   |   |   |   |   |   | <i>The two alternatives are equally preferred</i> |   |   |   |   |   |   |   |              | <i>This alternative is extremely preferred over the opposite alternative</i> |  |  |  |  |  |  |  |  |
| Factor: <b>COST</b> | ↓  |   |   |   |   |   |   |   |   | ↓   |   |   |   |   |   |   |   |              | ↓  |  |  |  |  |  |  |  |  |
| Non-Cert. Flrng.    | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2   | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Cert. Flrng. |  |  |  |  |  |  |  |  |  |
| Non-Cert. Flrng.    | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2   | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |  |  |  |  |  |  |  |  |  |
| Cert. Flrng.        | 9  | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2   | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |  |  |  |  |  |  |  |  |  |

Factor: **DEMAND**

|                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |
|------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Cert. Flrng. |
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |
| Cert. Flrng.     | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |

Factor: **PROFIT**

|                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |
|------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Cert. Flrng. |
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |
| Cert. Flrng.     | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |

Factor: **MARKETING ADVANTAGES**

|                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |
|------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Cert. Flrng. |
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |
| Cert. Flrng.     | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |

Factor: **ACCESS**

|                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |
|------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Cert. Flrng. |
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |
| Cert. Flrng.     | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |

Factor: **IMAGE**

|                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |              |
|------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Cert. Flrng. |
| Non-Cert. Flrng. | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |
| Cert. Flrng.     | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Both         |

**SECTION III**

5. **On average, how many people were employed in your company's hardwood flooring operations during 1997?** *(Please include production, maintenance, management, and sales employees.)*

\_\_\_\_\_ part-time employees  
 \_\_\_\_\_ full-time employees

6. **What was the total amount of hardwood flooring produced by your company in 1997?**

\_\_\_\_\_ board feet of hardwood flooring

7. **What percentage of your company's total hardwood flooring production in 1997 consisted of each of the following species?**

| <u>Species</u> | <u>Percentage of Total 1997 Flooring Production</u> |
|----------------|---|
| Red Oak        | _____ %   |
| White Oak      | _____ %   |
| Hard Maple     | _____ %   |
| Beech          | _____ %   |
| Birch          | _____ %   |
| Hickory/Pecan  | _____ %   |
| Other _____    | _____ %   |
| <b>TOTAL:</b>  | <b>100 %</b>  |

8. **What percentage of your company's total hardwood flooring production in 1997 was certified for each of the following species?**

| <u>Species</u> | <u>Certified Percentage of Total 1997 Flooring Production</u> |
|----------------|---|
| Red Oak        | _____ %   |
| White Oak      | _____ %   |
| Hard Maple     | _____ %   |
| Beech          | _____ %   |
| Birch          | _____ %   |
| Hickory/Pecan  | _____ %   |
| Other _____    | _____ %   |
| <b>TOTAL:</b>  | <b>100 %</b>  |

9. What percentage of your company's total hardwood flooring production in 1997 was certified for each of the following products?

| <u>Flooring Product</u>                             | <u>Certified Percentage of Total 1997 Flooring Production</u> |
|---|---|
| Finished and Unfinished Tongue & Groove Solid Strip | _____ %   |
| Plank   | _____ %   |
| Parquet   | _____ %   |
| Block   | _____ %   |
| Finished and Unfinished Square-Edged Solid Strip    | _____ %   |
| Laminated   | _____ %   |
| Other _____   | _____ %   |
| <b>TOTAL:</b>                                       | <b>100 %</b>  |

10. What were the total gross flooring sales for your company in 1997? (Please select the appropriate range from the following choices. All data are held in strictest confidence.)

- |  |  |  |
|--|--|--|
| <input type="checkbox"/> less than \$100,000   | <input type="checkbox"/> \$500,000 - \$999,999     | <input type="checkbox"/> \$10,000,000 - \$49,999,999 |
| <input type="checkbox"/> \$100,000 - \$249,999 | <input type="checkbox"/> \$1,000,000 - \$4,999,999 | <input type="checkbox"/> \$50,000,000 - \$99,999,999 |
| <input type="checkbox"/> \$250,000 - \$499,999 | <input type="checkbox"/> \$5,000,000 - \$9,999,999 | <input type="checkbox"/> greater than \$100,000,000  |

11. How many days did your company operate in 1997?

\_\_\_\_\_ days

12. On average, how many hours per day did your company operate in 1997?

\_\_\_\_\_ average hours per day

**Comments:** (Please use the space below to comment on this study, certification, or the hardwood flooring industry)

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## Appendix C — Discussion of Statistical Procedures

This work involved the comparison of two populations: manufacturers of certified hardwood flooring and manufacturers of non-certified hardwood flooring. Those populations were compared on a number of items, ranging from their views of environmental certification to the importance they place upon the decision factors when deciding whether or not to produce certified flooring.

The research hypothesis in all cases was that the two populations would not differ in their responses to the survey questions (i.e.  $H_0: \mu_1 - \mu_2 = 0$ ). Parametric hypothesis testing procedures were conducted to determine whether there actually was a statistical difference between the two populations (i.e.  $H_a: \mu_1 - \mu_2 \neq 0$ ).

As an initial analysis step, an ANOVA test was conducted on the responses to determine if there were statistical differences in each population's responses. That test was conducted at the 0.05 significance level. After it was determined that there were statistical differences in each population's response, a Tukey's HSD test was conducted to group the results. That test was conducted at the 0.05 significance level as well. Finally, t-tests were conducted to test the research hypothesis that the responses given by the two populations did not differ significantly. Those t-tests were also conducted at the 0.05 significance level.

# VITA

## **Curt Mathias Alt**

Curt Alt was born in Des Moines, IA on March 25, 1972 and grew up in Ames, IA. He earned his B.A. in Economics from the University of Virginia in 1994 and his MBA from the Pamplin School of Business at Virginia Tech in 1998. Curt continued his graduate work by studying forest products marketing at Virginia Tech, where he worked under the USDA National Needs Fellowship. Curt's interest in forest products grew from the years he spent wandering the woods with his grandfather on his grandparent's farm in Eastern Minnesota.